Downtown San Rafael to Larkspur Extension Environmental Assessment

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SUMMARY

PROJECT OVERVIEW

The Proposed Action that is evaluated in this Environmental Assessment (EA) is the extension of passenger rail service from Downtown San Rafael southwards to Larkspur, in Marin County, California. The rail extension would be approximately two miles in length. The project proponent is the Sonoma-Marin Area Rail Transit (SMART) District. SMART is currently constructing the locally-funded SMART project, which will eventually operate approximately 43 miles of passenger rail service from Downtown San Rafael northwards to Airport Boulevard in Santa Rosa, Sonoma County, California. The Proposed Action would utilize federal funds to extend SMART's locally-funded project approximately two miles southwards from Downtown San Rafael to Larkspur.

The entire SMART project, from Cloverdale to Larkspur, was reviewed in 2005 under the California Environmental Quality Act (CEQA), in an Environmental Impact Report (EIR). A Supplemental EIR that assessed specified changes to the original EIR was prepared and certified in 2008. Because federal funds were not expected to be used for any portion of the SMART system, clearance under the National Environmental Policy Act (NEPA) was not undertaken. SMART has since elected to apply for federal funds from the FTA to construct the Downtown San Rafael to Larkspur Extension.

Accordingly, this EA assesses the social, economic, and environmental effects of the Downtown San Rafael to Larkspur project (the Proposed Action) pursuant to NEPA. NEPA documentation is necessary whenever federal action or funding approval is sought. For the Proposed Action, funding is being sought from the Federal Transit Administration (FTA), and FTA is the federal lead agency. A summary description of the Proposed Action is presented below. For a full description of the Proposed Action, see Chapter 2, Alternatives.

ALTERNATIVES EVALUATED IN THIS ENVIRONMENTAL ASSESSMENT

This EA assesses two alternatives for the extension of SMART passenger rail service from Downtown San Rafael to Larkspur:

Alternative 1 – No Action

The No Action Alternative represents the future conditions of transportation facilities and services in 2040 in the corridor if the Proposed Action were not built. The No Action Alternative includes the existing highway network and transit service for which funding sources have been identified, and have been included in the constrained long range plan for implementation by 2040. At this time, adequate local funds are not available to construct and operate an extension of SMART service from Downtown San Rafael to Larkspur. While it is possible that local funding could become available at some point in the future, it is currently unknown when and if that would occur. As such, the ultimate buildout of the extension is unknown, and the assumption that the extension would, in fact, be constructed and become operational cannot be made. Under the No Action Alternative, the project corridor would remain in its current state, and no construction would occur.

Alternative 2 – Downtown San Rafael to Larkspur Extension (Proposed Action)

The Proposed Action would construct approximately 2 miles of passenger rail service from the SMART Downtown San Rafael Station (currently under construction) to the SMART Larkspur Station, planned as part of

the Proposed Action. The Downtown San Rafael Station is to serve as the southern terminus of the locally-funded SMART project Initial Operating Segment (IOS), which runs approximately 43 miles from Airport Boulevard just north of Santa Rosa to Downtown San Rafael. The IOS began construction in 2012, and it is expected to be operational in 2016. The Proposed Action would extend passenger rail service southward from the locally-funded SMART project IOS terminus at Downtown San Rafael to Larkspur.

As with the locally-funded SMART project, the Proposed Action would use the existing Northwestern Pacific (NWP) Railroad rail corridor, which has been acquired by SMART. The NWP Railroad historically provided freight and limited passenger rail service from Marin County to points northward. The stretch of the rail corridor proposed for use under the Proposed Action still is in place, but it has been non-operational for several decades. The right-of-way (ROW) remains intact and thus would require only limited improvements to be converted from its existing condition as an inactive freight railway to use as an active passenger railway. Acquisition of additional ROW would not be required to construct and operate the extension.

Proposed Improvements and Principal Project Components

The Proposed Action would require railway improvements, including trackwork, crossing improvements, trestle rehabilitation or replacement, and signal upgrading. Principal components are listed below. A full description of these and other project components can be found in Chapter 2, Alternatives.

Trackwork. Trackwork would include installing ballast, ties, rail, and other track material, including tie plates, spikes or fasteners, and rail anchors. All existing and inoperable NWP Railroad trackwork would be re-laid as part of the Proposed Action, with excavation of the existing track bed typically not to exceed the depth of the existing ties.

Trestle Bridges. Three wooden trestles are in place along the Proposed Action alignment. These trestles were installed as part of the former NWP Railroad operation and have been out of use for several decades.

- San Rafael Creek Trestle – The existing trestle at San Rafael Creek is in poor condition and would require complete replacement. In addition, the alignment would be shifted slightly downstream along this segment, and the existing trestle is partially outside the planned alignment. Furthermore, because double tracking is proposed along this portion of the alignment, a second trestle would need to be installed at this location.
- Unnamed Channel Trestle - The second trestle crosses an unnamed channel between Rice Drive and Andersen Drive. The trestle is in poor condition and would require replacement.
- Woodland Avenue/Bellam Boulevard Trestle – The trestle that crosses Woodland Avenue/Bellam Boulevard was constructed in the 1920s and lacks sufficient vertical and horizontal clearance to accommodate modern traffic. To remedy this condition, a new trestle of modern design would be required.

West Francisco Boulevard Partial Realignment. As currently configured, the existing rail alignment crosses West Francisco Boulevard at grade immediately south of the San Rafael Creek crossing. The alignment then crosses at grade over two additional roadways (Irwin Street and Rice Drive) further down the alignment. As part of the Proposed Action, the existing locations of West Francisco Boulevard and the railroad alignment would be "flipped" between the San Rafael Creek crossing and Rice Drive. Doing this would eliminate two at-grade crossings at West Francisco Boulevard and Irwin Drive, providing more efficient and safe rail operations, and also would eliminate disruptions to local traffic during train movement through the area. The total length of West

Francisco Boulevard that would be "flipped" would be approximately 1,800 feet and would run approximately from just south of Second Street to Rice Drive.

At-Grade Road Crossings. The existing alignment between Downtown San Rafael and Larkspur includes six public at-grade roadway crossings. From north to south, these are: 1) Third Street; 2) Second Street; 3) West Francisco Boulevard; 4) Irwin Street; 5) Rice Drive; and 6) Andersen Drive. Two of these crossings would be eliminated with the aforementioned "flip" of West Francisco Boulevard between Second Street and Rice Drive. Vehicular traffic at the remaining at-grade crossings would be controlled by bells, flashing beacons, and gates. Roadway surfaces at each crossing would be upgraded. All at-grade crossings would be designed and approved, in compliance with California Public Utilities Commission (CPUC) requirements.

Cal Park Hill Tunnel. The Cal Park Hill Tunnel was originally constructed to facilitate NWP Railroad operations but was closed for several decades following the cessation of rail operations in the area. The tunnel was reopened and rehabilitated in 2010 to accommodate a multi-use pathway and future SMART rail service. The tunnel was divided lengthwise by a concrete partition, with one side occupied by the pathway and the other side containing the future SMART railbed. With the exception of track installation, the tunnel essentially is ready for rail operations and would require minimal improvements to be prepared for that purpose. After the rails were installed, the tunnel would provide SMART rail use and the multi-use pathway, with the two uses separated by the aforementioned concrete partition.

Larkspur Station. The proposed Larkspur Station would have boarding platforms that would extend the full length of the passenger boarding area, permitting level boarding to accessible cars of all trains stopping at the station. The station would be equipped with a shelter, lighting, and other amenities such as signage, schedules, bike lockers, leaning bars, information kiosks, and ticket vending machines. Adequate space for bus, van and shuttle, and taxicab and passenger vehicle drop-off also would be provided. A tailtrack would extend beyond the platform to provide storage for rail vehicles. Following the morning commute period, vehicles would be stored on the tailtracks and staged for later use during the evening commute period. Beyond the tailtrack, a parking area would be provided with approximately 70 parking spaces.

Operation

Once operational, trains are expected to operate every 30 minutes in both directions during peak periods. Because the trains would be relatively short, they would be able to clear intersections relatively quickly, resulting in less traffic disruption on surface streets. A two-car train moving at 15 miles per hour would be expected to clear a six-lane intersection in approximately 11 seconds. With crossing gate movement delays before and after each crossing, street blockage at crossings would be expected to total approximately 35 seconds. The exception to this would be at Andersen Drive, where the long, acute angle of the crossing and the necessary times to ensure clearance of the intersection could require closures for as long as 2 minutes. To further improve traffic flow, the rail crossing signal system would be integrated with local, centralized traffic signal operations, which would electronically coordinate traffic lights with grade-crossing signals. This system would minimize delays, pre-empt conflicting traffic movements, provide progression (ongoing flow) of non-conflicting traffic movements, and allow faster recovery of the traffic signal system after a train passed.

Per federal regulations, SMART's train operators would be required to sound their horns at each of the four at-grade crossings. Per the regulation, the maximum volume level for the train horn would be 110 decibels, with the minimum volume level being 96 decibels.

All four of the at-grade crossings are located in the City of San Rafael. All SMART at-grade crossings are designed to be "Quiet Zone Ready," meaning that they contain the required gates, signals, and other infrastructure required for Quiet Zone approval by the Federal Railroad Administration (FRA). The City is exploring the possibility of applying for an exemption to the horn requirement under FRA's Quiet Zone Establishment Process. At the time of this writing, however, it cannot be determined whether the City will apply for the exemption. Regardless, even if the City were to apply, it cannot be predicted with certainty that FRA would grant the exemption. Therefore, as part of the Proposed Action, the rule presumably still would apply, and SMART trains would be required to sound their horns at each crossing. Options to lessen the effects of train horn noise are discussed in Section 3.10, Noise and Vibration, of this EA.

Proposed Action Construction Cost

The Downtown San Rafael to Larkspur Extension is expected to have an estimated cost of approximately $40,170,000, as shown in the Table S-1.

Table S-1: SMART Downtown San Rafael to Larkspur Extension Estimated Costs (2014 dollars)

Project Component	Cost Estimate
Guideway and Track Elements	12,310,025
Larkspur Station	3,250,000
Sitework and Special Conditions	7,185,525
Systems and Signals	8,362,900
Professional Services	9,061,650
Total Estimated Project Costs	**$40,170,000**

Expenditure of funds during the construction period is shown in Table S-2

Table S-2: Costs in Year of Expenditures

Cost (2014 Dollars)	Year 1 Expenditure	Year 2 Expenditure	Year 3 Expenditure	Total Cost (YOE)
40,170,000	1,000,000	29,579,000	11,954,000	42,533,000
Inflation Assumption	*0.0%*	*5.0%*	*3.5%*	

Funding for the Proposed Action would derive from a number of sources, as shown in the Table S-3.

Table S-3: Proposed SMART Downtown San Rafael to Larkspur Extension Funding Sources

Funding Source	Amount (millions)
Local/Regional	20,000,000
FTA New Starts/Small Starts	22,533,000
Total	**$42,533,000**

ENVIRONMENTAL ANALYSIS

Topics Analyzed

This EA evaluates a full range of impacts to the social, economic, and environmental consequences of the Proposed Action with respect to 14 environmental topic areas. Table S-3 summarizes the environmental topic areas and associated regions of influence described in this EA. The area, or region of influence, is defined for each environmental topic based on the extent of physical resources that may be affected directly or indirectly by the Proposed Action, applying appropriate guidelines of regulatory agencies or common professional practice.

Effects are analyzed and the findings are included in this EA, applying the following levels of significance:

- Adverse Effect
- No Adverse Effect with Mitigation
- No Adverse Effect
- No Effect
- Beneficial Effect

The results of the analysis contained in the EA is summarized below in Table S-4. Applicable mitigation measures from SMART's 2005 EIR to which SMART has already committed and that would apply to the Proposed Action have also been prescribed in the EA as applicable.

Table S-3: Environmental Issues and Region of Influence for the Proposed Action

Environmental Issue	Region of Influence
Air Quality	San Francisco Bay Area Air Basin
Biological Resources	Project sites and contiguous fish and wildlife habitats
Cultural Resources	Project sites
Energy	Project sites and San Francisco Bay Area
Geology and Soils	Project sites and San Francisco Bay Area
Greenhouse Gas Emissions	Global
Hydrology and Water Quality	Project sites and associated subbasins
Land Use	Project sites and adjacent land uses
Noise and Vibration	Project sites and traffic study areas
Safety and Security	Project sites and contiguous communities
Socioeconomics and Environmental Justice	Communities contiguous with the project sites and San Francisco Bay Area
Solid and Hazardous Materials	Project sites and surrounding areas
Transportation	Cities of San Rafael and Larkspur in the vicinity of the project sites
Visual Resources	Project sites and viewsheds to/from the project sites

This EA will be available for public review. Following the public review period, FTA will review and consider the comments received on the EA and determine whether adverse effects are likely to result from the Proposed Action. If the FTA determines that no adverse effects would occur, then FTA would issue a Finding of No Significant Impact.

Table S-4. Alternative Table

Resource Area	Alternative 1 (No Action)	Alternative 2 SMART Downtown San Rafael to Larkspur Extension (Proposed Action)
Air Quality (see EA Section 3.1 for more information)		
Criteria Pollutants	No adverse effect	No adverse effect
Toxic Air Contaminants	No adverse effect	No adverse effect
Odors	No adverse effect	No adverse effect
Biological Resources (see EA Section 3.2 for more information)		
Sensitive Plant and Wildlife Species – Terrestrial	No adverse effect	No adverse effect
Sensitive Fish Species and Habitats	No adverse effect	No adverse effect with implementation of applicable mitigation measures: <u>General Avoidance and Minimization Measures</u> 1) Prior to any onsite construction activities, a review of all required permits and notifications would be performed to ensure requirements for environmental compliance are fully understood, specific limits of activities and work are defined and understood, and all environmental clearances and access, encroachment agreements, and permissions have been obtained from the appropriate agencies and parties. 2) Prior to any construction activities, a job briefing would be held each day to discuss daily activities. 3) A biological monitor approved by NMFS would be onsite during all construction activities. The biological monitor would be approved prior to work. Biological monitors would be notified in advance of all work activities and locations and scheduled to be onsite as required during all ground disturbing activities. 4) A worker awareness program would be presented to all construction personnel before they start work on the proposed project. The program would summarize relevant laws and regulations that protect biological resources, and discuss sensitive habitats and listed species, the role of biological monitors, and applicable avoidance measures to protect listed species and habitats. 5) All work would occur during normal daylight working hours. 6) Access routes and work areas would be limited to the minimum amount necessary to achieve the project goals. Unpaved routes and boundaries would be clearly marked prior to initiating construction. 7) All food and food-related trash items would be enclosed in sealed trash containers and removed daily from the project site.

Resource Area	Alternative 1 (No Action)	Alternative 2 SMART Downtown San Rafael to Larkspur Extension (Proposed Action)
		8) Pets would not be allowed on the project site. 9) Standard best management practices (BMPs) would be applied to protect species and their habitat(s) from pollution due to fuels, oils, lubricants, and other harmful materials. Vehicles and equipment used during the course of the project would be fueled and serviced in a manner that would not affect federally protected species in the Action Area or their habitats. 10) Well-maintained equipment would be used to perform the work, and except in the case of a failure or breakdown, equipment maintenance would be performed off site. Equipment would be inspected daily by the operator for leaks or spills. If leaks or spills are encountered, the source of the leak would be identified, leaked material would be cleaned up, and the cleaning materials would be collected and properly disposed. 11) A Spill Prevention Control and Countermeasure (SPCC) Plan would be prepared to address the emergency cleanup of any hazardous material, and would be available on site. The SPCC plan would incorporate SPCC, hazardous waste, stormwater, and other emergency planning requirements. Fueling of equipment would be conducted in accordance with procedures to be developed in the SPCC. 12) All construction materials, wastes, debris, sediment, rubbish, trash, fencing, etc., would be removed from the site once project construction is complete, and transported to an authorized disposal area, as appropriate, in compliance with applicable federal, state, and local laws and regulations. 13) Hazardous materials such as fuels and lubricants would be stored in sealable containers in a designated location at least 200 feet from any aquatic habitat. 14) The number of access routes, size of staging areas, and the total area of the activity would be limited to the minimum necessary to achieve project goals. Project limits would be established and defined with physical markers to define access routes and maintenance areas to the minimum area necessary to complete the project; this includes locating access routes and maintenance areas outside of drainages and creeks. Construction access, staging, storage, and parking areas would be located on ruderal or developed lands to the extent possible. Vehicle travel adjacent to wetlands and riparian areas would be limited to existing roads and designated access paths. Sensitive natural communities (i.e. wetlands, watercourses, riparian zones, and oak woodlands) would be conspicuously marked in the field to minimize impacts on those communities, and work would be limited to outside the marked areas. 15) Best Management Practices (BMPs) as required by the Regional Water Quality Control Board would be implemented to effectively manage runoff and sediment from construction activities. 16) Only tightly woven fiber netting or similar material may be used for erosion control.

Resource Area	Alternative 1 (No Action)	Alternative 2 SMART Downtown San Rafael to Larkspur Extension (Proposed Action)
		No plastic mono-filament matting would be used for erosion control, as this material may ensnare wildlife. 17) Netting or suspended debris racks will be used during demolition and removal of the existing trestle structures to minimize the amount of debris falling into water bodies. 18) Temporarily disturbed areas, such as staging areas, would be returned to original contours to the extent feasible upon completion of the project. A project re-vegetation plan would be developed and implemented following the conclusion of construction activities. 19) During construction activities, the following measures would be implemented to the extent feasible to reduce the spread of exotic invasive plants in temporary work areas and throughout the project corridor: • Minimize vehicle travel through weed-infested areas. • Minimize soil disturbance and the removal of existing vegetation (exotic or native) to the extent feasible during construction activities. • Use only certified weed-free straw and mulch or weed-free fiber roll barriers or sediment logs. • Use only seed mixes and plantings that are native or naturalized to the North Bay region and are appropriate to the pre-existing or adjacent natural habitat for re-vegetation. 1) To prevent introduction and/or transport of aquatic invasive species into or from creeks, sloughs, or other wetted channels in the Action Area, any equipment that comes into contact with the channel would be inspected and cleaned before and after contact according to the most current Inspection Standards and Cleaning and Decontamination Procedures (DiVittorio et al. 2012). 2) Areas temporarily impacted by construction would be revegetated within one year of impact. After construction is completed, the contractor would regrade (using machinery) or resurface (using hand tools) any areas where the construction work resulted in holes, depressions, or mounded hummocks, and would ensure that the soil surface has not been compacted. The disturbed surfaces would be seeded and allowed to passively revegetate without irrigation. The seed mix used in these areas would be the same or similar to the native erosion control seed mix applied to disturbed soils by other SMART projects in the vicinity and would consist of grasses native to the North Bay region, such as California brome (*Bromus carinatus*), blue wildrye (*Elymus glaucus*) and creeping wildrye (*Leymus triticoides*). <u>Green Sturgeon Avoidance and Minimization Measures</u> 1) In-water work would be restricted to low-flow periods between July 1 and November 30, unless otherwise specified by appropriate agencies. This window can be extended

Resource Area	Alternative 1 (No Action)	Alternative 2 SMART Downtown San Rafael to Larkspur Extension (Proposed Action)
		based on creek and river conditions, if approved in writing by NMFS. Work from the banks, trestle, falsework, and inside closed coffer dams can occur year-round. 2) A qualified biological monitor would be present during ground or water disturbing activities (e.g., ESA fence installation, vegetation clearing, trestle demolition, and trestle/bridge construction). Work would stop immediately if a listed or protected species was encountered and the appropriate agency or agencies notified (USFWS, NMFS, and/or California Department of Fish and Wildlife [CDFW]). Work would not resume at that location prior to the agencies' approval, or as agreed to in prior consultation with the agencies. 3) Cofferdams would only be used around each wooden trestle pile during removal activities. If dewatering is required, a qualified biologist would be present during the dewatering period to inspect and ensure that sensitive aquatic species would not be trapped within temporary cofferdams. If green sturgeon were found within the cofferdams a NMFS approved biologist would capture and relocate trapped fish to an appropriate area away from the Project Area. 4) At the completion of the project, SMART would remove all materials from the streambed used to construct and maintain cofferdams. 5) Construction activities would avoid submergent and emergent aquatic vegetation to the greatest extent possible. 6) Catchment tarps would be installed to ensure all construction debris is caught and removed daily from the work area prior to trestle demolition, decommissioning, or work activity within the river floodway embankments. 7) Pumps used for dewatering, if needed, would have agency-approved fish screens installed to minimize intake of fish into pumps. Diversion structures would be left in place until all in-water work was completed. Temporary culverts, construction materials, and debris would be removed from the affected area prior to reestablishing flow and prior to the rainy season.
Federally Listed Threatened and Endangered Species	No adverse effect	No adverse effect with implementation of applicable mitigation measures as outlined directly above.
Migratory Birds	No adverse effect	No adverse effect with implementation of applicable mitigation measures from the 2005 EIR: **Mitigation Measure BR 3a:** To the extent feasible, trees and shrubs in the construction zones will be trimmed or removed between September 1 and January 31, to reduce potential impacts on nesting birds. If vegetation must be removed during the period from February 1 to August 31, a qualified wildlife biologist will conduct pre-construction surveys for nesting birds. If an active nest is found, the bird will be identified to species, and the approximate distance from the closest work site to the nest will be estimated. No additional measures need be implemented if active nests are more than the following distances from the nearest work site: a) 300 feet for

Resource Area	Alternative 1 (No Action)	Alternative 2 SMART Downtown San Rafael to Larkspur Extension (Proposed Action)
		raptors; or b) 75 feet for other non-special-status bird species. If active nests are closer than those distances to the nearest work site and the potential exists for destruction of a nest or substantial disturbance to nesting birds because of construction activities, a plan to monitor nesting birds during construction will be prepared and submitted to the USFWS and California Department of Fish and Wildlife for review and approval. Disturbance of active nests will be avoided to the extent possible, until it is determined that nesting is complete and the young have fledged. **Mitigation Measure BR-3b:** If construction is likely to occur during the nesting season of cliff swallows (March 1 to July 31), bridges will be inspected periodically for swallow nests by a qualified biologist before the onset of bridge demolition and/or new bridge construction. Nests will be knocked down by the biologist before the demolition is one-third completed. Inspection of the bridges will begin in late February. Alternative methods to prevent cliff swallow nesting on a bridge may be used with prior approval by the California Department of Fish and Wildlife.
Wetlands and Jurisdictional Waters	No adverse effect	No adverse effect with implementation of applicable mitigation measures.
Cultural and Paleontological Resources (see EA Section 3.3 for more information)		
Archaeological Resources	No adverse effect	No adverse effect
Historic Resources	No adverse effect	No adverse effect
Paleontological Resources	No adverse effect	No adverse effect
Energy (see EA Section 3.4 for more information)		
Indirect Energy Consumption During Construction	No adverse effect	No adverse effect with implementation of applicable mitigation measures from the 2005 EIR: **Mitigation Measure E-1:** Implement energy conservation measures during construction such as: • Reducing idling of trucks delivering construction material; • Consolidating material delivery; and • Scheduling material delivery during off-peak hours, to allow trucks to travel without traffic and at fuel-efficient speeds (45 to 55 miles per hour).
Electricity Use During Operation	No adverse effect	No adverse effect with implementation of applicable mitigation measures from the 2005 EIR: **Mitigation Measure E-1:** Implement energy conservation measures during operation such as: • Using energy efficient measures at rail stations, such as solar panels.
Petroleum Use During Operation	No adverse effect	Beneficial effect

Resource Area	Alternative 1 (No Action)	Alternative 2 SMART Downtown San Rafael to Larkspur Extension (Proposed Action)
Geology and Soils (see EA Section 3.5 for more information)		
Erosion and Loss of Topsoil	No adverse effect	No adverse effect with implementation of applicable mitigation measures from the 2005 EIR (see Hydrology and Water Quality, below)
Alteration of Topography	No adverse effect	No adverse effect
Seismically Induced Ground Shaking and Associated Ground Failure	No adverse effect	No adverse effect with implementation of applicable mitigation measures from the 2005 EIR: **Mitigation Measure G-4:** A site-specific geotechnical investigation report will be prepared as part of final [Proposed Action] design, and its recommendations for seismic design parameters per UBC code will be incorporated into the [Proposed Action] design. This report will include an in-depth study of the regional seismicity and site-specific geologic conditions, including a probabilistic seismic hazard analysis that incorporates risk-based evaluations of exceedance of certain peak ground accelerations. Measures to reduce impacts will include ground improvement such as soil mixing, jet grouting, soil densification, and pile supported structures. The use of specific measures will depend on soil type and stratigraphy, which will be determined during final [Proposed Action] design. Implementation of geotechnical design recommendations will be verified during construction by a qualified geotechnical consultant monitoring the construction activities. After any significant earthquake in the area resulting in felt shaking (also after major rainstorms), the constructed rail line shall be immediately inspected. This inspection would be for possible damage and delineation of areas requiring temporary speed reductions, maintenance or more substantial repair work before resumption of train service. **Mitigation Measure G-5:** Evaluation of fault rupture hazard shall be undertaken during subsurface geotechnical investigations using guidelines specified in Special Publication 42 of CGS [California Geological Survey]. The evaluation shall determine the specific design features that will be most appropriate for implementation. **Mitigation Measure G-6:** Proper subsurface investigation will be conducted in areas with liquefaction potential before construction, as detailed in Mitigation Measure G-4. This investigation will include Standard Penetration Test borings, laboratory grain size analysis, and liquefaction analysis. The subsurface investigation will identify the potential for liquefaction and also will identify design features to reduce the potential for liquefaction. Geotechnical design recommendations will be incorporated into final [Proposed Action] design and will be verified during construction by a qualified geotechnical consultant monitoring the construction activities.

Resource Area	Alternative 1 (No Action)	Alternative 2 SMART Downtown San Rafael to Larkspur Extension (Proposed Action)
Seismically Induced Landslides or Slope Failures	No adverse effect	No adverse effect
Expansive or Corrosive Soils	No adverse effect	No adverse effect with implementation of applicable mitigation measures from the 2005 EIR: **Mitigation Measure G-8:** The [Proposed Action] will incorporate one of the following three measures to reduce the effect of expansive soils: (1) remove expansive soil and replace with select, nonexpansive, engineered fill; (2) conduct lime treatment of expansive soil; or (3) place structures on drilled piers or foundation elements that are founded on deeper, nonexpansive bearing strata. **Mitigation Measure G-9:** Where corrosive soils are encountered, the [Proposed Action] will incorporate one or more of the following measures, as appropriate: epoxy coating of reinforcing steel; use of Type 5 Portland cement in structural concrete; or soil treatment to neutralize pH in the soil or reduce excessive chloride and sulfate concentrations in the soil.
Greenhouse Gas Emissions and Climate Change (see EA Section 3.6 for more information)		
GHG Emissions (Proposed Action contribution to climate change)	No adverse effect	Beneficial effect
Hazards and Hazardous Materials (see EA Section 3.7 for more information)		
Encountering Existing Hazardous Materials During Construction	No adverse effect	No adverse effect with implementation of applicable mitigation measures from the 2005 EIR: **Mitigation Measure G-8:** Mitigation Measure HM-1: Samples of soil shall be submitted for analysis for phenol and creosol compounds if track shoulder re-grading or excavations associated with bridge improvements are undertaken. Sampling of soil will also be based on available historical information and/or previous sampling data sampling and analysis and will be modified to include other potential contaminants such as metals, petroleum hydrocarbons, PCBs and PAHs where warranted. Samples of soil are recommended to be submitted for analysis for lead if improvements to the road crossings are required to determine if these compounds are present and have the potential to impact disposal or release to the environment. If phenol and creosol compounds or ADL are present in the soil, then preparation of a Site Mitigation Plan (SMP) will be required to address potential exposure of workers to impacted soil in order to comply with applicable waste handling and disposal regulations (if offsite disposal of soil is necessary). At a minimum, BMPs in the SMP should include provisions for excavation and grading of impacted soil, stockpiling and testing of contaminated soil, dust and odor control measures and health and safety requirements for working with impacted soil. To comply with AB 939 requirements, which dictate guidance for source reduction, recycling and composting, and environmentally safe transformation and land disposal of solid wastes,

Resource Area	Alternative 1 (No Action)	Alternative 2 SMART Downtown San Rafael to Larkspur Extension (Proposed Action)
		railroad ties and steel that are replaced during construction of the project will be recycled or re-used as appropriate. **Mitigation Measure HM-2:** Precautions, including sampling of soil and groundwater prior to work activities in the areas where proposed excavations are planned and preparation of a SMP, shall be implemented, where necessary. If naturally occurring asbestos is encountered, the project shall comply with the CARB Asbestos Airborne Toxic Control Measures regulations (17 CCR, Section 93105), which requires local air district review and approval of an asbestos dust mitigation plan. An Asbestos Dust Mitigation Plan must specify dust mitigation practices which are sufficient to ensure that no equipment or operation emits dust that is visible crossing the property line. If contaminated materials are encountered during construction activities, the local Fire Certified Unified Program Agency (CUPA) will be notified immediately. A qualified environmental consultant shall monitor soil and air and dust emissions during construction activities in these locations to identify whether potential hazards exist and whether special handling of soil and groundwater is required. Specially trained workers can be utilized to handle contaminated soil/groundwater and SMP implementation measures (i.e., use of personal protective equipment) can be utilized to mitigate potential exposures to contaminated soil/groundwater and additional releases to the environment. Construction-related impacts of soil excavation and groundwater dewatering in contaminated areas can be mitigated through implementation of BMPs, such as conducting daily health and safety meetings to discuss planned work in areas where contaminated soil/groundwater could be encountered. Mitigation measures to protect the public include limiting access (i.e., fencing and site security) to the railroad corridor during construction activities and implementation of BMP measures to prevent offsite migration of contaminated soil and groundwater. **Mitigation Measure HM-3:** Sampling activities shall be conducted in locations where asbestos containing materials or LBP are anticipated to identify whether potential hazards exist and whether special precautions to prevent workers from exposure to LBP or asbestos are necessary during bridge/overcrossing renovation and or/demolition. If friable asbestos materials are identified during bridge inspections, these materials shall be safely removed and properly disposed using procedures established by OSHA and the BAAQMD/NSCAPCD. Bridge workers shall be protected through the use of proper protective equipment. Standard procedures shall be used for capturing LBP during bridge cleaning (e.g., sand blasting) and preventing it from being released into the environment. Proper containment shall be employed for all bridge maintenance activities to prevent LBP from impacting the environment.
Release of Hazardous Materials During Construction	No adverse effect	No adverse effect
Routine Use, Storage, Transport, or Disposal of Hazardous Materials	No adverse effect	No adverse effect

Resource Area	Alternative 1 (No Action)	Alternative 2 SMART Downtown San Rafael to Larkspur Extension (Proposed Action)
Hydrology and Water Quality (see EA Section 3.8 for more information)		
Water Quality Degradation Caused by Erosion, Sedimentation, or Construction Contaminants	No adverse effect	No adverse effect with implementation of applicable mitigation measures from the 2005 EIR: **Mitigation Measure WR-1a:** The proposed project shall comply with the NPDES permit process which requires project applicants to file a Notice of Intent and prepare and submit a SWPPP to the RWQCB. The SWPPP must contain a detailed mitigation plan for erosion and sediment control, including plans for implementing BMPs for the control of stormwater runoff, erosion and sedimentation. Typical BMPs may include the use of silt fencing, temporary or permanent retention or detention basins, check dams, buffer strips adjacent to streams, and other similar devices or methods. **Mitigation Measure WR-1b:** The proposed project shall comply with the requirements for a Streambed Alteration Agreement for those portions of the project that would be completed along the banks of various surface waterbodies. **Mitigation Measure G-3:** Implement erosion control measures including hydroseeding or erosion control materials on areas that have been graded or disturbed. Additionally, maintain and repair drainage structures (e.g., culverts, drop inlets) on cut and fill slopes to minimize long term erosion. Licensed civil engineers shall develop properly designed stormwater runoff collection structures and finished contours for new stations, rail sidings, and earthwork to maximize long-term slope stability. **Mitigation Measure BR-1a:** Construction access, staging, storage, and parking areas shall be located on ruderal or developed lands to the extent possible. Vehicle travel adjacent to wetlands and riparian areas shall be limited to existing roads and designated access paths. Sensitive natural communities (i.e., wetlands, waters, riparian zones and oak woodlands) shall be conspicuously marked in the field to minimize impacts on these communities, and work activities shall be limited to outside the marked areas. **Mitigation Measure BR-2a:** Instream construction shall be confined to the dry or low-flow season. During in-stream construction, dewatered areas and temporary culverts shall be limited to the minimum area necessary. Pumps used for dewatering shall have agency-approved fish screens installed to minimize intake of fish into pumps. Diversion structures shall be left in place until all in-stream work is completed. Temporary culverts and all construction materials and debris shall be removed from the affected area prior to reestablishing flow and prior to the rainy season. **Mitigation Measure BR-2c:** Upon completion of the proposed project, all temporarily disturbed natural areas, including stream banks, shall be returned to original contours to the extent feasible. Affected wetlands, stream banks or stream channels shall be stabilized prior to the rainy season and/or prior to reestablishing flow. For wetland areas, the top six inches of native topsoil should be stockpiled and replaced following work. Wetland and riparian vegetation shall be reestablished as appropriate.

Resource Area	Alternative 1 (No Action)	Alternative 2 SMART Downtown San Rafael to Larkspur Extension (Proposed Action)
		Mitigation Measure G-1: Implement erosion control BMPs such as settling basins, the covering of soil stockpiles, runoff diversions, silt fences, and dewatering sediment filtersocks. Site-specific measures shall be determined during pre-construction planning.
Depletion of Groundwater Resources	No adverse effect	No adverse effect
Downstream Flooding as a Result of Altered Drainage Patterns or an Increase in Impervious Surfaces	No adverse effect	No adverse effect with implementation of applicable mitigation measures from the 2005 EIR: **Mitigation Measure WR-2:** Design structures and other improvements on the site so as not to raise flood levels. Specific measures shall be based on site specific hydrologic studies conducted during the final design stage of the proposed project. Once these studies have been completed, specific elements can be designed to eliminate impacts. When feasible, construction within the floodplain shall be avoided or minimized. When construction within the floodplain is unavoidable, efforts will be made to restore the floodplain, as necessary, to restore flood capacity.
Water Quality Degradation Caused by Changes in the Intensity of Land Use and Increases in Impervious Surfaces	No adverse effect	No adverse effect with implementation of applicable mitigation measures from the 2005 EIR: **Mitigation Measure G-3:** Implement erosion control measures including hydroseeding or erosion control materials on areas that have been graded or disturbed. Additionally, maintain and repair drainage structures (e.g. culverts, drop inlets, etc.) on cut and fill slopes to minimize long term erosion. Licensed civil engineers shall develop properly designed stormwater runoff collection structures and finished contours for new stations, rail sidings, and earthwork to maximize long-term slope stability. **Mitigation Measure BR-15b:** For all herbicide applications during right-of-way maintenance, herbicides shall be used only according to label directions, applications shall be confined to within the right-of-way and appropriate BMPs shall be followed to prevent uncontrolled release of chemicals. Only aquatic-approved herbicides shall be used for vegetation control adjacent to open water and wetland habitats.
Land Use and Planning (see EA Section 3.9 for more information)		
Existing and Surrounding Land Uses	No adverse effect	No adverse effect
Noise and Vibration (see EA Section 3.10 for more information)		
Noise During Construction	No adverse effect	No adverse effect
Noise During Operation	No adverse effect	No adverse effect with implementation of Mitigation Measure NOI-1 or NOI-2. **Mitigation Measure NOI-1:** *Quiet Zone* – Implementation of a Quiet Zone in the Proposed Action area would eliminate the noise effect caused by train horns. As discussed in Section 2.11.1, Train Horns at Grade Crossings, the City of San Rafael is exploring the possibility of applying for Quiet Zone designation along all or portions of the proposed rail alignment within

Resource Area	Alternative 1 (No Action)	Alternative 2 SMART Downtown San Rafael to Larkspur Extension (Proposed Action)
		its jurisdiction. SMART would be agreeable to working with the City in its application process, if the City decides to move forward. However, even if the City were to apply, whether the FRA would grant the exemption is unpredictable. CPUC approval also would be required because of the special circumstances at the Andersen Drive crossing. Therefore, Quiet Zone designation of the area would not be a reliable mitigation measure without an alternate mitigation option in place. **Mitigation Measure NOI-2:** *Wayside Horns* – Wayside horns present a viable mitigation alternative if Quiet Zone designation at the Andersen Drive crossing is not realized. Wayside horns would be both effective and feasible, and would adequately mitigate the effects that would otherwise occur with conventional train-mounted horns. For this reason, wayside horns would be the alternate mitigation strategy if Quiet Zones are not implemented.
Vibration During Construction	No adverse effect	No adverse effect
Vibration During Operation	No adverse effect	No adverse effect
Safety and Security (see EA Section 3.11 for more information)		
Safety and Security	No adverse effect	No adverse effect
Socioeconomics and Environmental Justice (see EA Section 3.12 for more information)		
Populations, Employment, and Income	No adverse effect	No adverse effect
Environmental Justice	No adverse effect	No adverse effect
Transportation and Traffic (see EA Section 3.13 for more information)		
Regional and Local Roadways	No adverse effect	No adverse effect
Transit Operations	No adverse effect	No adverse effect
Bicycle Circulation		
Pedestrian Circulation		
Parking	No adverse effect	No adverse effect
Transportation During Construction	No adverse effect	No adverse effect with implementation of Mitigation Measure T-1: **Mitigation Measure T-1**: SMART will develop a construction phasing/sequencing and traffic management plan to be developed and implemented by the contractor to minimize Proposed Action effects during construction. This plan will define each construction operation,

Resource Area	Alternative 1 (No Action)	Alternative 2 SMART Downtown San Rafael to Larkspur Extension (Proposed Action)
		approximate duration, and the necessary traffic controls to maintain access for vehicles. The plan will require the movement of heavy equipment and transport materials during off-peak travel demand periods. To reduce the effect on parking supply, the plan will encourage workers to carpool and use public transit. To address safety issues, clearly defined access for non-motorized modes will be maintained during construction. Staging areas will be fenced and signed. Where roadways and sidewalks are impassable for bicycles and pedestrians, safe alternate routes and pathways will be signed and maintained during construction. This plan will be coordinated with the cities of San Rafael and Larkspur, local fire and police departments, and transit providers.
Visual Resources (see EA Section 3.14 for more information)		
Views and Visual Character During Construction	No adverse effect	No adverse effect with implementation of applicable mitigation measures from the 2005 EIR: **Mitigation Measure V-1:** SMART shall install temporary fencing where views from adjacent residences are adversely affected during construction. These areas shall be identified in greater detail during design review and the type of temporary fencing selected, as part of the design review. Fencing materials would remain in place until finish work has been completed.
Views and Visual Character During Operation	No adverse effect	No adverse effect with implementation of applicable mitigation measures from the 2005 EIR: **Mitigation Measure V-2:** Fixture types, cut off angles, shields, lamp arm extensions, and pole heights will be determined in consultation with the local jurisdictions.
Light and Glare	No adverse effect	No adverse effect

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ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
ACE	Altamont Commuter Express
ADA	Americans with Disabilities Act
ADL	aerially deposited lead
ADT	average daily traffic
APE	area of potential effect
ARB	California Air Resources Board
BA	Biological Assessment
BAAQMD	Bay Area Air Quality Management District
BACT	Best Available Control Technology
BART	Bay Area Rapid Transit
Basin Plan	San Francisco Bay RWQCB Water Quality Control Plan for the San Francisco Bay Basin
Bay	San Francisco Bay
BGM	BAAQMD Greenhouse Gas Model
BMP	best management practice
BTU	British thermal unit
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CAFE	Corporate Average Fuel Economy
CAAQS	California ambient air quality standards
CalEEMod	California Emissions Estimator Model
Caltrans	California Department of Transportation
Central Bay	San Francisco Bay Central
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CFCs	chlorofluorocarbons
CFR	Code of Federal Regulations
CH_4	methane
CHRIS	California Historical Resources Information System
CMPA	Central Marin Police Authority
CNDDB	California Natural Diversity Database
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
CPUC	California Public Utilities Commission
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibels
DDT	dichlorodiphenyltrichloroethane
DHS	U.S. Department of Homeland Security
diesel PM	diesel particulate matter
DMU	diesel multiple unit
DNL	24-hour average noise level
DPS	distinct population segment
EA	Environmental Assessment
EDR	Environmental Data Resources, Inc.
EFH	essential fish habitat
EIR	Environmental Impact Report
EPA	U.S Environmental Protection Agency

ESA	Endangered Species Act
FBWC	Francisco Boulevard West Commercial District
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIMA	Federal Insurance and Mitigation Administration
FIP	federal implementation plan
FIRM	Flood Insurance Rate Map
FMP	fisheries management plan
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
g	gram
GC	General Commercial
GGBHTD or Golden Gate	Golden Gate Bridge, Highway, and Transportation District
GHG	greenhouse gas
GWP	global warming potential
HAPs	hazardous air pollutants
HCFCs	hydrochlorofluorocarbons
HCM	Highway Capacity Manual
HFCs	hydrofluorocarbons
HGWPG	high global warming potential gas
HIST UST	historical underground storage tank
HOV	high- occupancy vehicle
HREC	historical recognized environmental condition
I	Industrial
I-580	Interstate 580
IOS	Initial Operating Segment
IPCC	Intergovernmental Panel on Climate Change
ISA	Initial Site Assessment
L_{90}	the sound level exceeded 90 percent of the time
L_{dn}	day-night average sound level
$L_{eq}(h)$	hourly equivalent sound level
LEDPA	Least Environmentally Damaging Practicable Alternative
LFD	City of Larkspur Fire Department
LOMR	Letter of Map Revision
LOS	level of service
LPA	Locally Preferred Alternative
LRT	light rail transit
LUST	leaking underground storage tank
MACT	Maximum Achievable Control Technology
MBTA	Migratory Bird Treaty Act
MCSTOPPP	Marin County Stormwater Pollution Prevention Program
MEP	maximum extent practicable
$MMTCO_2e$	million metric tons carbon dioxide equivalent
MMWD	Marin Municipal Water District
MOS	Minimum Operating Segment
MP	Milepost
msl	mean sea level
MT	metric ton
MTC	Metropolitan Transportation Commission
MUN	Municipal and Domestic Supply
MUNI	San Francisco Municipal Railway
N_2O	nitrous oxide

NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NESHAPs	national emissions standards for hazardous air pollutants
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO	nitrogen oxide
NO_2	nitrogen dioxide
NO_X	collective reference for nitrogen oxide and NO_2
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NTPP	Nonmotorized Transportation Pilot Program
NWP Railroad	Northwestern Pacific Railroad
O_3	ozone
ODSs	ozone-depleting substances
OEHHA	Office of Environmental Health Hazard Assessment
P/QP	Public/Quasi-Public
Pb	lead
PCB	polychlorinated biphenyl
PCE	primary constituent element
PD	Planned Development
PFCs	perfluorocarbons
PFMC	Pacific Fisheries Management Council
PM	particulate matter
PM_{10}	respirable particulate matter
$PM_{2.5}$	fine particulate matter
ppb	parts per billion
ppm	parts per million
ppt	parts per thousand
ppT	parts per trillion
PPV	peak particle velocity
Proposed Action	Downtown San Rafael to Larkspur Extension
PTC	Positive Train Control
R-1	Residential First
REC	recognized environmental condition
ROGs	reactive organic gases
ROW	right-of-way
RPW	relatively permanent water
RWQCB	Regional Water Quality Control Board
San Francisco Bay RWQCB	San Francisco Bay Regional Water Quality Control Board
SEL	sound exposure level
SF_6	sulfur hexafluoride
SFBAAB	San Francisco Bay Area Air Basin
SFRD	City of San Rafael Fire Department
SHPO	State Historic Preservation Officer
SIP	state implementation plan
SLIC	Spills, Leaks, Investigations, and Cleanups program
SMART	Sonoma-Marin Area Rail Transit
SMART project	Sonoma-Marin Area Rail Transit (SMART) District project
SMP	Site Mitigation Plan
SO_2	sulfur dioxide
SOP	Special Operating Procedure

SRPD	City of San Rafael Police Department
SWPPP	storm water pollution prevention plan
SWRCB	State Water Resources Control Board
TAC	Toxic Air Contaminants
TAM	Transportation Authority of Marin
TCE	temporary construction easement
TMDL	Total Maximum Daily Load
TNW	traditionally navigable water
tpy	tons per year
US 101	U.S. Highway 101
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service
v/c	volume-to-capacity
VdB	vibration decibels
VMT	vehicle miles traveled
VOC	volatile organic compounds
WDR	waste discharge requirement
WETA	Bay Area Water Emergency Transportation Authority
$\mu g/m^3$	microgram per square meter

1.0 INTRODUCTION/PURPOSE AND NEED

1.1 INTRODUCTION

This Environmental Assessment (EA) evaluates the potential social, economic, and environmental effects associated with implementing the Sonoma-Marin Area Rail Transit (SMART) Downtown San Rafael to Larkspur Extension (the Proposed Action) and the associated facilities.

This EA has been prepared in compliance with the National Environmental Policy Act (NEPA) (42 U.S. Code [USC] Sections 4321–4370d [1994]) and the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500–1508 [2004]). This EA is intended to provide a full and fair discussion of environmental impacts associated with a range of alternatives and to inform decision-makers and the public.

1.2 OVERVIEW AND BACKGROUND

The Proposed Action that is evaluated in this EA is the extension of passenger rail service from Downtown San Rafael southwards to Larkspur, in Marin County, California. The rail extension would be approximately two miles in length. The project proponent is the Sonoma-Marin Area Rail Transit (SMART) District. SMART has applied with the Federal Transit Administration (FTA) for federal funding to assist with the implementation of the Proposed Action. SMART is currently constructing the locally-funded SMART project, which will eventually operate approximately 43 miles of passenger rail service from Downtown San Rafael northwards to Airport Boulevard in Santa Rosa, Sonoma County, California. The Proposed Action would utilize federal funds to extend SMART's locally-funded project approximately two miles southwards from Downtown San Rafael to Larkspur.

The Proposed Action can be evaluated separately from the locally-funded SMART project because it meets the criteria specified in 23 CFR 771.111(f) in that it would: 1) connect logical termini and be of sufficient length to address environmental impacts on a broad scope; 2) have independent utility or independent significance in that it would be a useable and reasonable expenditure even if no additional transportation improvements in the area are made; and 3) not restrict consideration of alternatives for other reasonably foreseeable transportation improvements. Only the Proposed Action is evaluated in this EA.

For purposes of description in this EA, the two projects are defined per the definitions presented below, and are referred to hereafter as the following:

> **Proposed Action:** The Downtown San Rafael to Larkspur Extension, which would extend passenger rail service approximately two miles from Downtown San Rafael southwards to Larkspur. The Proposed Action would be funded in part with federal funds.
>
> **Locally-Funded SMART Project:** The approximately 43-mile passenger rail system, currently under construction, that will provide passenger rail service from Downtown San Rafael northwards to Santa Rosa. The locally-funded SMART project is being funded entirely with local funds. Subsequent phases will extend service northwards from Santa Rosa to Cloverdale, for a total system length of approximately 70 miles.

1.2.1 SMART Project Overview

As originally envisioned, the entire 70-mile SMART project would have been constructed at one time from Cloverdale to Larkspur utilizing proceeds from a quarter-cent sales tax measure that was approved by voters in Sonoma and Marin counties in 2008. In 2010, SMART decision-makers elected to construct the project in phases. Under the revised construction plan, the first phase or Initial Operating Segment (IOS) would provide passenger rail service from Santa Rosa on the northern end to Downtown San Rafael on the southern end, a distance of approximately 43 miles. Subsequent phases would extend service northwards from Santa Rosa to Cloverdale and southwards from Downtown San Rafael to Larkspur. Figure 1-1 provides an overview of the SMART Project.

The construction from Santa Rosa to Downtown San Rafael began in 2012, and completion is anticipated in 2016. SMART is now looking to begin development and construction of the remaining phases, beginning with the Proposed Action that is evaluated in this EA. Construction of the Proposed Action would provide an important regional transit connection to the existing Larkspur Ferry Terminal. The ferry terminal provides ferry service from Larkspur to Downtown San Francisco, where access exists to the Bay Area Rapid Transit (BART) system, San Francisco Municipal Railway (MUNI), Caltrain, Alameda-Contra Costa Transit system, Golden Gate Transit system, Amtrak, and Greyhound Bus service. By providing a SMART connection at the Larkspur ferry terminal, SMART riders will gain access to the entire Bay Area transit network.

1.2.2 Previous Environmental Review of the SMART Project

The entire SMART project, from Cloverdale to Larkspur, was reviewed in 2005 under the California Environmental Quality Act (CEQA), in an Environmental Impact Report (EIR) (SMART 2005). A Supplemental EIR that assessed specified changes to the original EIR was prepared and certified in 2008 (SMART 2008). Because federal funds were not expected to be used for any portion of the SMART system, clearance under NEPA was not undertaken. SMART has since elected to apply for federal funds from the FTA to construct the Downtown San Rafael to Larkspur Extension.

Accordingly, this EA assesses the environmental effects of the Downtown San Rafael to Larkspur (the Proposed Action) pursuant to NEPA. NEPA documentation is necessary whenever federal action or funding approval is sought. For a full description of the Proposed Action assessed in this EA, see Chapter 2.0, Alternatives.

1.3 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.3.1 Purpose and Need of the Downtown San Rafael to Larkspur Extension (Proposed Action)

The Proposed Action would extend the locally-funded SMART passenger rail project from Downtown San Rafael to Larkspur. The proposed rail termini in Larkspur lies adjacent to the Larkspur Ferry Terminal, which provides direct ferry service from Larkspur to Downtown San Francisco. The improved transit connection between Downtown San Rafael and Larkspur would improve local and regional travel and, by extension, improve mobility on the congested north-to-south US 101 corridor in Sonoma County, Marin County, and San Francisco.

SMART San Rafael-Larkspur Extension 8/14/2014
Figure 1-1: SMART Project Overview

The Proposed Action is needed to better link Downtown San Rafael and Larkspur as well as to close a future gap in regional transit services. When the first phase of the locally funded SMART project is completed in 2016, SMART will be the only rail service in the Bay Area that does not link to another rail service or a major ferry terminal. If left unfilled, the gap will separate the North Bay from the larger Bay Area's rail and ferry network, thereby reducing the network's effectiveness for area residents and employers.

1.3.2 Overall Transportation Issue to be Addressed by the SMART Project

U.S. Highway 101 (US 101) serves as the primary transportation infrastructure connecting the larger employment and population centers of the North San Francisco Bay (Bay) Area. The majority of trips in Sonoma and Marin counties flow from north to south in the AM peak period along the US 101 corridor, and from south to north in the PM peak period. The commuter trips in the regional area, covering the broad corridor from Cloverdale to San Francisco, are directed to major employment centers in Santa Rosa, Petaluma, Novato, San Rafael, and San Francisco. These round-trip home-to-work trips primarily occur on US 101, with 93 percent of Sonoma County and 89 percent of Marin County trips occurring in personal vehicles.

In particular, the highest-volume segment of the US 101 corridor in the North Bay, between the North San Pedro Road and Lincoln Avenue interchanges in San Rafael, currently carries 207,000 vehicles per day in the peak month based on annual average daily traffic (AADT) data for 2013 published by the California Department of Transportation (Caltrans), marking the third straight year of traffic growth (up from 192,000 vehicles per day in 2011 and 197,000 vehicles per day in 2012). Meanwhile, peak-hour traffic volumes on this particular segment have risen from 15,000 vehicles in 2011 to 15,400 vehicles in 2012 and 15,900 vehicles in 2013. At the northern end of the corridor, the highest-volume segment in Sonoma County, located just south of the junction with State Route 12, carried 146,000 vehicles per day in 2013, a substantial jump up from 134,000 vehicles per day in 2011 and 135,000 vehicles per day in 2012.

In addition to standard commuter trips, Sonoma and Marin counties have strong and growing tourist and travel industries. Analysis of existing travel on US 101 crossing the Sonoma County–Mendocino County boundary on the northern end of the SMART corridor showed that 20 percent of all current trips are for recreational purposes.

Similarly, surveys of Golden Gate Transit bus riders on US 101 routes found that 26 percent of weekday passenger trips were for recreational purposes. Surveys of Larkspur Ferry passengers found that 10 percent of weekday and 36 percent of weekend travelers were not Bay Area residents. The bulk of these visitor trips likely were recreational and not work related.

In short, trips in the North Bay area are increasing, leading to additional congestion on US 101. The SMART project is intended to contribute to the improvement of this condition.

1.3.3 References

Sonoma-Marin Area Rail Transit (SMART). 2005. *SMART Draft Environmental Impact Report*. Website: http://www2.sonomamarintrain.org/index.php/docs/eir/. Accessed October 6, 2014.

Sonoma-Marin Area Rail Transit (SMART). 2008. *SMART Draft Supplemental Environmental Impact Report*. Website: http://www2.sonomamarintrain.org/index.php/docs/eir/. Accessed October 6, 2014.

Transportation Authority of Marin (TAM). 2013. *Marin County Congestion Management Program 2013 Update*. October 13, 2013. Available: http://www.tam.ca.gov/Modules/ShowDocument.aspx?documentid=6959. Accessed September 30, 2014.

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2.0 ALTERNATIVES

The alternatives analysis in this Environmental Assessment (EA) relies upon the studies and planning efforts that have been conducted over the last 30 years to help address the problem of increasing congestion on US 101 in Sonoma and Marin counties. The following discussion summarizes the planning efforts that resulted in the selection of the SMART project.

2.1 PREVIOUS PLANNING EFFORTS AND DEVELOPMENT OF A LOCALLY PREFERRED ALTERNATIVE

The development of alternatives to address the increasing congestion on US 101 generally has focused on two principal opportunities: 1) improvements to US 101 itself; and 2) use of the adjacent Northwestern Pacific (NWP) Railroad rail corridor for transit service. Accordingly, both US 101 and the NWP Railroad right-of-way (ROW) in Sonoma and Marin counties have been studied in great detail over the past 30 years. Because of the importance of US 101 as the primary north-south traffic corridor currently in operation, numerous efforts have been undertaken to help alleviate growing traffic congestion and travel time delays, including highway widening, interchange improvements, and expansion of high-occupancy vehicle (HOV) lanes. Continued improvements to US 101 are ongoing, and major improvement projects to US 101 are currently underway or are in the advanced planning stage. For example, the 9-mile segment of US 101 between Petaluma and Novato (known as the "Novato Narrows") is undergoing widening to create at least three continuous lanes in both the north and south directions from Santa Rosa on the northern end to San Francisco on the southern end, which also will allow this entire stretch of the US 101 to be designated as a "freeway."

In addition to continuing US 101 improvement plans, a number of comprehensive, multi-modal transportation planning efforts also have been conducted jointly by Sonoma and Marin counties, beginning in 1983. Based on these studies, decision-makers in the two counties have concluded that investment in both highway capacity and rail transit will be required to serve future transportation needs. Focusing on future highway and bus investments within the US 101 corridor and future rail investments within the NWP Railroad rail corridor emerged as the most cost-effective approaches for expanding the North Bay's north-south transportation capacity. On January 1, 2003, state legislation formed SMART as a special district government agency with the authority to implement passenger rail service within the NWP corridor.

Table 2-1 summarizes some of the studies that have been undertaken over the last three decades. The table shows the screening processes that were undertaken as part of each study to eliminate those alternatives that did not compare well to the other alternatives.

2.1.1 Alternatives Considered for the Locally Preferred Alternative but Withdrawn from Further Evaluation

A number of alternatives to address the US 101 congestion issue have been considered over the years but subsequently have been withdrawn or eliminated from further consideration. These eliminated alternatives are summarized as follows, along with a discussion of the rationale for their dismissal from further consideration.

Table 2-1: Alternatives Development and Screening

Previous Study	Transit Alternatives Considered	Screening Process	Alternatives Screened Out
Phase I 101 Corridor Study (1983–1985)—Marin County under the direction of the 101 Corridor Action Committee	Heavy rail Monorail Light rail (LRT) Busways on NWP Express bus lanes HOV lanes Diesel railbus	*Step 1*—Alternatives evaluated against 17 weighted criteria, including local political acceptability, peak period travel time reduction, and peak transit ridership potential. *Step 2*—Project components assembled into three corridor-wide alternatives, designed to meet LOS D service objectives for US 101.	Heavy rail Monorail BART extension Conversion of mixed-flow lanes to HOV operations
Phase II 101 Corridor Study (1986–1989)—Marin County under the direction of the 101 Corridor Action Committee	Low cost transportation improvements New ferry service HOV lanes Busways on NWP Commuter rail Light rail Additional mix flow lanes on US 101 Transitway on NWP Railroad (Phase I Preferred Alternative)	*Step 1*—Alternatives evaluated against capital and operating costs, daily ridership, transit cost effectiveness, and US 101 traffic congestion relief. *Step 2*—Public opinion surveys that were conducted in Sonoma and Marin counties indicated a strong preference for rail over bus operations in NWP. *Step 3*—Phase II Preferred Alternatives–Rail/Highway and Bus/Highway developed. *Step 4*—Evaluation of alternatives based on costs, ridership, and congestion relief to develop sales tax proposal.	Busway on NWP Railroad in early screening Light rail after 1990 election
Sonoma/Marin Multi-Modal Transportation and Land Use Study (Calthorpe Study) (1995–1997)—Sonoma County Transportation Authority and Joint Executive Committee	*Scenario A*—Minimal rail service with existing land use policies *Scenario B*—Maximum bus service and HOV lanes with existing land use policies *Scenario C*—Minimal rail service with compact mixed-use growth policies *Scenario D*—Maximum rail service with compact mixed-use	*Step 1*—Scenarios analyzed for capital and operating costs, transit ridership, and transit cost effectiveness. *Step 2*—Joint Executive Committee adopted a hybrid multi-modal transportation plan for US 101 as the Preferred Scenario.	1998 sales tax measure based on Preferred Scenario was defeated in both counties
SMART Commuter Rail Implementation Plan (1999–2000)—SMART Commission	Commuter rail—Healdsburg to Downtown San Rafael (51 miles) Commuter rail—Cloverdale to Downtown San Rafael (68.2 miles) Commuter rail—Healdsburg to Petaluma (29.5 miles) Commuter rail—Cloverdale to Petaluma (47.4 miles)	*Step 1*—Service options were analyzed for capital and operating costs, revenue generation, and fare box recovery. *Step 2*—In September 2000, SMART Commission adopted Cloverdale to San Rafael as the preferred service option. *Step 3*—Options for extension of service to San Quentin were	Shorter distance commuter rail options

Previous Study	Transit Alternatives Considered	Screening Process	Alternatives Screened Out
	Commuter rail—Petaluma to San Rafael (20.8 miles)	evaluated.	
Marin-Sonoma Express Bus Study (2001–2002)—Marin County Congestion Management Agency	*Strategy A*—Double existing express bus service to link residential commute areas to employment areas *Strategy B*—Double existing express bus service and add 14 buses *Strategy C*—Create frequent express bus service on US 101, with connecting shuttles to employment destinations *Strategy D*—Provide direct point-to-point express bus service linking major residential commute areas with major employment areas	*Step 1*—Evaluate strategies based on new daily riders, passengers per hour, passengers per trip, and fare box recovery. *Step 2*—Implementation of Strategy A as interim strategy and implementation of Strategy D when HOV lanes are completed.	Expansion of existing express bus service US 101 express bus service with connecting shuttles

Notes:
HOV = high- occupancy vehicle; NWP = Northwest Pacific Railroad

Rail Service Alternatives

Alternative technologies for rail service. A monorail system was rejected from further analysis because it would require development of extensive new transportation infrastructure, would result in the acquisition of substantial additional ROW, and would be likely to impose greater physical effects on the environment.

Light rail transit (LRT) initially was considered as a viable option to operate within the existing NWP corridor, and operational plans for LRT were developed and evaluated during early stages of initial planning efforts. LRT service ultimately was determined to be infeasible because of the high cost of implementation. In addition, because freight service was proposed to be reintroduced to segments of the NWP Railroad corridor and to be operated on the same line as the passenger rail, LRT was determined to be incompatible with heavy rail operations. Federal Railroad Administration (FRA) regulations prohibit light rail from operating on the same line as freight without temporal separation, which would render passenger service infeasible.

Alternative operating segment or a mix of separate operating segments. Studies of possible operational plans for these scenarios indicated that, although the scenarios evaluated would have a lower capital cost, the best operating performance in terms of revenue per train mile, operating cost per train mile, and fare box recovery would occur with a continuous and longer segment. This mainly was based on the finding that a continuous and longer segment would result in higher ridership. Accordingly, the shorter operating segments were rejected from further evaluation, with one exception: a Minimum Operable Segment Rail Alternative providing passenger rail service between Windsor and Downtown San Rafael, described further below, was developed to meet Federal Transit Administration (FTA) requirements for a low-cost, initial capital investment alternative.

Alternative southern termini, including Larkspur, Port Sonoma, and San Quentin. Although each of these sites were determined to be technically feasible as potential terminus locations, regional water transit investments in the North Bay mainly have been focused on the existing Larkspur Ferry Terminal. Detailed studies of Port Sonoma and San Quentin have not been undertaken, and the Bay Area Water Emergency Transportation Authority (WETA) has not determined yet whether these would be effective sites for expanded ferry operations or if they would offer substantial benefits over the existing terminal at Larkspur. Accordingly, considering the Port Sonoma or San Quentin rail termini as alternatives was determined to be premature, and they were rejected from further analysis.

Bus Service Alternatives

Enhanced bus service in the US 101 corridor. Exclusive busways within US 101 and the NWP Railroad corridors, as well as continuous HOV lanes that could reduce travel times for buses have been evaluated. These alternatives assumed the enhancement of bus service by the reorientation of local service, new express bus service, and/or new bus transfer facilities. The construction of an exclusive busway within the US 101 corridor was rejected from further evaluation because it would require major new infrastructure investment and the acquisition of substantial additional ROW, which would result in additional physical environmental effects as well as a substantial increase in capital costs.

Bus service in the NWP corridor. A busway in the NWP Railroad corridor was determined to conflict with the preservation of the existing rail ROW and tracks for the operation of freight rail service within the corridor. Therefore, this alternative would require substantial additional ROW acquisition along much of the corridor to construct an independent busway adjacent to the tracks. This widening of the ROW would result in additional environmental effects and a substantial increase in capital costs. Expanding beyond the existing NWP Railroad ROW would have the greatest effects where the ROW is located in wetland areas or immediately adjacent to existing homes or businesses. Therefore, a busway in the NWP Railroad corridor also was considered infeasible and was eliminated from further evaluation.

2.1.2 Alternatives Previously Carried Forward for Consideration as the Locally Preferred Alternative

The following alternatives have been the subject of additional feasibility studies and environmental effects analyses. These alternatives were considered and assessed in a 2006 SMART Project Environmental Impact Report (EIR), prepared by SMART pursuant to the California Environmental Quality Act (CEQA). Figure 1-1 provides an overview of the SMART Project.

No Project Alternative

The No Project Alternative was evaluated to consider the effects of not implementing any of the identified alternatives. The No Project Alternative accounted for growth and development foreseeable to 2025. The No Project Alternative considered the effects of projected growth on the existing transportation system in place as of 2001, as well as all transportation projects then planned for implementation by 2025 in the region, as defined in the 2001 Regional Transportation Plan. Projects that could not be funded with existing revenue (i.e., those designated as “Blueprint” projects) were not considered.

Express Bus Alternative

The Express Bus Alternative focused on expanded bus service in the two-county study area, to facilitate regional growth and accommodate increased traffic demand on US 101. The Express Bus Alternative assumed the same future baseline (2025) highway and roadway improvements as the No Project Alternative, based on 2001 Regional Transportation Plan (RTP) committed projects. The Express Bus Alternative would include the same 15 percent increase (over 2001 levels) in intra-county bus service within Sonoma and Marin counties. The alternative also considered increased frequency (above 2001 levels) of buses for the commuter service to San Francisco and the East Bay, and route changes for inter-county bus service.

Minimum Operable Segment Rail Alternative

The Minimum Operable Segment (MOS) Rail Alternative would provide passenger rail service and a bicycle/ pedestrian pathway along approximately 46 miles of the SMART corridor from Windsor in Sonoma County to San Rafael in Marin County. The alternative assumed the same future baseline (2025) highway and roadway improvements based on 2001 RTP committed projects. Subsequent study later determined that the MOS should be limited to a shorter segment than that originally assessed, and the MOS was shortened to the provision of 38.5 miles of passenger rail service, between Santa Rosa on the northern end and San Rafael on the southern end.

SMART Train Alternative

The SMART Train Alternative would provide passenger rail service along approximately 70 miles of the SMART corridor, from Cloverdale in Sonoma County to Larkspur in Marin County, with 14 rail stations, passing sidings, and a rail maintenance facility. This alternative also would include a bicycle/pedestrian pathway within or adjacent to the rail corridor.

2.1.3 Selection of the Locally Preferred Alternative

In July 2006, following certification of the Final SMART Project EIR, the SMART Train Alternative was selected as the locally preferred alternative (LPA). A principal factor in the selection was that use of a dedicated rail ROW would result in an independent system, not reliant on the operations of US 101, and therefore would be more reliable and efficient. The LPA would provide a link to bus and water transit services and key employment centers along the corridor. In addition, the implementation of rail stations would provide an opportunity for the creation of transit-oriented land use development and more compact growth patterns in the areas around the stations.

As originally envisioned, the entire 70-mile SMART project would have been constructed at one time from Cloverdale to Larkspur utilizing proceeds from a quarter-cent sales tax measure that was approved by voters in Sonoma and Marin counties in 2008. In 2010, SMART decision-makers elected to construct the project in phases. Under the revised construction plan, the first phase or Initial Operating Segment (IOS) will provide passenger rail service from Santa Rosa on the northern end to Downtown San Rafael on the southern end, a distance of approximately 43 miles. Subsequent phases will extend service northwards from Santa Rosa to Cloverdale and southwards from Downtown San Rafael to Larkspur.

Consistency of the Locally Preferred Alternative with Metropolitan Planning Organization Plan

The Metropolitan Transportation Commission (MTC) is the transportation planning, coordinating and financing agency for the nine-county San Francisco Bay Area. The MTC also serves as the region's metropolitan planning organization (MPO) through which planning for distribution of federal funds for qualifying transportation projects is channeled. The LPA is included in the MTC's financially constrained Regional Transportation Plan (Plan Bay Area) as Project Number 240736. No amendments to the plan would be required.

2.1.4 Relationship of the Proposed Action to the Locally Preferred Alternative

In its entirety, the LPA is the construction and operation of approximately 70 miles of passenger rail service from Cloverdale in Sonoma County to Larkspur in Marin County. The construction from Santa Rosa to Downtown San Rafael began in 2012, and completion is anticipated in 2016. Extension of service from Downtown San Rafael to Larkspur is analyzed in this EA as the Proposed Action.

2.2 DESCRIPTION OF EA ALTERNATIVES

Because of the extensive screening process that went into selection of the SMART project as the LPA, together with the previous analysis that has been conducted for the various other alternatives that have been considered over the last several decades, no additional action alternatives are analyzed in this EA. Accordingly, this EA only assesses the No Action Alternative and the Proposed Action. The Proposed Action and the LPA between Downtown San Rafael and Larkspur are one and the same, and thus the Proposed Action consists solely of the extension of SMART service approximately 2 miles from Downtown San Rafael to Larkspur.

2.2.1 Alternative 1—No Action

The No Action Alternative represents the future conditions of transportation facilities and services in 2040 in the corridor if the Proposed Action were not built. The No Action Alternative includes the existing highway network and transit service for which funding sources have been identified, and have been included in the constrained long range plan for implementation by 2040. At this time, adequate local funds are not available to construct and operate an extension of SMART service from Downtown San Rafael to Larkspur. While it is possible that local funding could become available at some point in the future, it is currently unknown when and if that would occur. As such, the ultimate buildout of the extension is unknown, and the assumption that the extension would, in fact, be constructed and become operational cannot be made. Under the No Action Alternative, the project corridor would remain in its current state, and no construction would occur.

2.2.2 Alternative 2—Downtown San Rafael to Larkspur Extension (Proposed Action)

The Proposed Action would construct approximately 2 miles of passenger rail service from the SMART Downtown San Rafael Station (currently under construction) to the SMART Larkspur Station, planned as part of the Proposed Action (Figure 2-1). The Downtown San Rafael Station is to serve as the southern terminus of the locally-funded SMART project IOS, which runs approximately 43 miles from Airport Boulevard just north of Santa Rosa to Downtown San Rafael. The IOS began construction in 2012, and it is expected to be operational in 2016. The Proposed Action would extend passenger rail service southward from the IOS terminus at Downtown San Rafael to Larkspur.


Approximate Location of Downtown San Rafael Station
Bettini Transit Center
Existing San Rafael Creek Trestle
Unnamed Channel Trestle
Northern Extent of Cal Park Hill Tunnel
Southern Extent of Cal Park Hill Tunnel
Approximate Location of Larkspur Station
Larkspur Ferry Terminal
Montecito Plaza Shopping Center
Larkspur Landing Shopping Center
Marin Airporter-Larkspur Station
Golden Gate Larkspur Ferry
Bret Harte Park
Greenbrae School Park
US-101 N
US-101 S
Redwood Hwy
Andersen Dr
Bret Harte Rd
Larkspur
Greenbrae
San Rafael
Feet
0 350 700
1:8,400
1 in = 700 ft
9/19/2014
Existing Railroad Right-of-Way
SMART Larkspur Extension, IOS-2 Phase
Source: .15m Marin County East Orthoimagery Basemap, April, 2011

As with the locally-funded SMART project, the Proposed Action would use the existing NWP Railroad rail corridor, which has been acquired by SMART. The NWP Railroad historically provided freight and limited passenger rail service from Marin County to points northward. The stretch of the rail corridor proposed for use under the Proposed Action still is in place, but it has been non-operational for several decades. The ROW remains intact and thus would require only limited improvements to be converted from its existing condition as an inactive freight railway to use as an active passenger railway.

Description of the Existing Downtown San Rafael to Larkspur Rail Alignment

This section describes the existing SMART Downtown San Rafael to Larkspur rail alignment. The alignment generally follows the former NWP Railroad corridor, and former NWP Railroad structures still exist (in some locations), such as inactive rails, trestles, and other features. Some of these features would be removed, replaced, or otherwise modified as part of the Proposed Action. The following discussion relies on a series of photographs. A photographic key that shows the photo locations, as well as the direction that the camera was facing when the photos were taken, is provided in Figure 2-2.

The alignment begins at the northern curb of Third Street in San Rafael, immediately south of the Downtown San Rafael Station location (see Figure 2-3, Photo 1) and adjacent to the Bettini Transit Center (see Figure 2-3, Photo 2). The alignment then travels southward across Second Street and across San Rafael Creek (sometimes referred to as Mahon Creek). This portion of San Rafael Creek is approximately 30 feet wide, and water levels vary from 1 to 6 feet in depth, depending on the tide (see Figure 2-3, Photos 3 and 4). The abandoned NWP tracks cross the creek over an old wooden trestle, which is in poor condition (see Figure 2-3, Photo 5). The alignment through this section is currently single-track.

After crossing San Rafael Creek, the alignment crosses West Francisco Boulevard (see Figure 2-3, Photo 6) and then roughly parallels this roadway along its western side for approximately 1,000 feet before angling away to the west. Within this portion of the alignment, the ROW also crosses Irwin Street and Rice Drive. The alignment that is in the vicinity of Irwin Street is constrained by the Caltrans US 101 ROW and West Francisco Boulevard to the east, and by a narrow, unnamed drainage channel to the immediate west (see Figure 2-3, Photo 7). This “pinch-point” is approximately 300 feet in length, after which US 101 and West Francisco Boulevard curve to the east and the area becomes less constrained. Shortly after Irwin Street, the ROW is partially paved over for approximately 1,300 feet, for use as an auto storage yard for area automobile dealerships from approximately midway between Irwin Street and shortly beyond the Rice Drive crossing (see Figure 2-3, Photo 8). The dealerships use the ROW through a temporary encroachment agreement with SMART. The dealerships are aware that their use of the ROW is temporary and would terminate on construction of the Proposed Action.

In the vicinity of the auto dealerships, the alignment becomes double-tracked, with the main line and a siding approximately 1,600 feet in length. Within this section, the alignment crosses an unnamed channel across a short wooden trestle that is in poor condition. The trestle is approximately 20 feet in length (see Figure 2-3, Photo 9).

After approximately 1,600 feet, the siding rejoins the mainline, and the alignment reverts to a single-track configuration, which remains the case for the rest of the way to Larkspur. At this point, the alignment crosses Andersen Drive (see Figure 2-3, Photo 10). The crossing at Andersen Drive was constructed by the City of San Rafael in 1997, when asphalt pavement was laid over the existing rails (see Figure 2-3, Photo 11). From the

crossing at Andersen Drive southwards, the alignment lies immediately adjacent to the Cal Park Hill Pathway (Marin County Bicycle Route 5), a combined bicycle and pedestrian pathway that travels along the SMART alignment from this point southwards to Larkspur (see Figure 2-3, Photo 12). The pathway was constructed in 2010, and was designed to be compatible with a future SMART passenger rail service.

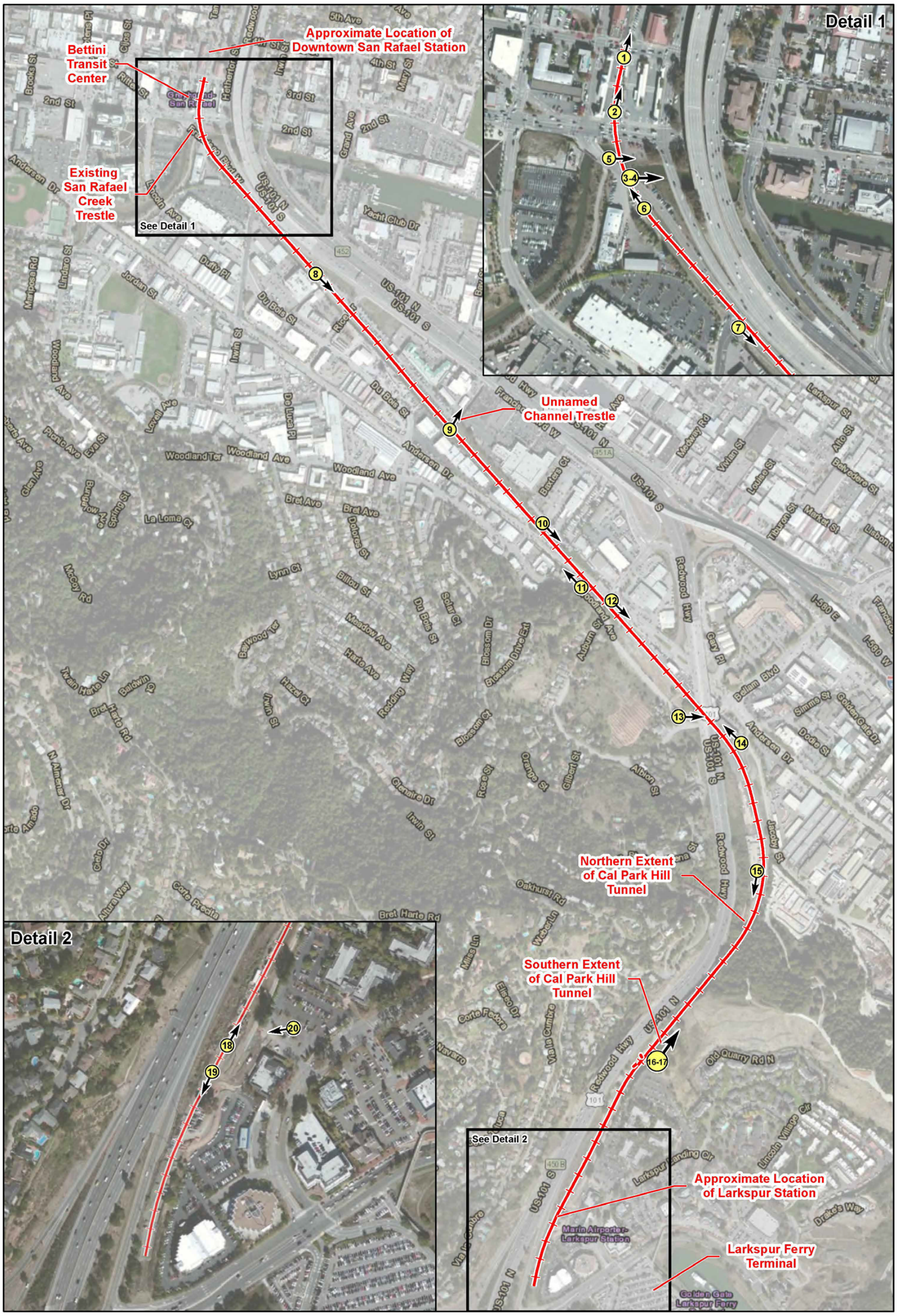
South of Andersen Drive, the alignment passes beneath US 101 and over Woodland Avenue/Bellam Boulevard via another wooden trestle that is in fair condition (see Figure 2-3, Photo 13). After the trestle, the alignment begins to roughly parallel US 101 along its eastern side for approximately 2,000 feet (see Figure 2-3, Photo 14), and then enters the Cal Park Hill Tunnel (see Figure 2-3, Photo 15). The former NWP Railroad tunnel is approximately 1,100 feet in length and was closed for several decades before its rehabilitation in 2010. The tunnel is divided lengthwise by a concrete partition (see Figure 2-3, Photo 16). The east side of the tunnel is occupied by the aforementioned Cal Park Hill Pathway, and the west side is reserved for future SMART passenger rail use (see Figure 2-3, Photo 17).

After emerging from the tunnel, the alignment travels approximately 2,500 feet to the proposed Larkspur Station location and the southern terminus of the SMART project alignment, just north of Sir Francis Drake Boulevard (see Figure 2-3, Photos 18 and 19). The ROW in this area is used as a parking area for the Marin Airporter. The Larkspur Station would be located adjacent to the Century Theaters' Larkspur Landing movie theater (see Figure 2-3, Photo 20). Other nearby uses include a business park and commercial entities on the other side of Larkspur Landing Circle, including Marin Country Mart, which has a mix of commercial uses, including restaurants, retail, offices, and a health club. The Larkspur Ferry Terminal lies approximately 1,700 feet (or approximately one-third mile) from the Larkspur Station site across Larkspur Landing Circle and Sir Francis Drake Boulevard.

The area through which the alignment passes is made up almost entirely of industrial and commercial land uses (see Figure 2-4, Land Use Map). A concrete mixing plant, light manufacturing operations, automobile dealerships, storage lots, automotive-related industry, and lay-down yards make up the bulk of the adjacent land uses north of the Cal Park Tunnel. Three single-family residences are approximately 200 feet west of the ROW along Woodland Avenue, in the vicinity of the US 101 overpass. The RV Park of San Rafael is located adjacent to the ROW, just north of where the alignment crosses Andersen Drive. The RV has approximately 45 spaces and a mix of travel-trailer and mobile-home units that use the facility on a semi-permanent basis. The RV is located in an area that has been designated as General Commercial in the City of San Rafael's General Plan and is zoned as part of the Francisco Boulevard West Commercial District (FBWC). The FBWC generally provides for uses such as multi-tenant shopping centers and large-scale commercial enterprises with a regional market base (San Rafael Municipal Code 14.05.020). Therefore, the site is a non-conforming use, based on the City's current land use and zoning standards.

Proposed Components and Improvements within the Existing ROW

The Proposed Action would require railway improvements, including trackwork, crossing improvements, trestle rehabilitation, and signal upgrading, as described in this section. Other principal improvements also are described in this section. Detailed alignment plans for the Proposed Action are provided in Appendix G of this EA.



Source: .15m Marin County East Orthoimagery Basemap, April, 2011

Photo 1: View of alignment looking north. The proposed extension would begin at the curb in the foreground. Future Downtown San Rafael Station location in background.

Photo 2: View of alignment looking north through the Bettini Transit Center.

SMART San Rafael-Larkspur Extension 6/27/2014
Figure 2-3: Site Photographs (Page 1 of 10)

Photo 3: San Rafael Creek looking downstream at high tide. Replacement trestle would be located in foreground area.

Photo 4: San Rafael Creek from same location as in Photo 3, but at low tide.

SMART San Rafael-Larkspur Extension
Figure 2-3: Site Photographs (Page 2 of 10)

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Photo 5: Existing San Rafael Creek trestle looking downstream. This structure would be replaced as part of the Proposed Action.

Photo 6: View of alignment looking north across West Francisco Boulevard. This crossing would be eliminated as part of the Proposed Action by flipping the location of the roadway relative to the tracks.

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SMART San Rafael-Larkspur Extension
Figure 2-3: Site Photographs (Page 3 of 10)

Photo 7: View looking south from vicinity of Irwin Street showing constrained "pinch-point" segment with U.S. 101 and West Francisco Boulevard to the left of the SMART ROW, and unnamed drainage channel to east.

Photo 8: View of alignment looking south at portions of ROW currently occupied by automobile dealership lots.

SMART San Rafael-Larkspur Extension
Figure 2-3: Site Photographs (Page 4 of 10)

6/27/2014

Photo 9: Existing trestle across unnamed channel between Rice Drive and Andersen Drive. This structure would be replaced as part of the Proposed Action.

Photo 10: View of alignment looking south at the Andersen Drive crossing.

SMART San Rafael-Larkspur Extension
Figure 2-3: Site Photographs (Page 5 of 10)

6/27/2014

Photo 11: View of alignment looking north at the Andersen Drive crossing.

Photo 12: View of alignment looking south, with SMART ROW on the right and the Cal Park Hill Pathway to the left.

SMART San Rafael-Larkspur Extension
Figure 2-3: Site Photographs (Page 6 of 10)

6/27/2014

Photo 13: Exisitng trestle over Woodland Avenue/Bellam Boulevard. U.S. 101 crosses over the alignment at this location. The trestle would be replaced as part of the Proposed Action.

Photo 14: View of alignment looking north immediately south of the Woodland Avenue/Bellam Drive trestle. The SMART ROW is to the left, the Cal Park Pathway is to right. U.S. 101 crosses over the alignment at this location.

SMART San Rafael-Larkspur Extension
Figure 2-3: Site Photographs (Page 7 of 10)

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Photo 15: View of the alignment looking south at northern portal of the Cal Park Hill Tunnel. SMART ROW occupies the right side of the tunnel, the Cal Park Pathway occupies the left side.

Photo 16: View of the alignment looking north at the southern portal of the Cal Park Hill Tunnel. SMART ROW is to the left, and the Cal Park Pathway is to the right.

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SMART San Rafael-Larkspur Extension
Figure 2-3: Site Photographs (Page 8 of 10)

Photo 17: Interior view looking north within the Cal Park Hill Tunnel of the SMART ROW. Masonry wall to right separates the SMART ROW from the Cal Park Pathway.

Photo 18: View of proposed Larkspur Station site, looking north. Cal Park Pathway can be seen to the right on the other side of the fence. U.S. 101 lies to the immediate left.

SMART San Rafael-Larkspur Extension
Figure 2-3: Site Photographs (Page 9 of 10)

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Photo 19: View of proposed Larkspur Station and tailtracks locations, looking south. U.S. 101 lies to the immediate right.

Photo 20: View looking west of proposed Larkspur Station site above the Century Theaters parking lot. A stairway would be constructed to the left of the fenced enclosure in the middle right as part of the Proposed Action.

SMART San Rafael-Larkspur Extension
Figure 2-3: Site Photographs (Page 10 of 10)

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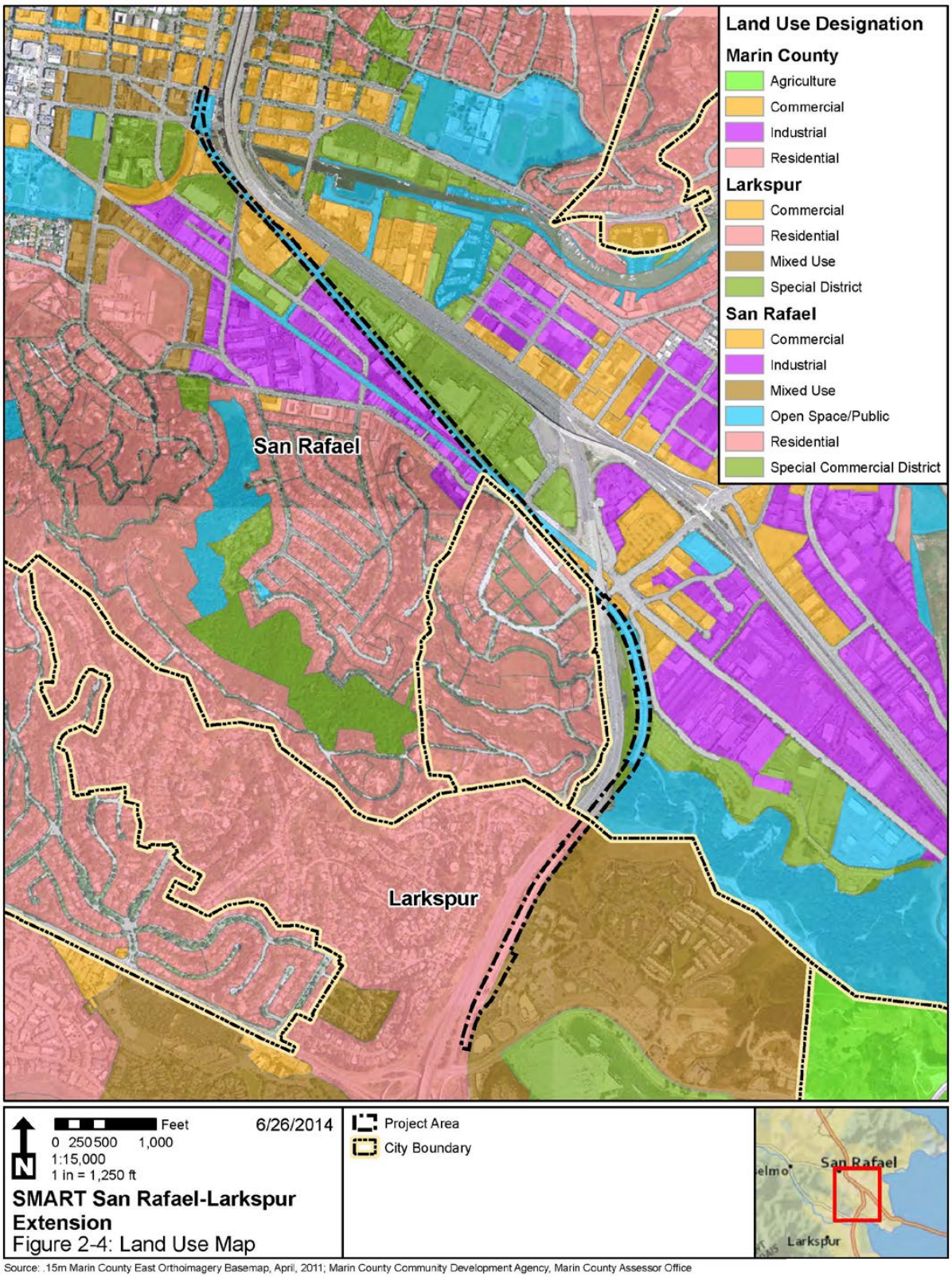

Land Use Designation
Marin County
Agriculture
Commercial
Industrial
Residential
Larkspur
Commercial
Residential
Mixed Use
Special District
San Rafael
Commercial
Industrial
Mixed Use
Open Space/Public
Residential
Special Commercial District
San Rafael
Larkspur
Feet
0 250500 1,000
1:15,000
1 in = 1,250 ft
6/26/2014
Project Area
City Boundary
San Rafael
Larkspur
SMART San Rafael-Larkspur Extension
Figure 2-4: Land Use Map
Source: .15m Marin County East Orthoimagery Basemap, April, 2011; Marin County Community Development Agency, Marin County Assessor Office

Trackwork

Trackwork would include installing ballast, ties, rail, and other track material, including tie plates, spikes or fasteners, and rail anchors. All existing and inoperable NWP Railroad trackwork would be re-laid as part of the Proposed Action, with excavation of the existing track bed typically not to exceed the depth of the existing ties. Applicable track safety standards establish minimum safety standards for operation of tracks to be used for passenger rail operations. SMART proposes to operate passenger trains at up to 79 mph, although train speeds between San Rafael and Larkspur would not be likely to exceed 45 miles per hour. Nevertheless, all portions of the SMART alignment are expected to be upgraded and maintained to meet minimum FRA Class 4 standards.

The existing railroad is a single track, generally centered within the ROW width, with an occasional second track for passing sidings. The ROW width varies from 30 feet to over 100 feet, with the majority ranging from 60 to 80 feet in width. Double tracking is proposed for approximately 5,000 feet of the alignment that runs between the Downtown San Rafael Station southward to just north of Andersen Drive. This double tracking would allow passing rail vehicles during operation. All rail tracks would be surfaced with new crushed rock ballast and would be aligned to create a smooth track for running passenger trains. Concrete ties and continuously welded rail would be used to minimize rail joints and the resultant noise.

West Francisco Boulevard Partial Realignment

As currently configured, the rail alignment crosses West Francisco Boulevard at grade immediately south of the San Rafael Creek crossing. The alignment then crosses at grade over two additional roadways (Irwin Street and Rice Drive) further down the alignment (see Figure 2-1). As part of the Proposed Action, the existing locations of West Francisco Boulevard and the railroad alignment would be “flipped” between the San Rafael Creek crossing and Rice Drive. Doing this would eliminate two at-grade crossings at West Francisco Boulevard and Irwin Drive, providing more efficient and safe rail operations, and also would eliminate disruptions to local traffic during train movement through the area. The total length of West Francisco Boulevard that would be “flipped” would be approximately 1,800 feet and would run approximately from just south of Second Street to Rice Drive.

A portion of the alignment near Irwin Street is constrained on its eastern side by US 101 and on its western side by an unnamed drainage channel. The channel drains into a screened catchment structure that passes beneath Irwin Street. Approximately 280 feet of this segment is not wide enough to accommodate all of the proposed elements without encroaching into the unnamed drainage channel. Therefore, a sheetpile retaining wall approximately 280 feet in length would be installed approximately midway down the bank of this channel. Doing this would provide several feet of additional space in which to position the SMART double-track alignment, the two lanes of West Francisco Boulevard, and associated shoulders and clearance spaces.

At-Grade Road Crossings

The existing alignment between Downtown San Rafael and Larkspur includes six public at-grade roadway crossings. From north to south, these are: 1) Third Street; 2) Second Street; 3) West Francisco Boulevard; 4) Irwin Street; 5) Rice Drive; and 6) Andersen Drive. Two of these crossings would be eliminated with the aforementioned “flip” of West Francisco Boulevard between Second Street and Rice Drive. Vehicular traffic at the remaining at-grade crossings would be controlled by bells, flashing beacons, and gates. Roadway surfaces at each crossing would be upgraded. All at-grade crossings would be designed and approved, in compliance with

California Public Utilities Commission (CPUC) requirements. SMART has adopted design standards for its railroad crossings along the IOS, and those same standards would be applied to the Proposed Action as well, subject to CPUC approval.

Andersen Drive At-Grade Crossing

The concept of establishing an at-grade, commuter rail crossing at Andersen Drive would present various challenges to the City of San Rafael and SMART. The existing grade crossing is on a sharp skew and was approved by the CPUC on the condition that no trains would use the crossing. The CPUC specified that, on the resumption of rail service, the City of San Rafael, in cooperation with Marin County, would be required to ensure unimpeded use of the crossing by trains (CPUC's Final Order, adopted July 16, 1997). Based on the CPUC ruling, approval from the CPUC would be required for the modification of this at-grade crossing. The City and the County, with SMART's assistance, have been working to finalize a design for the crossing that would be acceptable to the CPUC while meeting SMART's operational requirements.

In addition to the CPUC's concerns about the crossing, a number of traffic and operational issues also are present. The southbound, left-hand turn lane at Andersen Drive serves as a feeder for southbound US 101, which motorists access via an on-ramp that is located within 500 feet of the intersection of West Francisco Boulevard and Andersen Drive. The primary challenge that the City has faced in its design of the crossing is the queuing of motor vehicles over the tracks at Andersen Drive, particularly during left turn movements from southbound Andersen Drive.

A number of options were considered with respect to the Andersen Drive crossing. In preparation for SMART's commuter rail service, and in response to the CPUC's ruling, the City identified and studied six options to accommodate rail service through Andersen Drive:

- Option 1 (Grade Separation) would construct a grade-separated structure to carry rail traffic over Andersen Drive.
- Option 2 (At-grade crossing with realignment of Andersen Drive) would construct an at-grade crossing combined with a significant realignment of Andersen Drive. The realignment would improve the geometry of the crossing by bringing the roadway across the track at a 45-degree angle.
- Option 3 (Closure of Andersen Drive) would close Andersen Drive via construction of a cul-de-sac north of the track and construction of a permanent barrier south of the track at the intersection of West Francisco Boulevard and Andersen Drive.
- Option 4 (One-way southbound bypass via Woodland Avenue) would close Andersen Drive north and south of the track crossing and would reroute vehicular, bicycle, and pedestrian traffic via construction of a one-way southbound bypass onto Woodland Avenue.
- Option 5 (Two-way bypass via Woodland Avenue) would close Andersen Drive north and south of the track crossing and would reroute vehicular, bicycle, and pedestrian traffic via construction of a two-way bypass onto Woodland Avenue.
- Option 6 (At-grade crossing with additional motor vehicle storage capacity) would construct an at-grade crossing of Andersen Drive with the existing roadway and track geometry, and would increase storage capacity for motor vehicles at the Andersen Drive/West Francisco Boulevard intersection.

The City performed an analysis to determine the relative cost, feasibility, and traffic effects associated with each option. The City determined that Option 6 (At-grade crossing with additional motor vehicle storage capacity) would have minimal effect on traffic operations and would fit within the City's existing budget as well as within the existing timeline for planned operation of the SMART rail system.

The design for the Andersen Drive crossing would retain the existing 11-degree roadway and track geometry, and would restrict train speeds to 15 miles per hour through the crossing, which would be enforced by the railroad's Positive Train Control (PTC) system. Active grade crossing warning devices would be installed as part of this option and would include cantilevered flashing lights and automatic gates at both the northbound and southbound approaches to the crossing. Pedestrian and bicycle traffic would be separated from rail and vehicular traffic, and would be channelized to at-grade crossings located north and south of the vehicular crossing. The pedestrian/bicycle crossings would be oriented 90 degrees to the track alignment and would be equipped with flashing lights, automatic gates, and emergency egress swing gates.

To provide additional roadway capacity downstream from the crossing, Francisco Boulevard West would be restriped from one to two lanes between Andersen Drive and the US 101 southbound ramps. In addition, southbound Andersen Drive would be widened and striped to provide two lanes between Bellam Boulevard and Francisco Boulevard West. These additional lanes would provide emergency storage so that vehicles could proceed forward and clear the railroad crossing and the adjacent intersection.

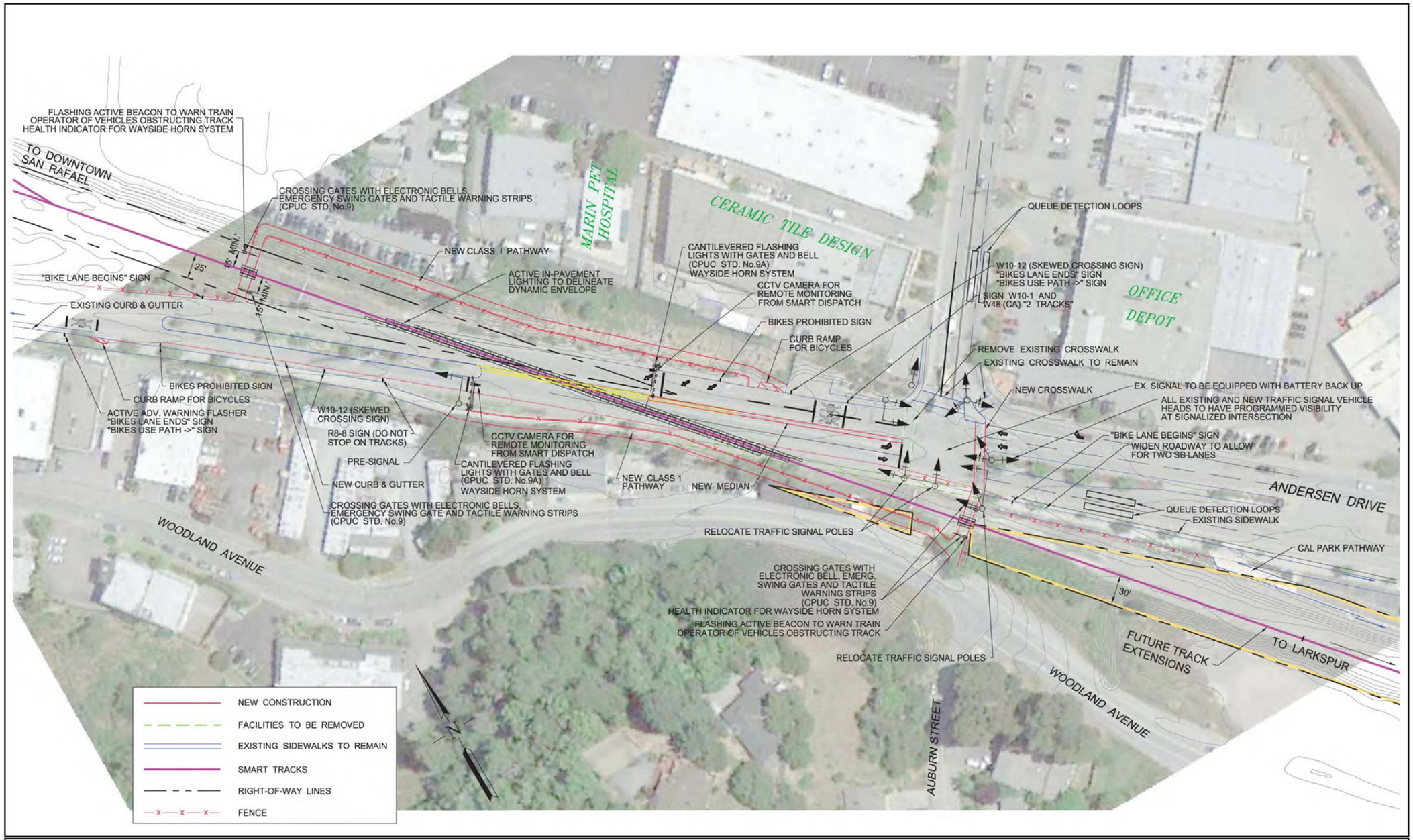
Details of these design features are provided next. Figure 2-5 provides a plan view of the proposed crossing.

Traffic Signals

The traffic signal controller at the intersection of Andersen Drive and West Francisco Boulevard would be interconnected with SMART's at-grade crossing warning system, which would provide the traffic controller with a period of advance preemption based on the City's calculations. After advance preemption is initiated by a train leaving San Rafael station southbound or Larkspur station northbound, the intersection of Andersen Drive and Francisco Boulevard West would enter preemption mode, which would finish all "Walk" and "Don't Walk" pedestrian phases sequentially, would shut down conflicting movements, and would give priority to southbound Andersen Drive to clear the tracks. At the same time, the pre-signal governing southbound traffic on the northern leg of Andersen Drive would prevent additional vehicles from entering the crossing area. The traffic signal would be equipped with battery backup, so that even in the event of a power outage, the signal would remain functional and all associated safety measures would remain in place.

Surveillance Cameras and Traffic Monitoring

In addition to SMART's camera system, the City would upgrade the existing system and would install new surveillance cameras on Andersen Drive and West Francisco Boulevard at strategic locations to monitor the traffic operations and queuing. The City also would implement a system to provide a direct connection between the Traffic Monitoring Center, located at the Department of Public Works, and each traffic signal controller and surveillance camera in the field for immediate communication and response.



SMART San Rafael-Larkspur Extension 6/26/2014
Figure 2-5: Anderson Drive Grade Crossing Plan View

Traffic Metering

The upstream intersection of Andersen Drive and DuBois Street would terminate southbound Andersen movements if the volume and the queues exceeded predetermined values, to meter additional traffic approaching the rail crossing.

Roadway Re-Striping and Storage

West Francisco Boulevard would be restriped from one to two lanes between Andersen and southbound US 101, and southbound Andersen Drive would be widened and striped to provide two lanes between Bellam Boulevard and West Francisco Boulevard. These additional lanes would provide emergency storage so that vehicles could proceed forward and clear the railroad crossing and adjacent intersection.

Coordination

The City would coordinate with Caltrans to provide preemption at the intersection of West Francisco Boulevard and southbound US 101. In the event that the queue detectors at southbound Andersen Drive were activated, the nearby Caltrans-maintained traffic signal would be preempted to give priority to eastbound West Francisco Boulevard and to ensure exit clearance for southbound Andersen Drive.

Pedestrian and Bicycle Facilities

The conceptual design separates bicycle and pedestrian facilities from the roadway and the railroad crossing, using signage and channelization fencing. In addition, pedestrian crossings have been planned for locations to the north and south of Andersen Drive, which are oriented at a 90-degree angle to the railroad. These at-grade pedestrian crossings would be equipped with tactile warning strips, automatic pedestrian gates and flashers, electronic bells, and emergency swing gates.

SMART Advance Preemption Interconnect with Andersen Drive Traffic Controller

To provide the City's traffic control system with sufficient advance notice to clear queues from the crossing during normal, non-emergency scenarios, SMART would implement Advance Preemption at Andersen Drive, along with the associated interconnect circuitry.

SMART Permanent 15 mph Speed Restriction through Andersen Drive

As a primary means of addressing the challenge associated with this location, SMART would modify the operation of commuter rail service to permanently restrict the speed of trains through and approaching the grade crossing to 15 miles per hour. When implemented, this speed restriction would be enforced by SMART's Positive Train Control system, so that any train would be forced to reduce speed well before it reached the near edge of the at-grade pedestrian crossings that are planned for the north and south sides of Andersen Drive. The clear sight distance approaching the crossings in both directions would be in excess of 1,000 feet, twice the distance required for the train to come to a full stop from 15 miles per hour. This restricted approach speed, combined with the clear sight distance to the crossing in both directions, would provide the train operator ample distance within which to bring the train to a stop in the event that the crossing was obstructed. Under this scenario, as SMART's train approached the crossing and reached the point where the operator would need to begin reducing speed, the on-board Positive Train Control equipment would emit an 85 decibel audible alert and would indicate the 15 miles per hour speed restriction. In the event that the operator did not comply with this speed restriction, the

onboard Positive Train Control equipment would institute an irrevocable penalty brake application and would bring the train to a complete stop before reaching the edge of the adjacent at-grade pedestrian crossing.

Enhanced Detection and Warning Systems

SMART is exploring the feasibility of using various methods of identifying and reporting unusual conditions at Andersen Drive to SMART's train operators. Although these methods have not been finalized, a preliminary list is as follows:

- Installation of a vehicle presence detection system within the queuing area at Andersen Drive, which would be used to activate wayside beacons to warn train operators of obstructions in the crossing.
- Installation of active in-pavement lighting to clearly delineate the trackway, which would be intended to assist train operators in determining the presence of a vehicular obstruction in the crossing area. Such a lighting system could be designed to flash and/or change color when a train was approaching the crossing.
- Installation of cameras with clear views of the queuing area, which would be monitored by SMART dispatch staff, who would issue emergency train handling orders in scenarios where traffic queues could not be cleared.

Operator and Dispatcher Training and Support

In support of these operational mitigations, SMART would develop and implement Special Operating Procedures (SOPs) and associated training for train operators and dispatch staff that would be specifically tailored to operations through Andersen Drive. In addition, all SMART operations staff would attend required retraining on these SOPs annually.

Trestle Bridges

Three wooden trestles are in place along the proposed alignment. These trestles were installed as part of the former NWP Railroad operation and have been out of use for several decades.

San Rafael Creek Trestle

The trestle at San Rafael Creek is in poor condition and would require complete replacement. In addition, the alignment would be shifted slightly downstream along this portion of the alignment, and the existing trestle is partially outside the planned alignment. Furthermore, because double tracking is proposed along this portion of the alignment, a second trestle would need to be installed at this location.

Based on design and construction experience at similar crossings along the IOS, SMART has determined that this crossing could be constructed as a single span, and that no piers would be needed inside the streambed. The existing abutments and retaining features that are located along both banks would remain in place during construction. Soil behind these existing features would be excavated, and new abutments would be constructed in the resultant void. After completing work on the new abutments, the former abutments and retaining features would be removed and the new bridge and trackwork would be laid across the stream on top of the new abutments. Constructing the new crossing in this manner would avoid construction work within the streambed. Some piles probably would need to be driven along the top-of-bank to secure the new abutments and carry bridge and train loads. In that case, cranes and associated equipment would be positioned alongside the streambank and

the piles would be driven in a typical fashion. Under normal conditions, approximately six to eight piles could be driven per day, usually to a depth of 50 to 80 feet, depending on subsurface conditions and design requirements.

The existing trestle would be removed, and the existing mid-stream piers would be cut 3 feet below stream bottom level. All creosote-treated materials associated with the old trestle and other removed features would be taken from the site and disposed of at an approved facility.

Unnamed Channel Trestle

The second trestle, located between Rice Drive and Andersen Drive, also would require replacement. The crossing is approximately 20 feet wide at the trestle location. As with the replacement trestle at San Rafael Creek, the existing abutments and retaining features that are located along both banks would remain in place during construction. Soil behind these existing features would be excavated, and new abutments would be constructed in the resultant void. After completing work on the new abutments, the old abutments and retaining features would be removed and the new bridge and trackwork would be laid across the stream on top of the new abutments. Constructing the new crossing in this manner would avoid construction work within the streambed.

Woodland Avenue/Bellam Boulevard Trestle

The trestle that crosses Woodland Avenue/Bellam Boulevard was constructed in the 1920s and lacks sufficient vertical and horizontal clearance to accommodate modern traffic. An impact by a truck or other heavy vehicle could seriously damage the structure, and evidence on the current structure indicates that such impacts have occurred in the past. To remedy this condition, a new trestle of modern design would be required. The new trestle would be constructed in accordance with approved SMART standards for trestles of this type.

Cal Park Hill Tunnel

The Cal Park Hill Tunnel was originally constructed to facilitate NWP Railroad operations but was closed for several decades following the cessation of rail operations in the area. The tunnel was reopened and rehabilitated in 2010, to accommodate a multi-use pathway and future SMART rail service. The rehabilitation included structural improvements, relining of the tunnel surface, drainage improvements, and the installation of a multi-use pathway and lighting. The tunnel was divided lengthwise by a concrete partition, with one side occupied by the pathway and the other side containing the SMART railbed. With the exception of track installation, the tunnel essentially is ready for rail operations and would require minimal improvements to be prepared for that purpose. After the rails were installed, the tunnel would provide SMART rail use and the multi-use pathway, with the two uses separated by the aforementioned concrete partition.

Larkspur Station

The proposed Larkspur Station would have boarding platforms that would extend the full length of the passenger boarding area, permitting level boarding to accessible cars of all trains stopping at the station. The station would be equipped with a shelter, lighting, and other amenities such as signage, schedules, bike lockers, leaning bars, information kiosks, and ticket vending machines. Adequate space for bus, van and shuttle, and taxicab and passenger vehicle drop-off also would be provided. See Figure 2-6 for the conceptual station site plan.

Passengers would enter and exit the station area via a stairway leading to the Century Theaters' Larkspur Landing movie theater parking lot. SMART would acquire an easement for construction of the stairway. Because the existing

Cal Park Hill multi-use pathway would be integrated into the station's design, passengers also could use the existing sloped pathway to enter and leave the station. All station facilities would be Americans with Disabilities Act (ADA) compliant.

A tailtrack would extend beyond the platform to provide storage for rail vehicles. Following the morning commute period, vehicles would be stored on the tailtracks and staged for later use during the evening commute period. Beyond the tailtrack, a parking area would be provided with approximately 70 parking spaces. Up to six additional disabled-accessible parking spaces would be located closer to the platform.

The Proposed Action does not include work on the Downtown San Rafael Station . That station is to be constructed as part of the IOS and is not a part of the Proposed Action. Work related to the Proposed Action begins at the northern curb of Third Street in Downtown San Rafael, immediately south of the future Downtown San Rafael Station.

Rail Vehicles

Diesel multiple units (DMUs) are the types of rail vehicles that would be used for the SMART passenger rail system. DMUs are rail cars that contain their own propulsion units, with each car served by a separate diesel engine below the respective car's passenger compartment. Because each rail car would be self-propelled, no large locomotive engine would be required for these passenger trains. DMUs are quieter and use less fuel compared to a locomotive-hauled train system. In addition, DMUs are shorter in length than trains with a locomotive-hauled system, which is critical to accommodate the block lengths in downtown areas such as San Rafael. DMUs also are capable of running in the reverse direction, with dual cab, train set configurations, eliminating the need for turnaround tracking or rail turntables.

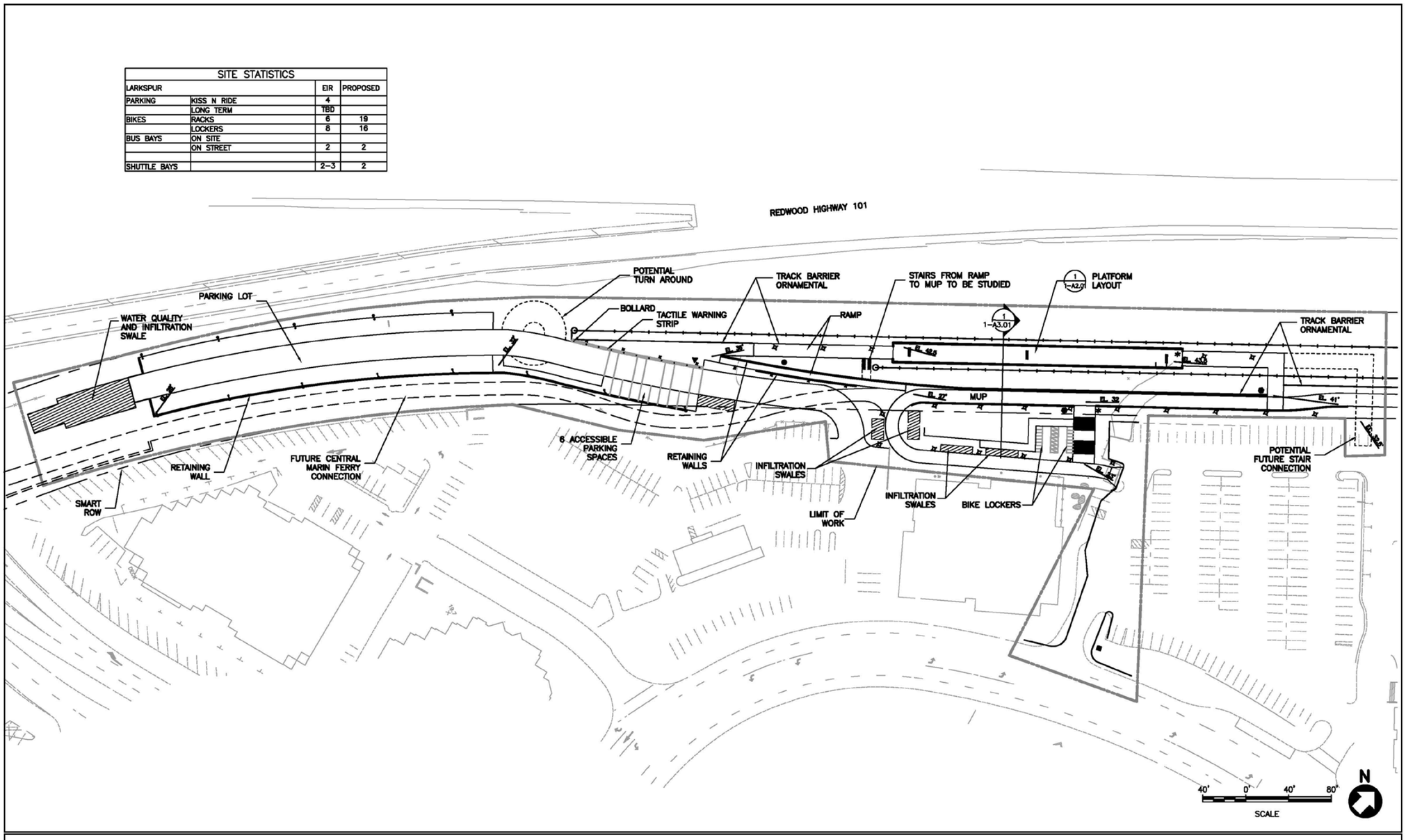
The SMART train fleet would consist of single-level DMUs, approximately 85 feet long, 10 feet wide, and 15 feet high. Vehicle capacity would be approximately 90 passengers per rail car. All cars would be powered by either one engine in a single car that in combination with a second car with a single engine would form two-car trains, or a single car that would have an engine at either end (double cab unit) that would operate as a one-car train. In either case, trains could travel in both directions without needing to turn around.

Construction

Because the railway is an existing facility, construction activities associated with the implementation of passenger rail service would include rehabilitation of the existing track, improvements to grade crossings, replacement and/or rehabilitation of existing trestles, installation of a new signal system, and construction of the new rail passenger station at Larkspur.

Construction would begin in 2015, which would allow the existing work on the locally-funded SMART project occurring at the Downtown San Rafael Station and further to the north to continue uninterrupted southwards to Larkspur. Rehabilitation of the railway and the installation of associated components are expected to take approximately 6 months, depending on the time of year that construction begins. If construction activities are interrupted by periods of heavy rain, the overall construction timeline could be lengthened accordingly, up to a total construction period of 12 months.

SITE STATISTICS			
LARKSPUR		EIR	PROPOSED
PARKING	KISS N RIDE	4	
	LONG TERM	TBD	
BIKES	RACKS	6	19
	LOCKERS	8	16
BUS BAYS	ON SITE		
	ON STREET	2	2
SHUTTLE BAYS		2-3	2



SMART San Rafael-Larkspur Extension
Figure 2-6: Larkspur Station Conceptual Plan

6/26/2014

Trackwork would consist of replacement of ballast, ties, rail and other track material in place. Most work would be completed with rail-mounted equipment, and all access for construction work would be within the railroad ROW. Excavation of the existing track bed typically would not exceed the depth of the existing ties.

At-grade crossing rehabilitation would include removal of the existing track, roadway, and old signals, and the installation of new track and crossing panels, new roadway approaches, drainage improvements, and new signal protection, including signal system software. Construction work would be coordinated with the cities of San Rafael and Larkspur regarding the grade crossing shutdown schedule (if required) and traffic detour plans. Temporary detours related to construction activities would occur but would be short-lived and generally would not occur during peak traffic periods.

The replacement of the existing trestle over San Rafael Creek, as well as the construction of the new trestle at the unnamed channel crossing, would take place from alongside the creekbeds. Because the new and replacement trestles would be single span, no pile driving or similar activities would be required within the creekbed itself, although some piles may need to be driven along the top-of-bank, to properly support the abutments and carry bridge and train loads. The trestle that crosses Woodland Avenue/Bellam Boulevard would require full replacement, and some night work and limited street closures would be required during certain phases of the construction.

Roadway and at-grade crossing work at West Francisco Boulevard and Andersen Drive also could require occasional night work and/or street closures. Based on experience constructing similar crossings along the IOS, the needed time for a closure would not be likely to exceed 48 hours.

Construction activities along the alignment would include the use of heavy equipment for excavation, trenching, grading in roadway preparation, and soil compaction. Equipment and vehicles to be used during construction could include excavators, mini-excavators, tamping equipment, cranes, pile drivers, perhaps a small bulldozer, and dump trucks. Some of the rail-specific equipment would be trucked to the site, placed on rails, and then moved down the tracks as construction proceeded.

Because the proposed Larkspur Station site is located on the edge of existing commercial uses, street closures and other potential disruptions would not be required during station construction. Before the start of construction, an initial mobilization of equipment, construction office space, delivery and storage of construction materials, and the erection of perimeter fencing around the site for public safety and security would occur.

Construction materials, such as clean soils for stockpiling, drainage piping, and concrete, would be delivered to the construction site. Some relocation of existing utilities, possibly both underground and aboveground, as well as the installation of new or upgraded utilities could be required.

Activities associated with the construction of building and structure foundations would require equipment for excavation, trenching, and other activities. During this period, the delivery of building materials would be required. Landscaping also would occur and would include the installation of items such as soils and backfilling materials, trees, shrubs, and other planting materials, as well as irrigation and other piping materials.

Operation

The locally-funded portion of the SMART project, from the Downtown San Rafael Station northwards to Santa Rosa, is currently under construction and is expected to begin revenue service in 2016. The Proposed Action, having started construction later, would probably not be available for revenue service until the following year.

Once operational, trains are expected to operate every 30 minutes in both directions during peak periods (see below for details related to peak periods). Because the trains would be relatively short, they would be able to clear intersections relatively quickly, resulting in less traffic disruption on surface streets. A two-car train moving at 15 miles per hour would be expected to clear a six-lane intersection in approximately 11 seconds. With crossing gate movement delays before and after each crossing, street blockage at crossings would be expected to total approximately 35 seconds. The exception to this would be at Andersen Drive, where the long, acute angle of the crossing and the necessary times to ensure clearance of the intersection could require closures for as long as 2 minutes.

To further improve traffic flow, the rail crossing signal system would be integrated with local, centralized traffic signal operations, which would electronically coordinate traffic lights with grade-crossing signals. This system would minimize delays, pre-empt conflicting traffic movements, provide progression (ongoing flow) of non-conflicting traffic movements, and allow faster recovery of the traffic signal system after a train passed.

Train Horns at Grade Crossings

Per 49 CFR Part 222.21, SMART's train operators would be required to sound their horns at each of the four at-grade crossings. The rule would require operators to sound their horns at least 15 seconds, and no more than 20 seconds, in advance of all public grade crossings. Train horns would be required to be sounded in a standardized pattern of two long, one short, and one long blast. The pattern would need to be repeated or prolonged until the train occupied the at-grade crossing. The rule does not stipulate the durations of long and short blasts. Per the regulation, the maximum volume level for the train horn would be 110 decibels, with the minimum volume level being 96 decibels.

All four of the at-grade crossings are located in the City of San Rafael. All SMART at-grade crossings are designed to be "Quiet Zone Ready," meaning that they contain the required gates, signals, and other infrastructure required for Quiet Zone approval by the FRA. The City is exploring the possibility of applying for an exemption to the horn requirement under FRA's Quiet Zone Establishment Process. At the time of this writing, however, it cannot be determined whether the City would apply for the exemption. Regardless, even if the City were to apply, it cannot be predicted with certainty that FRA would grant the exemption. Therefore, as part of the Proposed Action, the rule presumably still would apply, and SMART trains would be required to sound their horns at each crossing. Options to lessen the effects of train horn noise are discussed in in Section 3.10, Noise and Vibration, of this EA.

Service Timetable

Weekday Service

Weekday service from Santa Rosa to Larkspur currently is envisioned to operate on 30-minute headways in both southbound and northbound directions. The travel time between the Santa Rosa area and Larkspur would be

approximately 1 hour and 10 minutes. The travel time between the Downtown San Rafael and the Larkspur stations would be approximately 3 minutes.

Southbound service would begin in the Santa Rosa area at approximately 5:00 a.m., running every 30 minutes thereafter until approximately 8:30 a.m. A mid-day train would depart Santa Rosa at approximately 1:00 p.m. Afternoon southbound service would recommence at approximately 4:00 p.m. and would run every 30 minutes until approximately 6:00 p.m. The final southbound train would depart Santa Rosa at approximately 6:00 p.m., arriving at Larkspur shortly after 7:00 p.m.

Northbound service would begin at Larkspur at approximately 6:30 a.m., continuing every 30 minutes until approximately 8:30 a.m. A mid-day train would leave Larkspur around noon. Evening service would begin shortly before 4:00 p.m., departing every 30 minutes thereafter until approximately 7:30. The final northbound train would depart from Larkspur just before 7:30 p.m., arriving at Santa Rosa shortly after 8:30 p.m. Following the morning commute period, vehicles would be stored on the tailtracks at Larkspur Station for later use during the evening commute period. Weekend and Holiday Service

Weekend service is currently envisioned to operate on 3-hour headways and would be likely to operate using a single crew over a 12-hour service period. Accordingly, southbound trains would leave Santa Rosa at approximately 7:00 a.m., then every 3 hours thereafter (i.e., 10 a.m., 1 p.m., and 4 p.m.). Northbound trains would depart from Larkspur at approximately 8:30 a.m., 11:30 a.m., 2:30 p.m., with a final train departing at 5:30 p.m., arriving in Santa Rosa shortly before 7 p.m.

Measures Previously Committed to for the Reduction of Project Effects

The 2005 EIR and the 2008 Supplemental EIR both prescribed mitigation measures that would be implemented during the construction and operation of all phases of the SMART project. These measures have been incorporated into the SMART project's construction and operation protocols and, where applicable, would be incorporated into the Proposed Action to mitigate any potential effects. Both EIRs and the mitigation measures prescribed therein are incorporated by reference in this EA. Applicable EIR mitigation measures are included with each topical discussion sections in Chapter 3 of this EA. Additional mitigation measures specific to the Proposed Action also may be prescribed as part of FTA's decision on the Proposed Action.

Safety and Security

The U.S. Department of Homeland Security (DHS) works with local rail districts to assess security risks and response capabilities for all operating rail lines. Working with FTA, DHS would conduct a comprehensive vulnerability assessment of the SMART rail corridor. Following this assessment, a security plan would be developed by SMART and would be reviewed by DHS.

Substantial safety and security enhancements have already been incorporated into the locally-funded portion of the SMART project, and those same enhancements and design features would be applied to the Proposed Action. These features are described below.

Passenger Safety

Before the start of passenger service between Downtown San Rafael and Larkspur, SMART would submit appropriate safety and security plans to CPUC for approval, in accordance with CPUC General Order 164-D. Consistent with other transit systems operating throughout the U.S., SMART train operators would have primary responsibility for the safety of their passengers. Train operators would be able to contact system administration or SMART's emergency services for assistance, if needed, and would be able to modify train operations as appropriate. SMART staff and assigned law enforcement personnel also would be available, either at stations or as part of standard patrols, to provide assistance in maintaining passenger safety and security. SMART also would publish safety brochures and make safety presentations at schools, businesses, and community facilities to educate the public regarding safe riding protocol. Appropriate placards containing safety information would be posted on SMART vehicles and at stations to inform passengers of safety precautions and procedures. Closed-circuit-television monitoring systems would be installed on trains and at stations, as would "blue box" passenger alarm systems that could be activated in the event of an emergency.

Fire Protection Service

SMART would rely on the San Rafael Fire Department and Larkspur Fire Department for emergency response and fire safety for the Proposed Action. Before the start of the proposed rail service, training would be provided by SMART to both departments. Training would include vehicle construction for extrication operations, hazard recognition and abatement, and special firefighting tactics. SMART would assure that fire service personnel and equipment would have maximum access to SMART facilities when responding to emergency incidents. All materials used in construction of SMART vehicles would be evaluated for fire resistance, and the appropriate fire suppression methods would be provided to the fire departments.

Police Service

SMART would rely on local police and County sheriff personnel for law enforcement service on a contract basis. These agencies could dedicate specific personnel to the SMART transit system, or they could respond to calls as needed. SMART also may contract with a private security firm to provide a security presence at stations and along the proposed rail alignment. Fare inspectors also would be part of system security and would serve as additional surveillance to deter crime. Furthermore, roving security checks by contracted law enforcement officers or private security personnel would be a part of system security.

Emergency Response

Construction

The potential for temporary delays would exist in response times of fire and police vehicles because of increased traffic congestion and/or road closure during construction activities on at-grade crossings. Although road closures would be limited and of short duration, emergency vehicles may need to alter their routes to avoid those areas when construction is occurring. The number of delays would vary, depending on location, type of improvement, and surrounding conditions (e.g., traffic demands, access, and pedestrian activity). SMART would notify local emergency service providers before beginning construction activities regarding road closures and would coordinate with local protection service providers to establish alternative routes and post appropriate signage.

SMART has adopted such procedures for the locally-funded portion of the SMART project, currently under construction, and these same procedures would be implemented as part of the Proposed Action.

Operation

As discussed previously, weekday transit service between Santa Rosa and Larkspur is envisioned to operate on 30-minute headways in both southbound and northbound directions during AM and PM peak periods. Weekend service would operate on 3-hour headways.

Paramedic, fire, and police service providers could experience delays when approaching at-grade crossings, if a passenger rail train was present and the gates were down. Safe operating procedures require emergency responders to stop before at-grade crossings when the gates are in the down position, and to wait for trains to clear the crossing before proceeding. This may result in travel delays on average of about 40 seconds at the Third Street, Second Street, and Rice Drive crossings, and perhaps as much as 1.5 minutes at the Andersen Drive crossing.

Train operators may minimize emergency vehicle delays by remaining stopped at station platforms when emergency vehicles are in the area, slowing down or stopping to permit emergency vehicles to pass the train, or to proceed as quickly as possible through the crossing. In addition, if conditions allow, emergency vehicles could attempt a "queue jump" maneuver that would allow them to move to the front of the vehicle queue and immediately pass through when the gates were raised. In the event that a grade crossing was blocked because of a train-related incident, emergency aid may be required from fire or police stations or from a neighboring jurisdiction, until the crossing was clear.

Safety and Security at Larkspur Station

The planned Larkspur Station would create a new activity center with increased pedestrian activity, passenger drop-offs and loadings, and bicycle traffic. These conditions would increase the potential for safety and/or security incidents at and in the vicinity of the station. In general, the activities at the station would require mixed circulation of autos and pedestrians in parking and drop-off areas, with an increased potential for auto-pedestrian conflicts, primarily during busy peak periods. The safety and security of SMART passengers using station facilities would be a concern during all time periods, although AM and PM peak periods would be the periods for greatest concern because of the higher levels of activity.

Before the start of passenger service, SMART would submit appropriate safety and security plans to CPUC for approval, in accordance with CPUC General Order 164-D. SMART stations are being designed to be open and well demarcated for pedestrian access. Sidewalks and pedestrian paths through parking areas would help separate pedestrian traffic from auto and bus traffic. Fencing or other barriers would be provided to direct pedestrian movements appropriately. Special provisions would be made for pedestrian access to station platforms. Pathways of travel for disabled individuals would be maintained and would conform with relevant federal regulations (e.g., compliance with the Americans with Disability Act). The station platform and nearby areas would be well lighted. Passenger drop-off and loading would be allowed only in designated areas.

SMART would rely on local police and County sheriff personnel for law enforcement services on a contract basis. These agencies could dedicate specific personnel to the SMART transit system, or they could respond to calls as needed. SMART also may contract with a private security firm to provide security at stations. Fare inspectors also would be part of system security and would serve as additional surveillance to deter crime. Furthermore, roving

security checks by contracted law enforcement officers or private security personnel also would be a part of system security.

Acquisitions and Displacements

No property displacements or relocations would be required as part of the Proposed Action. The ROW is owned and controlled by SMART, and no additional ROW acquisition would be required. A small easement near the Century Park Theater in Larkspur would be required to accommodate the proposed stairway from the station to street level (see Figure 2-3, photo 20). This area would measure approximately 20 feet in length and 10 feet in width, and would not displace any existing uses. The acquisition could be obtained via full purchase by SMART or by the granting of an easement by the property owner.

Some encroachment onto the ROW has occurred over the years. In most cases, this encroachment has been negotiated with and authorized by SMART as a temporary use. This is the case with the automobile dealership storage lots that use portions of the ROW near West Francisco Boulevard. The dealerships occupy the ROW via a temporary encroachment agreement with SMART, and they are aware that their use of the ROW is temporary and would terminate on construction of the Proposed Action.

Project Cost

The Downtown San Rafael to Larkspur Extension is expected to have an estimated cost of approximately $40,170,000, as shown in Table 2-2.

Table 2-2: SMART Downtown San Rafael to Larkspur Extension Estimated Costs (2014 dollars)

Project Component	Cost Estimate
Guideway and Track Elements	12,310,025
Larkspur Station	3,250,000
Sitework and Special Conditions	7,185,525
Systems and Signals	8,362,900
Professional Services	9,061,650
Total Estimated Project Costs	**$40,170,000**

Expenditure of funds during the construction period is shown in Table 2-3.

Table 2-3: Costs in Year of Expenditures

Cost (2014 Dollars)	Year 1 Expenditure	Year 2 Expenditure	Year 3 Expenditure	Total Cost (YOE)
40,170,000	1,000,000	29,579,000	11,954,000	42,533,000
Inflation Assumption	*0.0%*	*5.0%*	*3.5%*	

Funding for the Proposed Action would derive from a number of sources, as shown in the Table 2-4.

Table 2-4: Proposed SMART Downtown San Rafael to Larkspur Extension Funding Sources

Funding Source	Amount (millions)
Local/Regional	20,000,000
FTA New Starts/Small Starts	22,533,000
Total	**$42,533,000**

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3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the affected environment and addresses the social, economic, and environmental consequences of the Proposed Action with respect to 14 environmental topic areas. The discussions of the affected environment include the existing physical conditions, or the baseline conditions, within the area of the Proposed Action. Generally, the baseline used for the analysis of environmental effects under NEPA reflects the conditions present at or about the time the EA was begun.

The area, or region of influence, is defined for each environmental topic based on the extent of physical resources that may be affected directly or indirectly by the Proposed Action, applying appropriate guidelines of regulatory agencies or common professional practice. Table 3-1 summarizes the environmental topic areas and associated regions of influence described in this EA.

Table 3-1: Environmental Issues and Region of Influence for the Proposed Action

Environmental Issue	Region of Influence
Air Quality	San Francisco Bay Area Air Basin
Biological Resources	Project sites and contiguous fish and wildlife habitats
Cultural Resources	Project sites
Energy	Project sites and San Francisco Bay Area
Geology and Soils	Project sites and San Francisco Bay Area
Greenhouse Gas Emissions	Global
Hydrology and Water Quality	Project sites and associated subbasins
Land Use	Project sites and adjacent land uses
Noise and Vibration	Project sites and traffic study areas
Safety and Security	Project sites and contiguous communities
Socioeconomics and Environmental Justice	Communities contiguous with the project sites and San Francisco Bay Area
Solid and Hazardous Materials	Project sites and surrounding areas
Transportation	Cities of San Rafael and Larkspur in the vicinity of the project sites
Visual Resources	Project sites and viewsheds to/from the project sites

The potential effects of the Proposed Action are compared with future No Action conditions for each environmental topic area.

Each of the two alternatives (i.e., the No Action Alternative and the Proposed Action Alternative) is analyzed from the viewpoint of these 14 environmental topic areas. Indirect effects are discussed only for those topics where they would have the potential to occur (e.g., air quality, biological resources, cultural resources).

Effects are analyzed and the findings are included in this EA, applying the following levels of significance:

- Adverse Effect
- No Adverse Effect with Mitigation
- No Adverse Effect
- No Effect
- Beneficial Effect

Adverse effects are defined in terms of context and intensity. Context is related to the uniqueness of an environmental resource. Intensity refers to the severity of the effect. Best management practices are incorporated into the Proposed Action to limit the potential for an adverse effect. Where necessary, mitigation measures are identified for adverse effects to limit the degree or magnitude of the action; to rectify the effect by repairing, rehabilitating, or restoring the affected environment; or to compensate for the effect by replacing or providing substitute resources or environments.

Common acronyms (i.e., CEQA, EA, EIR, NEPA, SMART, US 101) are not defined beyond Chapter 2 in this EA. A list of all acronyms used in the EA is included following the Table of Contents.

3.1 AIR QUALITY

This section presents an assessment of the Proposed Action's potential air quality effects. The Proposed Action construction and operational emissions would contribute to existing air quality conditions on a regional and local level. Previous analysis for air quality was undertaken for the entire SMART project as part of the 2005 EIR (SMART 2005) that was prepared as per CEQA (Section 3.5 of the 2005 Draft EIR).

Air quality in the San Francisco Bay Area Air Basin (SFBAAB) is regulated at the federal level by the U.S. Environmental Protection Agency (EPA), at the State level by the California Air Resources Board (ARB), and at the local level by the Bay Area Air Quality Management District (BAAQMD). Each of these agencies has developed rules, regulations, and policies to comply with applicable legislation. Although EPA regulations may not be superseded, both State and local regulations may be more stringent.

3.1.1 Clean Air Act and Clean Air Act Amendments

At the federal level, EPA has been charged with implementing national air quality programs. EPA's air quality mandates are drawn primarily from the federal Clean Air Act (CAA), enacted in 1970. The most recent major amendments were made by Congress in 1990.

The CAA required EPA to establish primary and secondary National Ambient Air Quality Standards (NAAQS) (Table 3.1-1). The CAA also required each state to prepare an air quality control plan, referred to as a state implementation plan (SIP). The federal Clean Air Act Amendments (CAAA) added requirements for states with nonattainment areas to revise their SIPs, for incorporating additional control measures to reduce air pollution. The SIP is to be modified periodically, to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins as reported by their jurisdictional agencies. EPA has responsibility for reviewing all SIPs, to determine conformation to the mandates of the CAAA and determine whether implementation will achieve air quality goals. If EPA determines a SIP to be inadequate, a federal implementation plan (FIP) that imposes additional control measures may be prepared for the nonattainment area. Failure to submit an approvable SIP or failure to implement the plan within the mandated time frame may result in application of sanctions to transportation funding and stationary air pollution sources in the air basin.

3.1.2 Clean Air Act Amendments General Conformity Rule

General conformity requirements were adopted by Congress as part of the CAAA and were implemented by EPA regulations in the November 30, 1993 Federal Register (40 Code of Federal Regulations [CFR] Sections 6, 51, and 93: "Determining Conformity of General Federal Actions to State or Federal Implementation Plans; Final Rule"). General conformity requires that all federal actions conform to the SIP as approved or promulgated by EPA, by determining that the action is either exempt from the General Conformity Rule requirements or subject to a formal conformity determination.

The purpose of the conformity program is to ensure that actions taken by the federal government do not undermine state or local efforts to achieve and maintain NAAQS. Before a federal action is taken, it must be evaluated for conformity with the SIP. All reasonably foreseeable emissions, both direct and indirect, predicted to

Table 3.1-1: Summary of Ambient Air Quality Standards and Attainment Designations (SFBAAB)

Pollutant	Averaging Time	California Standards (CAAQS) Standards [b,c]	California Standards (CAAQS) Attainment Status [d]	National Standards (NAAQS)[a] Primary [c,e]	National Standards (NAAQS)[a] Secondary [c,f]	National Standards (NAAQS)[a] Attainment Status [g]
Ozone (O_3)	8-hour	0.070 ppm (137 µg/m^3)	**Nonattainment**	0.075 ppm (147 µg/m^3)	Same as Primary	**Nonattainment**
Ozone (O_3)	1-hour	0.09 ppm (180 µg/m^3)	**Nonattainment**	–	–	–
Carbon Monoxide (CO)	8-hour	9.0 ppm (10 mg/m^3)	Attainment	9 ppm (10 mg/m^3)	None	Attainment [h]
Carbon Monoxide (CO)	1-hour	20 ppm (23 mg/m^3)	Attainment	35 ppm (40 mg/m^3)	None	Attainment [h]
Nitrogen Dioxide (NO_2)	1-hour	0.18 ppm (339 µg/m^3)	Attainment	0.100 ppm (188 µg/m^3)	None	Unclassified
	Annual	0.030 ppm (57 µg/m^3)	–	0.053 ppm (100 µg/m^3)	Same as Primary	Attainment
Sulfur Dioxide (SO_2)	24-hour	0.04 ppm (105 µg/m^3)	Attainment	0.14 ppm (365 µg/m^3)	–	Attainment
Sulfur Dioxide (SO_2)	1-hour	0.25 ppm (655 µg/m^3)	Attainment	0.075 ppm (196 µg/m^3)	–	Attainment
Sulfur Dioxide (SO_2)	Annual	-	–	0.03 ppm	–	Attainment
Particulate Matter (PM_{10})	Annual	20 µg/m^3	**Nonattainment**	–	–	–
	24-hour	50 µg/m^3	**Nonattainment**	150 µg/m^3	Same as Primary	Unclassified
Fine Particulate Matter ($PM_{2.5}$)	Annual	12 µg/m^3	**Nonattainment**	12.0 µg/m^3	15 µg/m^3	Attainment
Fine Particulate Matter ($PM_{2.5}$)	24-hour	-	–	35 µg/m^3	Same as Primary	**Nonattainment**
Lead (Pb)	30-day Average	1.5 µg/m^3	–	–	–	Attainment
Lead (Pb)	Quarterly	-	–	1.5 µg/m^3	Same as Primary	Attainment
Lead (Pb)	Rolling 3-month Average	-	–	0.15 µg/m^3	Same as Primary	–

Notes:
ppm = parts per million; µg/m3 = micrograms per cubic meter; mg/m3 = milligrams per cubic meter

a National standards (other than ozone, particulate matter, and those standards based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. The PM10 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m3 is equal to or less than 1 day. For PM2.5, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. The NO2 standard is attained when the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area does not exceed 0.100 ppm (effective January 22, 2010).

b California standards for ozone, CO (except Lake Tahoe), NO2, and particulate matter are not to be exceeded. All others are not to be equaled or exceeded.

c Concentrations are expressed first in units in which they were issued (i.e., ppm or µg/m3). Equivalent units given in parentheses are based on a reference temperature of 25 degrees Celsius (°C) and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

d Unclassified (U): The data are incomplete and do not support a designation of attainment or nonattainment.
Attainment (A): The State standard for that pollutant was not violated at any site in the area during a 3-year period.
Nonattainment (N): There was at least one violation of the State standard for that pollutant in the area.

e National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

f National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

g Nonattainment (N): Any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.
Attainment (A): Any area that meets the national primary or secondary ambient air quality standard for the pollutant.
Unclassifiable (U): Any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

h In April 1998, the San Francisco Bay Area Air Basin was redesignated to attainment for the national 8-hour carbon monoxide standard. The region is currently classified as an attainment/maintenance area.

Sources: ARB 2013; BAAQMD 2014

result from the action are taken into consideration and must be identified with respect to location and quantity. Direct emissions occur at the same time and place as the action. Indirect emissions are reasonably foreseeable emissions that may occur later in time and/or farther removed from the action; they are subject to conformity if the federal agency can control them practicably and maintain control through a continuing program responsibility.

General conformity applies in both federal nonattainment and maintenance areas. Within these areas, it applies to any federal action not specifically exempted by the CAA or EPA regulations. General conformity does not apply to projects or actions that are covered by the transportation conformity rule. However, certain transportation projects can involve Federal actions that require the evaluation of both general conformity and transportation conformity requirements.

Transportation Conformity

Transportation conformity ("conformity") is a way to ensure that federally funded transportation projects are consistent with air quality goals. Approval, funding, and implementation of FTA projects is subject to transportation conformity regulations under the CAA (40 CFR 93, Subpart A). FTA projects are defined in the transportation conformity rule as "any highway or transit project which is proposed to receive funding assistance and approval through the Federal Aid Highway program or the Federal mass transit program, or requires Federal Highway Administration (FHWA) or Federal Transit Administration (FTA) approval for some aspect of the project, such as connection to an Interstate highway or deviation from applicable design standards on the interstate system."

The U.S. Department of Transportation (USDOT) and USEPA developed guidance for determining conformity of transportation plans, programs, and projects. In areas that are nonattainment or maintenance for CAPs, a project level conformity determination must show that the project comes from a conforming Regional Transportation Plan (RTP) and Transportation Improvement Program (TIP). If the design concept and scope of a proposed transportation project are consistent with the project description in the applicable RTP and TIP and the assumptions in the regional emissions analysis for the RTP and TIP, then the project would conform to the SIP, and no adverse effect would occur as a result of the Proposed Action.

Rule on Control of Hazardous Air Pollutants from Mobile Sources

In February 2007, EPA finalized a rule to reduce HAPs from mobile sources (Control of Hazardous Air Pollutants from Mobile Sources, February 9, 2007). The rule limits the benzene content of gasoline and reduces toxic emissions from passenger vehicles and gas cans. EPA estimates that in 2030, this rule will reduce total emissions of mobile source air toxics by 330,000 tons and VOC emissions (precursors to O_3 and $PM_{2.5}$) by more than 1 million tons. Other recent and future milestones include the low-sulfur diesel fuel requirement, and tighter emissions standards for heavy-duty diesel trucks (2007) and off-road diesel equipment (2011) nationwide.

3.1.3 Affected Environment

The Proposed Action ROW is located in southern Marin County, which is part of the SFBAAB. The SFBAAB encompasses all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara counties; the southern portion of Sonoma County; and the southwestern portion of Solano County.

The SFBAAB is characterized by complex terrain, consisting of coastal mountain ranges, inland valleys, and bays that affect wind flow patterns. The climate is dominated by the strength and location of a semi-permanent, subtropical high-pressure cell, and results in cool, damp summers and mild, rainy winters. The greatest distortions to normal wind flow occur when low-level inversions are present and the air beneath the inversion flows independently of air above the inversion, a condition that is common in the summer. During these summertime inversions, pollutant concentrations can build to unhealthy levels within the inversion layer because of the lack of dispersion.

Properties, Effects, and Sources of Criteria Pollutants

EPA currently focuses on the following CAPs as indicators of ambient air quality: O_3, CO, nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM), and lead (Pb). Because these are the most prevalent air pollutants known to be deleterious to human health and extensive health-effects criteria documents are available, these pollutants commonly are referred to as CAPs. The federal CAA requires EPA to set outdoor air quality standards for the nation. EPA has established primary and secondary NAAQS for the criteria pollutants; for PM, standards have been established for respirable particulate matter (PM_{10}) and $PM_{2.5}$. The primary standards protect public health and the secondary standards protect public welfare.

EPA also permits states to adopt additional or more protective air quality standards if needed. The ARB has established California ambient air quality standards (CAAQS) for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing PM, in addition to the above-mentioned CAPs. In most cases, the CAAQS are more stringent than the NAAQS. In addition, the same CAPs are subject to a general conformity review if the region where the action is taking place has been designated a nonattainment or maintenance area (see Local Air Basin Attainment Status section below). The CAAQS and NAAQS are listed in Table 3.1-1 and are described in the narrative text that follows the table.

Ozone

O_3 is a gas that is not directly emitted into the atmosphere but is formed when reactive organic gases (ROGs) and NO_x, both byproducts of combustion, undergo photochemical reactions in the presence of sunlight. ROGs also can originate from the evaporation of chemical solvents or fuels. O_3 concentrations generally are highest during summer, when maximum solar isolation and warm temperatures are conducive to O_3 formation. Because of the reaction time involved in forming O_3, peak concentrations often are found many miles downwind from their precursor emissions. As a result, O_3 is known as a regional pollutant, which has concentrations that are homogeneously spread throughout an airshed.

Carbon Monoxide

CO is a colorless, odorless gas produced by the incomplete combustion of fuels, primarily from transportation sources. Wood-burning stoves, incinerators, and other industrial processes represent other sources of CO. Concentrations of CO tend to be the highest during winter mornings, when light winds and surface-based inversions trap the pollutant at ground levels. Because the primary source of CO occurs from motor vehicles operating at slow speeds, the highest ambient CO concentrations generally are found near congested transportation corridors and intersections. In contrast to O_3, which has regional effects, the impacts of CO are localized.

Nitrogen Dioxide

NO_2 is a brownish, highly reactive gas that is present in all urban environments. The major human-made NO_2 sources are combustion devices, such as boilers or turbines, and internal combustion engines, such as automobile or generator engines. Combustion devices emit primarily nitrogen oxide (NO), which reacts through oxidation in the atmosphere to form NO_2. Nitrogen oxide and NO_2 are referred to collectively as NO_x. As NO_2 is formed and depleted by photochemical reactions in the atmosphere, NO_2 concentrations in a particular geographical area may not be representative of the local NO_x emissions sources.

Particulate Matter

PM_{10} and $PM_{2.5}$ consist of extremely small, suspended particles or droplets 10 microns and 2.5 microns or smaller in diameter, respectively. Some sources of particulate matter, like pollen, forest fires, and windblown dust, are naturally occurring. However, in populated areas, most particulate matter is caused by road dust, combustion products, abrasion of tires and brakes, and construction activities. Particulate matter also can be formed in the atmosphere by chemical conversion of NO_x, SO_2, and ROGs.

Local Air Basin Attainment Status

As identified in Table 3.1-1, Marin County and the SFBAAB are designated nonattainment for:

- O3 (8-hour) CAAQS and NAAQS standards;
- O3 (1-hour) CAAQS standard;
- PM10 (annual and 24-hour) CAAQS standards;
- PM2.5 (annual) CAAQS standards; and
- $PM_{2.5}$ (24-hour) NAAQS standards.

The SFBAAB and Marin County is in attainment for all other CAAQS and NAAQS standards, including CO, NO_2, SO_2, and the NAAQS annual $PM_{2.5}$ standard; and it is unclassified for the 24-hour PM_{10} NAAQS and the 1-hour NO_2 NAAQS. In addition, the SFBAAB is a maintenance area for the federal CO standards (EPA 2012).

Existing Emissions of Criteria Air Pollutants

CAPs are monitored at several monitoring stations throughout the SFBAAB. The monitoring station closest to the Proposed Action area is located in San Rafael. This monitoring station measures O_3, NO_2, CO, PM_{10}, and $PM_{2.5}$. In general, the ambient air quality measurements from this station are representative of the air quality in the vicinity of the Proposed Action alignment. A summary of the air quality data from the most recent 3 years for which data are available (2011–2013) is shown in Table 3.1-3. During this period, no measured violations of the State 1-hour or 8-hour O_3 standards occurred.

The State CO and NO_2 standards also were not exceeded in any of the last 3 years. The federal 24-hour PM_{10} standard was not exceeded on any days during the 3-year period; however, the State 24-hour PM_{10} standard was exceeded multiple times in 2011 and 2013. For the $PM_{2.5}$ standard, the federal 24-hour standard was exceeded during this period; however, the State and federal annual average $PM_{2.5}$ standards were not exceeded in the most recent 3-year period. The air quality monitoring data shown in the Table 3.1-2 are used by ARB and EPA to determine whether the region has attained ambient air quality standards.

Table 3.1-2: Summary of Annual Ambient Air Quality Data (2010–2013)

	2011	2012	2013
Ozone [a]			
Maximum concentration (1-hour/8-hour average, ppm)	0.092/0.070	0.076/0.058	0.081/0.070
Number of days state standard exceeded (1-hour)	0	0	0
Number of days 8-hour standard exceeded (National/California)	0/0	0/0	0/0
Carbon Monoxide [b]			
Maximum concentration (8-hour/1-hour average, ppm)	1.21/1.9	1.11/2.3	na/2.2
Number of days state standard exceeded	0	0	0
Number of days national standard exceeded	0	0	0
Nitrogen Dioxide [b]			
Maximum concentration (1-hour,ppm)	53.2	52.2	49.6
Number of days state standard exceeded	0	0	0
Annual average (ppm)	12	11	12
Fine Particulate Matter ($PM_{2.5}$) [b]			
Maximum concentration ($\mu g/m^3$) (National/California [c])	42.2/42.2	26.5/26.5	44.9/44.9
Number of days national standard exceeded (measured/calculated [d])	1/1.0	0/0.0	2/2.0
Annual average ($\mu g/m^3$) (National/California)	9.8/na	8.0/na	10.7/na
Respirable Particulate Matter (PM_{10}) [e]			
Maximum concentration ($\mu g/m^3$) (National/California [c])	51.2/54.1	36.1/37.1	51.5/54.4
Number of days state standard exceeded (measured/calculated [d])	1/6.1	0/0.0	1.5.7
Number of days national standard exceeded (measured/calculated [d])	0/0.0	0/0.0	0/0.0
Annual average ($\mu g/m^3$) (California)	16.5	13.3	15.6

Existing Sensitive Receptors

The Proposed Action would include short-term construction and long-term operational activities along the Proposed Action alignment and at the proposed Larkspur Station. A majority of the rail line would be adjacent to industrial and commercial land uses, which are not considered sensitive receptors. However, some portions would be located in proximity of sensitive receptors. The closest sensitive receptors to the Proposed Action project would be at the San Rafael RV Park near the ROW's intersection with Andersen Drive, where residential receptors would be located approximately 100 feet from the rail line.

3.1.4 Environmental Consequences

Significance Criteria

A NEPA evaluation must consider the context and intensity of the environmental effects that would be caused by, or result from, the EA alternatives.

Criteria Air Pollutants

For evaluation of CAPs, a NEPA air quality significance analysis differs from the conformity analysis in that all Proposed Action emissions of CAPs are considered; this would include attainment pollutants as well as nonattainment and maintenance pollutant emissions considered under the Conformity Rule. Therefore, in the SFBAAB, attainment emissions of PM_{10} are considered for NEPA impact significance for air quality in addition to CO, VOCs, NO_X, and $PM_{2.5}$, which are required to be addressed under the Conformity Rule.

An alternative would be considered to result in an adverse effect related to CAPs emissions if it would:

- Result in annual criteria pollutant emissions during construction or operation in excess of EPA General Conformity de minimis thresholds; or Not be consistent with the project description in the applicable RTP and TIP and the assumptions in regional emissions analysis for the RTP and TIP.

Direct emissions would result from construction activities, area operational sources (i.e., natural gas combustion and landscaping fuel combustion), and mobile operational sources. Indirect source emissions of CAPs resulting from energy use (i.e., electricity and water use) are too speculative to evaluate; what proportion of electricity that would be consumed by the alternatives produced in the SFBAAB is unknown. In addition, CAPs emissions resulting from permitted sources of electricity production in the SFBAAB presumably already are included in the regional emissions budget and covered under the current SIP.

Local Carbon Monoxide

In addition to regional CO emissions, local operational CO emissions can be a concern. Vehicle traffic emissions can affect local CO. Severe vehicle congestion at major signalized intersections can generate elevated CO levels in excess of NAAQS and/or CAAQS, called “hotspots,” that can be hazardous to human receptors adjacent to the intersection. Severe vehicle congestion is determined by level of service (LOS) analysis for roadways and intersections. Local CO effects at signalized intersections typically are a concern related to unacceptable LOS.

The local air district, BAAQMD, has developed a screening approach that would be used to determine whether the alternatives could generate high enough traffic volumes to cause or contribute to a CO hotspot (BAAQMD 2011:3-3–3-4).

Thus, an alternative would result in an adverse effect related to local CO concentrations if it would:

- Not be consistent with an applicable congestion management program established by the county congestion management agency for designated roads or highways, the regional transportation plan, and local congestion management agency plans;
- Result in increased traffic volumes at affected intersections with more than 44,000 vehicles per hour; or
- Result in increased traffic volumes at affected intersections with more than 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited (e.g., tunnel, parking garage, bridge underpass, natural or urban street canyon, below-grade roadway).

Local TAC and PM Emissions

The thresholds for local TAC and $PM_{2.5}$ effects resulting from construction or operational activities would be identical. Operational activities would include siting new stationary sources or permanent mobile sources (such as a distribution center) of TACs and $PM_{2.5}$, or the siting of receptors to existing or new stationary or mobile sources of TACs and $PM_{2.5}$. The thresholds of significance for local TAC and $PM_{2.5}$ emissions is based on concentrations that produce risks of cancer at greater than 10 cases in a million, non-cancer health effects with HIs greater than 1, and an ambient $PM_{2.5}$ annual average increase greater than 0.3 microgram per square meter ($\mu g/m^3$). The zone of influence is considered to be within 1,000 feet of the property line of the source or receptor.

Odors

BAAQMD threshold guidance for odor effects was used to determine the significance of effects (BAAQMD 2011:2-5–2-6). Thus, an alternative would be considered to result in an adverse effect related to odors if it would:

- Result in siting a new odor source or a new receptor within the applicable screening distance (shown in Table 3.1-5); or
- Result in siting a sensitive receptor near[1] an odor source with five or more confirmed complaints per year averaged over 3 years.

Assessment Methods

Construction Emissions

Construction emissions of CAPs were modeled using the BAAQMD-approved California Emissions Estimator Model (CalEEMod) Version 2013.2.2 (CAPCOA 2013). Construction activities for the Proposed Action would range from 6 months to 1 year, depending on weather conditions. For the purposes of a conservative analysis, construction emissions were modeled by assuming that construction activities would last a full year. Therefore, construction emissions that were evaluated as part of this analysis would represent the maximum level of construction that could occur from the Proposed Action. For required off-road construction equipment, information from the description of the Proposed Action was used to estimate the types and number of equipment. For on-road construction vehicles such as material haul trucks and construction worker vehicles, the ARB-approved EMFAC2011 model was used to estimate CAPs. When Proposed Action-specific information was not available, default assumptions from CalEEMod or conservative assumptions were used to avoid underestimating construction-related air quality effects.

No indirect construction emissions of CAPs would occur, other than those associated with incidental electricity use during construction; however, emissions associated with grid-based power already would be accounted in the SFBAAB's air quality plans and California's SIP. Data supporting the air quality analysis, including modeling assumptions and projections, are provided in Appendix A.

[1] "Near" refers to the screening distances shown in Table 3.2-5. Not all types of odor sources with complaint histories have recommended screening distances, in which case the maximum distance of 2 miles would be utilized to determine the significance of the effect.

Operational Emissions

Following completion of the Proposed Action, long-term operational emissions associated with trains providing the San Rafael to Larkspur rail service would occur. Operational emissions associated with the diesel multiple unit (DMU) rail vehicles were quantified using the same methods as those described in the 2005 Draft EIR for consistency purposes.

Implementation of the Proposed Action would alter circulation and traffic patterns in the region. A traffic study was performed to evaluate the changes in LOS and volumes on local roadways and at affected intersections. The future cumulative plus project scenario was used to conservatively evaluate the potential of a CO hotspot (i.e., exceedance of the CO CAAQS or NAAQS). The future cumulative plus project scenario would result in the maximum number of vehicles at affected intersections and thus would represent the most conservative analysis.

As discussed above, a majority of the Proposed Action alignment is located adjacent to industrial and commercial land uses, which are not sensitive receptors. However, a portion of the Proposed Action would be located approximately 100 feet from an RV Park, containing some permanent residences. To evaluate the potential effects of HAPs associated with the proposed trains, health risk assessment information and analysis from the previous 2005 Draft EIR was used for this analysis. The 2005 Draft EIR evaluated the health risk impacts on sensitive receptors adjacent to the entire SMART rail line.

Emissions related to electricity that would use grid-based power delivery were not included, because these emissions already would be accounted in the SFBAAB's air quality plans and California's SIP, discussed previously. Therefore, no indirect effects are expected with operation of the proposed Larkspur Station that has not already been accounted for in regional and State air quality management plans. Data supporting the air quality analysis, including modeling assumptions and projections, are provided in Appendix A.

Alternative 1: No Action Alternative

Under the No Action Alternative, the FTA would take no action and would provide no funding to SMART for the Downtown San Rafael to Larkspur Extension project. The project would not be constructed, and none of the effects associated with the Proposed Action would occur. No construction or operation activities would occur, and the project corridor would remain in its current state.

Alternative 2: SMART Downtown San Rafael to Larkspur Extension (Proposed Action)

Construction

Criteria Air Pollutants

Air quality effects from proposed construction activities would occur from exhaust-related emissions, resulting from the use of fossil fuel-fired construction equipment, material delivery trucks, and construction worker vehicles; and from fugitive PM dust emissions, resulting from earth disturbance activities and vehicles traveling on unpaved roads. Construction activities are anticipated to last from 6 months to 1 year, depending on weather conditions. As discussed above, for the purpose of a conservative analysis, construction activities were assumed to continue for a full year. Therefore, the emissions shown in Table 3.1-3 represent the maximum construction emissions that could occur with implementation of the Proposed Action.

As shown in the Table 3.1-3, even using conservative assumptions, the Proposed Action's construction-related emissions would not exceed any of the applicable de minimis thresholds. Therefore, construction emissions resulting from the Proposed Action would not exceed the applicable de minimis thresholds and no adverse effect would occur from implementation of the Proposed Action.

Table 3.1-3: Summary of Total Construction-Related Emissions of Criteria Air Pollutants and Precursor Emissions (Proposed Action)

	Total Annual Emissions (tons/year)[a]	Total Annual Emissions (tons/year)[a]	Total Annual Emissions (tons/year)[a]	Total Annual Emissions (tons/year)[a]	Total Annual Emissions (tons/year)[a]
Construction Source	**VOC/ROG**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**
Off-Road Construction Equipment	1.79	2.96	1.47	0.17	0.16
On-Road Haul Trucks	0.03	1.25	0.16	0.03	0.02
Construction Worker Vehicles	0.01	0.10	0.27	0.02	0.01
Total Construction Emissions[b]	1.84	4.32	1.90	0.22	0.19
de minimis Threshold	50	100	100	100[c]	100

Notes:

VOC = volatile organic carbon; ROG = reactive organic gases; NO_X = oxides of nitrogen; CO = carbon monoxide; PM_{10} = respirable particulate matter with an aerodynamic diameter of 10 micrometers or less; $PM_{2.5}$ = fine particulate matter with an aerodynamic diameter of 2.5 micrometers or less

[a] Details of construction emissions, input parameters used in the modeling, and detailed modeling output, are provided in Appendix A.

[b] Construction activities are anticipated to last 6 months to 1 year; however, for the purposes of a conservative analysis, construction activities were modeled to last a full year. This represents the maximum total construction emissions that could occur.

[c] The SFBAAB currently is designated as unclassifiable for PM_{10}; however, the moderate nonattainment de minimis threshold is conservatively used to evaluate the Proposed Action.

Source: Modeling performed by AECOM in 2014

Local TAC and PM Emissions

Construction of the Proposed Action would include trackwork, upgrades to at-grade road crossings, replacement and improvements to trestle bridges, resurfacing of pathways, and construction of a rail station. Construction activities are anticipated to occur in a linear fashion along the proposed 2.1-mile rail alignment. Because of the constrained, linear nature of the proposed construction sites and the type of construction activities that would be required, intensive construction activities, such as cut/fill operations that would require large quantities of heavy-duty construction equipment, are not expected to be necessary. Nevertheless, most construction activities would include the use of some diesel-fueled construction equipment. Diesel particulate matter (diesel PM) has been classified as a HAP by EPA and as a TAC by ARB. Therefore, construction-related emissions of diesel PM would have the potential to affect nearby sensitive receptors. As discussed above, a majority of the Proposed Action alignment is adjacent to industrial and commercial land uses, which are not considered sensitive receptors. However, a portion of the Proposed Action would be adjacent to the San Rafael RV Park.

The dose to which receptors are exposed is the primary factor used to determine health risk and is a function of concentration and duration of exposure. According to the Office of Environmental Health Hazard Assessment (OEHHA), health risk assessments that determine the health risks associated with exposure of residential

receptors to TAC emissions should be based on a 70-year exposure period (OEHHA 2003). However, heath risk assessments should be limited to the period/duration of activities associated with the emissions activity.

As discussed above, construction activities would occur for approximately 6 months to 1 year, after which all construction emissions would cease. Therefore, the total exposure time would be approximately a maximum of 1.4 percent of the typical exposure time for a health risk assessment (i.e., 70 years). Although the construction site would be within 100 feet of residential receptors (i.e., nearest RV/mobile home unit to the proposed rail alignment), emissions occurring at that particular point along the alignment would occur only for a fraction of the total construction period (e.g., less than 1 month). As the trackwork was completed along that particular portion, construction activities would move further away from the residential receptors. Furthermore, construction equipment would operate intermittently throughout the day as needed and would cease at night. Therefore, the nearest sensitive receptors would be exposed to construction emissions for less than the 1.4 percent of typical health risk assessments. In addition, construction activities associated with the Proposed Action are not anticipated to be so intensive as to require large amounts of construction equipment continuously operating each day. Because the use of off-road construction equipment would be short-term and temporary, the low exposure period (i.e., less than 1 percent of typical health risk assessment), with a relatively low intensity of construction emissions in combination with the dispersive properties of diesel PM (Zhu et al. 2002), short-term construction activities would not result in the exposure of sensitive receptors to levels that would result in a health hazard. Therefore, no adverse effect would occur from implementation of the Proposed Action.

Odors

Construction of the Proposed Action would generate diesel PM emissions that could be a potential source of odors. However, as discussed above, construction-related diesel PM emissions would be relatively low in intensity and would be intermittent throughout the day, rather than a continuous plume, such as that from a stationary source. In addition, construction activities would continue to move after trackwork, trestles, crossings, or other components were completed. Thus, construction-related odor emissions would not occur at one location for the entire construction period. Considering the transient nature of construction activities, low intensity of construction equipment use, and the highly dispersive nature of diesel PM, construction-related odors would not generate an adverse effect from implementation of the Proposed Action.

Operation

Criteria Air Pollutants

Following completion of the Proposed Action's construction activities, long-term operational exhaust emissions would be generated by the Downtown San Rafael to Larkspur trains and vehicle trips associated with people traveling to the proposed Larkspur Station. As discussed previously, operational emissions were modeled using similar emission factors to those used in the 2005 Draft EIR for consistency purposes. The traffic study for the Proposed Action determined the number of peak hour vehicle trips to the proposed Larkspur Station. Peak hour trips were converted to daily trips using a factor of 10, and then were converted to annual trips using a factor of 347 operational days per year. The annual operational emissions associated with the trains and vehicle trips were added together to calculate the Proposed Action's annual operational emissions. As shown in Table 3.1-4, the Proposed Action's annual operational emissions would not exceed any of the applicable de minimis thresholds. The applicable transportation plan and program for the Proposed Action are the Metropolitan Transportation

Commission (MTC) *Plan Bay Area: Strategy for a Sustainable Region* and the 2013 TIP, adopted on July 18, 2013 (MTC 2013). The Plan Bay Area and 2013 TIP were approved by FTA and FHWA on August 12, 2013. MTC adopted the 2013 TIP and conformity analysis for Plan Bay Area on September 24, 2014.

Table 3.1-4: Summary of Annual Operational Emissions of Criteria Air Pollutants and Precursor Emissions (Proposed Action)

		Average Annual Emissions (tons/year)[a]	Average Annual Emissions (tons/year)[a]	Average Annual Emissions (tons/year)[a]	Average Annual Emissions (tons/year)[a]
Source	**VOC/ROG**	**NO_X**	**CO**	**PM_{10}[b]**	**$PM_{2.5}$[b]**
Trains	0.03	1.25	0.38	0.06	0.06
Rider Vehicle Trips[c]	1.53	11.64	30.11	1.79	1.04
Total	1.56	12.88	30.49	1.85	1.10
de minimis Threshold	50	100	100	100	100

Notes:

VOC = volatile organic carbon; ROG = reactive organic gases; NO_X = oxides of nitrogen; CO = carbon monoxide; PM_{10} = respirable particulate matter with an aerodynamic diameter of 10 micrometers or less; $PM_{2.5}$ = fine particulate matter with an aerodynamic diameter of 2.5 micrometers or less

[a] Details of operational emissions, including input parameters used in the modeling and detailed modeling output, are provided in Appendix A.

[b] Because separate emission factors were not available for PM_{10} and $PM_{2.5}$ separately, all particulate matter exhaust emissions from trains were conservatively assumed to be both PM_{10} and $PM_{2.5}$.

[c] Vehicle trips associated with riders were estimated a conservative peak hour-to-daily factor (i.e., 10), annualization factors (i.e., 347), and one-way trip distances (i.e., 30 miles). Therefore, rider vehicle trip emissions are expected to represent the maximum annual emissions.

Source: Modeling performed by AECOM in 2014

The Proposed Action is included in the Plan Bay Area as RTP ID #240736 ("Expand and enhance the SMART commuter rail system (Phase II) by constructing a one-station extension from San Rafael to Larkspur, constructing a one-station extension from North Santa Rosa to Windsor, implementing capacity improvements along the Initial Operating Segment (Sonoma County only), and completing the multiuse pathway from Larkspur to Cloverdale"). Therefore, the Proposed Action is as described in the current applicable RTP and TIP. The design concept and scope are consistent with the description in the Plan Bay Area, TIP, and the assumptions in MTC's regional emissions analysis. Therefore, the Proposed Action would conform with the SIP, and no adverse regional air quality impact would occur as a result of the implementation of the Proposed Action.

Local CO Emissions

The construction and operation of the Proposed Action would add vehicle traffic to local roadways that would contribute to vehicle volumes at local intersections. Congestion at local intersections is the main cause of CO hotspots, which are associated with local exceedance of the CAAQS or NAAQS. The traffic analysis evaluated the peak hour volumes at local intersections under existing conditions, 2040 conditions without the Proposed Action, and 2040 conditions with the Proposed Action. The 2040 conditions with the Proposed Action would represent the maximum vehicle volumes at affected intersections, and thus this was used to evaluate the Proposed

Action's potential to generate a CO hotspot. A BAAQMD-developed screening threshold allows evaluation of whether the contribution of a proposed action to local roadways potentially could cause CO hotspots. The hotspot screening level recommended by BAAQMD is 44,000 vehicles per hour at any given intersection. This screening threshold was developed using conservative assumptions, such as stable meteorological conditions and older emission factors. In 2040, emission rates from vehicles are anticipated to decrease.

Projected peak hour traffic volumes under 2040 with the Proposed Action conditions were determined for 10 affected intersections near the proposed Downtown San Rafael and Larkspur station sites. The maximum peak-hour vehicle volume during 2040 with the Proposed Action conditions was determined to be 6,682 vehicles per hour at the Sir Francis Drake Boulevard and the northbound US 101 ramp intersection. Because this volume is substantially less than the screening level of 44,000 vehicles per hour, operational activities associated with the Proposed Action would not be expected to contribute or cause CO concentrations that would exceed the CAAQS or NAAQS. Accordingly, operation of the Proposed Action related to local CO hotspots would not result in an adverse effect.

As discussed above, construction activities also would temporarily contribute vehicles to local roadways. However, construction-related vehicle trips are not anticipated to contribute peak hour volumes that would exceed the screening threshold described above. Maximum daily construction-related trips are not anticipated to exceed 100 trips per day, and thus would not contribute to an exceedance of the screening threshold even if added to the maximum volume intersection described above for operational activities. Thus, construction traffic associated with the Proposed Action would not result in an adverse effect related to CO hotspots.

Local TAC and PM Emissions

Long-term operation of the Proposed Action would include trains providing daily service between Downtown San Rafael and the proposed Larkspur Station. Because the trains would be diesel-fueled, the potential would exist for diesel PM emissions to affect nearby sensitive receptors. As discussed above, a majority of the proposed Downtown San Rafael to Larkspur alignment would be adjacent to industrial and commercial land uses that are not considered sensitive receptors. However, a portion of the Proposed Action would be adjacent to the San Rafael RV Park, with resident sensitive receptors. The 2005 Draft EIR evaluated the maximum health risk impacts associated with the DMU trains traveling and idling near sensitive receptors along the entire SMART alignment, including the Proposed Action. The Proposed Action would include a level of service (i.e., headways and idling times) consistent with those evaluated in the 2005 Draft EIR. The 2005 Draft EIR considered sensitive receptors that would be as close as 75 feet for exposure to idling trains and as close as 30 feet for exposure to traveling trains. The 2005 Draft EIR found that maximum diesel PM concentration levels and cancer risks at these nearest sensitive receptors would be 0.005 $\mu g/m^3$ and 1.5 in a million cancer risks, respectively. For the Proposed Action, a RV/mobile home at the RV Park would be located approximately 100 feet away from the proposed rail alignment, and thus the health risk impacts determined in the 2005 Draft EIR would be similar for these receptors. Therefore, the Proposed Action's rail activities are not anticipated to generate diesel PM emissions that would cause health risk effects to the nearest sensitive receptor that would exceed the BAAQMD's 0.8 $\mu g/m^3$ concentration threshold for diesel PM or the 10 in a million cancer risk threshold. Because the Proposed Action's operational emissions would not generate health risks that would exceed the applicable thresholds of significance, no adverse effect would occur from implementation of the Proposed Action.

PM Hotspot Analysis

The San Francisco Bay Area has been designated as non-attainment for the annual PM2.5 standard. Beginning December 14, 2010, certain projects are required to complete a PM2.5 hot-spot analysis as part of the project-level conformity determination process. Project sponsors must engage in interagency consultation on the PM2.5 hot-spot analysis through the MTC's Air Quality Conformity Task Force. The Conformity Task Force is charged with: 1) determining if a project meets the definition of a project of air quality concern and if the project requires undergoing a project-level PM2.5 hot-spot analysis, and 2) reviewing the methods, assumptions and analysis of the PM2.5 hot-spot analysis.

On December 6, 2012, the Conformity Task Force found that the SMART project is not a project of air quality concern and therefore is not required to undertake a hot-spot analysis. The Task Force's findings are included in Appendix A of this EA.

Odors

After completion of the Proposed Action, daily trains would travel along the proposed Downtown San Rafael to Larkspur rail alignment. The trains are anticipated to be diesel-fueled, which would be a potential source of odor emissions. Approximately 30 one-way trips are anticipated to occur along the proposed rail alignment during weekday service and approximately 8 one-way trips are expected to occur during weekend service. During peak weekday hours, trains would run every 30 minutes. Thus, weekday or weekend service would include trains constantly traveling along the proposed rail alignment. Therefore, considering the intermittent nature of train service along the proposed rail alignment, the use of EPA Tier IV DMU engines for service, and the highly dispersive nature of diesel PM, the Proposed Action's operational activities are not expected to generate odors that would cause an adverse effect.

3.1.5 References

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3.2 BIOLOGICAL RESOURCES

This section describes the biological resources found in the Proposed Action area and the potential effects of implementation of the Proposed Action on those resources. Biological resources include both common and special-status plant and wildlife species and their habitats, as well as wetlands and other waters that receive protection under various federal and State regulations. Previous analysis for biological resources was undertaken for the entire SMART project alignment as part of the 2005 Draft EIR (SMART 2005) prepared as per CEQA. That analysis can be found in Section 3.9 of the 2005 Draft EIR.

The Federal Endangered Species Act (ESA) of 1973, (16 U.S.C. 1531-1543) provides a means to conserve endangered and threatened species listed and protected under the Act, as well as the ecosystems upon which those species depend. Listed species are managed by either by the National Marine Fisheries Service (NMFS) or the U.S. Fish and Wildlife Service (USFWS), depending on the species. NMFS oversees management of listed marine species, such as marine fishes and marine mammals. Management of listed non-marine species, such as birds, terrestrial mammals, and non-marine fishes is overseen by the USFWS.

Section 7 of the Act requires that each federal agency, in consultation with and with the assistance of NMFS or USFWS, ensure that actions authorized, funded, or carried out by the agency do not jeopardize the continued existence of any listed species, or result in the destruction or adverse modification of habitat of such species, unless the agency has been granted an exemption for the proposed action. In situations where listed species have the potential to be impacted, or where NMFS or USFWS-designated critical habitat for a listed species is present, formal consultation with NMFS or USFWS is usually carried out via the preparation of a Biological Opinion (BO) by NMFS and/or USFWS, wherein the likely impacts to listed species or their habitats are disclosed, and mitigation is prescribed to offset those impacts. When it can be determined that listed species or critical habitat are not present, further consultation is not required (USFWS & NMFS 1998). In consultation with FTA, SMART prepared a Biological Assessment (BA) for the Proposed Action that considered the likelihood of occurrence for green sturgeon and EFH, and the potential effects that could occur from implementation of the Propose Action.. The BA was forwarded to NMFS on November 13, 2014 for its review, together with a request that NMFS concur with the BA's findings. Before issuance of a Finding of No Significant Impact for the Proposed Action, the FTA must receive concurrence from NMFS that the Proposed Action would not create an adverse effect on listed species.

3.2.1 Affected Environment

A general habitat assessment covering terrestrial plant and wildlife species with the potential to occur in the Proposed Action rail corridor was undertaken in April 2013 (AECOM 2013a). The general assessment focused on potential effects on sensitive land-based biological resources within the Proposed Action area that are protected by federal laws, which include wetland areas and navigable waters. A second assessment was prepared to consider aquatic species (AECOM 2014). Finally, a preliminary jurisdictional delineation was conducted for the Proposed Action right-of-way (ROW) (AECOM 2013b). A copy of each of these assessments is provided in Appendix B.

Vegetation Communities/Land Cover Types

The majority of the Proposed Action area is located within previously disturbed or otherwise urban environments; however, some natural habitats exist adjacent to the Proposed Action ROW. In general, non-native plants and noxious weed species dominate the area.

Urban/Ruderal

Urban/ruderal habitat is made up of paved or developed areas, as well as previously disturbed landscapes within the ROW, where vegetation is sparse and natural communities are absent. Urban/ruderal habitat is the most common vegetation community present in the Proposed Action area, covering the majority of the ROW and areas adjacent to the ROW, which generally lack vegetation except for scattered herbaceous weeds. Common non-native plant species found in this habitat include wild oats (*Avena* spp.), bull thistle (*Cirsium vulgare*), fennel (*Foeniculum vulgare*), annual rye (*Lolium multiflorum*), wooly mullein (*Verbascum thapsus*), Harding grass (*Phalaris aquatica*), and Italian thistle (*Carduus pycnocephalus*). Scattered patches of non-native scotch broom (*Cytisus scoparius*) and pampas grass (*Cortaderia* spp.) also are present. One small stand of ornamental trees is present along the edge of a parking lot that borders the ROW, near the southern extent of the Cal Park Hill Tunnel. Because the Cal Park Hill Tunnel lacks light, it does not contain any vegetation.

Brackish Marsh/Open Water

Brackish marsh and open water habitat in the Proposed Action area is present where tidally influenced freshwater systems exist—mainly along San Rafael Creek south of Second Street and an unnamed channel that borders the ROW from the intersection of Irwin Street and West Francisco Boulevard to approximately 1,200 feet southeast of Rice Drive. These two waterways generally are characterized by open water that is devoid of vegetation, but some brackish marsh vegetation is present in select locations along the margins of the two features. Vegetation present along the banks of these features includes cattails (*Typha* spp.), gumplant (*Grindelia* spp.), fennel, Bermuda grass (*Cynodon dactylon*), and other non-native grasses. In isolated locations, individual pickleweed plants (*Salicornia viginica*) also are present. Generally, these habitats are highly disturbed by channelization and shoring, and provide little to no estuarine, upland, or transitional habitats.

Seasonal Wetland

One seasonal wetland feature is present in the Proposed Action area and is located along the edge of the ROW between Rice Drive and Anderson Drive. The feature has an assemblage of species, including sedges (*Cyperus* spp.), rough cocklebur (*Xanthium strumarium*), curly dock (*Rumex crispus*), bristly ox tongue (*Helminthotheca echiodes*) Himalayan blackberry (*Rubus armeniacus*), and annual rye. The feature holds water only during a portion of the year and contains only non-persistent wetland vegetation. The wetland feature is present along the edge of the ROW where water naturally pools during precipitation events or from runoff. The feature is small and of poor quality, and is dominated by non-native species.

Freshwater Marsh

Three freshwater marsh features have been identified in the Proposed Action area at the following locations: 1) near the north side of the Cal Park Hill Tunnel, 2) immediately south of the Anderson Drive crossing, and 3) between Rice Drive and Anderson Drive. These freshwater marsh habitats are dominated by obligate wetland species,

including cattails (*Typha* sp.) and watercress (*Nasturtium officinale*). Other species present include willow (*Salix* spp.), tall flatsedge (*Cyperus eragrostis*), and bristly ox tongue. The freshwater marsh habitats are small and of very low quality, are typically dominated by non-native species, and often contain large amounts of refuse.

Sensitive Plant and Wildlife Species

The USFWS and NMFS were consulted to create a list of sensitive species with the potential to occur in the Proposed Action area. Correspondence from both agencies is included in Appendix B. In addition, the California Natural Diversity Database (CNDDB) was also queried for similar information (see AECOM 2013a). Table 3.2-1 presents a complete list of sensitive species with potential to occur in the area. The list also includes a brief evaluation of the likelihood of occurrence of those species within the project area itself based upon the presence or absence of suitable habitat.

Table 3.2-1: Determination of Federally Listed Species with Potential to Occur in the Vicinity of the Proposed Action Area

Common Name	Scientific Name	Status	Preferred Habitat	Likelihood of Occurring in the Proposed Action Area
Plants				
Marin dwarf-flax	*Hesperolinon congestum*	FT	Serpentinite soils in chaparral and valley and foothill grassland. Blooming period April through July. Elevation range 5 to 370 meters.	No potential to occur. Project area does not contain suitable habitat.
Santa Cruz tarplant	*Holocarpha macradenia*	FT	Clay or sandy soils in coastal prairie, coastal scrub, and valley and foothill grassland. Blooming period June through October. Elevation range 10 to 220 meters.	No potential to occur. Project area does not contain suitable habitat.
White-rayed pentachaeta	*Pentachaeta bellidiflora*	FE	Cismontane woodland and serpentine soils in valley and foothill grassland. Blooming period March through May. Elevation range 35 to 620 meters.	No potential to occur. Project area does not contain suitable habitat.
Showy Indian clover	*Trifolium amoenum*	FE	Coastal bluff scrub, valley and foothill grasslands with serpentine soils. Blooming period April through June. Elevation range 5 to 415 meters.	No potential to occur. Project area does not contain suitable habitat.
Invertebrates				
Black abalone	*Haliotes cracherodii*	FE	Rocky surfaces in intertidal and subtidal areas with moderate to high surf.	No potential to occur. Project area does not contain suitable coastal marine habitat.
White abalone	*Haliotes sorenseni*	FE	Rock or boulder habitat with interspersed sand channels.	No potential to occur. Project area does not contain suitable

Common Name	Scientific Name	Status	Preferred Habitat	Likelihood of Occurring in the Proposed Action Area
			Most abundant in depths of 25 to 30 meters.	coastal marine habitat.
Mission blue butterfly	*Icaricia icarioides missionensis*	FE	Coastal scrub. Associated with perennial lupine host plants (Lupinus albifrons, L. variicolor, and L. formosus).	No potential to occur. Project area does not contain suitable habitat.
Myrtle's silverspot butterfly	*Speyeria zerene myrtleae*	FE	Coastal dunes, scrub, and grassland; associated with host plant Viola adunca.	No potential to occur. Project area does not contain suitable habitat.
Fish				
Green sturgeon	*Acipenser medirostris*	FT	Rivers and estuaries.	Unlikely to occur in project area, but known to occur downstream of project area in San Francisco Bay.
Tidewater goby	*Eucyclogobius newberryi*	FE	Upper end of lagoons in salinities less than 10 ppt.	No potential to occur. Species is not known to occur in San Francisco Bay.
Delta smelt	*Hypomesus transpacificus*	FT	Sacramento-San Joaquin Delta, Suisun Bay, San Pablo Bay, river channels and sloughs. Rarely found in salinities greater than 10 to 12 ppt, or areas of over 1/3 seawater.	No potential to occur. Project area does not contain suitable water salinities.
Coho salmon	*Oncorhynchus kisutch*	FE	Lorenzo River; loose, silt-free, gravel beds for spawning, cover, cool water, sufficient dissolved oxygen.	No potential to occur. Species occurs along the California coast but is no longer present in San Francisco Bay.
Steelhead (central valley)	*Oncorhynchus mykiss*	FT	Sacramento and San Joaquin rivers and their tributaries.	No potential to occur in project area, but known to occur downstream of project area in San Francisco Bay.
Steelhead (central California coast)	*Oncorhynchus mykiss*	FT	Delta, Suisun Bay, San Francisco Bay west to the Golden Gate Bridge, and coastal areas designated as critical habitat.	No potential to occur in project area, but known to occur downstream of project area in San Francisco Bay.
Chinook salmon	*Oncorhynchus tshawytscha*	FT	Central Valley rivers and their tributaries; west to the Pacific Ocean	No potential to occur in project area, but known to occur downstream of project area in San Francisco Bay.
Amphibians				
California red-legged frog	*Rana draytonii*	FT	Lowlands and foothills in or near pools of deep water with dense, shrubby, or emergent riparian vegetation.	No potential to occur. Project area does not contain suitable habitat.

Common Name	Scientific Name	Status	Preferred Habitat	Likelihood of Occurring in the Proposed Action Area
Birds				
Marbled murrelet	*Brachyramphus marmoratus*	FT	Mature forests near coastlines for nesting; bays, sounds, saltwater passageways	No potential to occur. Project area does not contain suitable habitat.
Western snowy plover	*Charadrius alexandrinus nivosus*	FT	Sandy marine and estuarine shores. May nest on salt pond levees.	No potential to occur. Project area does not contain suitable nesting or foraging habitat.
Short-tailed albatross	*Diomedea albatrus*	FE	Sloping, grassy terraces for nesting; ocean surface for foraging.	No potential to occur. Project area does not contain suitable nesting or foraging habitat.
California brown pelican	*Pelecanus occidentalis californicus*	FE	Isolated islands and rocks for nesting; near shore and open ocean for foraging.	No potential to occur. Project area does not contain suitable nesting or foraging habitat.
California clapper rail	*Rallus longirostris obsoletus*	FE	Coastal wetlands and brackish areas.	No potential to occur. Project area does not contain suitable nesting or foraging habitat.
California least tern	*Sternula antillarum browni*	FE	Marine and estuarine shores, abandoned salt ponds. Feeds in shallow estuarine waters.	No potential to occur. Project area does not contain suitable nesting or foraging habitat.
Northern spotted owl	*Strix occidentalis caurina*	FT	Dense forest areas for nesting and foraging.	No potential to occur. Project area does not contain suitable habitat.
Mammals				
Guadalupe fur seal	*Arctocephalus townsendi*	FT	Tropical waters of southern California and Mexico; rocky habitats and caves.	No potential to occur. Project area does not contain suitable habitat.
Sei whale	*Balaenoptera borealis*	FE	Deep offshore waters	No potential to occur. Project area does not contain suitable habitat.
Blue whale	*Balaenoptera musculus*	FE	Deep offshore waters	No potential to occur. Project area does not contain suitable habitat.
Finback whale	*Balaenoptera physalus*	FE	Deep offshore waters	No potential to occur. Project area does not contain suitable habitat.
Right whale	*Eubalaena glacialis*	FE	Deep offshore waters	No potential to occur. Project area does not contain suitable habitat.
Sperm whale	*Physeter catodon*	FE	Deep offshore waters	No potential to occur. Project area does not contain suitable habitat.
Salt marsh harvest mouse	*Reithrodontomys raviventris*	FE	Found only in saline emergent wetlands in San Francisco Bay	No potential to occur. Project area does not contain suitable

Common Name	Scientific Name	Status	Preferred Habitat	Likelihood of Occurring in the Proposed Action Area
			and its tributaries.	habitat.

Notes: FT = Federal Threatened; FE = Federal Endangered
Source: NMFS, USFWS

As can be seen in the table, none of the listed species is likely to occur in the Proposed Action area. This mainly is based on the lack of suitable habitat and the highly developed and disturbed nature of the ROW and adjoining areas.

Since no USFWS-managed species are likely to occur in the project area, and are thus not likely to be affected by the Proposed Action, further consultation with USFWS is not required. However, in its response to initial coordination efforts, NMFS indicated that species and habitats that it manages could be affected by the Proposed Action. The NMFS response is provided in Appendix B (see AECOM 2014). The list provided by NMFS included those species and habitats that are managed by NMFS and are protected under the ESA. The habitats that were included in the NMFS response are designated essential fish habitat (EFH), protected under the Magnuson-Stevens Fishery Conservation and Management Act. The species and habitats that have the potential to be affected by the Proposed Action include the following:

- Species: North American green sturgeon: southern distinct population segment (DPS) (*Acipenser medirostris*), listed as threatened under the ESA;
- Habitat: North American green sturgeon: southern DPS critical habitat;
- Habitat: Pacific groundfish EFH; and
- Coastal pelagics EFH.

Southern Distinct Population Segment of North American Green Sturgeon

Green sturgeon was federally listed as threatened on June 6, 2006 (71 Federal Register [FR] 17757) (NOAA 2006). The species is anadromous, spawning in fresh water in the Central Valley and returning to the San Francisco Bay and near-shore marine waters to feed and mature. Green sturgeon is distributed throughout the San Francisco Bay and its associated river systems; the Southern DPS represents the southern-most spawning population. Juveniles are found throughout the Sacramento–San Joaquin Delta and San Francisco Bay region.

Adult green sturgeon sexually mature at 13 to 20 years of age, return to freshwater to spawn every 2 to 5 years, and generally show fidelity to spawning sites. Spawning occurs from March through July and peaks from mid-April through mid-June. Green sturgeon may migrate long distances upstream to reach spawning habitat. Adult sturgeon have been reported as far upstream as Red Bluff on the Sacramento River. Spawning habitat is characterized as deep pools or scour holes in the mainstem of large, turbulent rivers with large cobble, bedrock, or clean sand substrates. Green sturgeon requires cool water temperatures for egg and larvae development, with optimal temperatures ranging from 15 to 19 degrees Celsius. Spawning has been documented only in the Klamath, Sacramento, and Rogue rivers in recent times.

Adults captured in the Sacramento–San Joaquin Delta fed on invertebrates (i.e., shrimp, mollusks, amphipods) and small fish (Adams et al. 2005). Juveniles spend 1 to 3 years in freshwater before first ocean entry. The

optimal water temperature for juveniles is 14 to 16 degrees Celsius (Mayfield and Cech 2004), and the optimal salinities are from 10 parts per thousand (ppt; brackish) to 33 ppt (salt water).

The habitat described above is not available in the Proposed Action area of San Rafael Creek and the unnamed drainage ditch. Both features are highly compromised waterways and do not possess the food resources, water quality requirements, or depth and substrate characteristics necessary to support green sturgeon. However, these habitat characteristics are available downstream from these water courses in the tidally influenced estuarine habitats of San Pablo Bay. The closest documented occurrence of green sturgeon to the Proposed Action area was a tagged adult green sturgeon, netted at the mouth of the Petaluma River in 1997, which is approximately 9 miles north of the Proposed Action area (NMFS 2009).

Critical Habitat—Southern DPS of North American Green Sturgeon

Green sturgeon critical habitat was designated in October 2009 (74 FR 52300). The habitat that was designated is extensive and includes approximately 320 miles of riverine habitat and 897 miles of estuarine habitat in California, Oregon, and Washington. In the vicinity of the Proposed Action area, the designated habitat includes San Pablo Bay and the tidally influenced tributaries of San Pablo Bay, including San Rafael Creek and the unnamed drainage ditch that eventually feeds into the tidally influenced estuarine habitats of San Pablo Bay.

The primary constituent elements (PCEs) for green sturgeon in estuarine habitats include adequate food resources, specific water quality requirements, a diversity of water depths necessary for shelter, foraging, and migration of juvenile, sub-adult, and adult life stages, and suitable substrates. PCEs for freshwater habitats include adequate food resources, appropriately structured substrates, specific water flow regimes, and deep holding pools for both upstream and downstream holding of adult or subadult fish.

The habitat described above is not available in the Proposed Action area of San Rafael Creek and the unnamed drainage ditch. San Rafael Creek and the unnamed drainage ditch are both highly compromised waterways and do not possess the food resources, water quality requirements, or depth and substrate characteristics necessary to support green sturgeon. However, these habitat characteristics are available downstream from these water courses in the tidally influenced estuarine habitats of San Pablo Bay.

Essential Fish Habitat

Section 305(b)(2) of the Magnuson Stevens Fishery Conservation and Management Act requires federal agencies to consult with NMFS on activities that may adversely affect EFH for federally managed fish species. These species include commercial fishes with established fisheries management plans (FMPs), managed by regional fisheries management councils. With assistance from NMFS, these councils are required to delineate EFH for all managed species in the context of FMPs and their amendments, and NMFS approves EFH definitions.

EFH includes those waters and substrates necessary for fish spawning, breeding, feeding, or growth to maturity. In the definition of EFH, “waters” include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include aquatic areas historically used by fish where appropriate. “Substrates” include sediment, hard bottom, structures underlying the waters, and associated biological communities. “Necessary” means the habitat required to support a sustainable fishery and the managed species

contribution to a healthy ecosystem. “Spawning, breeding, feeding, or growth to maturity” covers a species’ full life cycle (NMFS 2004).

The Pacific Fisheries Management Council (PFMC) manages the relevant commercial fisheries in the vicinity of the Proposed Action area. The Proposed Action alignment crosses two tidally influenced water courses (i.e., San Rafael Creek and the unnamed drainage ditch) immediately adjacent to San Pablo Bay, and designated EFH is present in San Pablo Bay. Therefore, the Proposed Action has the potential to affect fish species that are managed under the Pacific Groundfish FMP and the Coastal Pelagics FMP.

Pacific Groundfish Essential Fish Habitat

PFMC manages 83 species of Pacific groundfish. Several of the species are known to occur in San Pablo Bay (see Table 3.2-2). The waters and substrates that make up groundfish EFH are diverse, widely distributed, and closely affiliated with other aquatic and terrestrial environments. All Pacific groundfish EFH in the vicinity of the Proposed Action area is characterized as estuarine. The Proposed Action alignment crosses two tidally influenced waters on the margin of San Pablo Bay (i.e., San Rafael Creek and the unnamed drainage ditch), downstream portions of which may be used by various life stages of Pacific groundfish (e.g., starry flounder, English sole, and leopard shark). Other Pacific groundfish species (listed in Table 3.2-2) typically use deeper water habitats and rocky or sandy substrates within estuaries. Starry flounder and English sole generally prefer low-gradient tidal areas with muddy or sandy bottoms. Leopard sharks use shallow muddy and sandy habitats to pup and forage.

Table 3.2-2: Fisheries Management Plan Species of Pacific Groundfish and Coastal Pelagics Potentially Occurring Downstream from the Proposed Action Area

Common Name	Scientific Name	FMP	Life Stage
Starry flounder	*Platichthys stellatus*	PG	J, A
English sole	*Parophrys vetulus*	PG	J, A
Lingcod	*Ophiodon elongatus*	PG	
Sand sole	*Psettichthys melanostictus*	PG	L, J, A
Leopard shark	*Triakis semifasciata*	PG	J, A
Spiny dogfish	*Squalus acanthias*	PG	
Big skate	*Raja binoculata*	PG	
Brown rockfish	*Sebastes auriculatus*	PG	J
Cabezon	*Scorpaenichthys marmoratus*	PG	J
Pacific whiting	*Merluccius productus*	PG	
Other rockfish	*Sebastes* sp.	PG	J
Northern anchovy	*Engraulis mordax*	CP	J, A
Pacific sardine	*Sardinops sagax*	CP	J, A

Notes:
A = adult; CP = coastal pelagics; E = egg; J = juvenile; L = larvae; PG = Pacific groundfish
Source: AECOM 2014

Coastal Pelagics Essential Fish Habitat

Pelagic fish live in the pelagic zone of ocean or lake waters, meaning that they live neither close to the bottom of the water column nor near the shore. PFMC manages five coastal pelagic species. Four are finfish and include Pacific sardine, Pacific (chub) mackerel, northern anchovy, and jack mackerel. The fifth species, market squid, is an invertebrate. All of these species generally occur above the thermocline in the upper mixed layer. The FMP for coastal pelagic species defines estuarine EFH, and (for the purposes of EFH) these species are treated as a single species complex because of similarities in life histories and habitat requirements. Pacific sardine and northern anchovy are known to occur in San Pablo Bay (see Table 3.2-2). These species primarily occupy open water habitats within estuaries; however, they occasionally may use tidal wetlands for foraging. Generally, coastal pelagic species have the least potential to be affected by the Proposed Action because they are pelagic at all life stages, are mobile, and typically are not associated with substrates.

Table 3.2-2 lists the various PFMC-managed species that potentially occur downstream from the Proposed Action area.

Migratory Birds

The Migratory Bird Treaty Act (MBTA) makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, or purchase any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued by USFWS. The MBTA also protects the habitat of migratory birds.

The Proposed Action alignment generally is devoid of vegetation, and therefore does not feature high bird diversity or abundance. Nonetheless, several species of birds were observed during the habitat assessment, including mallard (*Anas platyrhynchos*), snowy egret (*Egretta thula*), common raven (*Corvus corax*), and western scrub-jay (*Aphelocoma californica*) (AECOM 2013a). Potential nesting and foraging habitat for birds is present along the unnamed channel that lies adjacent to the ROW from Irwin Street to just north of Andersen Drive, and also within ornamental and native vegetation bordering the alignment south of the Cal Park Hill Tunnel. Evidence of previous swallow nesting also is present beneath the US 101 overpass. Thus, nesting has the potential to occur at this location in the future.

Wetlands and Jurisdictional Waters

A preliminary jurisdictional determination was conducted for the Proposed Action alignment in accordance with established delineation protocols (AECOM 2013b). The delineation found two traditionally navigable water (TNW) features (i.e., San Rafael Creek and the unnamed drainage ditch) within the Proposed Action alignment. Both of these features eventually discharge into San Pablo Bay. The delineation also found one non-relatively permanent water (non-RPW)—a human-made ditch that runs alongside the ROW, slightly north of the Cal Park Hill Tunnel. This feature eventually discharges into the City of San Rafael storm drain system.

Three small, freshwater marsh features also were recorded along the ROW. These are areas that contain obligate wetland plant species, such as cattails (*Typha* spp.) and watercress (*Nasturtium officinale*). The first feature is located just north of the Cal Park Hill Tunnel. The second feature is located within an open channel, southeast of the intersection of Auburn Street and Woodland Avenue. Only a small portion of this feature is located within the ROW. This feature enters a culvert beneath the railroad berm and flows into the City of San Rafael's underground storm drain system. The third feature is located between the unnamed channel trestle crossing and Andersen

Drive. This feature is small and very disturbed, and (at the time of the delineation) highly polluted with trash and discarded medical waste.

One seasonal wetland feature was recorded just south of the unnamed channel trestle crossing. It likely receives water from runoff and precipitation, and at times may receive overflow from the adjacent unnamed channel. This wetland connects directly to the unnamed channel, which likely sustains the water table at this location.

Table 3.2-3 summarizes the acreage of the identified, potentially jurisdictional features that are located within the Proposed Action ROW. Detailed information concerning these features is provided in Appendix B.

Table 3.2-3: Potentially Jurisdictional Features in the Proposed Action ROW

Feature	Jurisdiction (acres)
Traditionally Navigable Water (TNW)	
TNW1 (Unnamed Drainage)	0.752
TNW2 (San Rafael Creek)	0.097
Total TNW Acreage[1]	**0.85**
Non-Relatively Permanent Water (Non-RPW)	
Non-RPW1	0.03
Total Non-RPW Acreage[1]	**0.03**
Wetlands	
Freshwater Marsh (FM)	
FM1	0.048
FM2	0.003
FM3	0.007
Seasonal Wetland (SW)	
SW1	0.061
Total Wetlands[1]	**0.12**
TOTAL POTENTIALLY JURISDICTIONAL FEATURES[1]	**1.0**

Note:
[1] Acreage in the thousandth decimal place is not included in the total acreage reported in the "total" rows.
Source: AECOM 2013b

3.2.2 Environmental Consequences

This section analyzes the potential effects of the Alternatives on biological resources, specifically wildlife, fish, habitat, and jurisdictional features.

Alternative 1: No Action Alternative

Under the No Action Alternative, the FTA would take no action and would provide no funding to SMART for the Downtown San Rafael to Larkspur Extension project. The project would not be constructed, and none of the effects associated with the Proposed Action would occur. No construction or operation activities would occur, and the project corridor would remain in its current state.

Alternative 2: SMART Downtown San Rafael to Larkspur Extension (Proposed Action)

USFWS-Managed Sensitive Plant and Wildlife Species

As discussed in Section 3.2.1, no sensitive terrestrial plant or wildlife species are likely to occur in the Proposed Action area. This mainly is based on the lack of suitable habitat and the highly developed and disturbed nature of the ROW and adjoining areas. Based on this information, no adverse effect on sensitive terrestrial plant or wildlife species would occur with implementation of the Proposed Action. Further consultation with USFWS is not required.

NMFS-Managed Sensitive Fish Species and Habitats

Southern Distinct Population Segment of North American Green Sturgeon

As discussed in Section 3.2.1, neither San Rafael Creek nor the unnamed drainage channel contain the habitat features required to support green sturgeon. Both waterways are highly compromised and do not possess the food resources, water quality requirements, or depth and substrate characteristics necessary to support the species. However, these habitat characteristics are available downstream from these water courses in the tidally influenced estuarine habitats of San Pablo Bay. Although no effects on green sturgeon would be expected during the operational phase of the Proposed Action, construction activities would have the potential, albeit low, to affect downstream areas that could be occupied by the species.

Removal and replacement of the two trestles and the associated tracks, as well as placement of the retaining wall in the unnamed drainage ditch would have the potential to harass and displace fish that were in the general area of construction activities. Although it is unlikely that adult or juvenile green sturgeon are present at any time of year within the Proposed Action area around the San Rafael Creek crossing and the unnamed drainage ditch, adults and juveniles could be present year-round downstream from the Proposed Action area in the tidally influenced estuarine habitats near the confluence with San Pablo Bay.

During the construction phase, approximately 0.39 acre of bank and watercourse channel (0.14 acre for San Rafael Creek and 0.25 acre for the unnamed drainage ditch) would be disturbed by excavation, grading, shaping, removal of old piles, and pile driving activities. Construction activities could impair water quality temporarily within, adjacent to, or downstream from the Proposed Action area. Sediment mobilization and increased turbidity, and release of contaminants could occur if disturbed and eroded soil or fluids from construction equipment were discharged into receiving waters. The resultant impaired water quality could affect habitats and the physical health of fish and other aquatic life within San Rafael Creek, the unnamed drainage ditch, and San Pablo Bay.

Noise associated with pile driving and other construction activities also could affect fish. An interagency working group including NMFS established interim criteria for evaluating underwater noise effects on fish from impact

pile driving. These criteria are defined in the Agreement in Principal for Interim Criteria for Injury to Fish from Pile Driving Activities (FHWG 2008). This agreement identifies a peak sound pressure level of 206 decibels (dB) and an accumulated sound exposure level (SEL)[2] of 187 dB as thresholds for injury to fish greater than or equal to 2 grams (g). For fish less than 2 g, the accumulated SEL threshold is reduced to 183 dB. Although no formal agreement has been made on a behavioral threshold, NMFS uses the 150 dB-root mean square as the threshold for adverse behavioral effects (NMFS 2009).

The NMFS criteria used for underwater noise levels were established specifically for impact pile driving and are not intended to be applied to vibratory driving. No formal agreement has been made regarding injury thresholds for vibratory pile driving. However, a staff member from NMFS has suggested that thresholds for vibratory driving should be 20 to 30 dB higher than for impact driving (Stadler, pers. comm., 2009). In addition, detailed field studies that were conducted for the now completed Mad River Bridges Replacement Project along US 101 in Humboldt County concluded no immediate significant physical effects for fish exposure on cumulative SEL values less than 194 dB from impact pile driving. In the current regulatory environment, vibratory pile driving generally is viewed as a preferred method and mitigation measure for pile driving, and not as a substantial source of concern for injury to fish.

Construction activities can be undertaken in a manner to generally eliminate the potential effects described above. Avoidance and minimization measures were prescribed in the 2005 Draft EIR and 2008 Supplemental Draft EIR, and subsequent measures and conditions also have been prescribed during issuance of regulatory permits for the locally-funded SMART Project for segments that already are under construction. For instance, the Biological Assessment (BA) prepared for the IOS-1 South portion of the SMART project, which runs from San Rafael (Milepost [MP] 19.3) north to just south of the Petaluma River in Sonoma County (MP 37.02), contained a number of avoidance and minimization measures. The prescribed measures received concurrence from NMFS. These and other measures have been presented to NMFS for concurrence in the Proposed Action's BA (see Appendix B). The conservation measures also would be protective of other fish species and their habitat, and generally all aquatic life forms and processes within and around the Proposed Action area. The proposed BA conservation measures include both general measures and measures specific to green sturgeon and green sturgeon critical habitat:

General Avoidance and Minimization Measures

- Prior to any onsite construction activities, a review of all required permits and notifications would be performed to ensure requirements for environmental compliance are fully understood, specific limits of activities and work are defined and understood, and all environmental clearances and access, encroachment agreements, and permissions have been obtained from the appropriate agencies and parties.
- Prior to any construction activities, a job briefing would be held each day to discuss daily activities.
- A biological monitor approved by NMFS would be onsite during all construction activities. The biological monitor would be approved prior to work. Biological monitors would be notified in advance of all work activities and locations and scheduled to be onsite as required during all ground disturbing activities.

[2] "Sound exposure level" (SEL) is defined as the constant sound level acting for 1 second, which has the same amount of acoustic energy as the original sound. Expressed another way, the sound exposure level is a measure of the sound energy in a single pile driver strike. Accumulated SEL ($SEL_{accumulated}$) is the cumulative SEL resulting from successive pile strikes. $SEL_{accumulated}$ is based on the number of pile strikes and the SEL per strike; the assumption is made that all pile strikes are of the same SEL.

- A worker awareness program would be presented to all construction personnel before they start work on the proposed project. The program would summarize relevant laws and regulations that protect biological resources, and discuss sensitive habitats and listed species, the role of biological monitors, and applicable avoidance measures to protect listed species and habitats.
- All work would occur during normal daylight working hours.
- Access routes and work areas would be limited to the minimum amount necessary to achieve the project goals. Unpaved routes and boundaries would be clearly marked prior to initiating construction.
- All food and food-related trash items would be enclosed in sealed trash containers and removed daily from the project site.
- Pets would not be allowed on the project site.
- Standard best management practices (BMPs) would be applied to protect species and their habitat(s) from pollution due to fuels, oils, lubricants, and other harmful materials. Vehicles and equipment used during the course of the project would be fueled and serviced in a manner that would not affect federally protected species in the Proposed Action area or their habitats.
- Well-maintained equipment would be used to perform the work, and except in the case of a failure or breakdown, equipment maintenance would be performed off site. Equipment would be inspected daily by the operator for leaks or spills. If leaks or spills are encountered, the source of the leak would be identified, leaked material would be cleaned up, and the cleaning materials would be collected and properly disposed.
- A Spill Prevention Control and Countermeasure (SPCC) Plan would be prepared to address the emergency cleanup of any hazardous material, and would be available on site. The SPCC plan would incorporate SPCC, hazardous waste, stormwater, and other emergency planning requirements. Fueling of equipment would be conducted in accordance with procedures to be developed in the SPCC.
- All construction materials, wastes, debris, sediment, rubbish, trash, fencing, etc., would be removed from the site once project construction is complete, and transported to an authorized disposal area, as appropriate, in compliance with applicable federal, state, and local laws and regulations.
- Hazardous materials such as fuels and lubricants would be stored in sealable containers in a designated location at least 200 feet from any aquatic habitat.
- The number of access routes, size of staging areas, and the total area of the activity would be limited to the minimum necessary to achieve project goals. Project limits would be established and defined with physical markers to define access routes and maintenance areas to the minimum area necessary to complete the project; this includes locating access routes and maintenance areas outside of drainages and creeks. Construction access, staging, storage, and parking areas would be located on ruderal or developed lands to the extent possible. Vehicle travel adjacent to wetlands and riparian areas would be limited to existing roads and designated access paths. Sensitive natural communities (i.e. wetlands, watercourses, riparian zones, and oak woodlands) would be conspicuously marked in the field to minimize impacts on those communities, and work would be limited to outside the marked areas.
- Best Management Practices (BMPs) as required by the Regional Water Quality Control Board would be implemented to effectively manage runoff and sediment from construction activities.
- Only tightly woven fiber netting or similar material may be used for erosion control. No plastic mono-filament matting would be used for erosion control, as this material may ensnare wildlife.

- Netting or suspended debris racks will be used during demolition and removal of the existing trestle structures to minimize the amount of debris falling into water bodies.
- Temporarily disturbed areas, such as staging areas, would be returned to original contours to the extent feasible upon completion of the project. A project re-vegetation plan would be developed and implemented following the conclusion of construction activities.
- During construction activities, the following measures would be implemented to the extent feasible to reduce the spread of exotic invasive plants in temporary work areas and throughout the project corridor:
    - Minimize vehicle travel through weed-infested areas.
    - Minimize soil disturbance and the removal of existing vegetation (exotic or native) to the extent feasible during construction activities.
    - Use only certified weed-free straw and mulch or weed-free fiber roll barriers or sediment logs.
    - Use only seed mixes and plantings that are native or naturalized to the North Bay region and are appropriate to the pre-existing or adjacent natural habitat for re-vegetation.
- To prevent introduction and/or transport of aquatic invasive species into or from creeks, sloughs, or other wetted channels in the Action Area, any equipment that comes into contact with the channel would be inspected and cleaned before and after contact according to the most current Inspection Standards and Cleaning and Decontamination Procedures (DiVittorio et al. 2012).
- Areas temporarily impacted by construction would be revegetated within one year of impact. After construction is completed, the contractor would regrade (using machinery) or resurface (using hand tools) any areas where the construction work resulted in holes, depressions, or mounded hummocks, and would ensure that the soil surface has not been compacted. The disturbed surfaces would be seeded and allowed to passively revegetate without irrigation. The seed mix used in these areas would be the same or similar to the native erosion control seed mix applied to disturbed soils by other SMART projects in the vicinity and would consist of grasses native to the North Bay region, such as California brome (*Bromus carinatus*), blue wildrye (*Elymus glaucus*) and creeping wildrye (*Leymus triticoides*).

Green Sturgeon Avoidance and Minimization Measures

- In-water work would be restricted to low-flow periods between July 1 and November 30, unless otherwise specified by appropriate agencies. This window can be extended based on creek and river conditions, if approved in writing by NMFS. Work from the banks, trestle, falsework, and inside closed coffer dams can occur year-round.
- A qualified biological monitor would be present during ground or water disturbing activities (e.g., ESA fence installation, vegetation clearing, trestle demolition, and trestle/bridge construction). Work would stop immediately if a listed or protected species was encountered and the appropriate agency or agencies notified (USFWS, NMFS, and/or California Department of Fish and Wildlife [CDFW]). Work would not resume at that location prior to the agencies' approval, or as agreed to in prior consultation with the agencies.
- Cofferdams would only be used around each wooden trestle pile during removal activities. If dewatering is required, a qualified biologist would be present during the dewatering period to inspect and ensure that

sensitive aquatic species would not be trapped within temporary cofferdams. If green sturgeon were found within the cofferdams a NMFS approved biologist would capture and relocate trapped fish to an appropriate area away from the Proposed Action area.

  - At the completion of the project, SMART would remove all materials from the streambed used to construct and maintain cofferdams.

- Construction activities would avoid submergent and emergent aquatic vegetation to the greatest extent possible.
- Catchment tarps would be installed to ensure all construction debris is caught and removed daily from the work area prior to trestle demolition, decommissioning, or work activity within the river floodway embankments.
- Pumps used for dewatering, if needed, would have agency-approved fish screens installed to minimize intake of fish into pumps. Diversion structures would be left in place until all in-water work was completed. Temporary culverts, construction materials, and debris would be removed from the affected area prior to reestablishing flow and prior to the rainy season.

Based on the information provided above, potential construction-related temporary disturbances and effects on adult and juvenile green sturgeon would be minimal because:

- Effects and disturbances would be brief and temporary (approximately 2 weeks of total construction at each trestle location);
- A very small section of watercourse channel and adjacent bank would be disturbed (approximately 0.39 acre), and much of that work would occur behind existing abutments and outside the stream channel;
- Construction activities would be restricted to low flow periods between July 1 and November 30;
- Most fish would be likely to move away from the area of disturbance;
- The presence of green sturgeon at construction sites would be unlikely during the proposed construction window; and
- Implementation of the aforementioned BA conservation measures would minimize potential effects.

Based on the characteristics of the Proposed Action's construction (as described above), together with implementation of the BA conservation measures, construction activities associated with the Proposed Action would not be likely to affect the Southern DPS of green sturgeon.

Critical Habitat – Southern DPS of North American Green Sturgeon

As discussed in Section 3.2.1, San Rafael Creek and the unnamed drainage ditch are located within designated critical habitat for North American green sturgeon southern DPS. Critical habitat identifies specific areas, both occupied and unoccupied by a listed species, which are essential to the conservation of the species and that may require special management considerations or protection. Although no effects on critical habitat would be expected during the operational phase of the Proposed Action, construction activities associated with the removal and replacement of two trestles could have temporary effects on designated green sturgeon critical habitat. Disturbance during construction activities could mobilize sediments, increase turbidity, and release fuels and

lubricants through accidental discharge, which would affect food resources, water quality, sediment quality, and water depth.

The effects on green sturgeon critical habitat would be identical to that described above for the Southern DPS of green sturgeon. Potential temporary effects during construction of the Proposed Action would have minimal effects on green sturgeon critical habitat because:

- Effects and disturbances would be brief and temporary (approximately 2 weeks of construction at each trestle location);
- A very small section of watercourse channel and adjacent bank would be disturbed (approximately 0.39 acre), and much of that work would occur behind existing abutments and outside the stream channel;
- Construction activities would be restricted to low-flow periods between July 1 and November 30; and
- Implementation of BA conservation measures would minimize potential effects.

Based on the characteristics of the construction activities (as described above), together with the implementation of the BA conservation measures presented previously, construction of the Proposed Action would not be likely to affect designated critical habitat for green sturgeon. In addition, the Proposed Action would remove approximately 36 creosote-treated wooden piles from San Rafael Creek and the unnamed drainage ditch. The piles would be cut 3 feet below the streambed and removed. Creosote-treated wood placed in aquatic environments has been shown to leach contaminants into surrounding waters for many years, and to have negative effects on both fish and people (Hutton and Samis 2000; Sherry et al. 2006). Removal of the creosote-treated wooden piles would have beneficial effects on green sturgeon and its critical habitat and other aquatic life forms.

Essential Fish Habitat

The Proposed Action area is not within designated Pacific groundfish or coastal pelagics EFH. However, areas downstream from the Proposed Action area include estuarine portions of San Pablo Bay that are designated Pacific groundfish and coastal pelagics EFH. Although no effects on EFH are expected during operation of the Proposed Action, construction activities associated with the removal and replacement of two trestles could have temporary effects on EFH if not managed appropriately.

Potential adverse effects on estuarine EFH may affect various life stages of groundfish and coastal pelagic species that utilize estuarine habitats in San Pablo Bay adjacent to the mouth of San Rafael Creek. Estuarine habitats provide productive shallow water locales for fish and their prey. Effects may include changes to local water quality and habitat quality during proposed trestle replacement through substrate disturbance, sediment mobilization, and the resulting increase in turbidity. Accidental release of fuels and lubricants from construction vehicles also could have negative impacts.

Turbidity plumes could result from the disturbance of substrates during construction activities. Fish may suffer reduced feeding ability, leading to limited growth and lowered resistance to disease if high levels of suspended particles persist in the water column (PFMC 1998b). Suspended materials could contain toxins or pathogens, and could decrease levels of dissolved oxygen in the water. Toxic metals and organics, pathogens, and viruses absorbed or adsorbed to fine-grained particulates in the material may become biologically available to organisms either in the water column or through food chain processes. The introduction of nutrients or organic material to

the water column could lead to a high biochemical oxygen demand, in turn possibly leading to reduced dissolved oxygen, thereby potentially affecting the survival of many aquatic organisms. In addition, increases in nutrients could alter conditions enough to favor one group of organisms, such as polychaetes or algae, to the detriment of other types. Increased turbidity also could reduce light penetration and lower the rate of photosynthesis and the primary productivity of an aquatic area (PFMC 1998a). More significant pollution events (e.g., accidental spills of fuels or lubricants) could have both acute and chronic effects on various fish life stages and prey items, including death, disease, behavioral abnormalities, and physiological malfunctions.

Temporary effects on water and habitat quality resulting from implementation of the Proposed Action are not expected to result in any significant losses or degradation of estuarine EFH, considering the short term duration of these effects and the implementation of appropriate BA conservation measures, as discussed previously. Potential adverse effects are expected to be local and relatively short-lived, so that any temporary losses of habitat functions or values would be minor (e.g., temporary increases in turbidity within tidally influenced waters, where suspended sediment loads are naturally high, are not expected to adversely affect estuarine EFH). Furthermore, the likelihood for occurrence of Pacific groundfish or coastal pelagic species in the marginal tidal areas that potentially may be affected by the Proposed Action would be relatively low. Therefore, temporary effects that may result from implementation of the Proposed Action are not likely to adversely affect estuarine EFH.

Migratory Birds

Construction activities could affect migratory birds nesting in vegetation, in or adjacent to construction sites. Because the majority of the ROW is devoid of brush and trees, trimming or removal of vegetation that could support nesting generally would be limited, and therefore the destruction of nests is not anticipated to occur. Equipment noise, vibration, lighting, and other human-related disturbance could disrupt nesting, feeding, or other life cycle activities, and could cause nest abandonment or nesting failure for birds nesting adjacent to the ROW. Structure-nesting species, such as cliff swallows, also could have their nests disturbed by the removal of the existing trestles or by construction occurring beneath the US 101 overpass.

The 2005 Draft EIR prescribed Mitigation Measures BR-3a and BR-3b to avoid effects on migratory birds by restricting nest-affecting activities to outside the nesting season and implementing exclusionary buffers to protect active nests. These measures would be as follows:

- **Mitigation Measure BR 3a:** To the extent feasible, trees and shrubs in the construction zones will be trimmed or removed between September 1 and January 31, to reduce potential impacts on nesting birds. If vegetation must be removed during the period from February 1 to August 31, a qualified wildlife biologist will conduct pre-construction surveys for nesting birds. If an active nest is found, the bird will be identified to species, and the approximate distance from the closest work site to the nest will be estimated. No additional measures need be implemented if active nests are more than the following distances from the nearest work site: a) 300 feet for raptors; or b) 75 feet for other non-special-status bird species. If active nests are closer than those distances to the nearest work site and the potential exists for destruction of a nest or substantial disturbance to nesting birds because of construction activities, a plan to monitor nesting birds during construction will be prepared and submitted to the USFWS and California Department of Fish and Wildlife for review and approval. Disturbance of active nests will be avoided to the extent possible, until it is determined that nesting is complete and the young have fledged.

- **Mitigation Measure BR-3b:** If construction is likely to occur during the nesting season of cliff swallows (March 1 to July 31), bridges will be inspected periodically for swallow nests by a qualified biologist before the onset of bridge demolition and/or new bridge construction. Nests will be knocked down by the biologist before the demolition is one-third completed. Inspection of the bridges will begin in late February. Alternative methods to prevent cliff swallow nesting on a bridge may be used with prior approval by the California Department of Fish and Wildlife.

These measures would be implemented for the Proposed Action. Thus, no adverse effect would occur on nesting birds during construction. Operation of the Proposed Action could result in minor disturbances to migratory birds; however, the existing rail alignment does not provide high-quality nesting or foraging habitat, and operation is not expected to result in take of any active nests because few birds would be likely to use the area. Furthermore, because the alignment would be under continuous rail operation, birds nesting near the ROW presumably would become accustomed to rail operations. Therefore, no direct effects resulting from construction, operation, or maintenance of the Proposed Action would occur.

Wetlands and Jurisdictional Waters

As discussed in Section 3.2.1, approximately 1 acre of potentially jurisdictional waters or wetlands is present within the ROW between Downtown San Rafael and Larkspur. However, not all of these features would be affected by the Proposed Action. Most of these features occupy areas that are on the periphery of the ROW and well outside the construction footprint. For instance, fully three-quarters of the identified jurisdictional areas lie within the unnamed channel that is located along the ROW between Irwin Street and Andersen Drive. This feature is approximately 4,500 feet in length. However, only about 280 feet of that length would be affected during construction, and the activity would be limited to the installation of a retaining wall approximately halfway up the bank of the channel. This would affect a small fraction of the channel. Other jurisdictional features within the ROW, such as the freshwater marsh features, the seasonal wetland features, and the relatively-nonpermanent TNW would be avoided entirely.

Installation of abutments and other structures at the San Rafael Creek crossing would take place above the bank. No fill of the existing channel would occur. In addition, removal of the existing piers within the creek would eliminate existing fill and would provide a beneficial effect for both jurisdictional waters and the aquatic species that use them. Detailed designs for the San Rafael Creek, unnamed channel trestles, and unnamed channel retaining wall have not been completed, and thus the precise quantity of jurisdictional waters that would be affected is not available yet. However, based on the information provided above, the area of waters that would be directly affected is not expected to exceed 0.1 acre.

SMART is working to identify and acquire mitigation properties to offset impacts to jurisdictional waters and sensitive habitats. Offsite mitigation for this extension will not occur at SMART's existing mitigation property at the former Mira Monte Marina in northern Marin County. A new property location will be identified.. Any such mitigation efforts would be developed in cooperation with the U.S. Army Corps of Engineers, the Regional Water Quality Control Board, NMFS, and the California Department of Fish and Wildlife. The amount of acreage to be acquired, along with specific management requirements, would be negotiated with the regulatory agencies during the permitting process before construction of the Proposed Action. The eventual permit agreements would provide offsite mitigation for all construction-related wetland and jurisdictional waters effects associated with the

Proposed Action. Therefore, no adverse effect on wetlands and jurisdictional waters would occur with implementation of the Proposed Action.

3.2.3 References

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3.3 CULTURAL AND PALEONTOLOGICAL RESOURCES

This section provides an assessment of the cultural resources located in the vicinity of the Proposed Action area. Previous analysis for cultural resources was undertaken for the entire SMART project alignment as part of the 2005 Draft EIR (SMART 2005), prepared as per CEQA. That analysis can be found in Sections 3.14 and 3.15 of the 2005 Draft EIR. Because the Proposed Action would receive federal funding, compliance with Section 106 of the National Historic Preservation Act (NHPA) is required.

A Cultural Resources Inventory and Evaluation Report was prepared in 2004 to support the 2005 Draft EIR for the SMART project. An updated review has been performed as part of this EA to update the record with any new information or previously unidentified data. Data for this updated effort was taken from various sources, including an updated search of the Native American Heritage Commission Sacred Lands File database, an updated records search of the California Historical Resources Information System (CHRIS) Northwest Information Center (NWIC), the 2005 Draft EIR, and various technical reports addressing the Proposed Action area.

In accordance with Section 106 of the NHPA, an area of potential effect (APE) was delineated around the Proposed Action area to encompass potential direct and indirect effects on cultural resources that could occur from implementation of the Proposed Action. Two APEs were delineated—one for archaeological resources and another for historic and architectural resources—and the State Historic Preservation Officer (SHPO) approved both APEs on May 22, 2013. Maps showing the APEs are included in the historic and architectural resources reports prepared for the Proposed Action (AECOM 2014a, AECOM 2014b),which are included in Appendix C of this EA. Required records searches and surveys were taken for both APEs, and the aforementioned reports were prepared and submitted to SHPO on behalf of the FTA with a request for concurrence of a Finding of No Effect. SHPO concurred with the request and, on May 14, 2014, determined that the Proposed Action would result in no historic properties being affected. All relevant correspondence with SHPO is provided in Appendix C.

3.3.1 Affected Environment

The Proposed Action area is located in an urban environment that includes inactive rail facilities within the proposed rail alignment and a mix of commercial and industrial development along both sides of the alignment. Most of the ground surface is covered by pavement, artificial fill, or other obstructions that limit visibility. All portions of the Proposed Action area have undergone some level of ground disturbance, and in most cases the level of disturbance has been complete.

The updated research effort included a review of reports and other information filed at NWIC that was relevant to the Proposed Action area. The records and literature search identified 22 previous investigations conducted within 0.5 mile of the APE, including the previous SMART cultural resources study, and indicated that 100 percent of the APE has been studied previously. These 22 investigations, conducted between 1984 and 2013, are summarized in Table 3.3-1. Methods employed during these surveys included archival research and records reviews, surface reconnaissance and pedestrian surveys, historic property inventories and evaluation, feasibility studies, and limited subsurface archaeological testing. The updated effort also included pedestrian surveys of the proposed rail alignment for both archaeological and historic architectural resources, and these surveys were conducted in 2013 and 2014.

Table 3.3-1: Previous Cultural Resources Investigations within 1/2-Mile of the APE

NWIC Report #	Title	Year	Author(s)
6424	*Archaeological Resources Evaluation for the Central Marin Sanitation Wastewater Transportation Facilities Improvement Project – Phase II, Marin County, California*	1984	David Chavez
9907	*Archaeological Survey of Landmark Plaza (former Victorian Station Restaurant, 17 E. Sir Francis Drake Boulevard, Larkspur, California*	1988	Teresa Miller Saltzman (Archaeological Resource Service)
9125	*Preliminary Cultural Resources Assessment for Planned Modification and Maintenance of San Rafael Creek in the Town of San Rafael, Marin County, California*	1987	Allan Bramlette
10760	*Archaeological Survey Report for the Marin HOV Gap Closure City of San Rafael, Marin County, California*	1989	Terry Jones (Caltrans, District 4)
16949	*A Cultural Resources Evaluation of a Proposed Reclaimed Pipeline in the San Quentin Point, Corte Madera, Larkspur, Kentfield and San Rafael Areas*	1991	Eric McGuire (Marin Municipal Water District)
22013	*Results of Archaeological Monitoring at the Marin Recycling Center, Jacoby Street, San Rafael, California*	1996	Carol Whitmire (Archaeological Resource Service)
22086	*Cultural Resource Record Search and Literature Review for Stations, Sidings, and Bridges son the Northwestern Pacific Railroad, Between Cloverdale and Larkspur, Sonoma and Marin Counties*	1999	Anthropological Studies Center
27664	*Historic Structures Evaluation of 1103 Lincoln Avenue, San Rafael*	2003	Cassandra Chattan (Archaeological Resource Service)
NA	*California Park Hill Railroad Tunnel Project Historical Resources Inventory and Evaluation Report.*	2004	JRP Historical Consulting Services
31163	*An Archaeological and Paleontological Resources Study for the Lincoln and Mission residential Condominium Project, San Rafael, Marin County, California*	2006	LSA Associates
30316	*A Cultural Resources Evaluation of the Proposed Best Buy San Rafael, 632 Irwin Avenue, San Rafael, Marin County, California*	2005	Cassandra Chattan (Archaeological Resource Service)
31737	*Archaeological Resources Technical Report for the Sonoma Marin Area Rail Transit (SMART) Project, Sonoma and Marin Counties, California*	2004	Garcia and Associates
33646	*Transportation Authority of Marin, Highway 101 Greenbrae Corridor Cultural Resources Feasibility Study*	2007	Brian Byrd (Far Western Anthropological Research Group, Inc.)
35514	*Historic Property Survey Report for the Marin HOV Gap Closure, City of San Rafael, Marin County, California*	2008	Caltrans, District 4
36070	*Central Marin Ferry Connection Project, Marin County, California Archaeological Survey Report*	2009	Brian Byrd (Far Western Anthropological Research Group, Inc.)
36941	*Negative Archaeological Survey Report of the Puerto Suello to Transit Center Connection Project (04-MRN00-SRF), City of San Rafael, Marin County, California*	2010	Alex DeGeorgey (North Coast Resource Management)

NWIC Report #	Title	Year	Author(s)
37429	*A Cultural Resources Evaluation of the Marin Sanitary Service Parcel, Jacoby Street, San Rafael, Marin County, California*	2010	William Roop (Archaeological Resource Service)
37826	*Archaeological Survey Report for the Central Marin Ferry Connection Project, Larkspur, Marin County, California*	2010	Brian Byrd and Michael Darcangelo (Far Western Anthropological Research Group, Inc.)
37827	*Extended Phase I Subsurface Geoarchaeological Investigation Report for the Central Marin Ferry Connection Project, Larkspur, Marin County, California*	2011	Philip Kaijankoski and Jack Meye (Far Western Anthropological Research Group, Inc.)
38714	Historic Property Survey Report for Federal Aid Project No NMTPL 5043(023)	2011(?)	Caltrans District 4
38999	*Archaeological Survey Report for the US 101/Route 580 Twin Cities Greenbrae Corridor Improvement Project, Larkspur and Corte Madera, Marin County, California*	2011	Brian Byrd (Far Western Anthropological Research Group, Inc.)
NA	*Cultural Resources Inventory and Evaluation Report for SMART, the Sonoma-Marin Rail Transit Downtown San Rafael, Marin County (MP 17) to Petaluma, Sonoma County (MP 38.5)*	2013	ICF International

Source: Northwest Information Center 2014

Archaeological Resources

None of the 22 investigations on file at NWIC identified any previously recorded archaeological resources within the APE. During the 2014 pedestrian survey, the proposed rail alignment was noted to have been the subject of intense development. Portions of the Proposed Action area extend through parking lots, commercial and industrial properties, and the newly renovated Cal-Park Hill Tunnel. In general, the APE is located in an area that has been heavily developed, and the area is mostly characterized by artificial surfaces, such as pavement and fill. No archaeological resources were identified during the 2013 pedestrian survey. It also was observed that the Proposed Action area has been the subject of multiple construction episodes, and any previously undocumented resources that may have been present at one time have since been destroyed by construction-related activities or lie beneath fill. None of the identified resources meet the criteria for listing in the NRHP. SHPO concurred with this finding in May, 2014 (see Appendix C).

Historic Resources

Previously Recorded Historic Resources

The NWIC records search revealed that three potentially historic resources were evaluated previously within the APE.

California Park Hill Tunnel

The California Park Hill Tunnel was evaluated for the National Register of Historic Places (NRHP) in 2004, as part of the Cal Park Hill Tunnel Rehabilitation and Pathway Design Project EIR. The 2004 evaluation found that the tunnel did not meet the criteria for the NRHP because the tunnel as an individual element of the much larger

Northwestern Pacific (NWP) Railroad was not considered significant in history or as an engineering feature. In addition to not meeting the NRHP criteria, the tunnel also was determined to lack integrity of design, materials, and workmanship. SHPO concurred with this finding in 2005.

NWP Railroad Auburn Street Trestle

The NWP Railroad Auburn Street Trestle (sometimes referred to as the Woodland Street Trestle) was evaluated in 2004, also as part of the Cal Park Hill Tunnel Rehabilitation and Pathway Design Project EIR. The evaluation found that the segment did not meet the criteria for the NRHP because the trestle as an element of the much larger NWP was not considered significant in Marin County history or with regard to events or people. The trestle is a common example of a standard designed railroad trestle. In addition, the trestle was determined to lack integrity of design, materials, and workmanship. SHPO concurred with this finding in 2005.

San Rafael Passenger Depot/Northwest Pacific Railroad Depot

The San Rafael Passenger Depot/Northwest Pacific Railroad Depot was first recorded in 1978, and was evaluated for the NRHP in 2013 as part of the Cultural Resources Inventory and Evaluation Report for SMART. The 2013 evaluation found that the depot was not eligible for the NRHP because it lacked sufficient integrity of design, materials, and workmanship. SHPO concurred with this finding in 2013.

Additional Historic Resources Recorded as Part of the Update Effort

Two additional, potentially historic resources were evaluated as part of the update effort. These included an approximately 1-mile segment of the NWP Railroad and a commercial building located at 250 Francisco Boulevard. These resources are described further below, as well as their eligibility for listing in the NRHP.

Northwestern Pacific Railroad Segment

An approximately 1-mile-long segment of the former NWP Railroad was surveyed between Anderson Drive and 4th Street. The segment is not intact, and large portions of the track are missing on the southeast side of Rice Drive. The first approximately 1,600 feet of at-grade track consists of two sets of rails with timber ties. Most of the ties are missing. Approximately 1,162 feet from the beginning of the segment is a small trestle that crosses an unnamed drainage. It is constructed of timber with timber abutments. Steel mesh plates cover portions of the bridge. Approximately 455 feet west of the trestle, the tracks are covered by a paved parking lot but then resume as a single track shortly before reaching Rice Drive. A second, small single-track trestle is located north of West Francisco Boulevard, where the track crosses San Rafael Creek south of Second Street. The trestle has wood timbers and steel mesh plates. The segment of track continues northward to 4th Street, with portions partially or entirely paved over with asphalt. In some locations, the ties are completely covered over with asphalt, with only the tops of the rails visible.

This approximately 1-mile segment of the NWP Railroad was evaluated against applicable NRHP listing criteria. It does not meet the criteria because the segment was part of a much larger system, and construction of the segment did not result in immediate and substantial development to San Rafael or Marin County in a manner that was significant. Therefore, the 1-mile segment has no direct associations with significant events or trends in history. Research also did not suggest that the segment is associated with known individuals who made a significant contribution to history. The segment is a common example of railroad construction and does not express distinctive characteristics. It does not appear to be the source of important information in history.

Furthermore, this 1-mile segment is part of a much larger system that has been altered by the removal of tracks and ties, and it has been covered over in several places along its original alignment. Therefore, the segment lacks integrity of design, materials, and workmanship. Its setting, feeling, and association also have been lost because of the modern-era development surrounding what is left of the segment. In summary, the resource does not meet the criteria for listing in the NRHP. SHPO concurred with this finding in May, 2014 (see Appendix C).

250 West Francisco Boulevard

The 250 West Francisco Boulevard address is occupied by a single-story commercial building with a rectangular plan and side-gable roof. The building has four bays and is partially open on the north elevation. The bays feature a loading dock with steel supports. Two of the bays have concrete masonry units that have roll-up metal doors and flush, metal single-entry doors. Siding includes wood shake shingles, brick, and corrugated metal. The windows are set with aluminum sliders. An addition appears to be located on the eastern elevation and is rectangular in plan and flat-roofed with plywood siding. Below the roof line are ribbon windows with plastic panes. Because the property was recorded from the public right-of-way, whether the two buildings are attached could not be confirmed.

This area of San Rafael along the western side of the former NWP Railroad was developed in the late 1960s, primarily between 1966 and 1969. Most of the commercial development in San Rafael occurred after World War II, in the late 1940s and 1950s. This particular building was constructed circa 1969 and does not appear to be directly associated with significant events or trends in the history of the region. Research revealed little about the original owners or occupants of this commercial property. Today, it is occupied by a roofing company, which has been in business locally since 1929. However, this building was not constructed until circa 1969, so the company presumably located to the building sometime after it was built. The building has no known associations with persons who played a significant role in history. Architecturally, the building lacks distinctive characteristics and was not designed by a master architect. It is a modest example of a late 1960s commercial building and is not an important example of its type, period, or method of construction. Furthermore, it does not appear likely to yield information important to history. In summary, the building does not meet the criteria for listing in the NRHP. SHPO concurred with this finding in May, 2014 (see Appendix C).

Paleontological Resources

Most of the area through which the proposed rail alignment would pass was formerly marshes, mudflats, and open water. Historic topographic maps show the old NWP Railroad alignment crossing directly through an area of marshes from downtown San Rafael to near the northern entrance of the Cal-Park Hill Tunnel (USGS 1897). The existing rail alignment was presumably laid on top of an earthen causeway or levee through the marsh area. The entire area on either side of the alignment was filled during the ensuing decades, with the lands west of the alignment the last to be filled in the 1940s and 1950s (USACE 1941; USGS 1954, 1968, 1980, 1993, 1995). Thus, the northern two-thirds of the Proposed Action area lying north of Cal-Park Hill Tunnel are made up entirely of artificial fill, most of which is several feet in depth. The existing alignment has been the subject of multiple construction and reconstruction events. Soils within the proposed rail alignment have been severely disturbed on multiple occasions and are a mix of artificial fill that is several feet in depth, overlain by railroad ballast in the immediate vicinity of the existing and former track beds. Based on the near entirety of the Proposed Action area being made up of artificial fill, together with the severe and repeated disturbance that has taken place within and

around the alignment, the likelihood of paleontological resources being present within the first several feet of soil is low.

On entering the Cal-Park Hill Tunnel, the alignment enters bedrock material made up of Franciscan Complex mélange rocks. Metamorphic rocks are the principal component of the Franciscan Complex, although volcanic rocks such as basalt may be present, along with sedimentary rocks. The Franciscan Complex is known for its chaotic and disjointed structure, and the typical assemblage of diverse rock types that are present at most locations sometimes is referred to as a "mélange." The chaotic assemblage mainly is the result of the deformation, folding, breaking, and mixing associated with movement along the nearby San Andreas Fault. Because of this, rocks within the mélange zones contain only a sparse assemblage of fossils, and those that are rarely present usually are microfossils. Vertebrate fossils are extremely rare. Based on this information, the likelihood of paleontological resources being present along this portion of the proposed rail alignment is low.

3.3.2 Environmental Consequences

Alternative 1: No Action Alternative

Under the No Action Alternative, the FTA would take no action and would provide no funding to SMART for the Downtown San Rafael to Larkspur Extension project. The project would not be constructed, and none of the effects associated with the Proposed Action would occur. No construction or operation activities would occur, and the project corridor would remain in its current state.

Alternative 2: SMART Downtown San Rafael to Larkspur Extension (Proposed Action)

Archeological Resources

None of the nearly two dozen archaeological resources assessments conducted over the last 30 years within the Proposed Action area have recorded an archaeological resource that is eligible for the NRHP. The most recent investigation, performed as part of this EA, has indicated similarly that no resources eligible for listing are known to occur within the proposed rail alignment. SHPO has concurred with this determination and has issued a finding of No Historic Properties Affected (see Appendix C). Therefore, archeological properties pursuant to Section 106 of the NHPA are not present within the Proposed Action area, and no adverse effect on such resources would occur with implementation of the Proposed Action.

Historic Resources

None of the historic architecture assessments conducted over the last 30 years within the Proposed Action area have recorded a historic resource that is eligible for the NRHP. The most recent investigation, performed as part of this EA, has indicated similarly that no resources eligible for listing are known to occur within the proposed rail alignment. SHPO has concurred with this determination and has issued a finding of No Historic Properties Affected (see Appendix C). Therefore, historic properties pursuant to Section 106 of the NHPA are not present within the Proposed Action area, and no adverse effect on such resources would occur with implementation of the Proposed Action.

Paleontological Resources

The northern two-thirds of the proposed rail alignment pass through an area that is made up entirely of artificial fill at least several feet below the existing ground surface. The southern one-third of the alignment passes through an area of Franciscan Complex mélange bedrock, within which paleontological resources have a low probability of occurrence. The proposed rail alignment has been the subject of repeated construction events. Excavation activities associated with the Proposed Action would be performed to a very shallow extent and would be likely to disturb only the first 12 inches of soil in a few select areas, with the remaining portions of the alignment being disturbed to an even lesser degree. Based on each of these factors, no adverse effect would occur to paleontological resources during construction of the Proposed Action.

3.3.3 References

AECOM. 2014a (April). *Draft Cultural Resources Inventory and Evaluation Report for the Sonoma Marin Area Rapid Transit (SMART) Larkspur to San Rafael Project*.

———. 2014b (April). *Historic Architectural Survey Report for the Sonoma Marin Area Rail Transit (SMART) Rail Corridor San Rafael to Larkspur Project, Marin County, California*.

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3.4 ENERGY

Energy is consumed during the construction and operation of transportation projects. This section assesses the effects of the Proposed Action on transportation-related energy consumption within the entire SMART corridor. The analysis considers both direct (operational) and indirect energy requirements. Previous analysis for energy was undertaken for the entire SMART corridor as part of the 2005 Draft EIR (SMART 2005), prepared as per CEQA. That analysis can be found in Section 3.8 of the 2005 Draft EIR. Because most riders of the Proposed Action also would be using other parts of the corridor for a typical trip, the analysis presented here also considers energy use in the entire corridor.

3.4.1 Affected Environment

This section discusses the existing energy use characteristics at the national, state, and local levels. Detailed information about energy use in the Proposed Action area is limited; therefore, state-level trends are relied on to characterize energy consumption at the local level.

Energy Consumption in the United States

The U.S. is the largest consumer of transportation energy in the world. Transportation energy use accounts for 28 percent of total U.S. energy use, and 93 percent of transportation energy use is provided by petroleum (Oak Ridge National Laboratory 2013). Figure 3.4-1 shows the annual transportation-related energy consumption trends in the United States over the last six decades. Of all petroleum used in the United States, 67 percent is used for transportation. Petroleum products supply approximately 36 percent of the energy demand in the U.S. (EIA 2012). Natural gas and coal supply approximately 25 percent and 20 percent of national demand, respectively, and renewable and nuclear resources supply the remaining demand.

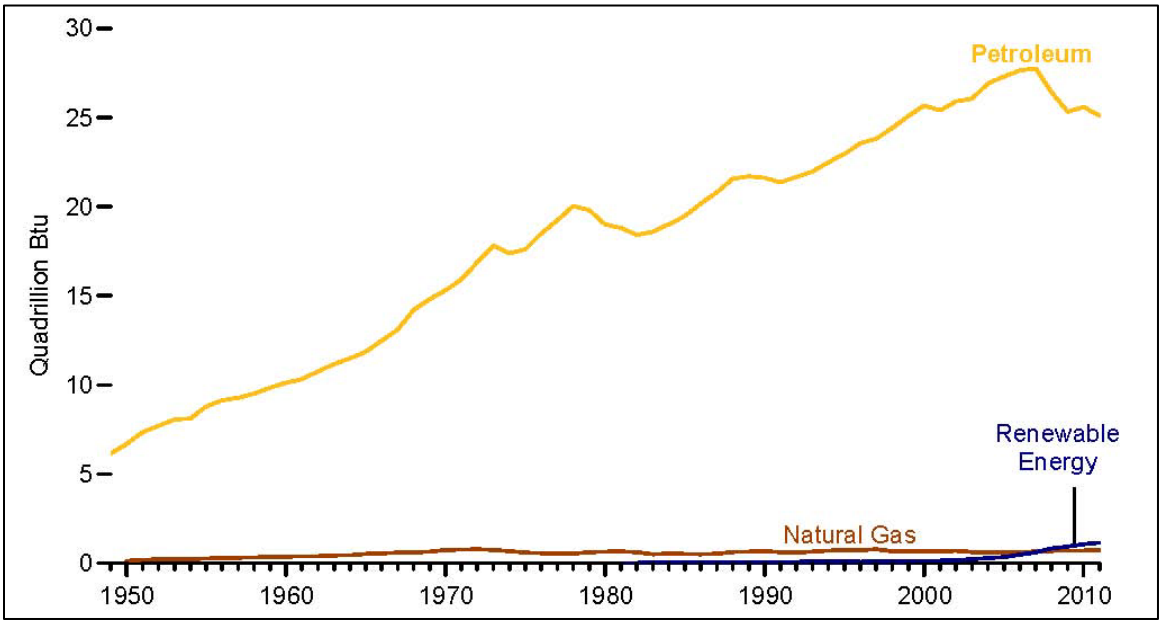
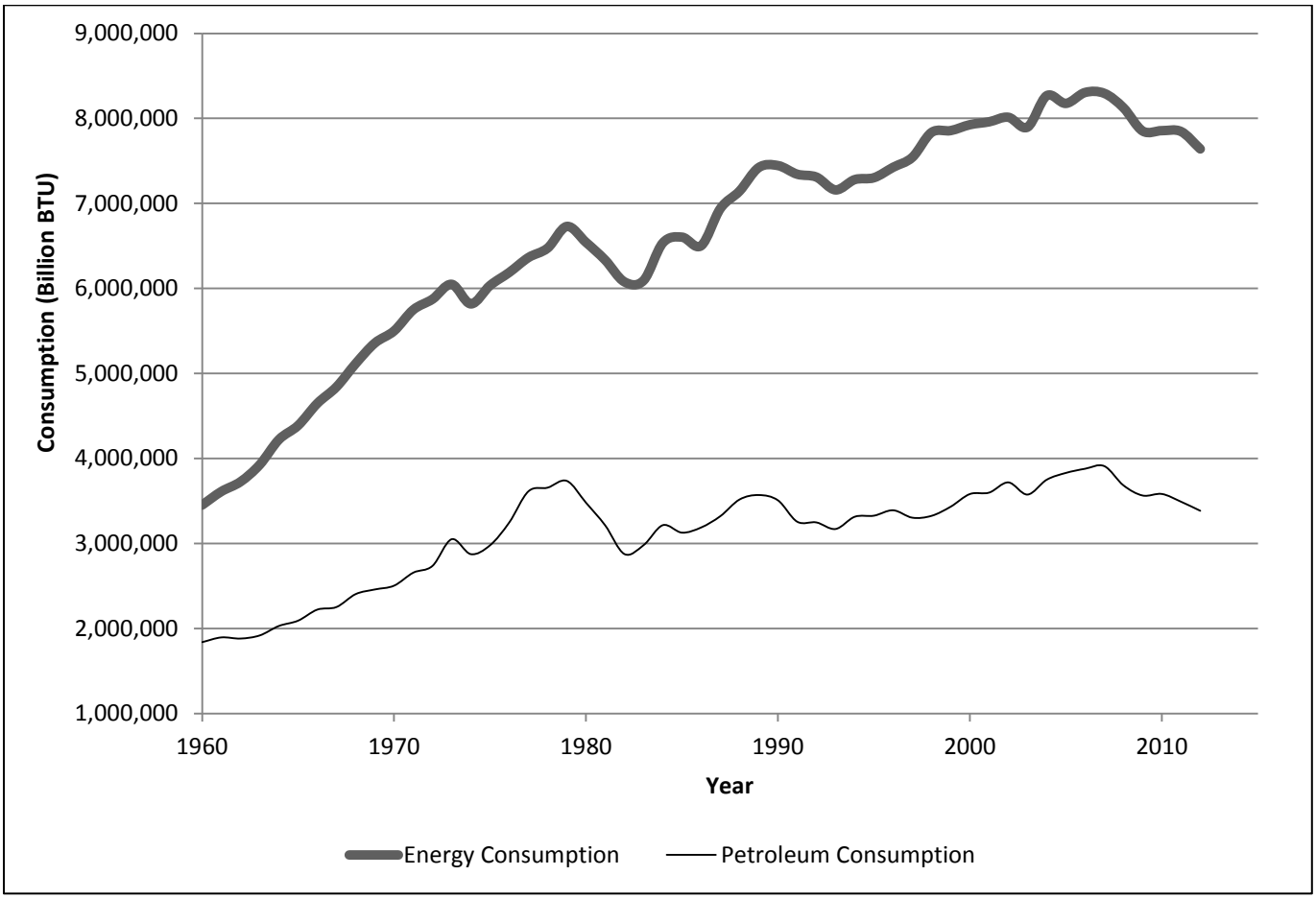


Figure 3.4-1: U.S. Transportation Energy Consumption Estimates (by Major Source), 1949–2011

Energy Consumption in California

In 2012, total statewide energy consumption in California was approximately 7,641 trillion British thermal units (BTUs) (EIA 2014). In California in 2012, petroleum use accounted for approximately 44 percent of all energy consumption (EIA 2014). Approximately 86 percent of petroleum use in the state is for transportation, and overall, transportation accounts for 39 percent of the total energy use in the state (EIA 2014). In 2012, 2,943 trillion BTUs of energy were used in California for transportation, which accounts for 11 percent of all transportation-related energy consumption in the United States (DOE 2014). Figure 3.4-2 shows California's annual energy consumption trends over the last six decades.



Source: EIA 2014

Figure 3.4-2: California Total Energy and Petroleum Consumption Trends (1960–2012)

Marin and Sonoma Counties

Energy Consumption

Gasoline sales for Sonoma and Marin counties between 2008 and 2012 are shown in Table 3.4-1. During that time, gasoline fuel sales increased approximately 3 percent in Marin County and decreased by approximately 11 percent in Sonoma County. Between 2008 and 2012, gasoline sales throughout California decreased by approximately 3 percent.

Table 3.4-1: Estimated Total Retail Gasoline Sales in Sonoma and Marin Counties

County	2008	2009	2010	2011	2012	Change 2008–2012
Marin	104	104	94	103	107	2.9%
Sonoma	213	198	189	178	189	-11.3%
Total for California	**14,924**	**14,805**	**14,860**	**14,596**	**14,486**	**-2.9%**

Note:
Figures are shown in millions of gallons.
Source: CEC 2014

Vehicle Miles Traveled

Although long-term fuel consumption data is not available for Sonoma and Marin counties, trends in vehicle miles traveled (VMT) growth suggest that the two counties have followed statewide annual fuel consumption trends. Statewide VMT trends between 2005 and 2013 show only a minimal (0.03 percent) increase over that 9-year period (Caltrans 2013). Year to year, however, statewide VMTs between 2005 and 2013 varied from a 1.86 percent increase to a 3.49 percent decrease.

Marin County was one of four counties in the United States selected to participate in the Nonmotorized Transportation Pilot Program (NTPP), and the County received approximately $25 million for pedestrian and bicycle infrastructure and nonmotorized programs. As reported for Marin County in the Nonmotorized Transportation Pilot Program 2014 Report, an estimated 85.1 million VMT were eliminated because of increased nonmotorized trips between 2009 and 2013, relative to 2007 (DOT 2014). As part of Sonoma County's Green My Ride program, the County is applying for funding to implement a ridesharing program and is working on other transportation programs to help reduce VMT (SCTA/RCPA 2014).

Electricity and Natural Gas

Pacific Gas and Electric Company (PG&E), which is regulated by the California Public Utilities Commission (CPUC), provides electricity and natural gas to approximately 15 million people throughout a 70,000-square-mile service area in northern and central California, including the project area (PG&E, 2011). PG&E produces its power from a mixture of sources, including hydropower, gas-fired steam, and nuclear energy, and acquires electricity from more than 400 plants owned by independent power producers and some out-of-state power producers. Approximately 5.1 million PG&E customers receive electricity through 141,215 circuit miles of electric distribution lines and 18,616 circuit miles of interconnected transmission lines. Natural gas is delivered to PG&E's 4.3 million natural gas customers through approximately 42,141 miles of distribution pipeline and 6,438 miles of transportation pipelines from three major sources: California, the southwestern United States, and Canada. Marin Clean Energy (MCE), in partnership with PG&E, also provides electricity to Marin County, offering two options of renewable energy: MCE's 50 percent renewable energy (Light Green), and MCE's 100 percent renewable energy (Deep Green). MCE provides renewable energy for approximately 75 percent of all electricity customers in Marin County.

3.4.2 Environmental Consequences

The analysis presented in this EA mainly is based on that provided in the 2005 Draft EIR but was updated with more recent data and adjusted to focus on the Proposed Action's approximately two-mile alignment rather than the entire 70-mile SMART project. In this EA, the energy consumption of the Proposed Action is compared to existing conditions as well as to future conditions with the Proposed Action. Future conditions are analyzed for 2025 because that was the future scenario evaluated in the 2005 EIR and the analysis for the Proposed Action extrapolates from that data. For purposes of comparing future conditions with and without the Proposed Action, the same projected roadway improvements to the transportation system and growth in annual VMT were assumed for both. This comparison generally allowed for an analysis of the relative effect of the Proposed Action on energy consumption, based on like assumptions about technology, fuels, and vehicles.

Direct Energy

Direct energy consumption includes the fuel required for the operation of passenger vehicles (e.g., automobiles, vans and light trucks), transit buses and passenger rail vehicles. The method used to estimate direct energy consumption is outlined in FTA's Reporting Instructions for the Section 5309 New Starts Criteria (DOT 2002). The direct energy analysis for each alternative was based on modeled year 2025 corridor traffic VMT, as documented in Section 3.6, Transportation of the 2005 Draft EIR. The daily VMT then was adjusted, using a factor of 290 days per year to provide annual VMT for passenger vehicles, transit buses, and passenger rail (Caltrans 1983).

The factors in Table 3.4-2 reflect the variable rates at which different modes consume energy. Annual VMT values were adjusted using these factors to provide the direct energy consumption under each scenario.

Table 3.4-2: Operational Energy Consumption Rates

Vehicle Type	Energy Consumption/Vehicle Mile BYU[1]/Vehicle Mile
Passenger Vehicles (auto, van, light truck)	6,233
Transit Bus (all vehicle types)	41,655
Proposed Passenger Rail Vehicle (DMU)	75,000 95,000[2]
Traditional Passenger Rail Vehicle (diesel)	100,000 BTU/Vehicle Mile

Notes:

BTU = British thermal unit; DMU = diesel multiple unit

1 One BTU is the quantity of energy necessary to raise the temperature of one pound of water by 1 degree Fahrenheit. Source: DOE 1996; Colorado Railcar Manufacturing LLC 2003; SMART 2008

2 The operational energy consumption rate for heavy DMU is estimated between 75,000 BTU per vehicle-mile or approximately 1.8 miles per gallon (Table 3.8-2 of the 2005 Draft EIR) and 95,000 BTU per vehicle-mile or 1.5 miles per gallon (Air Quality Technical Study, June 2005)

The Proposed Action would rely on DMUs for the passenger rail cars. Therefore, operational energy calculations for passenger rail in this analysis rely on the DMU energy consumption factor. DMUs use between five and 29 percent fewer BTUs per vehicle mile than traditional passenger rail vehicles. In addition, SMART is considering whether to operate the DMUs on a biodiesel fuel mixture. Biodiesel blends of 20 percent or less can be used in DMU vehicles without requiring any modifications to the vehicles. Fuel efficiency is expected to be slightly less

than DMUs operated on conventional diesel—2 miles per gallon for diesel fuel (Colorado Railcar Manufacturing LLC 2003) and 1.96 miles per gallon for biodiesel (EPA 2002).

Indirect Energy

Indirect energy consumption includes three components: 1) the initial energy investment required for construction of the Proposed Action; 2) the initial energy required to manufacture the operating vehicles; and 3) the energy required for the annual maintenance or periodic rehabilitation of the infrastructure. The indirect energy analysis was conducted using the Input-Output Method as part of the 2005 Draft EIR. This method converts VMT, lane-miles, or construction dollars into energy consumption based on existing data from other rail projects in the United States. The indirect energy consumption rates in Table 3.4-3 reflect the amount of energy that is consumed in the construction of the rail guideway and the manufacturing and maintenance of passenger vehicles, transit buses, and passenger rail cars. It is conservatively assumed that the Proposed Action would require 2.9 percent of the indirect energy of the overall SMART project, as the Proposed Action would comprise two miles out of the total 70 mile SMART system. This is a conservative assumption, as manufacturing of additional rail cars would not be required to operate the Proposed Action and maintenance activities associated with the rail cars would not need to be duplicated with the addition of the Proposed Action.

Table 3.4-3: Indirect Energy Consumption Rates

Activity	Energy Consumption Rate (BTU/VMT)
Manufacturing	
Passenger Vehicles	1,410
Transit Buses	3,470
Passenger Rail	2,108
Rail Guideway	12,200
Maintenance	
Passenger Vehicles	1,400
Transit Buses	13,142
Passenger Rail	7,060

Notes:
BTU = British thermal unit; DMU = diesel multiple unit

[1] Passenger rail consumption rates are based on traditional passenger rail cars. An indirect energy consumption rate currently is not available for DMUs. Energy consumption associated with maintenance and manufacturing of DMUs is expected to be similar to traditional rail cars.

[2] Rail guideway consumption includes only construction of the permanent way (e.g., rails and ties). Consumption associated with constructing stations is not included.

Source: Caltrans 1983; U.S. Congress 1977

Alternative 1: No Action Alternative

Under the No Action Alternative, the FTA would take no action and would provide no funding to SMART for the Downtown San Rafael to Larkspur Extension project. The project would not be constructed, and none of the effects associated with the Proposed Action would occur. No construction or operation activities would occur, and the project corridor would remain in its current state.

Alternative 2: SMART Downtown San Rafael to Larkspur Extension (Proposed Action)

Construction

Indirect energy in this EA is the energy required to construct and maintain the Proposed Action. Indirect energy construction estimates for the Proposed Action are shown in Table 3.4-4. This table also shows the barrels of crude oil that would be consumed under each alternative. The energy consumption estimates for construction and maintenance represent a one-time expenditure of energy.

Table 3.4-4: Estimates of Future Indirect Energy Consumption

Project Component	Without the Proposed Action	With the Proposed Action
Construction (in billion BTUs)		
Passenger Vehicle Manufacturing	227.1	226.0
Transit Bus Manufacturing	1.2	1.4[1]
Passenger Rail Manufacturing	0.0	0.0.24
Rail Guideway	0.0	0.14
Total Construction	228.3	227.5
Total Construction in Barrels of Oil (in thousands)[2]	39.4	39.21
Change in Barrels of Oil from No Action Conditions	-	(128)
Maintenance (in billion BTUs)		
Passenger Vehicle	225.5	224.4
Transit Bus	4.7	152.9
Passenger Rail	0.0	0.086
Total Maintenance	230.1	229.8
Total Maintenance in Barrels of Oil (in thousands)[3]	39.7	39.6
Change in Barrels of Oil from Future Conditions without the Proposed Action	-	(64)
Summary		
Total Indirect Energy Consumption (in billions of BTUs)	458.4	457.3
Total Indirect Energy Consumption (in thousands of Barrels of Oil)	79.0	78.8

Notes:
BTU = British thermal units
[1] The travel demand model demonstrated that intracounty trips to and from proposed rail stations via transit bus would increase 15 percent under the SMART project. As trips increase, it is conservatively assumed that the number of transit buses manufactured and maintained also would increase.[2] The Energy Information Administration estimates that there are approximately 5.8 million BTUs per barrel of crude oil.
Source: SMART 2005

Indirect Energy Consumption During Construction and Maintenance

The analysis presented here is adapted from the 2005 Draft EIR, which analyzed the entire SMART project corridor, including the Proposed Action.

Energy consumption for construction and maintenance was calculated based on projected VMT, shown in Table 3.4-5, and was adjusted using the energy consumption rates shown in Table 3.4-3. Energy consumption

related to vehicle manufacture and maintenance was based on the amount of energy necessary to produce material, create component parts, and assemble the vehicles. The results of this analysis are shown in Table 3.4-4.

This energy use represents an initial consumption amount, rather than an annual operational consumption rate and is assumed to be conservative, as additional rail vehicles would not need to be manufactured as part of the Proposed Action in addition to those already being manufactured as part of the overall SMART Project. Energy consumption related to the Proposed Action's construction and manufacturing necessarily would represent an increase in energy use over existing conditions, as it would require the manufacturing and maintenance of new rail facilities. A more meaningful way to assess this indirect energy use is to compare it to future conditions under the No Action scenario. As shown in Table 3.4-4, the manufacturing of vehicles and construction associated with the Proposed Action, in addition to manufacturing of passenger and other non-rail vehicles that would be in service in the year 2025, would consume approximately 39,200 barrels of oil (227.5 billion BTUs). The Proposed Action's indirect energy consumption associated with construction would represent a decrease of 0.32 percent compared to the No Action scenario. This decrease would be because of lower passenger auto manufacturing and maintenance energy use, which would offset the energy consumption for the Proposed Action. Maintenance under the Proposed Action combined with maintenance of passenger and other non-rail vehicles would require approximately 39,600 barrels of oil (229.8 billion BTUs) through 2025. Energy consumption from maintenance would decrease 0.16 percent compared to the No Action scenario. Therefore, the Proposed Action's indirect energy consumption would not represent a wasteful or inefficient use of energy. This one-time energy use would not place a substantial demand on regional energy supplies.

Although the Proposed Action would not cause a substantial increase in indirect energy consumption, measures could be implemented to further reduce energy demand during the construction period. The 2005 Draft EIR prescribed the following mitigation measure to address energy use during construction. The measure would also be applicable to the Proposed Action.

- **Mitigation Measure E-1:** Implement energy conservation measures during construction such as:
    - Reducing idling of trucks delivering construction material;
    - Consolidating material delivery; and
    - Scheduling material delivery during off-peak hours, to allow trucks to travel without traffic and at fuel-efficient speeds (45 to 55 miles per hour).

Implementation of the above mitigation measure would further reduce energy consumption during construction.

Operation

Energy Use During Operation

The preferred rail vehicle for the Proposed Action is the DMU, which consumes between five and 29 percent less energy (BTU/VMT) than a traditional diesel rail vehicle.

The Proposed Action would reduce the amount of energy consumed by automobiles in the region by diverting some automobile users to passenger rail service. Overall future energy consumption would be less with the

Proposed Action compared to the No Action conditions. Projected annual operational energy consumption of the Proposed Action is compared to the No Action scenario and the existing conditions in Table 3.4-5, and is discussed below. A range of energy consumption is provided for the passenger rail, as the expected energy consumption per mile is currently unknown (it is estimated to range from 75,000 to 95,000 BTU/mile).

Table 3.4-5: Estimates of Direct Energy Consumption

	Existing Conditions	Future Conditions without the Proposed Action	Future Conditions with the Proposed Action
Vehicle Miles Traveled (in millions)			
Daily Passenger Vehicle	0.43	0.55	0.55
Annual Passenger Vehicle	124.5	161.0	160.3
Daily Transit Bus	0.001	0.001	0.001
Annual Transit Bus	.036	0.36	0.4
Daily Passenger Rail	0	0	0.00004
Annual Passenger Rail	0	0	0.012
Estimated BTUs (in billions)			
Passenger Vehicle	776	35,130	34,966
Transit Bus	14.9	14.9	16.8
Passenger Rail	0	0	30.21
Summary			
Total BTUs (in billions)	791	1,019	1,016.7-1,016.9[1]
Total Barrels of Oil (in thousands)	136.4	175.6	175.29-175.33[1]
Change in Barrels of Oil from Future Conditions without the Proposed Action	-	-	(282-321)[1]

Note:
BTU = British thermal unit
[1] A range of estimated energy consumption is presented for the scenarios that include passenger rail DMUs, as the expected energy consumption per mile is currently unknown (it is estimated to range from 75,000 to 95,000 BTU/mile)
Source: SMART 2005; SMART 2008

Under the Proposed Action, annual VMT within the Proposed Action project corridor is forecast to be 160 million miles for passenger vehicles, 402,857 miles for transit buses, and 11,509 miles for passenger rail in 2025. These VMTs were estimated by using a proportion (2.9 percent) of the VMT estimated for the overall SMART project, as the Proposed Action would account for two out of the 70 miles of rail line encompassed within the overall SMART Project. All vehicles operating within the Proposed Action corridor are anticipated to consume approximately 175,334 barrels of oil (1,017 billion BTUs), a 321-barrel decrease in direct energy consumption as compared to the No Action scenario.

When compared to the existing condition, the difference between the Proposed Action and the No Action scenario would be minimal. Both scenarios would result in an increase in energy use because of projected regional growth and associated increased vehicle travel. By 2025, annual passenger VMT would increase 29.3 percent under the

No Action scenario. With implementation of the Proposed Action, annual passenger VMT would be slightly less, increasing 28.7 percent during the same time period. This small energy savings under the Proposed Action, however, would be partially offset by an increase in transit bus and passenger rail vehicle miles.

In 2006, the Corporate Average Fuel Economy (CAFE) program was expanded to include the largest sport utility vehicles, and in late 2007 the CAFE standard was increased from 27.5 mpg for cars to 35 mpg for manufacturers' fleets by 2020. Starting in 2011, the CAFE standards are newly expressed as mathematical functions depending on vehicle "footprint", a measure of vehicle size determined by multiplying the vehicle's wheelbase by its average track width. On July 29, 2011, President Obama announced an agreement with thirteen large automakers to increase fuel economy to 54.5 mpg for cars and light-duty trucks by model year 2025. Because new standards for motor vehicles would result in more fuel efficiency for the passenger vehicle fleet, the net reduction in energy use associated with the Proposed Action compared to the future No Action scenario would not be as great as those identified in the 2005 Draft EIR, and as extrapolated here. Nevertheless, even if considering the new vehicle standards, the SMART project would not result in an inefficient use of energy and the impact significance does not change.

The Proposed Action would result in a 0.16 to 0.18 percent decrease in total energy consumption compared to the No Action scenario. Relative to future conditions without the Proposed Action, this would be a beneficial effect. Therefore, implementation of the Proposed Action would not result in wasteful, inefficient, or unnecessary use of energy. Because the Proposed Action would consume fewer barrels of oil than the No Action scenario, it would not place a substantial demand on regional energy supply or require substantial additional capacity.

The 2005 Draft EIR prescribed the following mitigation measure to address energy use during operation. The measure would also be applicable to the Proposed Action.

- **Mitigation Measure E-1:** Implement energy conservation measures during operation such as:
    - Using energy efficient measures at rail stations, such as solar panels.

Implementation of the above mitigation measure would further reduce energy consumption during operation.

Electricity Demand During Operation

Electricity would be needed to operate the Proposed Action. The Larkspur Station would have electricity demands associated with lighting and other amenities such as signage and ticket vending machines. No additional electricity would be required for rail car maintenance activities, as maintenance would take place further north outside of the Proposed Action project area at the Airport Boulevard location just north of Santa Rosa. For the Proposed Action, electricity demand would be expected to be fairly constant throughout the day. The system would not be subject to higher demand during peak hours of service because the DMU rail cars would be powered by diesel fuel and not electricity; the only electrical demand from the Proposed Action would be from station operations and electricity use associated with crossing gates and lights at road crossings along the alignment. Because of the relatively low electricity demand from the Proposed Action and the fact that electricity demand would not sharply peak during the day, impacts to peak and base-period electricity demand from the Proposed Action are expected to be negligible.

Petroleum During Operation

Crude oil is used to produce various petroleum products at refineries including gasoline and diesel. While the Proposed Action would result in an increase in diesel fuel consumption, overall petroleum consumption would actually decrease by reducing the number of automobiles on the road. As shown in Table 3.4-5, the Proposed Action would result in an overall decrease of 282 to 321 barrels of oil in future years as compared to the future without project scenario. This would represent a very minor decrease in total demand expected in California in future years; however, overall, the Proposed Action would result in a net benefit by reducing petroleum consumption.

3.4.3 References

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3.5 GEOLOGY AND SOILS

This section provides an assessment of the effects of geology and soils within the Proposed Action area. The discussion focuses on assessment of geology and soils within the vicinity of the Proposed Action area, between Downtown San Rafael and Larkspur. Previous analysis of geology and soils was undertaken for the entire SMART project as part of the 2005 Draft EIR (SMART 2005), prepared as per CEQA. That analysis can be found in Section 3.2 of the 2005 Draft EIR.

3.5.1 Affected Environment

Regional Physiographic and Geologic Setting

The proposed rail alignment is located in the cities of San Rafael and Larkspur, located on the west side of San Francisco Bay in the Coast Ranges geomorphic province, a relatively young and seismically active geological region on the western margin of the North American Plate. The Coast Ranges are characterized by discontinuous northwest to southeast–trending mountains and valleys, and are dominated by northwest-trending faults, folds, and geologic structures (CGS 2002). The proposed rail alignment is situated near the San Francisco Bay (Bay), a northwest-trending structural depression. The Bay and much of its margins are underlain by Late Mesozoic Age rocks of the Franciscan Complex. Franciscan Complex rocks commonly consist of sheared shale and interbedded sandstone, with serpentine and other metamorphic rocks. Tertiary and Quaternary formations occur locally in unconformity on the Franciscan Complex, while other Mesozoic formations occur in fault contact with the Franciscan Complex (CGS 2002).

Beneath the Bay and its margins, the Franciscan Complex bedrock is overlain by a young, unconsolidated sedimentary sequence, which in places exceeds 400 feet in thickness. The sequence is divided into three units: older Bay sediments of the Yerba Buena Formation, Merritt sands of the San Antonio Formation, and younger Bay Mud. Artificial fill of variable thickness, quality, and density has been placed along the margins of the Bay to reclaim marshland and land once covered by shallow water.

Faulting and Seismicity

The Bay Area is located in a seismically active region near the boundary between two major tectonic plates, the Pacific Plate to the southwest and the North American Plate to the northeast. These two plates move relative to each other in a predominantly lateral manner, with the San Andreas Fault Zone at the junction. The Pacific Plate, on the west side of the fault zone, is moving north relative to the North American Plate on the east. Since approximately 23 million years ago, about 200 miles of right-lateral slip has occurred along the San Andreas Fault Zone to accommodate the relative movement between these two plates (USGS 2002). The relative movement between the Pacific and North American Plates generally occurs across a 50-mile zone, extending from the San Gregorio Fault in the southwest to the Great Valley Thrust Belt to the northeast. In addition to the right-lateral slip movement between tectonic plates, a compressional component of relative movement has developed between the Pacific Plate and a smaller segment of the North American Plate at the latitude of the Bay during the last 3.5 million years. Strain produced by the relative motions of these plates is relieved by right-lateral strike-slip faulting on the San Andreas Fault and related faults, and by vertical reverse-slip displacement on the Great Valley Fault and other thrust faults in the central California area.

The region's seismic faults can be classified as historically active, active, sufficiently active and well-defined, or inactive, each defined as follows (CGS 2007):

- *Historically active* faults are faults that have generated earthquakes accompanied by surface rupture during historic time (approximately the last 200 years), or that exhibit a seismic fault creep (slow incremental movement along a fault that does not entail earthquake activity).
- *Active* faults show geologic evidence of movement within Holocene time (approximately the last 11,000 years).
- *Sufficiently active and well-defined* faults show geologic evidence of movement during the Holocene along one or more of their segments or branches, and their trace may be identified by direct or indirect methods.
- *Inactive* faults show direct geologic evidence of inactivity (i.e., no displacement) during all of Quaternary time or longer.

Although quantifying the probability that an earthquake will occur on a specific fault is difficult, the preceding classification is based on the assumption that if a fault has moved during the last 11,000 years, it is likely to produce earthquakes in the future.

The major regional active faults considered likely to produce damaging earthquakes are the San Andreas, Hayward, San Gregorio, and Calaveras faults, based on their estimated maximum moment magnitude of 7.0 to 7.9.

The Proposed Action rail alignment is approximately 9.75 miles from the San Andreas Fault and 8.3 miles from the Hayward Fault (USGS 1995).

Ground Shaking

USGS has predicted a 63 percent chance of a moment magnitude 6.7 earthquake or greater occurring in the Bay Area over a period of 30 years, between 2003 and 2032 (USGS 2007). The intensity of the seismic shaking during an earthquake depends on the distance and direction to the earthquake's epicenter, the magnitude of the earthquake, and the area's geologic conditions.

Liquefaction typically occurs when saturated, clean, fine-grained loose sands near the surface (usually in the upper 50 feet) are subject to intense ground shaking and the groundwater table is shallow. One of the major types of liquefaction-induced ground failures is lateral spreading of mildly sloping ground. Lateral spreading is a failure within a nearly horizontal soil zone (possibly from liquefaction) that causes the overlying soil mass to move toward a free face or down a gentle slope.

Liquefaction probability is very high for the majority of the proposed rail alignment (approximately the northern two-thirds). Because of the presence of bedrock, no liquefaction probability exists for the lower third.

Soils and Bedrock

Historic topographic maps show the old Northwestern Pacific Railroad alignment crossing directly through an area of marshes from Downtown San Rafael to near the northern entrance of the Cal Park Hill Tunnel (USGS 1897). This rail alignment presumably was laid on top of an earthen causeway or levee through the marsh area.

The entire area on either side of the alignment was filled during the ensuing decades, with the lands west of the alignment being the last to be filled, in the 1940s and 1950s. Therefore, the northern two-thirds of the Proposed Action area lying north of Cal Park Hill Tunnel is entirely artificial fill, most of which is at least 6 feet in depth. The proposed rail alignment has been the subject of multiple construction and reconstruction events. Soils within the proposed rail alignment have been severely disturbed on multiple occasions and are a mix of artificial fill, overlain by railroad ballast in the immediate vicinity of the existing and former track beds.

On entering Cal Park Hill Tunnel, the alignment enters bedrock material made up of Franciscan Complex mélange rocks. Metamorphic rocks are the principal component of the Franciscan Complex, although volcanic rocks such as basalt may be present, along with sedimentary rocks. The Franciscan Complex is known for its chaotic and disjointed structure, and the typical assemblage of diverse rock types that are present at most locations is sometimes referred to as a "mélange." The chaotic assemblage generally is the result of the deformation, folding, breaking, and mixing associated with movement along the nearby San Andreas Fault.

The majority of the existing Proposed Action alignment (approximately the northern two-thirds) in overlain by fill. This fill is associated with the filling in of the original San Rafael Creek tidal estuary, beginning in the late 1800s and extending into the 1950s. Parts of the alignment also lie on top of bedrock that is associated with the Franciscan Complex mélange. A very small part at the very southern end lies on top of Quaternary alluvium.

Mostly flat land exists throughout the alignment, which presents a very low potential for landslides. In addition, the hill through which the CalPark Tunnel traverses is well-consolidated bedrock that is at very low risk of landslide.

3.5.2 Environmental Consequences

Significance of effects associated with faulting, ground acceleration, and ground shaking are evaluated based on distance to known fault zones as well as the seismic characteristics of the fault zones. Adverse effects could be generated by the Proposed Action from soils that possess a moderate to severe potential for erosion and liquefaction. Soil erosion effects also are discussed in Section 3.8, Hydrology and Water Quality of this EA.

Alternative 1: No Action Alternative

Under the No Action Alternative, the FTA would take no action and would provide no funding to SMART for the Downtown San Rafael to Larkspur Extension project. The project would not be constructed, and none of the effects associated with the Proposed Action would occur. No construction or operation activities would occur, and the project corridor would remain in its current state.

Alternative 2: SMART Downtown San Rafael to Larkspur Extension (Proposed Action)

Construction

Erosion and Loss of Topsoil

Construction of the Proposed Action would include site grading and preparation that would disturb artificial fill. Despite previous development within the proposed rail alignment, erosion and loss of topsoil could occur as a result of construction activities. Excavation, grading, import of fill, and facility construction within the proposed

rail alignment would require temporary disturbance of surface soils and removal of existing on-site pavements and portions of existing railroad ties and tracks. Exposed fill materials would be susceptible to erosion during construction-related excavation. Stormwater runoff could cause erosion during construction, although most loosened and eroded soil would remain within the excavation pits.

SMART would obtain a National Pollutant Discharge Elimination System (NPDES) general permit for stormwater discharges associated with construction activities (Construction General Permit; State Water Resources Control Board Order No. 99-08-DWQ) before the start of construction. To complete construction activities that would disturb 1 acre or more where drainage would flow to the sewer system, SMART would comply with the Construction General Permit and would prepare and implement a storm water pollution prevention plan (SWPPP) to comply with the permit's requirements. The discussion of a SWPPP in Section 3.8, Hydrology and Water Quality in this EA also evaluates erosion in further detail. The 2005 EIR identified a number of mitigation measures related to erosion and runoff that would also apply to the Proposed Action. These measures are listed in Section 3.8. With implementation of a SWPPP and the mitigation measures identified in Section 3.8, construction-related effects related to erosion and loss of topsoil would not be significant.

Alteration of Topography

The Proposed Action would not entail any extensive excavation or alternation of existing topography. Therefore, no adverse effect would occur related to alteration of topography.

Operation

Seismically Induced Ground Shaking and Ground Failure

The proposed rail alignment is located within an area that is mapped as a liquefaction hazard zone (USGS 1995). Specifically, the liquefaction probability is very high for the majority of the existing alignment (approximately the northern two-thirds). Because of the presence of bedrock, no liquefaction probability exists for the southern third of the alignment. Because the proposed rail alignment is located between two major active faults (i.e., the Hayward Fault and the San Andreas Fault), and because the top layers of soil consist of loose to very loose saturated sand within the northern two-thirds of the corridor, the potential for liquefaction and lateral spreading during a seismic event is high. However, no habitable facilities with foundations are proposed as part of the Proposed Action. In addition, the proposed trestle bridges and embankments would be updated to reflect FTA's Seismic Design Considerations for Mass Transit Facilities and the Uniform Building Code to reduce or prevent damage associated with potential embankment loss of stability resulting from ground shaking, loss of rail alignment, and unseated railroad trestle bridges.

Subsidence, the sinking or settling of land, is caused by compaction of unconsolidated soils during a seismic event, soil compaction by heavy structures, erosion of peat soils, or groundwater depletion. Subsidence usually occurs over a broad area, and therefore is not detectable at the ground surface. Placing additional fill or constructing structures with shallow foundations within the proposed rail alignment would place additional weight on the Bay Mud that underlies the artificial fill within the northern two-thirds of the alignment. This additional weight would cause consolidation of the Bay Mud layer, resulting in settlement at the ground surface. Consolidation would occur relatively slowly as excess pore pressures dissipate. The amount of consolidation settlement would depend on the thickness of the existing fill, the thickness of the soft Bay Mud, and the imposed loads from new fill and structures. However, no additional fill is anticipated to be required to raise the ground

elevation for the proposed rail alignment. In addition, no habitable facilities with foundations are proposed as part of the Proposed Action.

The 2005 Draft EIR prescribed the following two mitigation measures to address potential impacts associated with geology and soils, and they also would be applicable to the Proposed Action:

- **Mitigation Measure G-4:** A site-specific geotechnical investigation report will be prepared as part of final [Proposed Action] design, and its recommendations for seismic design parameters per UBC code will be incorporated into the [Proposed Action] design. This report will include an in-depth study of the regional seismicity and site-specific geologic conditions, including a probabilistic seismic hazard analysis that incorporates risk-based evaluations of exceedance of certain peak ground accelerations. Measures to reduce impacts will include ground improvement such as soil mixing, jet grouting, soil densification, and pile supported structures. The use of specific measures will depend on soil type and stratigraphy, which will be determined during final [Proposed Action] design. Implementation of geotechnical design recommendations will be verified during construction by a qualified geotechnical consultant monitoring the construction activities.

  After any significant earthquake in the area resulting in felt shaking (also after major rainstorms), the constructed rail line shall be immediately inspected. This inspection would be for possible damage and delineation of areas requiring temporary speed reductions, maintenance or more substantial repair work before resumption of train service.

- **Mitigation Measure G-5:** Evaluation of fault rupture hazard shall be undertaken during subsurface geotechnical investigations using guidelines specified in Special Publication 42 of CGS [California Geological Survey]. The evaluation shall determine the specific design features that will be most appropriate for implementation.

- **Mitigation Measure G-6:** Proper subsurface investigation will be conducted in areas with liquefaction potential before construction, as detailed in Mitigation Measure G-4. This investigation will include Standard Penetration Test borings, laboratory grain size analysis, and liquefaction analysis. The subsurface investigation will identify the potential for liquefaction and also will identify design features to reduce the potential for liquefaction. Geotechnical design recommendations will be incorporated into final [Proposed Action] design and will be verified during construction by a qualified geotechnical consultant monitoring the construction activities.

With implementation of the above mitigation measures, no adverse effect will occur from seismically-induced ground shaking, liquefaction, or ground failure.

Seismically Induced Landslides or Slope Failures

Landslides and other slope failures are common occurrences during or soon after earthquakes. The proposed rail alignment is not located within a designated landslide hazard zone (USGS 1995), and low potential exists for landslides in the area because the proposed rail alignment generally is flat or within areas of well-consolidated bedrock. Therefore, no effect from seismically induced landslides or slope failures would occur from implementation of the Proposed Action.

Expansive or Corrosive Soils

Expansive soils generally result when specific clay minerals in the soil expand when saturated and shrink in volume when dry. Expansive soils can occur in any climate; however, arid and semiarid regions are subject to more extreme cycles of expansion and contraction than more consistently moist areas. Rail beds typically are not affected because rock ballast absorbs the movement of ground expansion and contraction. Thus, adjacent structures, including platforms, pavement, and station structures, could be affected. Corrosive soils, found along tidal flats, have a different effect because they are aggressive only towards steel and concrete. Therefore, new pilings, trestle bridges, and exposed concrete structures would be susceptible to these effects.

The 2005 Draft EIR prescribed the following mitigation measures to address potential impacts associated with expansive and corrosive soils, and they also would be applicable to the Proposed Action.

- **Mitigation Measure G-8:** The [Proposed Action] will incorporate one of the following three measures to reduce the effect of expansive soils: (1) remove expansive soil and replace with select, nonexpansive, engineered fill; (2) conduct lime treatment of expansive soil; or (3) place structures on drilled piers or foundation elements that are founded on deeper, nonexpansive bearing strata.

- **Mitigation Measure G-9:** Where corrosive soils are encountered, the [Proposed Action] will incorporate one or more of the following measures, as appropriate: epoxy coating of reinforcing steel; use of Type 5 Portland cement in structural concrete; or soil treatment to neutralize pH in the soil or reduce excessive chloride and sulfate concentrations in the soil.

With implementation of the above mitigation measures, no adverse effect will occur from expansive or corrosive soils.

3.5.3 References

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3.6 GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE

This section assesses greenhouse gas (GHG) emissions as well as climate change effects in the Proposed Action area. Previous analysis related to GHG emissions and climate change was not undertaken for the overall SMART project as part of the 2005 Draft EIR (SMART 2005), prepared as per CEQA, because assessment of this issue was not required under CEQA in 2005.

3.6.1 Affected Environment

Greenhouse Effect, Global Warming, and Climate Change

Most of the energy that affects Earth's climate comes from the sun. Some solar radiation is absorbed by Earth's surface, and a smaller portion of this radiation is reflected by the atmosphere back toward space. As Earth absorbs high-frequency solar radiation, its surface gains heat and then re-radiates lower frequency infrared radiation back into the atmosphere.[3] Most solar radiation passes through gases in the atmosphere that are classified as GHGs; however, infrared radiation is selectively absorbed by GHGs. GHGs in the atmosphere play a critical role in maintaining the balance between Earth's absorbed and radiated energy, Earth's radiation budget,[4] by trapping some of the infrared radiation emitted from Earth's surface that otherwise would have escaped to space (Figure 3.6-1). Specifically, GHGs affect the radiative forcing of the atmosphere,[5] which in turn affects Earth's average surface temperature. This phenomenon, the *greenhouse effect*, keeps the earth's atmosphere near the surface warmer than it would be otherwise and allows successful habitation by humans and other forms of life.

With the accelerated increase of fossil fuel combustion and deforestation since the industrial revolution of the nineteenth century, concentrations of GHGs have increased exponentially in the atmosphere. Such emissions of GHGs in excess of natural ambient concentrations contribute to the enhancement of the natural greenhouse effect. This enhanced greenhouse effect has contributed to *global warming*, an increased rate of warming of the Earth's average surface temperature.[6] Variations in natural phenomena, such as volcanoes and solar activity, produced most of the global temperature increases during preindustrial times; however, increasing atmospheric GHG concentrations resulting from human activity have been responsible for most of the observed global temperature increases in the last century.[7]

Global warming affects global atmospheric circulations and temperatures, oceanic circulations and temperatures, wind and weather patterns, average sea level, ocean acidification, chemical reaction rates, precipitation rates, timing, and form, snowmelt timing and runoff flow, water supply, wildfire risks, and other phenomena in a manner commonly referred to as *climate change*.

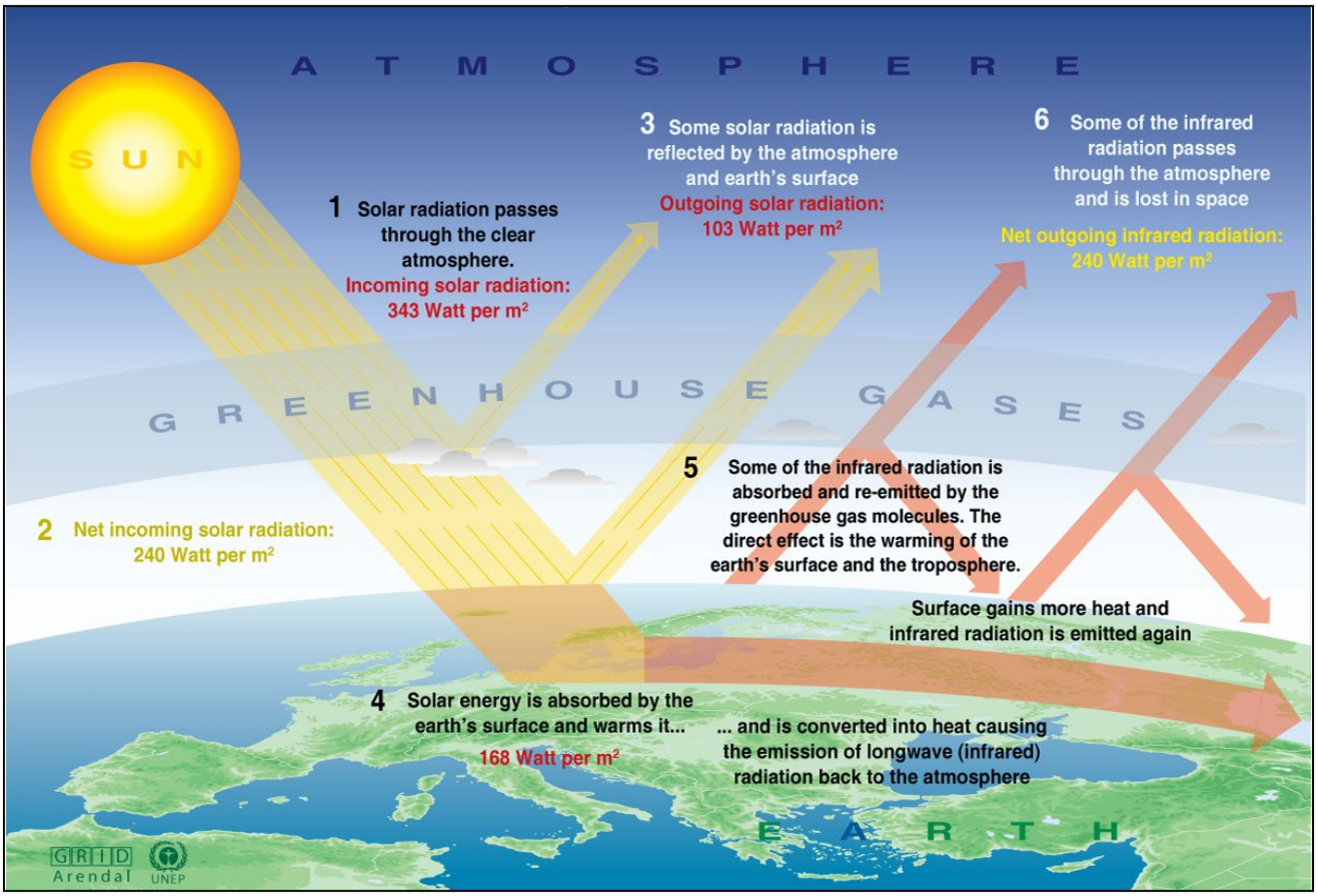
[3] Frequencies at which bodies emit radiation are proportional to temperature. Earth has a much lower temperature than the sun and emits lower frequency (longer wavelength) radiation, compared to the high-frequency (short wavelength) solar radiation emitted by the sun.

[4] This includes all gains of incoming energy and all losses of outgoing energy; Earth always is striving to be in equilibrium.

[5] This is the change in net irradiance at the tropopause after allowing for stratospheric temperatures to readjust to radiative equilibrium, but with surface and tropospheric temperatures and state held fixed at the unperturbed values.

[6] This is the result of Earth having to work harder to maintain its radiation budget, because (under the condition of more GHGs in the atmosphere) Earth must force emission of additional infrared radiation out into the atmosphere.

[7] These basic conclusions have been endorsed by more than 45 scientific societies and academies of science, including all of the national academies of science of the major industrialized countries. Since 2007, no scientific body of national or international standing has maintained a dissenting opinion.



Source: UNEP/GRID-Arendal 2005

Figure 3.6-1: The Greenhouse Effect

Intergovernmental Panel on Climate Change Temperature Prediction

The Intergovernmental Panel on Climate Change (IPCC) was established by the World Meteorological Organization and the United Nations Environment Programme to assess scientific, technical, and socioeconomic information relevant to the understanding of climate change, its potential impacts, and options for adaptation and mitigation. Warming of the climate system now is considered to by unequivocal (IPCC 2007a), with the global surface temperature increasing approximately 1.33 degrees Fahrenheit (°F) over the last 100 years. The IPCC predicts increases in global average temperature between 2° and 11°F over the next 100 years (IPCC 2007b).

Greenhouse Gases and Global Emission Sources

Prominent naturally occurring GHGs in Earth's atmosphere are water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and ozone (O_3). Anthropogenic (i.e., human-caused) emissions include additional release of these GHGs plus releases of human-made, high global warming potential gases (HGWPGs) (i.e., sulfur hexafluoride [SF_6], perfluorocarbons [PFCs], hydrofluorocarbons [HFCs], and ozone-depleting substances [ODSs]) into Earth's atmosphere. The GHGs listed by the IPCC (CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6) are discussed below, in order of abundance in the atmosphere. Water vapor, although the most abundant GHG, is not discussed because natural concentrations and fluctuations far outweigh anthropogenic influences, making it

impossible to predict. Ozone is not included because it does not directly affect radiative forcing. ODSs, which include chlorofluorocarbons (CFCs), halons, carbon tetrachloride, methyl chloroform, and hydrochlorofluorocarbons (HCFCs), are not included because they have been replaced primarily by HFCs and PFCs.

GHGs have different potentials for contributing to global warming. For example, methane is 21 times as potent as carbon dioxide, while sulfur hexafluoride is 22,200 times more potent than carbon dioxide. To simplify reporting and analysis, methods have been set forth to describe emissions of GHGs in terms of a single gas. The most commonly accepted method to compare GHG emissions is the global warming potential (GWP) methodology defined in the IPCC reference documents (IPCC 2001). The IPCC defines the GWP of various GHG emissions on a normalized scale that recasts all GHG emissions in terms of carbon dioxide equivalents (CO_2e), which compares the gas in question to that of the same mass of CO_2 (CO_2 has a GWP of 1 by definition). Therefore, a high GWP represents high infrared radiation absorption and long atmospheric lifetime compared to CO_2. A time horizon also needs to be selected to convert GHG emissions to equivalent CO_2 emissions, to account for chemical reactivity and lifetime differences among various GHG species. The standard time horizon for climate change analysis is 100 years. Generally, GHG emissions are quantified in terms of metric tons (MT) of CO_2e emitted per year.

The atmospheric residence time of a gas is equal to the total atmospheric abundance of the gas divided by its rate of removal (Seinfeld and Pandis 2006). The atmospheric residence time of a gas is, in effect, a half-life measurement of how long a gas is expected to persist in the atmosphere, when taking into account removal mechanisms such as chemical transformation and deposition.

Table 3.6-1 lists the GWP of each GHG, its lifetime, and abundance in the atmosphere in parts per trillion (ppT). Units commonly used to describe the concentration of GHGs in the atmosphere are parts per million (ppm), parts per billion (ppb), and ppT, referring to the number of molecules of the GHG in a sampling of 1 million, 1 billion, or 1 trillion molecules of air. Collectively, HFCs, PFCs, and SF_6 are referred to as HGWPGs. CO_2 is by far the largest component of worldwide CO_2e emissions, followed by CH_4, N_20, and HGWPGs in order of decreasing contribution to CO_2e.

The primary human processes that release GHGs include burning of fossil fuels for transportation, heating, and electricity generation; agricultural practices that release methane such as livestock grazing and crop residue decomposition; and industrial processes that release smaller amounts of HGWPGs. Deforestation and land cover conversion also have been identified as contributing to global warming by reducing Earth's capacity to remove CO_2 from the air and altering Earth's albedo or surface reflectance, allowing more solar radiation to be absorbed. Specifically, CO_2 emissions associated with fossil fuel combustion are the primary contributors to human-induced climate change. CO_2, CH_4, and N_2O emissions associated with human activities are the next largest contributors to climate change.

Carbon Dioxide

CO_2 is the most important anthropogenic GHG and accounts for more than 75 percent of all anthropogenic GHG emissions. Its long atmospheric lifetime (on the order of decades to centuries) ensures that atmospheric concentrations of CO_2 will remain elevated for decades after GHG mitigation efforts to reduce GHG concentrations are promulgated (Olivier et al. 2005, 2006 in IPCC 2007c).

Table 3.6-1: Lifetimes, Global Warming Potentials, and Abundances of Significant Greenhouse Gases

Gas	Global Warming Potential (100 years)	Lifetime (years)	1998 Atmospheric Abundance (ppT1)
CO_2	1	50–200	365,000,000
CH_4	21	9–15	1,745
N_2O	310	120	314
HFC-23	11,700	264	14
HFC-134[a]	1,300	14.6	7.5
HFC-152[a]	140	1.5	0.5
CF_4	6,500	50,000	80
C_2F_6	9,200	10,000	3
SF_6	23,900	3,200	4.2

Notes:

C_2F_6 = hexafluoroethane; CF_4 = tetrafluoromethane; CH_4 = methane; CO_2 = carbon dioxide; HFC = hydrofluorocarbon; N_2O = nitrous oxide; SF_6 = sulfur hexafluoride

Tetrafluoromethane and hexafluoroethane are perfluorocarbons.

[1] ppT is a mixing ratio unit, indicating the concentration of a pollutant in parts per trillion by volume.

Sources: IPCC 1996, 2001

Increasing concentrations of CO_2 in the atmosphere are largely attributable to emissions from the burning of fossil fuels, gas flaring, cement production, and land use changes. Three-quarters of the current radiative forcing is likely caused by anthropogenic CO_2 emissions that are the result of fossil fuel burning, and approximately one-quarter of the current radiative forcing is the result of land-use change (IPCC 2007d). Anthropogenic emissions of CO_2 have increased concentrations in the atmosphere most notably since the Industrial Revolution; the concentration of CO_2 has increased from approximately 280 to 379 ppm over the last 250 years, an increase of over 35 percent (IPCC 2007d). IPCC estimates that the present atmospheric concentration of CO_2 has not been exceeded in the last 650,000 years and is likely to be the highest ambient concentration in the last 20 million years (IPCC 2007b).

Methane

CH_4, the main component of natural gas, is the second largest contributor to anthropogenic GHG emissions and has a GWP of 21 (IPCC 1996). Anthropogenic emissions of CH_4 are the result of growing rice, raising cattle, combusting natural gas, and mining coal (NOAA 2008). Atmospheric CH_4 has increased from a preindustrial concentration of 715 to 1,775 ppb in 2005 (IPCC 2001). Although it is unclear why, atmospheric concentrations of CH_4 have not risen as quickly as anticipated (NOAA 2008).

Nitrous Oxide

N_2O is a powerful GHG, with a GWP of 310 (IPCC 1996). Anthropogenic sources of N_2O include agricultural processes, nylon production, power plants, nitric acid production, and vehicle emissions. N_2O also is used in rocket engines, racecars, and as an aerosol spray propellant. Agricultural processes that result in anthropogenic

N_2O emissions are fertilizer use and microbial processes in soil and water. N_2O concentrations in the atmosphere have increased from preindustrial levels of 270 to 319 ppb in 2005, an 18 percent increase (IPCC 2001).

Hydrofluorocarbons

HFCs are human-made chemicals used in commercial, industrial, and consumer products, and they have high GWPs (EPA 2006). HFCs generally are used as substitutes for ODSs in automobile air conditioners and refrigerants. Concentrations of HFCs have risen from zero to current levels. Because these chemicals are human-made, they do not exist naturally in ambient conditions.

Perfluorocarbons

The most abundant PFCs are CF_4 (PFC-14) and C_2F_6 (PFC-116). These human-made chemicals are emitted mainly from aluminum production and semiconductor manufacturing processes. PFCs are extremely stable compounds that are destroyed only by very high-energy ultraviolet rays, which results in the very long lifetimes of these chemicals (EPA 2006). PFCs have large GWPs that have risen from zero to current levels.

Sulfur Hexafluoride

Sulfur hexafluoride, another human-made chemical, is used as an electrical insulating fluid for power distribution equipment, in the magnesium industry, in semiconductor manufacturing, and also as a trace chemical for study of oceanic and atmospheric processes (EPA 2006). In 1998, atmospheric concentrations of SF_6 were 4.2 ppT and steadily increasing in the atmosphere. SF_6 is the most powerful of all GHGs listed in IPCC studies, with a GWP of 23,900 (IPCC 1996).

Global Climate Change Issue

Climate change is a global problem because GHGs are global pollutants, unlike criteria air pollutants and hazardous air pollutants, which are pollutants of regional and local concern. Whereas pollutants with localized air quality effects have relatively short atmospheric lifetimes (approximately 1 day), GHGs have long atmospheric lifetimes (several years to several thousand years). GHGs persist in the atmosphere for a long enough time to be dispersed around the globe. Although the exact lifetime of any particular GHG molecule depends on multiple variables and cannot be pinpointed, more CO_2 is currently emitted into the atmosphere than is sequestered. Carbon dioxide sinks, or reservoirs, include vegetation and the ocean, which absorb CO_2 through photosynthesis and dissolution, respectively. These are two of the most common processes of CO_2 sequestration. Of the total annual human-caused CO_2 emissions, approximately 54 percent is sequestered through ocean uptake, Northern Hemisphere forest regrowth, and other terrestrial sinks within a year, whereas the remaining 46 percent of human-caused CO_2 emissions remain stored in the atmosphere (Seinfeld and Pandis 1998).

Similarly, effects of GHGs are borne globally, as opposed to localized air quality effects of criteria air pollutants and toxic air contaminants. The quantity of GHGs that it takes to ultimately result in climate change is not known precisely; the quantity is enormous and no single project would be expected to measurably contribute to a noticeable incremental change in the global average temperature, or to global, local, or microclimate. Emissions of GHGs have the potential to adversely affect the environment, because such emissions contribute, on a cumulative basis, to global climate change. Therefore, a cumulative discussion and analysis of Proposed Action effects on global climate change is presented in this EA, because although a single project is unlikely to contribute

significantly to climate change, cumulative emissions from many projects affect global GHG concentrations and the climate system.

Global climate change also has the potential to result in sea level rise (resulting in flooding of low-lying areas), to affect rainfall and snowfall (leading to changes in water supply), to affect temperatures and habitats (affecting biological resources and public health), and to result in many other adverse environmental consequences. Although the international, national, state, and regional communities are beginning to address GHGs and the potential effects of climate change, worldwide GHG emissions are expected to continue to rise over the next several years.

Climate and Topography

Climate is the accumulation of daily and seasonal weather events over a long period of time, whereas *weather* is the condition of the atmosphere at any particular time and place (Ahrens 2003). For a detailed discussion of climate and topography, see Section 3.1, Air Quality of this EA.

Existing Greenhouse Gas Emissions

U.S. Greenhouse Gas Inventory

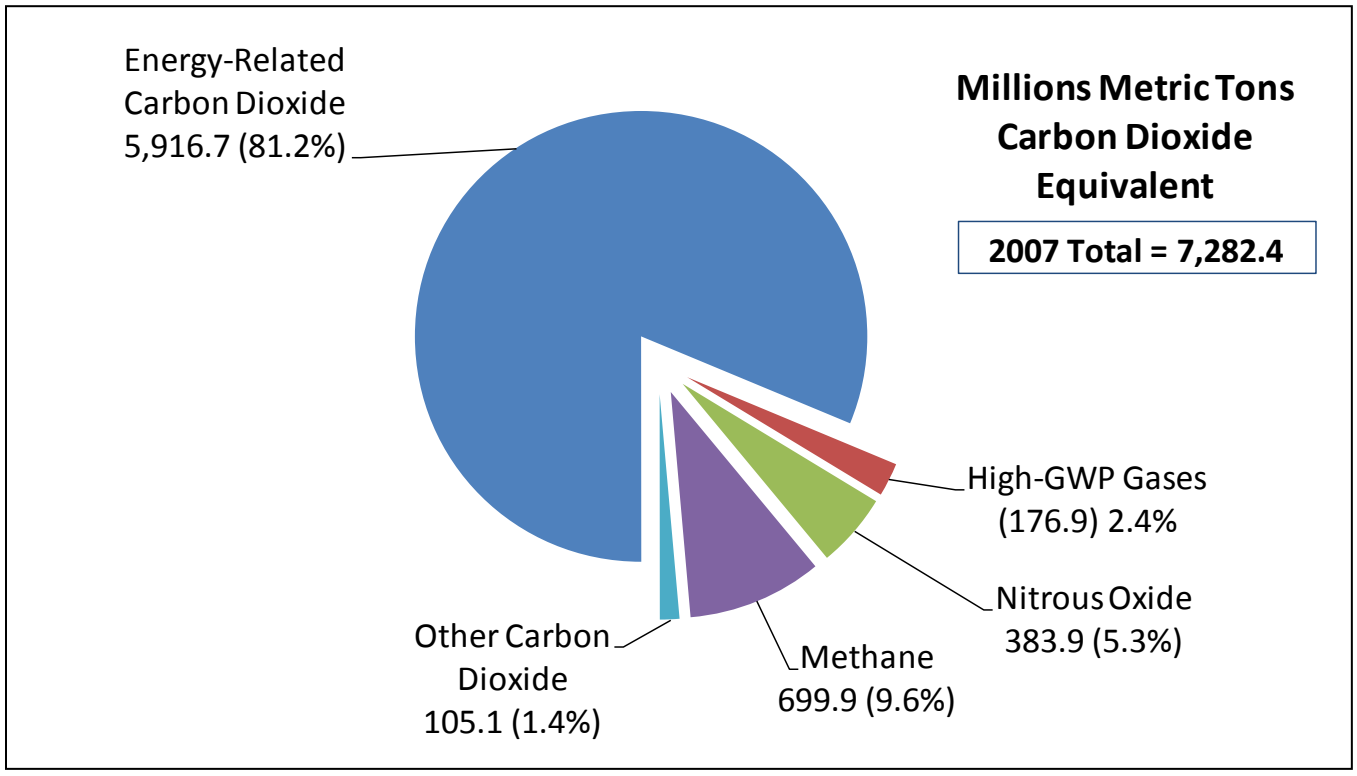
Total U.S. GHG emissions in 2007 were 1.4 percent above the 2006 total (DOE 2008). Figure 3.6-2 shows 2007 U.S. GHG emissions by gas, including percentages.

Total emissions growth—from 7,179.7 million metric tons carbon dioxide equivalent ($MMTCO_2e$) in 2006 to 7,282.4 $MMTCO_2e$ in 2007—mainly was the result of an increase in CO_2 emissions of 75.9 $MMTCO_2e$. Larger percentage increases in emissions of other GHGs occurred, but their absolute contributions to total emissions growth were relatively small: 13.0 $MMTCO_2e$ for CH_4, 8.2 $MMTCO_2e$ for N_2O, and 5.6 $MMTCO_2e$ for HGWPGs (DOE 2008).

The increase in U.S. CO_2 emissions in 2007 resulted primarily from two factors: unfavorable weather conditions, which increased demand for heating and cooling in buildings; and a drop in hydropower availability, which led to greater reliance on fossil energy sources (coal and natural gas) for electricity generation, thus increasing the carbon intensity of the power supply (DOE 2008). The increase in CH_4 emissions resulted from energy sources, waste management, and agriculture. The increase in N_2O is attributed primarily to an increase of emissions from nitrogen fertilization of agricultural soils.

California Greenhouse Gas Inventory

As the second largest emitter of GHG emissions in the U.S. and 12th to 16th largest in the world, California contributes a significant quantity of GHGs to the atmosphere (CEC 2006). Emissions of CO_2 are byproducts of fossil-fuel combustion and are attributable in large part to human activities associated with transportation, industry/manufacturing, electricity and natural gas consumption, and agriculture (ARB 2010). In California, the transportation sector is the largest emitter of GHGs, followed by electricity generation (ARB 2010).



Note: High global warming potential gases include hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.
Source: DOE 2008

Figure 3.6-2: 2007 U.S. Greenhouse Gas Emissions by Gas

Emissions of CH_4 and N_2O generally are much lower than those of CO_2 and are associated with anaerobic microbial activity resulting from agricultural practices, flooded soils, and landfills. These two compounds, CH_4 and N_2O, have approximately 23 and 296 times the GWP of CO_2, respectively.

Bay Area Air Quality Management District Greenhouse Gas Inventory

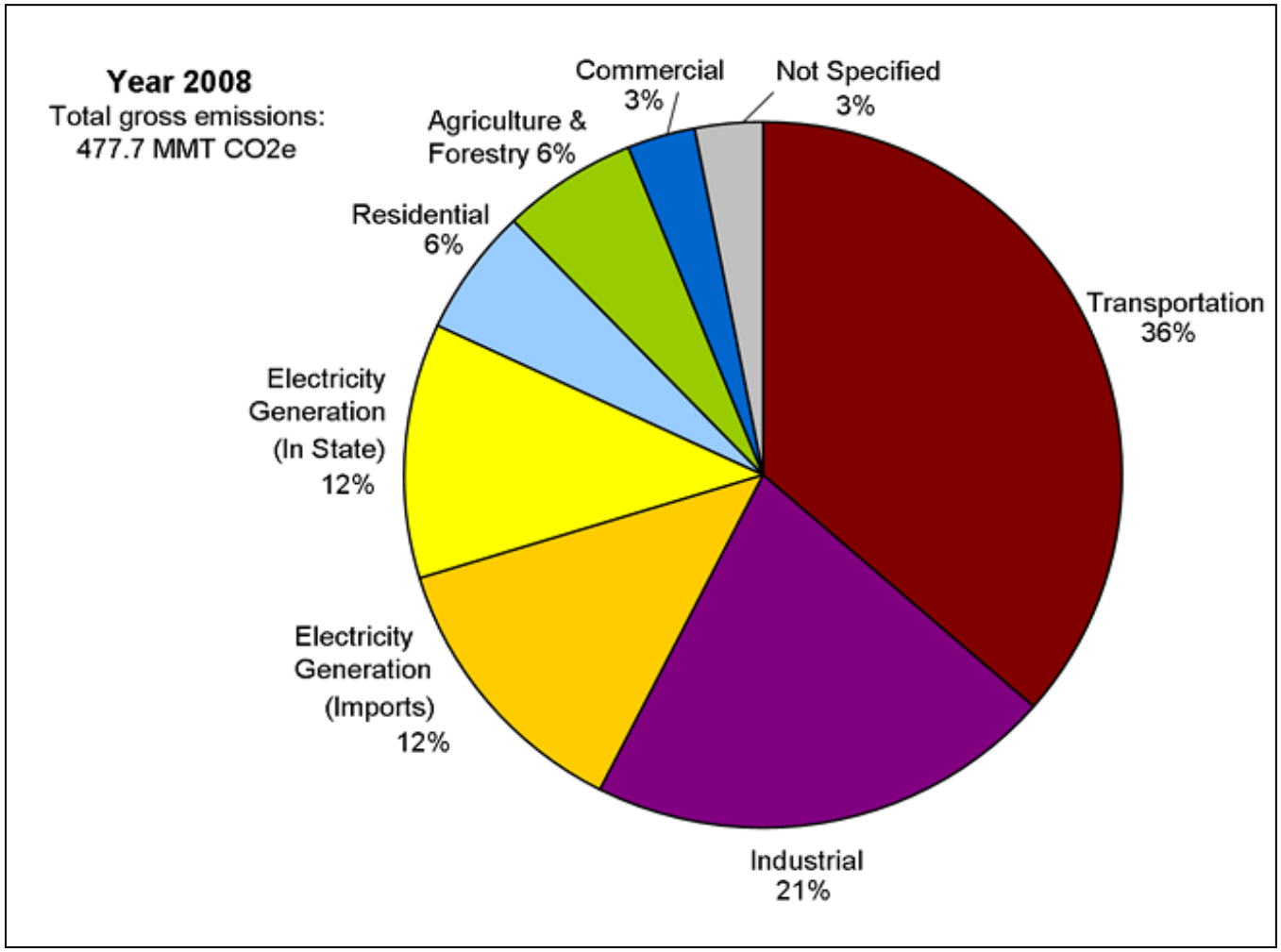
In 2010, the Bay Area Air Quality Management District (BAAQMD) published a GHG inventory for the San Francisco Bay (Bay) Area, which provides an estimation of GHG emissions in the base year 2007 for all seven counties under its jurisdiction: Marin, San Francisco, Napa, Alameda, Contra Costa, San Mateo, Santa Clara, as well as the southern portions of Solano and Sonoma Counties (BAAQMD 2010). This GHG inventory is based on the standards for criteria air pollutant inventories and is used to support BAAQMD's climate protection activities.

The regional (Bay Area) and local (county project location) 2007 GHG emissions from existing direct and indirect sources are shown in Table 3.6-2. The estimated GHG emissions are presented in CO_2e, which weights each GHG by its GWP. The GWPs used in the BAAQMD inventory are from the Second Assessment Report of the IPCC. In 2007, Marin County GHG emissions accounted for about 2.9 percent of the total Bay Area GHG emissions (BAAQMD 2010). Transportation is the largest GHG emissions sector in the Bay Area, followed by industrial/commercial, electricity generation and cogeneration, and residential fuel usage.

Table 3.6-2: 2007 Estimated Regional and Local Greenhouse Gas Emissions

Emissions Source	Emissions in Metric Tons of CO_2e per Year (2007) Bay Area	Emissions in Metric Tons of CO_2e per Year (2007) Marin County
Transportation	34,870,000 (36.41%)	1,300,000
Industrial/Commercial	34,860,000 (36.40%)	500,000
Electricity/Cogeneration	15,200,000 (15.87%)	300,000
Residential Fuel Usage	6,820,000 (7.12%)	400,000
Off-Road Equipment	2,920,000 (3.05%)	100,000
Agricultural/Farming	1,110,000 (1.16%)	200,000
Total Emissions	**95,780,000 (100%)**	**2,800,000**

Note: CO_2e = carbon dioxide equivalent
Source: BAAQMD 2010



Source: ARB 2010

Figure 3.6-3: 2008 California Greenhouse Gas Emissions by Sector (2000–2008 Emissions Inventory)

Existing Proposed Action Rail Alignment

Because of the condition of the remnant tracks within the existing Proposed Action alignment, no trains can use this rail alignment. Therefore, no GHG emissions occur within the existing alignment.

Sea Level Rise

Sea level rise refers to an increase in msl with respect to a land benchmark. Global sea level rise can be a result of global warming through the expansion of seawater as the oceans warm and ice melts over land. Local sea level rise is affected by global sea level rise plus tectonic land movements and subsidence, which can be of the same order as global sea level rise.

Most climate scientists agree that anthropogenically induced global warming will cause the rate of sea level rise to increase from current conditions further. In 2001, the IPCC released a report with projections of global sea level rise over the next century (IPCC 2001).

IPCC projections of sea level rise vary, depending on several different GHG emissions scenarios that are analyzed in the IPCC Special Report on Emissions Scenarios; the IPCC estimates sea level rise to be between 3.6 and 34.8 inches between 1990 and 2100 (IPCC 2001). The IPCC model range of estimates for global sea level average rise by 2060 is predicted to be between 2.4 and 15.6 inches. However, the models used by the IPCC do not predict uniform global sea level rise, and substantial regional variations exist. The IPCC model predictions for the eastern Pacific indicate a range of sea level rise of 3.6 to 19.2 inches by 2100, which is on the lower end of the global range noted above.

The Proposed Action rail alignment sits at an elevation ranging from 12 to 21 feet relative to msl. The alignment crosses San Rafael Creek (within the City of San Rafael), which is tidally influenced.

3.6.2 Environmental Consequences

A NEPA evaluation must consider the context and intensity of the environmental effects that would be caused by, or result from, the EA alternatives. The Council on Environmental Quality's (CEQ) draft national guidance suggests that federal agencies consider opportunities to reduce GHG emissions caused by proposed federal actions and adapt their actions to climate change impacts throughout the NEPA process, addressing these issues in their agency NEPA procedures (CEQ 2010). According to CEQ's draft national guidance, two main considerations exist when addressing climate change in environmental documentation: (1) the GHG emissions effects of a proposed action and alternative actions; and (2) the effects of climate change on a proposed action or alternatives. Therefore, this EA discusses both the Proposed Action's contribution to climate change and the effects that climate change may have on implementation of the Proposed Action.

CEQ draft national guidance refers to a quantitative GHG emissions significance threshold of 25,000 $MTCO_2e$ per year for inclusion of a GHG analysis within a NEPA document. Therefore, absent established quantitative thresholds, an alternative would be considered to result in an adverse effect related to GHG emissions if it would:

- make a considerable contribution to cumulative GHG emissions and global climate change. Annual GHG emissions totaling more than 25,000 $MTCO_2e$ per year would be considered a cumulatively considerable contribution to GHG emissions for the purposes of this EA.

No quantitative climate change significance thresholds have been set for the effect of climate change on a region/project. However, CEQ draft national guidance states that climate change effects should be considered in the analysis of projects that are designed for long-term utility and located in areas that are considered vulnerable to specific effects of climate change (such as increasing sea level or ecological change) within the project's time frame.

Assessment Methods

Greenhouse Gas Emissions

The magnitude of Proposed Action GHG emissions has been quantified. Therefore, these numerical GHG emissions are included as part of the Proposed Action effects discussion.

URBEMIS was used to estimate GHG emissions associated with construction of individual development projects, and the BAAQMD Greenhouse Gas Model (BGM) model was used to estimate operational GHG emissions. URBEMIS is designed to model construction emissions for land use development projects, based on building size, land use and type, and disturbed acreage, and allows for the input of project-specific information. BGM was developed for use with URBEMIS, and calculates operational GHG emissions associated with a project at buildout, including those emissions resulting from transportation (trip generation), electricity use, natural gas use, solid waste generation, water and wastewater use, and other area sources (hearths [e.g., gas fireplaces, wood-burning fireplaces, and wood-burning stoves] and landscaping).

Construction-generated GHG emissions were modeled based on general information provided in Chapter 2.0, Alternatives in this EA and default BAAQMD-recommended settings and parameters attributable to the proposed land use type and site location. The URBEMIS model only provides estimates of emissions of CO_2. Although emissions of other GHGs, such as CH_4 and N_2O, are important with respect to global climate change, the emission levels of these other GHGs from on- and off-road vehicles used during construction are about two to three orders of magnitude smaller than CO_2 emissions, even when factoring in the relatively larger global warming potentials of CH_4 and N_2O (CCAR 2009).

GHG emissions associated with operation of the Proposed Action were modeled using BGM Version 1.1.9 beta, with default San Francisco Bay Area values for temperature, humidity, and vehicle fleet characteristics as well as energy consumption, waste generation, water use, and wastewater generation rates for various land uses. All modeling assumptions and output summaries are provided in Appendix A.

The mobile-source GHG emissions associated with the Proposed Action were modeled by taking into account the California Low Carbon Fuel Standard, which aims for a 10 percent life-cycle GHG emissions reduction from increased renewable fuel use in California by 2020. The mobile-source GHG emissions associated with the Proposed Action also were modeled by taking into account California Assembly Bill 1493 "Pavley" GHG emissions standards, which require model year 2009–2016 passenger cars, light-duty trucks, and medium-duty passenger vehicles to reduce their GHG emissions from an average 0.45 percent reduction in 2009 to an average 29.7 percent reduction by 2016.

Global Climate Change

In the following discussion, the effects of global climate change on the alternatives are described and assessed relative to local/regional projections of specific climate change effects. Scientific findings are summarized for the proposed rail alignment. Thus, this section includes an overview of the potential effects of the EA alternatives in the context of global climate change related to sea level rise, and the potential effect associated with the effect of an alternative in the context of global climate change is determined.

Unlike the other topics evaluated in this EA, the effects of global climate change may not become apparent until well into the future. As explained earlier, this is a function of the incremental buildup of GHG concentrations in the atmosphere over time and the long-term warming and climate change effects of increasing GHG concentrations. Therefore, a longer timeframe is used when considering the effects of climate change. In the discussion below, for instance, predictions for sea level rise are made for the years 2050 and 2100. This is a substantially longer timeframe than that used for other topics in this EA, but is used here based on the specific characteristics of climate change prediction and evaluation.

Alternative 1: No Action Alternative

Under the No Action Alternative, the FTA would take no action and would provide no funding to SMART for the Downtown San Rafael to Larkspur Extension project. The project would not be constructed, and none of the effects associated with the Proposed Action would occur. No construction or operation activities would occur, and the project corridor would remain in its current state.

Alternative 2: SMART Downtown San Rafael to Larkspur Extension (Proposed Action)

Construction

GHG emissions associated with construction of the Proposed Action would include emissions related to off-road construction equipment, on-road haul trucks, and construction worker vehicles in the commutes to and from construction sites. GHG emissions resulting from construction of the Proposed Action would total 505 MT of CO_2e (see Table 3.6-3). Construction-related GHG emissions would cease following construction, and therefore would not be a continuous GHG emissions source over the lifetime of the Proposed Action. The Proposed Action would implement best construction management practices to reduce GHG emissions embedded within materials or generated by vehicles required to deliver materials to construction sites. Therefore, the Proposed Action would not substantially effect contributions to global climate change.

Table 3.6-3: Construction GHG Emissions

Emissions Source	Metric Tons CO_2e
Off-Road Construction Equipment	210
On-Road Haul Trucks	212
Construction Worker Vehicles	83
TOTAL	**505**

Source: Compiled by AECOM in 2014

Operation

GHG emissions associated with operation of the Proposed Action would include emissions related to operations of the passenger trains as well as vehicles commuting to and from train stations located along this portion of the transit system. GHG emissions resulting from operation of the Proposed Action would total 9,019 MT of CO_2e (see Table 3.6-4). As discussed in Chapter 2, Alternatives of this EA, the proposed trains would use diesel multiple units (DMUs), which are rail cars that contain their own propulsion units, with each car served by a diesel engine below the passenger compartment. Because they are self-propelled, no large locomotive engine is required. As a result, a DMU results in lower emissions when compared to a locomotive-hauled train system. Thus, the selected engines would produce less GHG emissions. Although the trains are expected to operate every 30 minutes in both directions during peak periods, the addition of this new passenger rail service would result in a reduction of personal auto vehicles on local roadways and highways. Therefore, the Proposed Action would result in a net beneficial effect with regard to operational GHG emissions.

Table 3.6-4: Operational GHG Emissions

Emissions Source	Metric Tons CO_2e
Trains	170
Rider Commute	8,849
TOTAL	**9,019**

Source: Compiled by AECOM in 2014

The Effect of Climate Change on the Proposed Rail Alignment

Most of the proposed rail alignment is located at a higher elevation (12 to 21 feet above msl) than both the Pacific Ocean (0 feet above msl) and high-end sea level rise predictions. Future sea-level rise may have the potential to affect coastal and tidally influenced areas of Marin County, including the project area; however, potential sea level effects are not expected within the foreseeable future as it pertains to this EA.

As discussed in Section 3.8, Hydrology and Water Quality of this EA, implementation of Mitigation Measures WR-2 from the 2005 Draft EIR would require that the replacement trestles and retaining wall be designed and constructed so that they would not raise existing flood levels and construction work in the floodplain would be avoided or minimized. Furthermore, as discussed in Section 3.8, if the Proposed Action would result in any increase to 100-year water surface elevations, a Letter of Map Revision would be required, and a Conditional Letter of Map Revision would be obtained from the Federal Emergency Management Agency before construction was initiated. However, whether this process also would account for predicted sea level rise inundation is unknown.

3.6.3 References

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3.7 HAZARDS AND HAZARDOUS MATERIALS

This section discusses known hazardous materials in the vicinity of the Proposed Action area. Previous analysis for hazardous materials was undertaken for the entire SMART alignment as part of the 2005 Draft EIR, prepared as per CEQA (SMART 2005). That analysis can be found in Section 3.4 of the 2005 Draft EIR.

The 2005 Draft EIR included a hazardous materials investigation to determine the potential health risks resulting from encounters with environmental contamination in the soil and groundwater within the entire SMART 70-mile rail alignment. Because of the age and expansive geographic study area of that investigation, an Initial Site Assessment (ISA) was prepared in March 2013, to provide updated information regarding recognized environmental conditions (RECs) associated with the Proposed Action (AECOM 2013). The ISA was performed in general conformance with the scope and limitations of American Society for Testing and Materials Standard Practice Designation E 1527-05 for Environmental Site Assessments. In preparation of the ISA, a site visit, regulatory research, a historical review, and an environmental database analysis of the proposed rail alignment were conducted. The site visit occurred on February 7, 2013, and no visual evidence of underground storage tanks (e.g., vent pipes, fill ports), potable water wells, monitoring wells, clarifiers, dry wells, septic tanks, or leach fields was observed. The ISA was based on a review of existing conditions, reported pre-existing conditions, and observed operations within the Proposed Action right-of-way (ROW) and adjacent properties. The following analysis is based on the information contained in the ISA. A copy of the ISA is provided in Appendix D.

3.7.1 Affected Environment

Proposed Rail Alignment

The Proposed Action area is part of an existing remnant railroad alignment, averaging around 100 feet in width and just over 2 miles in length, located within the city limits of San Rafael and Larkspur. The ROW is owned by SMART. For most of its length, the alignment is on top of a former Northwestern Pacific (NWP) Railroad embankment, except in the 1,100-foot tunnel section between San Rafael and Larkspur, located beneath Cal Park Hill on the east side of U.S. Highway 101. The tunnel was constructed originally as a single track bore in 1884, and essentially was rebuilt/excavated in 1924 to accommodate a second track. Railroad ties associated with former NWP Railroad operations have been removed from substantial segments of the alignment. In other areas, the ROW has been paved with asphalt.

The proposed rail alignment was not identified as containing any known RECs in the environmental database search report that was obtained for the Proposed Action. Hazardous materials, petroleum products, and staining or visual evidence of a hazardous materials release were not observed in the ROW during the February 2013 site visit. Furthermore, no visual evidence of underground storage tanks (e.g., vent pipes, fill ports), potable water wells, monitoring wells, clarifiers, dry wells, septic tanks, or leach fields was observed within the alignment during the site visit. Based on this information, no known RECs exist within the alignment.

Surrounding Area

Off-site sources of potential hazardous material occur in the immediate vicinity of the ROW, because of the nature of the businesses in the area, which include a number of auto repair shops and a cement plant. Former industrial and commercial land uses in the area also may be sources of hazardous materials. Environmental

regulatory agency database reports from Environmental Data Resources, Inc. (EDR) have identified properties listed in ASTM-recommended databases, within recommended search distances from the proposed rail alignment, and have provided information on listed properties. The EDR report returned over 700 database listings for properties surrounding, but not within, the Proposed Action ROW that have used, stored, or have had documented releases of hazardous materials within the ASTM-recommended search distances from the proposed rail alignment.

The majority of the sites were listed on noncontamination-related databases; however, 111 leaking underground storage tank (LUST) site listings were listed—13 Spills, Leaks, Investigations, and Cleanups (SLIC) program listings through the California Regional Water Quality Control Board, and 24 EnviroStor listings through the California Department of Toxic Substances Control. Based on review of these database listings, most of these sites are not expected to present a REC with respect to the Proposed Action ROW, based on their distance from the ROW, regulatory status (i.e., closed, no violations found), media affected (i.e., soil only), and/or topographical position from the ROW (i.e., downgradient or cross-gradient).

The following three active RECs were identified in the immediate vicinity of the Proposed Action ROW during the ISA assessment:

- Proshop Inc. at 658 Irwin Street, San Rafael is located approximately 130 feet southwest of the ROW, on the other side of an open drainage channel. This Cleanup Program Site is listed as an open case under site assessment. Because of the open regulatory status, proximity to the ROW, groundwater direction towards the proposed rail alignment, and presence of sheen on the groundwater as noted on available groundwater monitoring reports, this site is considered to be an active REC relative to the ROW.
- Best Buy at 632 Irwin Street, San Rafael is located approximately 20 feet southwest of the proposed rail alignment, on the other side of an open drainage channel. In May 2009, the California Regional Water Quality Control Board, San Francisco Bay Region issued a Notification of Intent to Issue a No Further Action Letter, stating that residual amounts of hydrocarbons and metals remained in the soil and groundwater beneath the property but do not pose an adverse human health or environmental impact under current conditions and/or commercial/industrial property use. However, the State Water Resource Control Board's GeoTracker online database does not indicate that the No Further Action Letter was issued. Because of the open regulatory status and proximity of the ROW, this site is considered an active REC relative to the ROW.
- 10 Woodland Avenue, San Rafael adjoins the proposed rail alignment near the intersection of Andersen Drive and Francisco Boulevard West. This site is listed on a historical underground storage tank (HIST UST) database for a gasoline UST installed in 1975. The site is not listed in the State Water Resource Control Board's GeoTracker online database, which includes permitted UST facilities. Because of the proximity to the alignment and unknown status of the UST, this site is considered an active REC relative to the ROW.

In addition, a total of six historical RECs (HRECs) were identified during the ISA. These RECs have been closed by the relevant regulatory agencies, and no further action was identified as necessary.

3.7.2 Environmental Consequences

Alternative 1: No Action Alternative

Under the No Action Alternative, the FTA would take no action and would provide no funding to SMART for the Downtown San Rafael to Larkspur Extension project. The project would not be constructed, and none of the effects associated with the Proposed Action would occur. No construction or operation activities would occur, and the project corridor would remain in its current state.

Alternative 2: SMART Downtown San Rafael to Larkspur Extension (Proposed Action)

As noted above, no known RECs are within the Proposed Action ROW. Although three active RECs were identified adjacent to the ROW, they would not be disturbed by Proposed Action activities. This determination is based on the limited amount of excavation that would be required to construct the Proposed Action, which generally would be limited to less than 1 foot in depth. Thus, disturbance of potentially hazardous materials emanating from off-site areas in groundwater and soils would be extremely unlikely. Therefore, this analysis is centered on the potential for the inadvertent discovery of previously unknown RECs during construction, as well as the potential for release of hazardous materials during construction and operation of the Proposed Action.

Construction

Two general types of potential hazardous situations exist that may have adverse effects related to the Proposed Action: 1) encountering existing hazardous materials during construction activities, which in turn, would have the potential to expose workers or the public to them; and 2) release of hazardous materials into the proposed rail alignment or vicinity as a result of construction activities (e.g., an accidental spill of hazardous materials during construction).

Encountering Existing Hazardous Materials during Construction

A potential exists for encountering previously unknown RECs in the Proposed Action area during construction, including phenol, creosol, asbestos, or aerially deposited lead (ADL), from one of the following situations:

- Existing crossties supporting the rail in the ROW are creosote-treated timbers. Therefore, phenol and creosol may have leached into the soil underlying these timbers over time.
- Asbestos may be present during the excavation process.
- ADL may be present during construction and could be released from soil near at-grade crossings.

A potential exists that emissions from the release of these hazardous materials could affect workers and the public. Exposure to these compounds could be mitigated through implementation of best management practices (BMPs) and compliance with health and safety regulatory requirements. Contaminated material may require off-site disposal as mandated by established regulations. Federal and state regulations exist that require specific handling and disposal procedures for such hazardous materials.

The 2005 Draft EIR prescribed mitigation measures to address this potential effect. Implementation of these measures would be applied to the Proposed Action.

- **Mitigation Measure HM-1:** Samples of soil shall be submitted for analysis for phenol and creosol compounds if track shoulder re-grading or excavations associated with bridge improvements are undertaken. Sampling of soil will also be based on available historical information and/or previous sampling data sampling and analysis and will be modified to include other potential contaminants such as metals, petroleum hydrocarbons, PCBs and PAHs where warranted. Samples of soil are recommended to be submitted for analysis for lead if improvements to the road crossings are required to determine if these compounds are present and have the potential to impact disposal or release to the environment. If phenol and creosol compounds or ADL are present in the soil, then preparation of a Site Mitigation Plan (SMP) will be required to address potential exposure of workers to impacted soil in order to comply with applicable waste handling and disposal regulations (if offsite disposal of soil is necessary). At a minimum, BMPs in the SMP should include provisions for excavation and grading of impacted soil, stockpiling and testing of contaminated soil, dust and odor control measures and health and safety requirements for working with impacted soil.

  To comply with AB 939 requirements, which dictate guidance for source reduction, recycling and composting, and environmentally safe transformation and land disposal of solid wastes, railroad ties and steel that are replaced during construction of the project will be recycled or re-used as appropriate.

- **Mitigation Measure HM-2:** Precautions, including sampling of soil and groundwater prior to work activities in the areas where proposed excavations are planned and preparation of a SMP, shall be implemented, where necessary. If naturally occurring asbestos is encountered, the project shall comply with the CARB Asbestos Airborne Toxic Control Measures regulations (17 CCR, Section 93105), which requires local air district review and approval of an asbestos dust mitigation plan. An Asbestos Dust Mitigation Plan must specify dust mitigation practices which are sufficient to ensure that no equipment or operation emits dust that is visible crossing the property line.

  If contaminated materials are encountered during construction activities, the local Fire Certified Unified Program Agency (CUPA) will be notified immediately. A qualified environmental consultant shall monitor soil and air and dust emissions during construction activities in these locations to identify whether potential hazards exist and whether special handling of soil and groundwater is required. Specially trained workers can be utilized to handle contaminated soil/groundwater and SMP implementation measures (i.e., use of personal protective equipment) can be utilized to mitigate potential exposures to contaminated soil/groundwater and additional releases to the environment. Construction-related impacts of soil excavation and groundwater dewatering in contaminated areas can be mitigated through implementation of BMPs, such as conducting daily health and safety meetings to discuss planned work in areas where contaminated soil/groundwater could be encountered. Mitigation measures to protect the public include limiting access (i.e., fencing and site security) to the railroad corridor during construction activities and implementation of BMP measures to prevent offsite migration of contaminated soil and groundwater.

- **Mitigation Measure HM-3:** Sampling activities shall be conducted in locations where asbestos containing materials or LBP are anticipated to identify whether potential hazards exist and whether special precautions to prevent workers from exposure to LBP or asbestos are necessary during bridge/overcrossing renovation and or/demolition. If friable asbestos materials are identified during

bridge inspections, these materials shall be safely removed and properly disposed using procedures established by OSHA and the BAAQMD/NSCAPCD. Bridge workers shall be protected through the use of proper protective equipment. Standard procedures shall be used for capturing LBP during bridge cleaning (e.g., sand blasting) and preventing it from being released into the environment. Proper containment shall be employed for all bridge maintenance activities to prevent LBP from impacting the environment.

With implementation of the above measures, construction of the Proposed Action would not result in an adverse effect. Although the proposed rail alignment is in the vicinity of some hazardous materials sites, none of these sites are located within the proposed rail alignment. In the event that contaminated soils, rock, or groundwater are encountered during construction, compliance with standard regulatory conditions also would apply. No adverse effect would occur.

Release of Hazardous Materials during Construction

Hazardous materials used during construction would be limited to those required to fuel and service on-site construction equipment. These materials would include fuels and lubricants. Fuel or other substances could be released accidentally during refueling operations. However, SMART would implement spill prevention and response measures as part of its construction protocols. In addition, existing regulations require the use of BMPs for handling and storage of hazardous materials. With implementation of standard spill prevention and response protocols and compliance with existing regulations, no adverse effect would occur.

Operation

Hazardous materials that would be used during operation of the Proposed Action would be limited to diesel fuel, lubricants, and similar materials associated with passenger trains. As described above concerning use of these same materials during Proposed Action construction, SMART would implement spill prevention and response measures as part of its operational protocols. In addition, existing regulations require the use of BMPs for handling of hazardous materials. With implementation of standard spill prevention and response protocols and compliance with existing regulations, no adverse effect would occur.

3.7.3 References

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3.8 HYDROLOGY AND WATER QUALITY

This section discusses hydrology and water quality in the vicinity of the Proposed Action area. This analysis describes the effects on all surface water sources, including the Section 303(d) list of water bodies in the Proposed Action vicinity with pollutants that cannot be managed completely. This analysis also looks at the potential effects on flooding resulting from the proposed rail line improvements. Previous analysis for water resources was undertaken for the entire SMART alignment as part of the 2005 Draft EIR (SMART 2005), prepared as per CEQA. That analysis can be found in Section 3.3 of the Draft EIR. Effects on wetland resources were analyzed in Section 3.2, Biological Resources of the 2005 Draft EIR.

3.8.1 Affected Environment

This section discusses existing conditions related to hydrology and water quality within the vicinity of the Proposed Action area, including the extent and quality of surface water and groundwater, runoff and drainage patterns, and flood conditions. Most of the area through which the Proposed Action rail alignment would pass was formerly an area of marshes, mudflats, and open water. The old Northwestern Pacific (NWP) Railroad alignment presumably was laid on top of an earthen causeway or levee through the marsh area, and the entire area on either side of the alignment was filled during the ensuing decades. Therefore, the northern two-thirds of the Proposed Action area lying north of Cal Park Hill Tunnel is entirely made up of artificial fill, most of which is several feet in depth.

All portions of the Proposed Action area have undergone some level of ground disturbance, and most of the ground surface along the alignment as well as at the planned Larkspur Station has been paved with asphalt or covered with artificial fill. Along the old NWP Railroad alignment, the ground is overlain by railroad ballast. When entering the Cal Park Hill Tunnel, the alignment enters bedrock material made up of Franciscan Complex mélange rocks.

The old NWP Railroad crossing over San Rafael Creek (also sometimes referred to as Mahon Creek) consists of a single-track trestle that has wood timbers and steel mesh plates. This trestle is located north of West Francisco Boulevard and south of Second Street. A second small trestle crosses an unnamed channel and is constructed of timber with timber abutments. Steel mesh plates cover portions of the bridge.

Climate

Marin County has a mild, Mediterranean climate with long, dry, warm summers and cool, rainy winters. The majority of precipitation occurs between October and May. The mean precipitation in the Proposed Action area is about 33 inches per year (DWR 2004), most of which occurs during the wet winter season. Violent thunderstorms and other extreme weather conditions are rare. The mean annual temperature is about 58 degrees Fahrenheit.

Regional Hydrologic Setting

The San Francisco Bay Region, defined by its jurisdiction under the San Francisco Bay Regional Water Quality Control Board (San Francisco Bay RWQCB), is 4,603 square miles and is characterized by its dominant feature, the 1,100 square miles of San Francisco Bay Estuary, the largest estuary on the western coast of the United States. The San Francisco Bay RWQCB's Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan)

separates the San Francisco Bay Region into seven Hydrologic Planning Areas. The Proposed Action area is located within the San Francisco Bay Central Hydrologic Planning Area, which includes the San Francisco Bay north of the Oakland–San Francisco Bay Bridge and the eastern half of Marin County, including the Ross Valley watershed (SFBRWQCB 2013:Figure 2-5).

The City of San Rafael General Plan 2020 identifies ten watersheds within the San Rafael Planning Area, which is defined as the area encompassing portions of San Rafael and San Pablo Bays, plus approximately 31 square miles of baylands, alluvial valleys, and uplands that drain to the western margins of San Pablo Bay (City of San Rafael 2013:Exhibit 37). The Proposed Action area is located within the San Rafael Creek watershed and the Eastern San Rafael/Point San Quentin watershed. The planned Larkspur Station and the southern portion of the proposed rail alignment south of the Cal Park Hill Tunnel are located in the Ross Valley watershed.

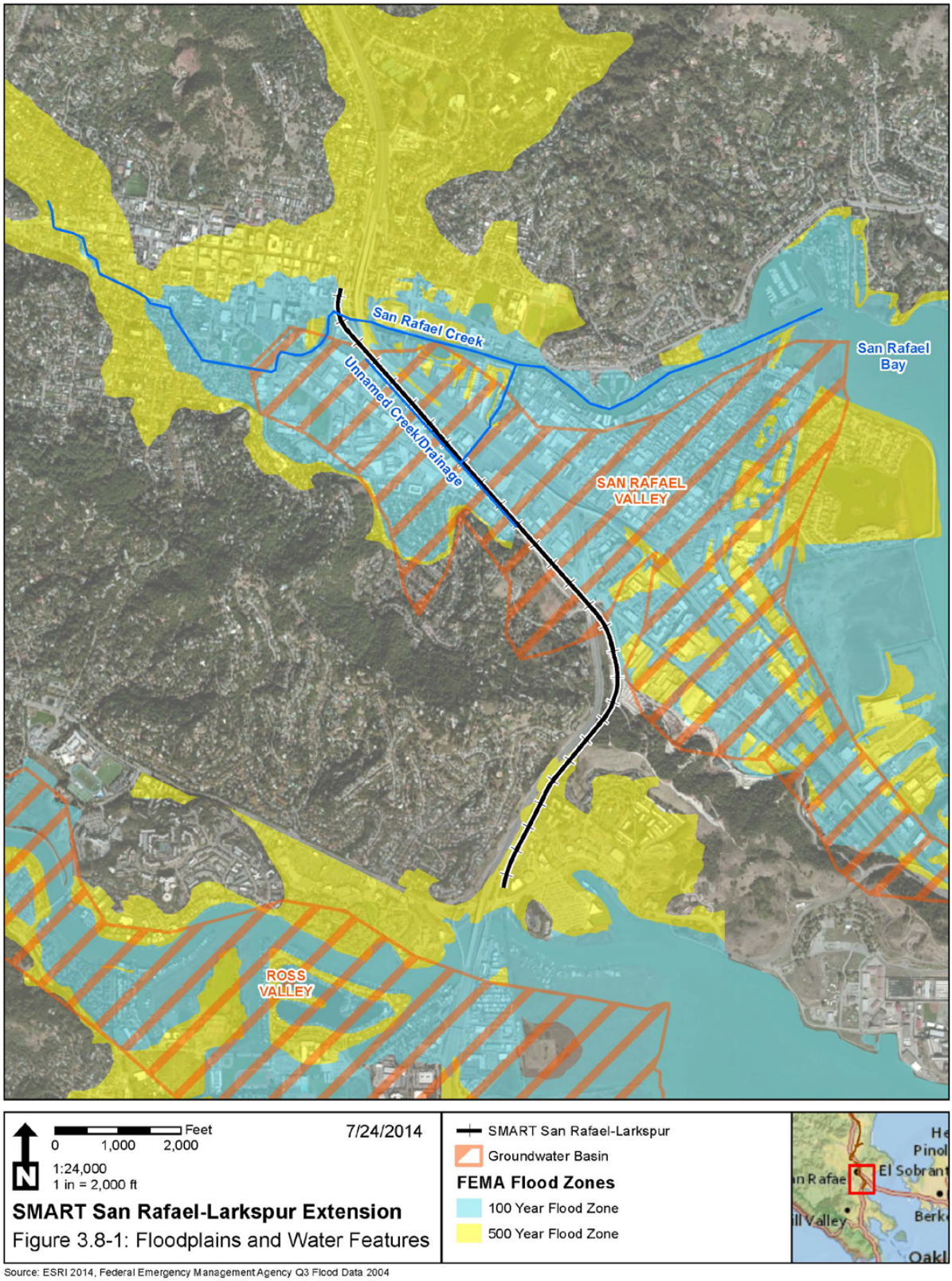
The Basin Plan identifies the beneficial uses of water bodies and provides water quality objectives and standards for waters of the San Francisco Bay Hydrologic Region. Federal and State laws mandate protection of designated "beneficial uses" of water bodies. State law (California Water Code Sections 13050–13051) defines beneficial uses as "domestic; municipal; agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves." The beneficial uses of any specifically identified water body generally apply to all tributary streams to that water body. Those water bodies not specifically designated for beneficial uses in the Basin Plan are assigned the Municipal and Domestic Supply (MUN) use, in accordance with State Water Resources Control Board (SWRCB) Resolution No. 88-63.

Local Hydrologic Features

The Basin Plan lists beneficial uses for the San Francisco Bay Central Hydrologic Planning Area, which includes San Rafael Creek and its receiving water, the San Francisco Bay Central (Central Bay). Existing beneficial uses in the Central Bay include industrial service supply, industrial process supply, commercial and sport fishing, shellfish harvesting, estuary habitat, fish migration, preservation of rare and endangered species, fish spawning, wildlife habitat, water contact recreation, noncontact water recreation, and navigation (SFBRWQCB 2013:Table 2-1).

Two tidally-influenced drainages—San Rafael Creek and an unnamed channel—cross through the northern half of the Proposed Action area in two separate locations (see Figure 3.8-1). San Rafael Creek crosses through the northernmost part of the area. This portion of San Rafael Creek is approximately 30 feet wide, and water levels vary from 1 to 6 feet in depth, depending on the tide. San Rafael Creek discharges into San Rafael Bay, which is connected to San Francisco Bay.

The unnamed channel begins to parallel the proposed rail alignment in the vicinity of Irwin Street and continues to run alongside the alignment for approximately 0.4 mile before making a 90-degree turn, crossing through the Proposed Action area and connecting with San Rafael Creek, which in this area is a highly developed marina district set within an expansive commercial area.



SMART San Rafael-Larkspur Extension

Figure 3.8-1: Floodplains and Water Features

Source: ESRI 2014, Federal Emergency Management Agency Q3 Flood Data 2004

The remainder of the Proposed Action area receives water primarily from two sources: direct precipitation and runoff from developed areas. The area through which the Proposed Action alignment passes is made up almost entirely of industrial and commercial land uses, including a concrete mixing plant, light manufacturing operations, automobile dealerships, storage lots, automotive-related industry, and lay-down yards.

San Rafael Creek's existing beneficial uses include cold freshwater habitat, warm freshwater habitat, wildlife habitat, water contact recreation, noncontact water recreation, and navigation (SFBRWQCB 2013: Table 2-1). Because the unnamed channel is a tributary to San Rafael Creek, the beneficial uses identified for San Rafael Creek generally would apply.

Drainage

The Proposed Action area follows the old NWP Railroad alignment, which is characterized by fill and low areas or ditches on either side of the remnant rail line in many areas. The Proposed Action area is currently primarily compacted (e.g., the old NWP Railroad alignment) or paved (e.g., parking lots, roadways), with low permeability. In the portion of the Proposed Action area south of Bellam Boulevard and Auburn Street, several roadside ditches along the alignment collect water from US 101 and other runoff sources. Water from the ditches enters drains (catchment basins), and flows eventually through the storm drain system and out to San Francisco Bay (AECOM 2013). Water in a ditch near the corner of Woodland Avenue and Auburn Street enters the storm drain system after crossing beneath an old railway trestle. This water similarly appears to discharge eventually to San Francisco Bay via underground stormwater systems (AECOM 2013). North of Andersen Drive and south of the unnamed channel crossing, several low points along the alignment receive water from parking lots and other industrial runoff, as well as from precipitation.

Flooding

San Rafael Creek and the unnamed channel may overflow during storm events or very high tides, and may contribute to the water table in the Proposed Action area (AECOM 2013:10). The low-lying and coastal areas of the City of San Rafael are designated as flood hazard areas and are subject to periodic inundation. The City has adopted a flood hazard ordinance (Title 18 of the San Rafael Municipal Code) that seeks to restrict or prohibit land uses within the flood hazard areas that are dangerous to health, safety, and property because of water or erosion hazards, or which result in damaging increases in erosion or flood heights or velocities. The intent of the ordinance is to reduce flood hazards by controlling the alteration of natural floodplains, stream channels, and natural protective barriers that accommodate or channel flood waters. The ordinance regulates filling, grading, dredging, and other activities that could increase flood damage, and requires that uses vulnerable to floods be protected against flood damage at the time of their initial construction.

Approximately the northern half of the proposed rail alignment is located within the 100-year flood zone, as determined by the Federal Emergency Management Agency (FEMA) (see Figure 3.8-1). The 100-year flood zone also is located directly adjacent to the proposed rail alignment, just to the east, from Auburn Street to Jacoby Street. The northwestern part of the alignment is designated as Zone AE, and the remainder of the alignment within the 100-year flood zone is designated as Zone AH, defined as follows:

- **Zone AE**: Areas subject to inundation by the 1-percent-annual-chance flood event, determined by detailed methods.

- **Zone AH**: Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet.

The area south of the US 101 and Auburn Street crossing is not located within the 100-year flood zone, including the site of the planned Larkspur Station. Areas located within the 100-year flood hazard zone may be inundated during the 100-year (or greater magnitude) storm event.

Executive Order 11988 requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains, and to avoid direct and indirect support of floodplain development wherever a practicable alternative exists. FEMA has conducted flood analysis studies throughout California that have resulted in the development of Flood Insurance Rate Maps (FIRMs). FIRMs identify the estimated limits of the 100-year and 500-year flood events in various watersheds. Executive Order 11988 applies to acquisition, new construction, and most rehabilitation activities that are undertaken with federal assistance within special flood hazard areas designated by FEMA.

The Federal Insurance and Mitigation Administration (FIMA) within FEMA is responsible for administering the National Flood Insurance Program (NFIP) and administering programs that provide assistance for mitigating future damages from natural hazards. The NFIP is a federal program enabling property owners in participating communities to purchase insurance as a protection against flood losses in exchange for their compliance with floodplain management regulations to reduce future flood damages. Participation in the NFIP is based on an agreement between communities and the federal government. Both the City of San Rafael and the City of Larkspur have participated in the NRIP since 1984 (FEMA 2014).

Section 60.3(d)(3) of the NFIP regulations states that a community shall "prohibit encroachments, including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base (100-year) flood discharge" (FEMA 2000). Section 60.3(d)(4) of the NFIP states that "notwithstanding any other provisions of Section 60.3, a community may permit encroachments within the adopted regulatory floodway that would result in an increase in base flood elevations, provided that the community first applies for a conditional FIRM and floodway revision, fulfills the requirements for such revisions as established under the provisions of Section 65.12, and receives the approval of the Administrator."

Water Quality

Section 303(d) List of Water Quality Limited Segment of the Clean Water Act (CWA) (303[d] list) lists the SWRCB water bodies with water quality limited segments. The waters on the 303(d) list do not meet water quality standards necessary to support a waterway's beneficial uses, even after the minimum required levels of pollution control technology have been implemented. The law requires that jurisdictions establish priority rankings for water bodies on the 303(d) list and develop action plans, known as Total Maximum Daily Loads (TMDLs), to improve water quality. A TMDL is a calculation of the total maximum daily load (or "amount") of a pollutant that a water body can receive on a daily basis and still safely meet water quality standards. The SWRCB, RWQCBs, and U.S. Environmental Protection Agency (EPA) are responsible for establishing TMDL waste load allocations and incorporating approved TMDLs into water quality control plans, National Pollutant Discharge

Elimination System (NPDES) permits, and waste discharge requirements (WDRs), in accordance with a specified schedule for completion. The San Francisco Bay RWQCB develops TMDLs for the San Francisco Bay area.

A 3.6-mile stretch of San Rafael Creek is listed on the U.S. Environmental Protection Agency (EPA) 303(d) list for diazinon, a pesticide found in urban runoff (EPA 2010). EPA approved a TMDL for diazinon in 2007, at which point it was removed by EPA from the 303(d) list.

Central Bay, which San Rafael Creek drains into, is listed on the EPA 303(d) list for chlordane, dichlorodiphenyltrichloroethane (DDT), dieldrin, dioxin compounds, furan compounds, invasive species, mercury, polychlorinated biphenyls (PCBs), PCBs (dioxin-like), selenium, and trash (EPA 2010). EPA approved a TMDL for mercury in 2008, at which point it was removed by EPA from the 303(d) list.

The NPDES stormwater permitting program, under Section 402(d) of the CWA, is administered by the RWQCB on behalf of EPA. Section 402(d) of the CWA establishes a framework for regulating nonpoint-source stormwater discharges (33 U.S. Code 1251). The objective of the NPDES program is to control and reduce levels of pollutants in water bodies from surface water discharges, which include municipal and industrial wastewater as well as stormwater runoff. Under the CWA, discharges of pollutants to receiving water are prohibited unless the discharge complies with an NPDES permit. The NPDES permit specifies discharge prohibitions, effluent limitations, and other provisions, such as monitoring deemed necessary to protect water quality based on criteria specified in the National Toxics Rule, the California Toxics Rule, and the Basin Plan.

The Marin County Stormwater Pollution Prevention Program (MCSTOPPP) was formed in 1993 as a joint effort between the 11 cities and towns in Marin County, and is administered by the Marin County Flood Control and Water Conservation District. The SWRCB issued the MCSTOPPP NPDES permit for small MS4, also known as the Phase II General Permit, for projects and facilities within Marin County and its 11 cities and towns. The Phase II Permit currently requires Marin's municipalities and the County to implement their Stormwater Management Plan, with the goal of reducing the discharge of pollutants to the maximum extent practicable (MEP). MEP is the performance standard specified in Section 402(p) of the CWA (CWA Section402[p][3][B]). The Stormwater Management Plan specifies the best management practices (BMPs) to be used to address the Phase II Permit program areas (MCSTOPPP 2005). On February 5, 2013, the proposed final draft of the Phase II Small MS4 General Permit (Order No. 2013-0001 DWQ) was adopted, and it became effective on July 1, 2013.

A 3.6-mile stretch of San Rafael Creek is listed on the 303(d) list for diazinon, a pesticide found in urban runoff (EPA 2010). EPA approved a TMDL for diazinon in 2007, at which point it was removed by EPA from the 303(d) list.

Groundwater

San Rafael Valley Groundwater Basin (Basin No. 2-29) is 896 acres (1.4 square miles) and is bounded on the east by San Rafael Bay, on the north by San Rafael Creek, and on the south near San Quentin (DWR 2004). Potential beneficial uses of this basin include municipal and domestic water supply, industrial process water supply, industrial service water supply, and agricultural water supply (SFBRWQCB 2013:Table 2-2). Limited published information is available regarding water quality in the San Rafael Valley Groundwater Basin; however, available information suggests that sea water intrusion may be a problem near San Francisco Bay (DWR 2004).

Potable water in the City of San Rafael is provided by the Marin Municipal Water District (MMWD). MMWD's water supplies come from a combination of local surface water supplies (approximately 73 percent in 2010), imported water from the Sonoma County Water Agency (approximately 25 percent in 2010), as well as recycled water for nonpotable uses (MMWD 2011:4-1). MMWD does not use groundwater for community drinking water supplies; however, private domestic wells exist in Marin County.

The northern-most part of the Proposed Action alignment, from Third Street in San Rafael to approximately San Rafael Creek, is not located in a mapped groundwater basin. In addition, the portion from the northern extent of Cal Park Hill Tunnel to the southern terminus of the Proposed Action alignment at planned Larkspur Station is not located in a mapped groundwater basin. The central portion of the Proposed Action alignment between approximately San Rafael Creek and the northern extent of Cal Park Hill Tunnel is located within the San Rafael Valley Groundwater Basin.

3.8.2 Environmental Consequences

The following is a discussion of hydrology and water quality effects associated with potential Proposed Action-related drainage alterations, increased impervious areas, or water quality degradation. This analysis focuses on the effects of construction and operation of the Proposed Action.

Alternative 1: No Action Alternative

Under the No Action Alternative, the FTA would take no action and would provide no funding to SMART for the Downtown San Rafael to Larkspur Extension project. The project would not be constructed, and none of the effects associated with the Proposed Action would occur. No construction or operation activities would occur, and the project corridor would remain in its current state.

Alternative 2: SMART Downtown San Rafael to Larkspur Extension (Proposed Action)

Construction

Water Quality Degradation Caused by Erosion, Sedimentation, or Construction Contaminants

During construction of the Proposed Action, land would be disturbed with the use of heavy machinery, and work would be conducted along the banks of San Rafael Creek and the unnamed channel. Construction would include use of heavy equipment for excavation, trenching, grading, pile driving, and soil compaction, all of which would have the potential to result in erosion and sedimentation of local waterways, including San Rafael Creek, for which a TMDL has been established. Local waterways ultimately drain into the Central Bay which is an impaired water under section 303(d) of the CWA.

Construction materials and equipment staging generally would occur along the proposed rail alignment within the old NWP Railroad right-of-way, now owned by SMART. In addition, staging may occur in the vicinity of the planned Larkspur Station and parking area, which already has been disturbed and is predominantly paved. Cranes or other machinery, such as a pile driver, may be staged adjacent to Second Street as part of construction of the replacement San Rafael Creek trestle. Similar equipment would be used to install the replacement trestle across the unnamed drainage channel. Exposure of surface soils during construction activities could lead to increased surface runoff and erosion. Construction work and associated erosion adjacent to San Rafael Creek and the

unnamed channel could lead to increased stream sedimentation. Therefore, the proposed construction activities would have the potential to affect the beneficial uses of San Rafael Creek, the unnamed channel, and their receiving water, San Rafael Bay and San Francisco Bay, by affecting water quality.

In general, the disturbance associated with Proposed Action construction would be temporary, and the disturbed ground surface would be compacted, in the case of the proposed rail alignment, or would be paved, in the case of planned Larkspur Station parking area. The replacement of the trestles over San Rafael Creek and the unnamed channel would take place from alongside the creekbeds, and no piers would be required inside the streambed itself. Existing retaining features located along both banks of San Rafael Creek and the unnamed channel would remain in place during construction and would serve to minimize the potential for erosion or accidental spills from reaching the creek. For work that would be required along the top-of-bank, cranes and associated equipment would be positioned alongside the streambank, allowing for work from the top-of-bank and avoiding construction work within the streambed itself. BMPs, including erosion control measures, would be implemented during construction of the Proposed Action to reduce effects on water quality and to protect beneficial uses of water bodies.

Construction equipment and vehicles operating in close proximity to surface waterbodies also could result in accidental discharges of oil or other construction-related contaminants into waterways. Accidental spills from refueling and lubrication would be avoided by implementing a spill prevention program, which is listed in the Section 2.9, 2005 Draft EIR project description as an environmental compliance measure. The spill prevention program has been integrated into SMART's construction protocols, and currently is in use along those portions of the larger SMART project that are currently under construction. The spill prevention program would similarly apply to the implementation of the Proposed Action. Additional environmental compliance measures included in the 2005 Draft EIR that also would be incorporated into the Proposed Action are the following:

- Consult with RWQCB and CDFW, as necessary, regarding stream crossings and minimization of impacts on water quality and biological resources.
- Repair in place small and medium size railroad bridges and replace or rehabilitate existing structures such as bridges within the original footprint, to minimize the physical effects at water crossings, on the floodplain and any surrounding sensitive biological areas.
- Use of appropriate controls for pollution prevention during servicing and fueling of construction vehicles including:
    - Perform fueling and servicing only in designated areas located as far as practicable from stream zones and wetland areas.
    - When fueling, do not "top off" tanks.
    - Carry spill containment kits in all construction vehicles.
    - Use a secondary containment such as a drain pan or drain cloth when fueling to catch spills.
    - Train all project construction personnel and subcontractors in proper fueling, servicing, and clean-up procedures.
    - Report all fluid spills immediately.
    - Store hazardous materials as far as practical from stream zones and wetland areas.

- Develop and implement a contingency plan for possible leaks and spills of hazardous materials.

- Develop a storm water pollution prevention plan (SWPPP) for construction activities in or adjacent to waterways or wetlands, BMPs shall be implemented to minimize erosion and sedimentation. BMPs would include the following types of activities:

  - Control sheet flow and run off from all disturbed areas using ditches, berms, weed free waddles, straw bales, and silt fencing.
  - Cover or stabilize loose soil and exposed slopes prior to the onset of rainy season and any time that rain is forecast within 24 hours.
  - Use geo textile fabric or protective mats where feasible to minimize ground damage where vehicle travel through wetlands or other saturated soil areas cannot be avoided in temporary work areas.
  - Apply gravel to a depth of three inches to access roads used during the rainy season.
  - Install silt fencing and fiber rolls around soil and gravel stockpiles between October 15 and April 15 to prevent sedimentation in nearby watercourses and wetlands.
  - Hydroseed disturbed areas before October 15 with a mixture of native and non-invasive plants that provide protection from erosion. The seed mixtures should be developed for each site based on local conditions.
  - Stabilize stream banks prior to October 15 with riprap, native plantings, willow wattles, or other biotechnical slope stabilization techniques.

The SWRCB has adopted a statewide NPDES general permit for stormwater discharges associated with construction activities (Construction General Permit; SWRCB Order 2009-0009-DWQ, as amended by 2010-0014-DWQ). For sites that disturb 1 acre or more and drain to the separate sewer system, compliance with the Construction General Permit and preparation and implementation of an SWPPP that meets Construction General Permit conditions is required. The SWPPP would contain a detailed mitigation plan for erosion and sediment control, including plans for implementing BMPs for the control of stormwater runoff, erosion, and sedimentation.

As noted previously, all of the mitigation measures prescribed in the 2005 Draft EIR have been integrated into SMART's construction protocols, and currently are in use along those portions of the larger SMART project that currently is under construction. In addition to those that have already been mentioned, the following mitigation measures also would be implemented so that the Proposed Action would have no adverse effect on water quality during construction:

- **Mitigation Measure WR-1a:** The proposed project shall comply with the NPDES permit process which requires project applicants to file a Notice of Intent and prepare and submit a SWPPP to the RWQCB. The SWPPP must contain a detailed mitigation plan for erosion and sediment control, including plans for implementing BMPs for the control of stormwater runoff, erosion and sedimentation. Typical BMPs may include the use of silt fencing, temporary or permanent retention or detention basins, check dams, buffer strips adjacent to streams, and other similar devices or methods.

- **Mitigation Measure WR-1b:** The proposed project shall comply with the requirements for a Streambed Alteration Agreement for those portions of the project that would be completed along the banks of various surface waterbodies.

- **Mitigation Measure G-3:** Implement erosion control measures including hydroseeding or erosion control materials on areas that have been graded or disturbed. Additionally, maintain and repair drainage structures (e.g., culverts, drop inlets) on cut and fill slopes to minimize long term erosion. Licensed civil engineers shall develop properly designed stormwater runoff collection structures and finished contours for new stations, rail sidings, and earthwork to maximize long-term slope stability.

- **Mitigation Measure BR-1a:** Construction access, staging, storage, and parking areas shall be located on ruderal or developed lands to the extent possible. Vehicle travel adjacent to wetlands and riparian areas shall be limited to existing roads and designated access paths. Sensitive natural communities (i.e., wetlands, waters, riparian zones and oak woodlands) shall be conspicuously marked in the field to minimize impacts on these communities, and work activities shall be limited to outside the marked areas.

- **Mitigation Measure BR-2a:** Instream construction shall be confined to the dry or low-flow season. During in-stream construction, dewatered areas and temporary culverts shall be limited to the minimum area necessary. Pumps used for dewatering shall have agency-approved fish screens installed to minimize intake of fish into pumps. Diversion structures shall be left in place until all in-stream work is completed. Temporary culverts and all construction materials and debris shall be removed from the affected area prior to reestablishing flow and prior to the rainy season.

- **Mitigation Measure BR-2c:** Upon completion of the proposed project, all temporarily disturbed natural areas, including stream banks, shall be returned to original contours to the extent feasible. Affected wetlands, stream banks or stream channels shall be stabilized prior to the rainy season and/or prior to reestablishing flow. For wetland areas, the top six inches of native topsoil should be stockpiled and replaced following work. Wetland and riparian vegetation shall be reestablished as appropriate.

If dewatering is required during construction, discharge of collected groundwater with potentially significant amounts of sediment into nearby creeks or storm drains also could result in adverse effects on water quality. Implementation of the following mitigation measure from the 2005 Draft EIR would ensure that the Proposed Action would have no adverse effect on water quality relating to dewatering during construction:

- **Mitigation Measure G-1:** Implement erosion control BMPs such as settling basins, the covering of soil stockpiles, runoff diversions, silt fences, and dewatering sediment filtersocks. Site-specific measures shall be determined during pre-construction planning.

With implementation of the these mitigation measures from the 2005 Draft EIR in addition to implementation of standard environmental compliance measures already incorporated within the SMART construction protocols, no adverse effect would occur.

Depletion of Groundwater Resources

Construction of the Proposed Action would require only limited excavation, which would be done to a very shallow extent. Excavation activities would be likely to disturb only the first 12 inches of soil in a few select areas, with the remaining portions of the alignment being disturbed to an even lesser degree. Excavations would have the potential, however, to encounter shallow or perched groundwater, which may require dewatering. Any dewatering would be temporary and would not result in the depletion of groundwater resources because MMWD does not use groundwater for community drinking water supplies. If needed, dewatering would be most likely to occur during construction of the replacement trestles and may result in highly localized, short-term lowering of groundwater levels. Overall, construction of the Proposed Action is expected to take six to 12 months. After completing construction, dewatering would cease and groundwater levels would return to pre-construction levels. Therefore, because potential dewatering activities would be temporary, localized, and would not result in the depletion of groundwater resources, no adverse effect would occur from implementation of the Proposed Action.

Operation

Downstream Flooding as a Result of Altered Drainage Patterns or an Increase in Impervious Surfaces

According to guidelines established by FEMA, an increase in flood height in the floodway resulting from any encroachment in the floodway fringe areas may not exceed 12 inches, provided that hazardous velocities are not produced in the water body. Constructing bridges, levees, rail and road embankments, and buildings that encroach on floodplains may reduce the flood-carrying capacity and increase flood elevations. For the Proposed Action, the primary floodplain effects would occur at the San Rafael Creek and unnamed channel crossings where trestles would be replaced, as well as within the unnamed channel where an approximately 280-foot-long retaining wall would be placed. All of these areas are located within the 100-year flood zone.

Replacement of the two trestles would be done behind existing retaining features. Each crossing would be a single span, and thus no piers would be needed inside the streambed that could alter flows. In addition, existing mid-steam piers in San Rafael Creek would be cut at the stream's bottom level and the existing trestle would be removed. Removal of these existing features across San Rafael Creek potentially could serve to improve flood levels. The unnamed channel trestle would be constructed similarly without in-stream disturbance or the need for placement of new abutments within the streambed. Because the San Rafael Creek crossing is located immediately adjacent to Downtown San Rafael and the unnamed channel crossing also ultimately drains into San Rafael Creek and is surrounded by industrial and commercial uses, increases in water surface elevations could exacerbate existing flooding issues for the City of San Rafael and its residents.

The Proposed Action also includes the construction of a sheetpile retaining wall within the unnamed drainage channel by Irwin Street at Francisco Boulevard West. The retaining wall would be approximately 280 feet long and would be constructed approximately midway down the bank of the channel. Construction of a retaining wall in the channel would result in decreased capacity of the channel to convey stormwater and could result in localized flooding.

Hydraulic modeling has not been completed yet for the Proposed Action. Because it currently is not known whether the Proposed Action would substantially change the capacity of the channels to carry water or result in a rise in flood levels, an adverse effect could occur. Implementation of Mitigation Measure WR-2 from the 2005 Draft EIR would require for the replacement trestles and retaining wall to be designed and constructed so that they

would not raise flood levels, and for work in the floodplain to be avoided or minimized. Design would be based on site-specific hydrologic studies, conducted during the final design stage. This mitigation measure is as follows:

- **Mitigation Measure WR-2:** Design structures and other improvements on the site so as not to raise flood levels. Specific measures shall be based on site specific hydrologic studies conducted during the final design stage of the proposed project. Once these studies have been completed, specific elements can be designed to eliminate impacts. When feasible, construction within the floodplain shall be avoided or minimized. When construction within the floodplain is unavoidable, efforts will be made to restore the floodplain, as necessary, to restore flood capacity.

If the Proposed Action would result in any increase to 100-year water surface elevations, a Letter of Map Revision (LOMR) would be required. A LOMR would necessitate hydraulic modeling of the waterway to determine water surface elevation effects and creation of new regulatory floodplain maps. It also would include notification of affected property owners as to the degree of effects on their property. If an LOMR is anticipated by the Proposed Action, a Conditional Letter of Map Revision would need to be obtained from FEMA before beginning construction. After completing construction, a LOMR would need to be obtained from FEMA to finish the revision of the FIRM.

The planned Larkspur Station and parking area would not be located within the 100-year floodplain; however, they could result in an increase in impervious area and associated increase in stormwater runoff. The Proposed Action would include construction of several infiltration swales as well as a water quality and infiltration swale in proximity to the planned station and parking area. These stormwater management features would serve to capture runoff from impervious areas associated with the Proposed Action. The risk of a substantial increase in flooding caused by the change in impervious surfaces associated with the new station and parking lot would be minimal because the new station would be relatively small; the area of the planned station and parking area currently are primarily paved.

Based on the information above, any potentially adverse effect associated with flooding created as part of the Proposed Action would be effectively mitigated. No adverse effect would occur.

Water Quality Degradation Caused by Changes in the Intensity of Land Use and Increases in Impervious Surfaces

During operation, non-point source pollutants would be the primary contributors to potential water quality degradation. The proposed rail alignment would be compacted and the planned Larkspur Station and associated parking area would be either paved or concrete, and therefore sediment would be stabilized and erosion potential during operation would be minimal. Non-point source pollutants could be washed by rainwater from the planned Larkspur Station platform, the paved parking area, and rail alignment into local drainage networks. Potential non-point source pollutants could include oil, grease, fuel, chemicals, fertilizers, metals, and trash. However, the presence of non-point source pollutants associated with the Proposed Action would be minor because no maintenance and storage facilities would be associated with the Proposed Action, and no vehicle or train washing, fueling, or maintenance would occur in the Proposed Action area. However, non-point source pollutants in runoff that reached San Rafael Bay could result in an adverse effect.

Although the proposed rail alignment would be compacted and the planned Larkspur Station and parking lot would be paved or concrete, these areas currently are compacted and are mainly paved. Therefore, the Proposed Action would not substantially increase the amount of impermeable surface that would result in surface water runoff from storms. In addition, the Proposed Action would include construction of infiltration swales in the vicinity of the new station as well as a water quality and infiltration swale just west of the associated parking area. These swales would serve to detain stormwater runoff and improve water quality in accordance with RWQCB and MCSTOPPP standards, before it entered San Rafael Bay and San Francisco Bay.

As noted previously, Mitigation Measure WR-1a from the 2005 Draft EIR would include compliance with the NPDES permit process, including preparation and submittal of an SWPPP to the RWQCB. The SWPPP would contain a detailed mitigation plan for erosion and sediment control, including plans for implementing BMPs for the control of stormwater runoff, erosion, and sedimentation. Surface water runoff from the Proposed Action area would be dispersed in accordance with the measures required under an approved SWPPP. In addition, the 2005 Draft EIR includes Mitigation Measure G-3 to minimize long-term erosion from surface runoff.

- **Mitigation Measure G-3:** Implement erosion control measures including hydroseeding or erosion control materials on areas that have been graded or disturbed. Additionally, maintain and repair drainage structures (e.g. culverts, drop inlets, etc.) on cut and fill slopes to minimize long term erosion. Licensed civil engineers shall develop properly designed stormwater runoff collection structures and finished contours for new stations, rail sidings, and earthwork to maximize long-term slope stability.

Furthermore, in conjunction with MCSTOPPP, and as required by the City of San Rafael's General Plan 2020 Policy S-25 (RWQCB Requirements), implementation of recommended measures to reduce pollutants in stormwater discharges would be required to the maximum extent practicable. An overall mitigation plan for water quality effects is a condition of the MCSTOPPP NPDES permit. MCSTOPPP offers guidance for appropriate BMPs, using a manual developed by the San Francisco Bay RWQCB, and provides descriptions of BMPs for erosion and sediment control, pollution prevention, and long-term BMP maintenance. Compliance with these requirements already has been integrated within SMART's construction protocols, and this also would apply to the Proposed Action. In addition, the 2005 Draft EIR includes Mitigation Measure BR-15b to minimize water quality impacts due to herbicides during project operations.

- **Mitigation Measure BR-15b:** For all herbicide applications during right-of-way maintenance, herbicides shall be used only according to label directions, applications shall be confined to within the right-of-way and appropriate BMPs shall be followed to prevent uncontrolled release of chemicals. Only aquatic-approved herbicides shall be used for vegetation control adjacent to open water and wetland habitats.

Based on the information above, any potentially adverse effect associated with non-point source pollutants created as part of the Proposed Action would be effectively mitigated. No adverse effect would occur.

Depletion of Groundwater Resources

The Proposed Action would receive water service from MMWD and would not use groundwater for any purpose. In addition, groundwater in the Proposed Action area is not used as a drinking water source. The minimal increase in impervious area associated with the Proposed Action would not cause interference with groundwater recharge or result in any substantial lowering of the local groundwater table when compared to the overall San Rafael

Valley watershed. The Proposed Action would not result in the extended extraction of groundwater or interfere with groundwater recharge, and therefore it would not have a long-term adverse effect on groundwater supplies.

3.8.3 References

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3.9 LAND USE

This section describes the land use characteristics in the vicinity of the Proposed Action area and includes an assessment of the alternatives. Specific land use effects addressed include conflicts with existing uses (i.e., changes in the organization, interaction, or intensity of uses) and consistency with future plans for the Proposed Action area. Previous analysis for land use was undertaken for the entire SMART alignment as a part of the 2005 Draft EIR, prepared as per CEQA (SMART 2005). That analysis can be found in Section 3.11 of the 2005 Draft EIR.

3.9.1 Affected Environment

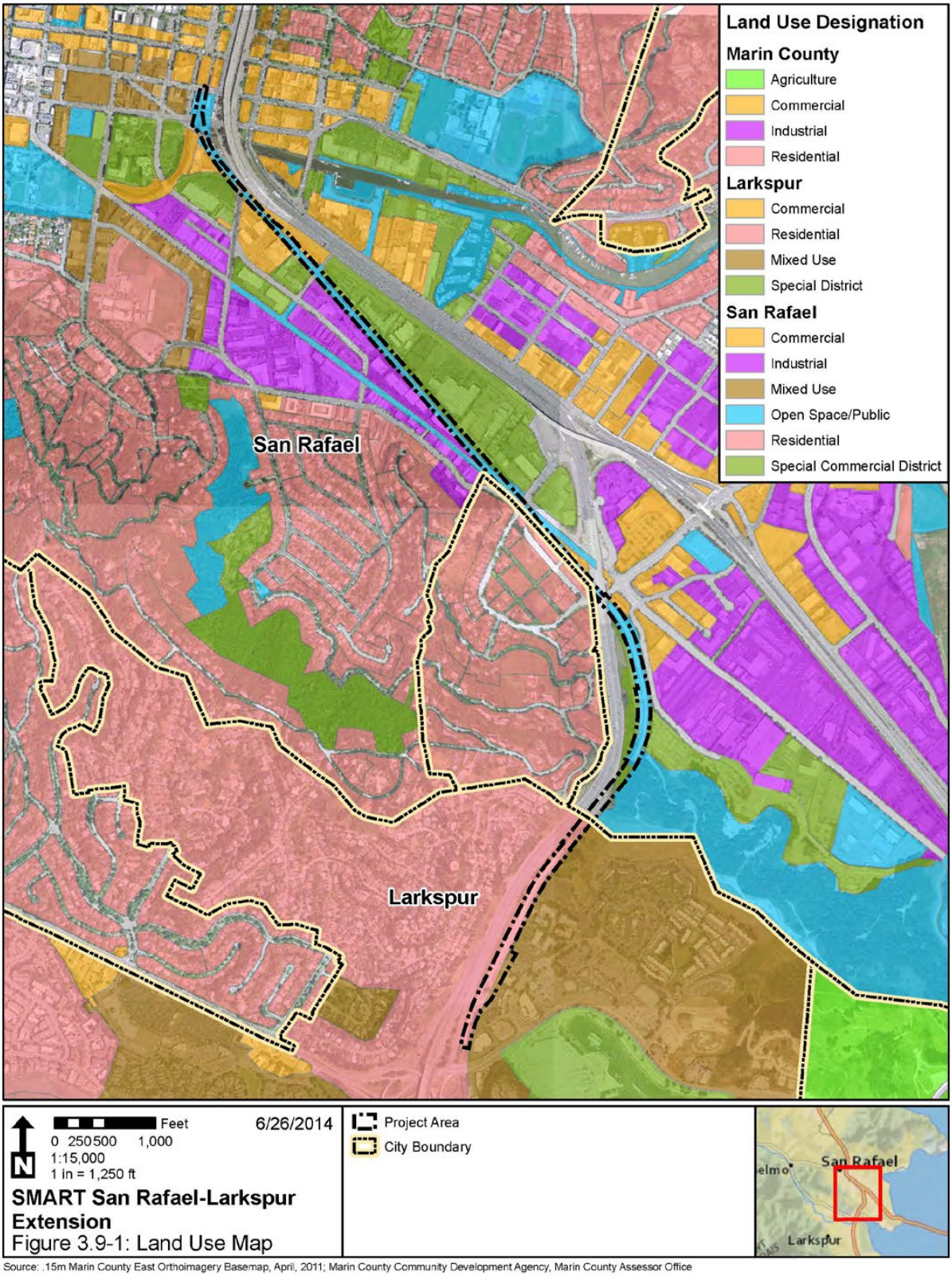
Existing and Adjacent Land Uses

The proposed rail alignment consists of the existing Northwestern Pacific (NWP) Railroad rail alignment, which has been acquired by SMART. The existing rail alignment proposed for use under the Proposed Action is still in place but has been non-operational for several decades. It has remained a designated rail right-of-way (ROW) for more than 120 years. The ROW remains intact and the majority of it is not occupied by other uses.

The northern terminus of the proposed rail alignment is immediately south of the Downtown San Rafael Station location and adjacent to the Bettini Transit Center. The Bettini Transit Center serves as a major transfer point for passengers using inter- and intra-regional bus services. Land uses adjacent to the Bettini Transit Center are mostly commercial.

The land uses adjacent to the proposed rail alignment between the northern and southern terminus are almost entirely made up of industrial and commercial uses. Figure 3.9-1 shows the existing City of San Rafael and City of Larkspur land use designations along the alignment. A concrete mixing plant, light manufacturing operations, automobile dealerships, storage lots, automotive-related industry, and lay-down yards make up the bulk of the adjacent land uses north of the Cal Park Hill Tunnel. Three single family residences are approximately 200 feet west of the ROW, along Woodland Avenue in the vicinity of a U.S. Highway 101 overpass. The RV Park of San Rafael is located adjacent to the ROW, just north of where the alignment crosses Andersen Drive. The RV park contains approximately 45 spaces and a mix of travel trailer and mobile home units that use the facility on a semi-permanent basis. The RV park is located in an area that has been designated as General Commercial in the City of San Rafael's General Plan and is zoned as part of the Francisco Boulevard West Commercial District (FBWC). The FBWC generally provides for uses such as multi-tenant shopping centers and large-scale commercial enterprises with a regional market base (San Rafael Municipal Code 14.05.020). The site's current use predates establishment of the FBWC, and therefore is a nonconforming use, based on the City's current zoning standards. Any expansion or modification of the use would require issuance of a Conditional Use Permit by the City.

As described above, the majority of the proposed rail alignment is not occupied by other uses. The exception to this is the use of 1,300 feet by automobile dealerships for auto storage, from approximately midway between Irwin Street and just beyond the Rice Drive crossing. This portion of the alignment is used by the dealerships via a temporary encroachment agreement with SMART.


Land Use Designation
Marin County
Agriculture
Commercial
Industrial
Residential
Larkspur
Commercial
Residential
Mixed Use
Special District
San Rafael
Commercial
Industrial
Mixed Use
Open Space/Public
Residential
Special Commercial District
San Rafael
Larkspur
Feet
0 250500 1,000
1:15,000
1 in = 1,250 ft
6/26/2014
Project Area
City Boundary
San Rafael
Larkspur
SMART San Rafael-Larkspur Extension
Figure 3.9-1: Land Use Map
Source: .15m Marin County East Orthoimagery Basemap, April, 2011; Marin County Community Development Agency, Marin County Assessor Office

The southern terminus of the proposed rail alignment is adjacent to the Century Theaters' Larkspur Landing movie theater. Other nearby uses include a business park and commercial entities on the other side of Larkspur Landing Circle, including Marin Country Mart, which contains a mix of commercial uses, including restaurants, retail, offices, and a health club. The Larkspur Ferry Terminal is approximately 1,700 feet from the southern terminus of the proposed rail alignment, across Larkspur Landing Circle and Sir Francis Drake Boulevard.

Zoned Land Uses

The proposed rail alignment within the City of San Rafael is zoned Public/Quasi-Public (P/QP), and the dominant zoning districts on either side of the corridor are General Commercial (GC), Industrial (I), and the aforementioned FBWC. The alignment within the City of Larkspur is zoned Residential First (R-1) and Planned Development (PD), with the same dominant zoning districts on either side of the alignment.

Relevant City of San Rafael Plans

San Rafael General Plan

The City of San Rafael adopted the San Rafael General Plan 2020 in 2004, with subsequent minor amendments. The Circulation Element of the General Plan includes the following policies that are relevant to the Proposed Action: 1) call for a viable commuter rail service through San Rafael operating on the SMART ROW; 2) encourage efforts to connect railroad with ferry service bound for San Francisco; 3) establish a rail station in Downtown San Rafael to serve as a multi-modal commuter transit hub; and 4) encourage high-density, transit-oriented development in the vicinity of the San Rafael rail stations (City of San Rafael 2013).

Downtown San Rafael SMART Station Area Plan

The City's Downtown SMART Station Area Plan builds on previous City initiatives to create a more vibrant, mixed-use, livable area, supported by a mix of transit opportunities, including passenger rail service. The plan sets out a community-supported long-term strategy for the Downtown San Rafael station area and includes short, medium, and long-term implementation concepts that take into account community input. The San Rafael community has considered and provided input on the safest way for buses, pedestrians, bicyclists, and automobile drivers to travel to and from residential and commercial areas, the best ways to access the SMART station and nearby services, the most appropriate crossing improvements, design guidelines to maximize amenities and passenger rail ridership potential, and strategies to sustain and improve economic vitality.

Relevant City of Larkspur Plans

Larkspur General Plan

The City of Larkspur adopted the City of Larkspur General Plan 1990–2010 in 1990. A General Plan update was initiated in June 2010 and currently is underway. The General Plan Circulation Element calls for the implementation of passenger rail service on the NWP Railroad ROW, terminating near the Larkspur Ferry Terminal (City of Larkspur 1990).

Larkspur SMART Station Area Plan

The City of Larkspur initiated the SMART Station Area Plan process in 2011, and released a public review draft in March 2014. Although the plan currently is in draft form and has not been adopted yet, a brief discussion is included here for informational purposes. The plan is intended as a long-range vision, taking into account community input, and it examines opportunity sites for potential land use and necessary regulatory changes in the area surrounding the planned SMART station. The plan also considers the planned Larkspur Station and presents an integrated land use and transportation strategy that would encourage mixed-use, transit-oriented development (City of Larkspur 2014).

3.9.2 Environmental Consequences

Land use effects are related to their level of consistency with federal plans and policies and local land use plans (e.g., general plans, zoning ordinances, master plans, and other specific land use policies). An adverse effect would occur if proposed land uses would not be consistent with relevant federal and local plans and policies. As noted above, no federal or FTA land use regulations would be directly applicable to development of the Proposed Action.

Alternative 1: No Action Alternative

Under the No Action Alternative, the FTA would take no action and would provide no funding to SMART for the Downtown San Rafael to Larkspur Extension project. The project would not be constructed, and none of the effects associated with the Proposed Action would occur. No construction or operation activities would occur, and the project corridor would remain in its current state.

Alternative 2: SMART Downtown San Rafael to Larkspur Extension (Proposed Action)

Construction

Construction of the Proposed Action would not conflict with established uses, land use goals or plans, or be incompatible with adjacent and planned uses. The ROW is an established rail ROW that has been in place for more than 120 years. All construction activities, to the extent practicable, would take place within the existing ROW, and would not require the use of lands adjacent to the proposed rail alignment. All access for construction work would be from within the ROW, and access to adjacent land uses would not be impeded.

The 1,300-foot portion of the proposed rail alignment between Irwin Street and Rice Drive, currently used by automobile dealerships, would be vacated on the start of construction of the Proposed Action. The dealerships are aware of the temporary nature of their encroachment agreement and that use of the ROW would terminate on construction of the Proposed Action. Therefore, no effect would occur related to existing temporary uses of the ROW.

The majority of land uses adjacent to the proposed rail alignment are almost entirely made up of industrial and commercial uses, and therefore generally they are occupied only during normal business hours. The several residences along Woodland Avenue and the RV Park of San Rafael are located near or adjacent to the ROW where construction would occur. Construction activities would incorporate avoidance and minimization measures to reduce any potential effects on these adjacent land uses during the construction period (i.e., measures to reduce

noise and air quality effects on adjacent uses). Construction activities would be short-term and would not result in adverse effects on land use. Access to these private properties would not be impeded during construction.

Operation

The Proposed Action would not conflict with the City of San Rafael or City of Larkspur land use goals and policies. As described under Section 3.9.1, Affected Environment, the San Rafael and Larkspur General Plans call for the use of the existing NWP Railroad alignment for passenger rail service. The station area plans for both cities also account for passenger rail service along the alignment and include a long-range vision to create land uses that would support mixed-use and transit-oriented development. Therefore, the Proposed Action would facilitate implementation of these goals and policies, and would not conflict with the land use goals of either jurisdiction. No zoning changes would be required as part of the Proposed Action.

Operation of the passenger rail service between Downtown San Rafael and Larkspur would occur within the existing ROW, which has been acquired by SMART. No additional ROW would be required to accommodate the proposed rail alignment. Although rail service on the old NPW tracks has been dormant, the Proposed Action would reintroduce rail service within this existing transportation alignment. Operation of passenger rail service is an allowed use within the ROW and would not conflict with or result in incompatibility of physical development to adjacent uses. The uses adjacent to the ROW are almost entirely industrial and commercial land uses, which are not sensitive land uses. Furthermore, the back of the buildings or parking lots associated with these industrial and commercial land uses face the ROW and would not be conflicting or incompatible uses with passenger rail service. Adjacent land uses would not be altered as a result of the Proposed Action, nor would access to these uses be impeded as a result of the transit service. Pedestrian and vehicular at-grade crossings would remain, with the exception of two crossings that would be eliminated with the “flip” of West Francisco Boulevard between Second Street and Rice Drive for operational and safety reasons. The elimination of these crossings would result in an improved condition over existing conditions with respect to traffic and safety. The at-grade crossings would be controlled by bells, flashing beacons, and gates to prevent conflicting movements and allow safe access to and from adjacent uses. The proposed rail alignment is not proximate to public gathering, recreation, or education venues. No adverse effect on land use would occur.

Acquisitions and Displacements

No property displacements or relocations would be required as part of the Proposed Action. The ROW is owned and controlled by SMART, and no additional ROW acquisition would be required. A small easement near the Century Park Theater in Larkspur would be required to accommodate the proposed stairway from the station to street level (see Figure 2-3, photo 20). This area would measure approximately 20 feet in length and 10 feet in width, and would not displace any existing uses. The acquisition could be obtained via full purchase by SMART or by the granting of an easement by the property owner.

Some encroachment onto the ROW owned and controlled by SMART has occurred over the years. In most cases, this encroachment has been negotiated with and authorized by SMART as a temporary use. This is the case with the automobile dealership storage lots that use portions of the ROW near West Francisco Boulevard. The dealerships occupy the ROW via a temporary encroachment agreement with SMART, and they are aware that their use of the ROW is temporary and would terminate on construction of the Proposed Action.

3.9.3 References

City of San Rafael. 2013. *General Plan Circulation Element*.

City of Larkspur. 1990. *General Plan Circulation Element*.

———. 2014. *Draft SMART Station Area Plan*. Available: http://www.ci.larkspur.ca.us/index.aspx?NID=551. Accessed: June 13, 2014.

Sonoma-Marin Area Rail Transit (SMART). 2005. *SMART Draft Environmental Impact Report*. Website: http://www2.sonomamarintrain.org/index.php/docs/eir/. Accessed October 6, 2014.

3.10 NOISE AND VIBRATION

This section describes the analyses performed to assess noise and vibration effects from the Proposed Action and alternative on properties (i.e., "receivers") near the proposed rail alignment. The purpose of the analyses is to determine whether any receivers near the alignment would be affected by noise or vibration from the Proposed Action, in accordance with Federal Transit Administration (FTA) guidelines.

The FTA's Transit Noise and Vibration guidance manual (FTA 2006) provides guidelines for establishing the extent of the study area to be used for the noise and vibration effects analyses. It also provides guidance for identifying noise sensitive locations where increased annoyance can occur from passing train. Also, this section presents acoustical fundamentals and terminology relevant to the alternatives under consideration; a summary of the existing (ambient) acoustical conditions in the Proposed Action area; the regulatory framework applicable to the Proposed Action and those affected by implementation of the Proposed Action; methodologies used to assess existing noise exposure (measurements and modeling), potential future, Proposed Action-related, noise exposure effects; and mitigation measures that would be implemented to reduce or abate any adverse effects.

The analyses were based on noise levels in A-weighted decibels (dBA) and on vibration levels in vibration decibels (VdB). The analysis of noise and vibration effects used design information for the proposed rail alignment and regional rail and traffic data. Previous analysis for noise and vibration was undertaken for the overall SMART project as part of the 2005 Draft EIR (SMART 2005), prepared as per CEQA. That analysis can be found in Sections 3.7 of the 2005 Draft EIR.

3.10.1 Regulatory Overview

Noise

Noise Descriptors and Effects

The descriptors and criteria for assessing noise effects from rail transit projects vary according to land use categories adjacent to the track. Noise- sensitive land uses are described below. The metrics most commonly used to express noise levels are the hourly equivalent sound level (L_{eq}[h]) and the day-night average sound level (L_{dn}). For land uses where people live and sleep (e.g., residential neighborhoods, hospitals, and hotels), L_{dn} is the assessment parameter. L_{dn} is the day-night average level, which is the energy averaged sound level for a continuous 24-hour period with 10 dBA added to all levels occurring between 10 p.m. and 7 a.m. (to account for the added sensitivity to sounds during normal sleeping hours). For other land-use types where there are noise sensitive uses (e.g., outdoor concert areas, schools, and libraries), the equivalent (energy-averaged) noise level for an hour of noise sensitivity (L_{eq}[h]) that coincides with train activity is the assessment parameter. The L_{eq}(h) measure describes the average cumulative exposure experienced at a location from all noise producing events over a 1-hour period.

The U.S. Environmental Protection Agency (EPA) Office of Noise Abatement and Control originally was established to coordinate federal noise control activities. After inception, EPA's Office of Noise Abatement and Control issued the Federal Noise Control Act of 1972, establishing programs and guidelines to identify and address the effects of noise on public health and welfare, and the environment. To prevent hearing loss over the lifetime of a receptor, the

yearly average L_{eq} should not exceed 70 dBA, and the L_{dn} should not exceed 55 dBA in outdoor activity areas or 45 dBA indoors to prevent interference and annoyance.

FTA Noise Criteria

The FTA defines three levels of noise assessment (FTA 2006):

1) The **Screening Procedure** is used to determine whether any noise-sensitive receivers are within a distance where impact is likely to occur. The distance given in the table defines the study area of any subsequent noise impact assessment. Where there is potential for noise impact, the procedures of General Assessment and Detailed Assessment will be used to determine the extent and severity of impact. In some cases, a General Assessment may be all that is needed. On the other hand, if the proposed project is in close proximity to noise-sensitive land uses and it appears at the outset that the impact would be substantial, it is prudent to conduct a Detailed Analysis.

2) The **General Assessment** is used for a wide range of projects which show potential noise impact from the screening procedure. For a variety of smaller transit projects, a General Assessment may be all that is needed to evaluate noise impact and propose mitigation measures where necessary. It is also used to compare alternatives, such as locations of facilities or alignments, or even candidate transportation modes in a corridor. Estimates are made of project noise levels and of existing noise conditions to estimate the location of a noise impact contour which defines the outer limit of an impact corridor or area.

3) **Detailed Analysis** is undertaken when the greatest accuracy is needed to assess impacts and the effectiveness of mitigation measures on a site-specific basis. In order to do this, the project must be defined to the extent that location, alignment, mode and operating characteristics are determined. The results of the Detailed Analysis would be used in predicting the effectiveness of noise mitigation measures on particular noise-sensitive receivers.

The FTA criteria group noise-sensitive land uses are divided into the following categories:

- **Category 1:** Buildings or parks where quiet is an essential element of their purpose.
- **Category 2:** Residences and buildings where people normally sleep. This category includes residences, hospitals, and hotels where nighttime sensitivity is assumed to be of utmost importance.
- **Category 3:** Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, churches, active parks, and medical offices.

L_{dn} is used to characterize noise exposure for residential areas (Category 2). For other noise-sensitive land uses, such as outdoor amphitheaters and school buildings (Categories 1 and 3), the maximum 1-hour L_{eq} during a facility's operating period is used.

There are two levels of impact included in the criteria, as follows:

- **Moderate Impact:** In this range of noise impact, other project-specific factors must be considered to determine the magnitude of the impact and the need for mitigation. These other factors can include the predicted increase over existing noise levels, the types and number of noise-sensitive land uses affected,

existing outdoor-indoor sound insulation, and the cost effectiveness of mitigating noise to more acceptable levels.

- **Severe Impact:** Severe noise impacts are considered "adverse" as this term is used in NEPA and implementing regulations. Noise mitigation normally would be specified for severely affected areas unless no practical method of mitigating the noise exists.

In addition, the FTA guidance manual does not include any noise limits that are specifically applicable to stationary ancillary equipment. Commonly applied limits for this type of noise in residential areas is 10 dBA more than the minimum hourly L_{90} (the sound level exceeded 90 percent of the time) or a maximum of 45 dBA at any residence, whichever is more stringent.

The FTA offers the following guidance in determining which noise impact threshold to apply in specific project circumstances:

- **Moderate Impact**: Predicted noise levels in the "... moderate impact range will also require consideration and adoption of mitigation measures when it is considered reasonable. The range of Moderate Impact delineates an area where project planners are alerted to the potential for adverse impacts and complaints from the community and must then carefully consider project specifics as well as details concerning the affected properties in determining the need for mitigation." Factors that may be considered when deciding whether to mitigate moderate impacts can include the predicted increase over existing noise levels, the type and number of noise-sensitive land uses affected, existing outdoor indoor sound insulation, and the cost effectiveness of mitigating noise to more acceptable levels.
- **Severe Impact**: "Impacts in this range have the greatest adverse impact on the community; thus there is a presumption by FTA that mitigation will be incorporated in the project unless there are truly extenuating circumstances which prevent it."

The FTA notes that no standardized criteria have been developed for assessing construction noise impacts. However, as part of its General Assessment procedure for addressing construction noise, it recommends that the potential for impact be evaluated by estimating the combined noise level from the two noisiest pieces of equipment likely to operate at the same time.

For the Proposed Action, adverse effects would occur at nearby residential receptors, for example, where the noise level exceeded 90 dBA during the day and 80 dBA at night. Controls including construction planning, scheduling, and equipment then would be implemented to reduce construction noise intrusions to these receptors to the maximum feasible extent.

City of San Rafael General Plan

The City of San Rafael General Plan's (City of San Rafael 2004) Noise Element contains the following policies with respect to noise that would be applicable to the Proposed Action:

> **N-4. Noise from New Nonresidential Development.** Design nonresidential development to minimize noise impacts on neighboring uses.

a) **Performance Standards for Uses Affecting Residential Districts.** New nonresidential development shall not increase noise levels in a residential district by more than L_{dn} 3 dB, or create noise impacts that would increase noise levels to more than L_{dn} 60 dB at the property line of the noise receiving use, whichever is the more restrictive standard.

b) **Performance Standards for Uses Affecting Nonresidential and Mixed Use Districts.** New nonresidential projects shall not increase noise levels in a nonresidential or mixed-use district by more than L_{dn} 5 dB, or create noise impacts that would increase noise levels to more than L_{dn} 65 dB (Office, Retail) or L_{dn} 70 dB (Industrial), at the property line of the noise receiving use, whichever is the more restrictive standard.

c) **Waiver.** These standards may be waived if, as determined by an acoustical study, there are mitigating circumstances (such as higher existing noise levels), and no uses would be adversely affected.

N-4a. Require Acoustical Study. Identify through an acoustical study noise mitigation measures to be designed and built into new nonresidential and mixed-use development, age absorptive types of mitigation measures between noise sources and residential districts.

N-5. Traffic Noise from New Development. Minimize noise impacts of increased off-site traffic caused by new development. Where the exterior L_{dn} is 65 dB or greater at a residential building or outdoor use area and a plan, program, or project increases traffic noise levels by more than L_{dn} 3 dB, reasonable noise mitigation measures shall be included in the plan, program or project.

N-5a. Traffic Noise Studies. Require acoustical studies to evaluate potential off-site noise impacts resulting from traffic generated by new development.

N-6c. Coordination with Local and State Agencies. Coordinate with Caltrans, Marin Countywide Planning Agency, Congestion Management Agency and other agencies to achieve noise reduction along Pt. San Pedro Road Highways 101 and 580, and the Sonoma Marin Area Rail Transit corridor.

N-8. Sonoma-Marin Area Rail Transit. If a commuter rail service or other use is developed along the Sonoma Marin Area Rail Transit right-of-way, minimize noise impacts on existing development.

N-8a. Future Transitway Mitigation Measures. A detailed noise assessment and appropriate mitigation measures should be prepared for any rail project on the Sonoma Marin Area Rail Transit right-of-way. The analysis should address the City's noise standards and the Federal Transit Administration's (FTA) guidelines.

N-10b. Mitigation for Construction Activity Noise. Through environmental review, minimize the exposure of neighboring properties to excessive noise levels from construction-related activity.

City of Larkspur General Plan

The Health and Safety Element of the Larkspur General Plan (City of Larkspur 1990) requires that projects in the city be evaluated for their potential to create noise impacts. However, the General Plan does not contain quantitative standards for judging how much of an increase in noise would be deemed significant. According to the EPA, a change in noise level of at least 5 dB is required before any noticeable change in community response

would be expected. For the purposes of this EA, an ambient noise level increase of 5 dBA or more would be considered a substantial increase or adverse effect.

City of San Rafael Noise Ordinance

The City of San Rafael Noise Ordinance (City Code Chapter 8.13) provides a listing of noise limits associated with specific activities. The ordinance also provides an exception to the prescribed limits during temporary construction activities (Chapter 8.13.050), whereby noise in excess of the City's standards may be allowed if they are limited to the following time periods:

- Monday through Friday (excluding legal holidays), 7 a.m. to 6 p.m.
- Saturday 9 a.m. to 6 p.m.
- Sunday and holidays, prohibited

City of Larkspur Noise Ordinance

The City of Larkspur Noise Ordinance (City Code Chapter 9.54) provides a listing of noise limits associated with specific activities. The ordinance also provides an exception to the prescribed limits during temporary construction activities (Chapter 9.54.060), whereby noise in excess of the City's standards may be allowed if they are limited to the following time periods:

- Monday through Friday (excluding legal holidays), 7 a.m. to 6 p.m.
- Saturday, Sunday, and legal holidays 9 a.m. to 5 p.m.

Vibration

FTA Vibration Criteria

The FTA defines three levels of vibration assessment (FTA 2006):

1) Screening: Generalized distances of potential impacts are used to quickly determine whether there is any potential for an impact.

2) General Assessment: The FTA provides a general curve of vibration level vs. distance that is used to estimate the vibration levels. The curve was developed by plotting measured vibration levels from a number of different rail transit systems against distance from the tracks and drawing a line through the top range of the data. The curve is intended to give a conservative (high) estimate of potential vibration impacts. Adjustments are made to the general curve to account for factors such as speed and special trackwork.

3) Detailed Assessment: The FTA recommends use of an impact test for measuring how vibration is transmitted from the light-rail tracks through the ground and then predicting rail generated groundborne vibration (FTA 2006). The procedure basically consists of dropping a weight onto the ground and measuring the vibration waves that are created at several distances from the impact.

The FTA criteria for general vibration assessments are based on land use type and train pass-by frequency, as shown in Table 3.10-1. These general assessment criteria are used first to identify potential vibration impacts. If vibration levels exceed the general assessment criteria, then more detailed assessment criteria based on the frequency spectrum of the predicted vibrations are applied to determine if vibration mitigation would be required at potentially affected receptors. If part of the predicted vibration spectrum exceeds the detailed assessment values defined by the FTA for each frequency component, vibration mitigation is required.

Table 3.10-1: FTA Ground-Borne Vibration Impact Criteria for General Assessment

Land Use Category	GBV Impact Levels (VdB)		
	Frequent Events [a]	Occasional Events [b]	Infrequent Events [c]
Category 1: Buildings where vibration would interfere with interior operations	65[d]	65[d]	65[d]
Category 2: Residences and buildings where people normally sleep	72	75	80
Category 3: Institutional land uses with primarily daytime uses	75	78	83

Notes:
a. "Frequent Events" is defined as more than 70 vibration events of the same source per day.
b. "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day.
c. "Infrequent Events" is defined as fewer than 30 vibration events of the same source per day.
d. This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels.
Source: FTA 2006

3.10.2 Affected Environment

Noise

The primary sources of noise in the Proposed Action area include traffic on major roadways and industrial and commercial activities. The proposed rail alignment lies roughly parallel to the western side of US 101 until it crosses under the freeway near Woodland Avenue/Bellam Boulevard. It then continues along the east side of the freeway before entering the Cal Park Hill Tunnel, after which it continues immediately alongside US 101 until reaching the planned Larkspur Station site.

For purposes of this analysis, the Proposed Action alignment can generally be divided into two section: 1) that portion of the alignment lying north of the Cal Park Hill Tunnel in the City of Larkspur; and 2) that portion of the alignment south of the Cal Park Hill Tunnel in the City of Larkspur. The land uses in the San Rafael portion of the proposed rail alignment north of the Cal Park Hill Tunnel are almost entirely made up of industrial and commercial uses. A concrete mixing plant, light manufacturing operations, automobile dealerships, storage lots, automotive-related industry, and laydown yards make up the bulk of the adjacent land uses north of the tunnel. Several single-family residences are approximately 200 feet west of the alignment along Woodland Avenue, in the vicinity of the US 101 overpass. The RV Park of San Rafael is located adjacent to the alignment, just north of where the alignment crosses Andersen Drive. The RV park contains approximately 45 spaces and a mix of travel trailer and mobile home units that use the facility on a semi-permanent basis. The RV park is located in an area that has been designated as General Commercial in the City of San Rafael's General Plan and is zoned as part of the Francisco Boulevard West Commercial District.

The existing Cal Park Hill pathway lies immediately adjacent to the Proposed Action alignment from Andersen Drive south to Larkspur. The pathway is an active transportation facility, and is not a sensitive land use as defined in the FTA criteria (FTA 2006).

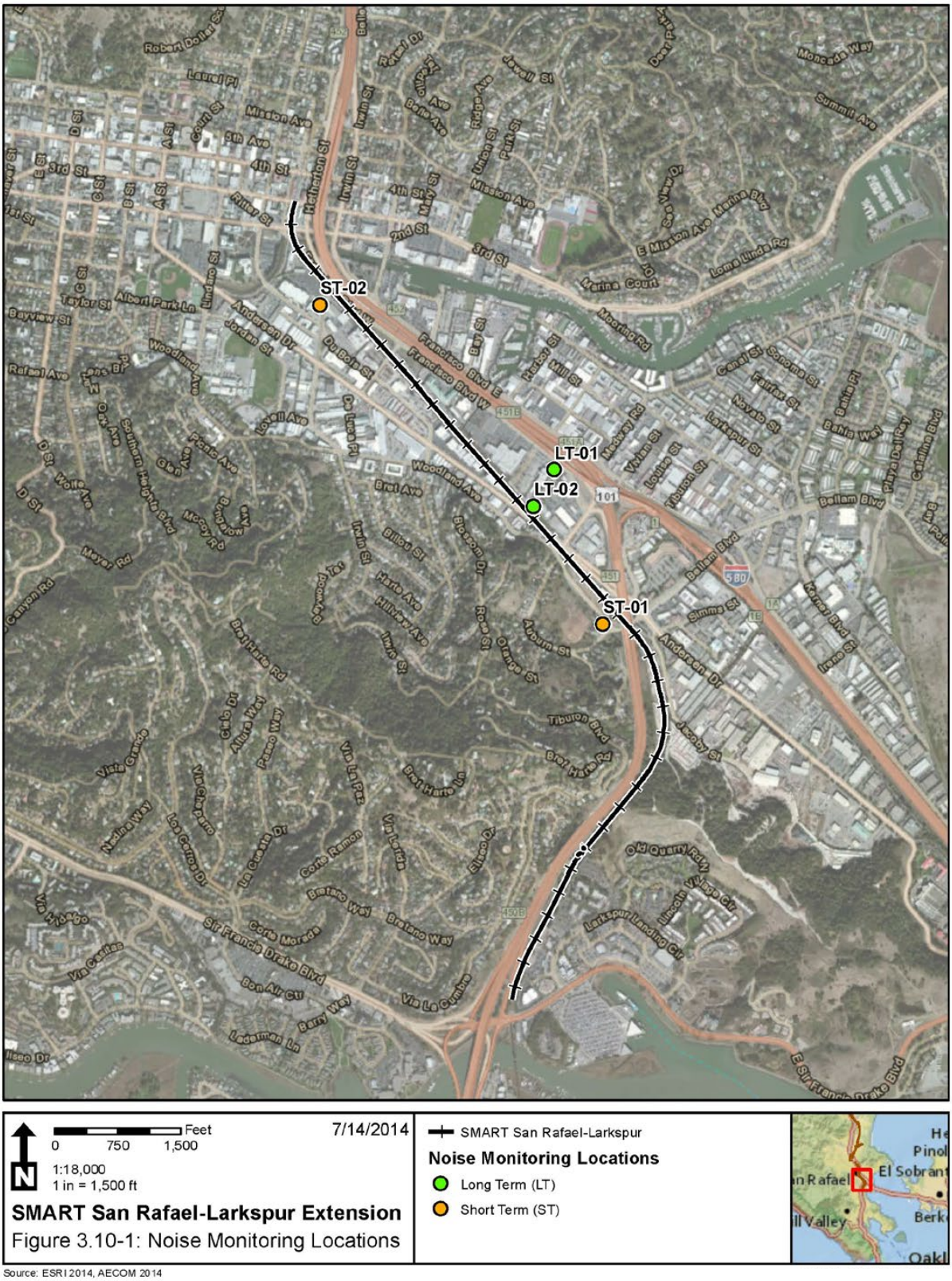
South of the Cal Park Hill Tunnel within the City of Larkspur, the proposed rail alignment is depressed beneath the surrounding terrain by 15 to 60 feet for the first approximately 700 feet after emerging from the tunnel. Land uses consist of US 101, parallel to and directly west of the alignment. US 101 is elevated above the alignment by as much as 40 feet along the Proposed Action alignment south of the Cal Park Hill Tunnel, all the way from the tunnel's southern portal to the planned Larkspur Station site. The Larkspur Landing complex is east of the alignment. The complex has commercial and office uses. A large residential apartment complex also is located in this area, northwest of Larkspur Landing Circle, and this apartment complex constitutes the closest sensitive receptors to the proposed rail alignment. Within this complex, the closest apartment units are approximately 600 feet east of the alignment, and they are separated from the alignment by a low ridge that emanates from Cal Park Hill. FTA's assessment criteria dictates that only sensitive receiver sites located within 375 feet of the centerline of a proposed rail alignment would require evaluation for possible noise effects, and sensitive receptor sites located within 1,200 feet of the centerline of a proposed rail alignment where a train's horn is used would require evaluation for possible noise effects. The apartment complex exceeds this distance by approximately 250 feet. Therefore, no sensitive noise receptors meeting the FTA criteria are located along the Proposed Action alignment south of the Cal Park Hill Tunnel.

Existing Noise Levels

Ambient Noise Survey

The proposed rail alignment includes limited noise-sensitive Category 2 uses, as defined above, within the City of San Rafael north of the Cal Park Hill Tunnel. Existing noise-sensitive uses along the Proposed Action alignment north of the Cal Park Hill Tunnel in the City of San Rafael consist of the RV Park of San Rafael, adjacent to the alignment just north of the Andersen Drive crossing, and several single-family residences on Woodland Avenue near the location where the alignment passes under US 101. No sensitive receptors are located along the City of Larkspur segment of the Proposed Action alignment south of the Cal Park Hill Tunnel.

Based on the FTA's assessment criteria, all noise-sensitive receptors located within 375 feet of the proposed rail alignment were evaluated for potential train noise effects, and receivers located within 1,200 feet were evaluated for potential train horn noise effects. Ambient noise level measurement surveys were conducted along the alignment on June 13 and 14, 2014, to determine the existing noise environment at noise sensitive uses along the alignment. Measurements were made at four noise sensitive locations along the alignment. These receivers were selected because they could be affected by both train movement and horn noise. Twenty-four-hour noise level measurements were completed at two locations, as shown in Figure 3.10-1. Site 1 was located at the entrance area of the RV Park of San Rafael, approximately 570 feet east of the alignment and 130 feet from US 101/Interstate 580. This location provided the best opportunity to record existing freeway noise levels affecting the RV park residences. Site 2 was located at the west end of the RV park, approximately 100 feet east of the edge of the existing rail track and approximately 600 feet from the freeway. This location was used for an overall assessment


ST-02
LT-01
LT-02
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0 750 1,500
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SMART San Rafael-Larkspur Extension
Figure 3.10-1: Noise Monitoring Locations
SMART San Rafael-Larkspur
Noise Monitoring Locations
Long Term (LT)
Short Term (ST)
Source: ESRI 2014, AECOM 2014

of existing noise exposure at the quietest areas of the RV park, and it provided the best opportunity to record existing ambient noise level data close to the at-grade intersection of the alignment with Anderson Drive. This at-grade intersection is the only crossing along the alignment that has adjacent residences.

Short term (1-hour) noise measurements were conducted at two other noise sensitive locations along the proposed rail alignment, as shown in Figure 3.10-1. These measurements were conducted at the single-family residences along Woodland Avenue (Site 3), and at an outside seating area of a Subway Restaurant on the southwest corner of the Irwin Street/West Francisco Boulevard intersection (Site 4). Measured hourly noise level data is summarized in Table 3.10-2.

As shown in the table, the lowest noise levels occurred at sites that do not have direct exposure to US 101, while the highest noise levels were at sites directly exposed to US 101. The ambient noise level measured at the western end of the RV park near the Anderson Drive crossing was 59 dBA, and the noise level at the eastern end of the RV park, adjacent and directly exposed to US 101, was 67 dBA. The ambient noise level at the residential uses along Woodland Avenue was 63 dBA. Furthermore, the ambient noise level at the outside seating area of the Subway restaurant on the corner of Irwin Street and West Francisco Boulevard was 65 dBA.

Roadway Traffic Noise

Vehicular traffic is the dominant noise source in the Proposed Action area. Roadways in the Proposed Action area include US 101, Woodland Avenue, Anderson Street, West Francisco Boulevard, and Irwin Street. According to the City of San Rafael's General Plan, US 101 is and will continue to be the predominant source of noise in the Proposed Action area. According to the City's 2001 Noise Contours for the Proposed Action area, the 24-hour average noise level (DNL) along US 101 was measured at between 60 to 80 DNL in 2001. The City's General Plan indicates that future development noise levels along US 101 will be approximately 85 DNL at 100 feet when the City reaches full development.

The Federal Highway Administration (FHWA) Traffic Noise Prediction Model (FHWA RD 77-108) was used to model existing traffic noise levels along local roadways that would be affected, based on daily volumes and their distribution, from the traffic analysis prepared for the Proposed Action (see Section 3.13 of this EA). Table 3.10-3 summarizes existing traffic noise levels and contour distances for the roadways segments studied under the traffic analysis for the Proposed Action.

As shown in the table, existing traffic noise levels along all studied roadway segments currently exceeds EPA's threshold of 55 dB L_{dn}., and the local ordinance (N-4a: Performance Standards for Uses Affecting Residential Districts) threshold of 60 dB L_{dn} limit for residential uses, at 50 feet. However, no noise sensitive uses are located within 50 feet of the studied roadway segments.

Vibration

Existing Vibration Levels

The potential sensitive receivers for vibration from the Proposed Action essentially mirror those for noise and include the several Category 2 properties along the proposed rail alignment. Of these, only residential properties within approximately 50 feet of the alignment would have the potential to be affected by Proposed Action-related vibration.

Table 3.10-2: Summary of Proposed Action Area Ambient Noise Level Measurement Results (L_{eq}/L_{max}, in dBA)

Time	Site 1 (LT-01)[1]	Site 2 (LT-02)[1]	Site 3 (ST-01)[2]	Site 4 (ST-02)[2]
13:00-14:00	64/76	56/73	63/79	
14:00-15:00	64/71	60/80		65/85
15:00-16:00	64/79	57/77		
16:00-17:00	63/76	58/81		
17:00-18:00	63/71	56/76		
18:00-19:00	64/92	56/73		
19:00-20:00	61/73	55/69		
20:00-21:00	62/72	56/82		
21:00-22:00	62/71	53/64		
22:00-23:00	60/71	51/68		
23:00-24:00	58/70	49/61		
0:00-1:00	56/68	47/65		
1:00-2:00	56/71	46/61		
2:00-3:00	55/70	45/59		
3:00-4:00	58/82	44/62		
4:00-5:00	60/78	47/59		
5:00:6:00	61/73	55/67		
6:00-7:00	62/80	52/69		
7:00-8:00	63/78	55/68		
8:00-9:00	65/76	57/72		
9:00-10:00	65/77	55/70		
10:00-11:00	65/76	56/68		
11:00-12:00	63/75	56/71		
Peak Hour L_{eq}	62	55	63	65
L_{dn}	67	59	66	
Distance from US 101 Freeway	130 feet	600 Feet	200 Feet	250 Feet
Distance from proposed rail alignment	570 feet	100 Feet	200 Feet	200 Feet

Notes:

1. 24-hour noise measurement

2. 1-hour noise measurement

dB = decibel; L_{eq} = equivalent sound level; L_{max} = maximum sound level; L_{dn} = day-night average level; LT = long term (24-hour measurement); ST = short term (1-hour measurement); ROW = right-of-way

Source: AECOM 2014

Table 3.10-3: Summary of Existing Traffic Noise Levels and Contour Distances

Roadway	Segment	Existing No Project	Existing No Project	Existing No Project	Existing No Project
			Contours	Contours	Contours
		Noise Level, L_{dn} at 50 ft	70 dB	65 dB	60 dB
Lincoln Avenue	From Third Street to Fourth Street	60.3	11	24	52
Lincoln Avenue	From Third Street to Second Street	59.7	10	22	48
Third Street	From Lincoln Avenue to Francisco Boulevard West	65.4	25	53	115
Third Street	From Lincoln Avenue to Cijos Street	65.4	25	53	114
Lincoln Avenue	From Second Street to Third Street	59.7	10	22	48
Lincoln Avenue	From Second Street to Irwin Street	58.5	9	18	40
Second Street	From Lincoln Avenue to Francisco Boulevard West	65.5	25	54	117
Second Street	From Lincoln Avenue to Lindaro Street	65.1	24	51	110
Francisco Boulevard West	From Third Street to Fourth Street	56.5	6	14	29
Francisco Boulevard West	From Third Street to Second Street	59.7	10	22	48
Third Street	From Francisco Boulevard West to Hetherton Street	66.1	27	59	127
Third Street	From Francisco Boulevard West to Lincoln Avenue	65.4	25	53	115
Francisco Boulevard West	From Second Street to Third Street	59.7	10	22	48
Francisco Boulevard West	From Second Street to Irwin Street	60.9	12	27	57
Second Street	From Francisco Boulevard West to Hetherton Street	66.2	28	60	129
Second Street	From Francisco Boulevard West to Lincoln Avenue	65.5	25	54	117
Hetherton Street	From Third Street to Fourth Street	62.9	17	36	78

Roadway	Segment	Existing No Project	Existing No Project	Existing No Project	Existing No Project
			Contours	Contours	Contours
		Noise Level, L_{dn} at 50 ft	70 dB	65 dB	60 dB
Hetherton Street	From Third Street to Second Street	63.3	18	38	82
Third Street	From Hetherton Street to Irwin Street	65.6	25	55	118
Third Street	From Hetherton Street to Francisco Boulevard West	66.1	27	59	127
Hetherton Street	From Second Street to Third Street	63.3	18	38	82
Hetherton Street	From Second Street to US 101 SB On Ramp	65.2	24	51	111
Second Street	From Hetherton Street to Irwin Street	64.9	23	49	105
Second Street	From Hetherton Street to Francisco Boulevard West	66.2	11	24	52
Irwin Street	From Third Street to Fourth Street	63.2	18	38	82
Irwin Street	From Third Street to Second Street	65.5	25	54	116
Third Street	From Irwin Street to Grand Avenue	63.0	17	37	79
Third Street	From Irwin Street to Hetherton Street	65.6	25	55	118
Irwin Street	From Second Street to Third Street	65.5	25	54	116
Irwin Street	From Second Street to US 101 northbound off-ramp	64.8	22	48	104
Second Street	From Irwin Street to Grand Avenue	64.1	20	44	94
Second Street	From Irwin Street to Hetherton Street	64.9	23	49	105
Southbound Off-Ramp	From Sir Francis Drake Boulevard to southbound off-ramp	61.3	13	28	61
Sir Francis Drake Boulevard	From southbound on- and off-ramps to Francisco Boulevard West	70.9	57	123	265
Sir Francis Drake Boulevard	From southbound on- and off-ramps to northbound on- and off-ramps	68.7	41	89	191
Northbound On-Ramp	From Sir Francis Drake Boulevard to northbound on-ramp	66.3	28	61	132
NB Off Ramp	From Sir Francis Drake Boulevard to northbound off-ramp	66.7	30	65	140

Roadway	Segment	Existing No Project Noise Level, L_{dn} at 50 ft	Existing No Project Contours 70 dB	Existing No Project Contours 65 dB	Existing No Project Contours 60 dB
Sir Francis Drake Boulevard	From northbound on- and off-ramps to Larkspur Landing Circle East	70.9	57	123	265
Sir Francis Drake Boulevard	From northbound on- and off-ramps to southbound on- and off-ramps	69.4	46	99	213
Larkspur Landing Circle	From Sir Francis Drake Boulevard to Old Quary Roads	61.0	13	27	59
Larkspur Landing Circle	From Sir Francis Drake Boulevard to South of Sir Francis Drake Boulevard	62.7	16	35	76
Sir Francis Drake Boulevard	From northbound on- and off-ramps to Larkspur Landing Circle West	69.0	43	93	200
Sir Francis Drake Boulevard	From northbound on- and off-ramps to southbound on-and off-ramps	70.9	57	123	265
Larkspur Landing Circle	From Sir Francis Drake Boulevard to Lincoln Village Circle	58.7	9	19	41
Sir Francis Drake Boulevard	From northbound on- and off-ramps to Drakes Cove Road	69.0	43	92	199
Sir Francis Drake Boulevard	From northbound on- and off-ramps to Larkspur Landing Circle West	69.0	43	93	200

Notes:
dB = decibels; L_{dn} = day-night noise level (L_{eq} with a 10-dB nighttime weighting).
Source: AECOM 2014

Existing vibration sources for these residential properties include cars, trucks, and buses on the nearby streets and highways. However, vibrations from street traffic generally would not be perceptible at receivers along the proposed rail alignment unless major bumps or other uneven roadway surfaces existed nearby. FTA vibration impact criteria do not depend on existing vibration levels, but instead focus on the vibration anticipated to be generated by new transit source. Therefore, measurements of existing vibration levels along the alignment were not necessary.

3.10.3 Environmental Consequences

Noise Impact Assessment Methodology

To assess the potential short-term noise effects from construction, sensitive receptors and their relative levels of exposure were identified. Construction noise anticipated to be generated by proposed near-term and long-term projects in the general area was predicted using the FTA's methodology for construction noise prediction (FTA 2006). The noise emission levels and usage factors were based on FHWA's Roadway Construction Noise Model (FHWA 2006). Noise levels of specific construction equipment and resultant noise levels at the locations of sensitive receptors were calculated.

The FHWA Traffic Noise Prediction Model was used to model traffic noise levels along affected local roadways, based on daily volumes and their distribution, from the traffic analysis prepared for the near-term and long-term projects in the general area in 2013 and 2040, respectively. The contribution of traffic noise levels along area roadways was determined by comparing the modeled future noise levels at 50 feet from the centerline of the roadway, with and without Proposed Action conditions.

. For the analyses, noise levels were measured at various locations along the proposed rail alignment to determine existing noise conditions, and corresponding specific noise levels from the Proposed Action were calculated for these areas for comparison to determine effects at the locations shown in Figure 3.10.1. Each location was selected to represent a cluster of potential receivers with similar characteristics. Following FTA guidelines, only sensitive receiver sites located within 375 feet of the centerline of the proposed rail alignment were evaluated for possible effects. Per the FTA guidelines, this distance can be reduced to 175 feet at locations where existing walls, buildings, or other noise attenuating structures are located between the alignment and the sensitive receiver sites.

Calculations of noise levels from the Proposed Action were based primarily on train frequency and speed, but also included other operating characteristics, such as train size and the use of horns at crossings. The at-grade intersection of the proposed rail alignment with Anderson Drive is the only crossing along the proposed rail alignment that has adjacent residences. Sensitive receiver sites close to the Anderson Drive crossing were modeled for noise levels that included horns from approaching trains and idling noise from the trains because of the potential for signalized intersection effects on the flow of the trains.

Vibration Impact Assessment Methodology

Groundborne vibration effects were quantitatively assessed, based on existing documentation (e.g., vibration levels anticipated to be produced by specific construction equipment operations) and the distance of sensitive receptor sites from a given source. Vibration levels were calculated using the FTA methodology for construction and transportation vibration sources, evaluating effects against the established FTA thresholds, as shown in Table 3.10-1.

Alternative 1 - No Action Alternative

Under the No Action Alternative, the FTA would take no action and would provide no funding to SMART for the Downtown San Rafael to Larkspur Extension project. The project would not be constructed, and none of the

effects associated with the Proposed Action would occur. No construction or operation activities would occur, and the project corridor would remain in its current state.

Alternative 2 - SMART Downtown San Rafael to Larkspur Extension (Proposed Action)

Noise

Implementation of the Propose Action would generate three sources of noise along the proposed rail alignment: 1) temporary construction activity noise; 2) potential increases in traffic noise near the planned Larkspur Station site; and 3) new railroad operation noise.

Temporary Construction Activity Noise

Construction noise would create the potential for short-term effects on those sensitive receptor sites along the proposed rail alignment, near station locations and along designated construction access routes. The primary source of construction noise is expected to be diesel-powered equipment, such as trucks and heavy equipment, as well as shorter term but intense activities, such as track-work construction. Construction would create the potential for increased noise to affect area residents and businesses.

Noise from construction activities would be generated by two primary sources: the on-road transport of construction materials and workers commuting to and from work, and the off-road construction itself. Because transportation of personnel and materials would occur on already traveled roadways, background noise conditions would mask any on-road contributions. On-road construction-related truck noise would be limited to delivery of ballast and other building material.

Construction activities would be limited to daytime hours because they would be performed in compliance with the local noise control ordinances of both the cities of San Rafael and Larkspur, and they would be exempt if these activities occurred only during the hours specified in each ordinance. This exemption, according to the ordinances, would be granted if all powered construction equipment was equipped with intake and exhaust mufflers recommended by their respective manufacturers; pavement breakers and jackhammers also would be equipped with acoustical attenuating shields or shrouds as recommended by their manufacturers.

Also, FTA construction noise assessment guidelines recommend that 8-hour L_{eq} levels should not exceed 80 dB in residential areas. The industrial land use standard is 90 dB. Noise levels from equipment uses for rail construction typically are slightly above 80 dB at 50 feet from the source. Table 3.10-4, compiled from the FTA guidelines, lists reference noise levels for typical construction equipment at 50 feet.

If several pieces of construction equipment operate in close proximity, a reference level of 85 dB at 50 feet is a representative input analysis threshold. The short-term reference level is reduced by intermittent usage, by distance spreading, and by any intervening ground effects in determining the 8-hour L_{eq}. Distance spreading alone between track construction and the closest residence at the San Rafael RV Park would be -6 dB, because the nearest residence (at the RV park) would be located 100 from the track. Therefore, worst-case construction noise would be less than the 80 dB 8-hour L_{eq} impact criterion at the nearest residence. Thus, no adverse construction noise effects would occur during construction.

Table 3.10-4: Equipment Noise Reference Levels at 50 Feet

Equipment Type	Reference Noise Level at 50 Feet
Backhoe	80 dB
Ballast Equalizer	82 dB
Ballast Tamper	83 dB
Compactor	82 dB
Mobile Crane	83 dB
Spike Driver	77 dB
Tie Handler	80 dB

Source: FTA 2006

Traffic Noise

The criteria for highway noise impacts (relevant to the extent the Proposed Action would cause changes in traffic patterns) are from the FHWA Procedures for Abatement of Highway Traffic Noise and Construction Noise, as provided in 23 Code of Federal Regulations (CFR) Subchapter H, Section 772 (23 CFR Part 772). A Type 1 project is defined in 23 CFR Part 772 as a proposed federal or federal-aid highway project for the construction of a highway at a new location or the physical alteration of an existing highway that significantly changes either the horizontal or vertical alignment or increases the number of through-traffic lanes. FHWA requires identifying highway traffic noise impacts and examining potential abatement measures for all Type 1 projects receiving federal funds.

Caltrans is responsible for implementing the FHWA regulations in California. Under Caltrans policy, a traffic noise impact occurs if projected noise levels are within 1 dB of the FHWA criteria; therefore, a residential impact occurs at 66 dBA L_{eq}, and a commercial impact occurs at 71 dBA L_{eq}. Caltrans also considers a 12 dB increase in noise a substantial increase and an impact, regardless of the original noise level.

As shown in Table 3.10-5, the Proposed Action would include traffic increases to local roads, mainly near the stations, without any major changes to the existing roadway designs anticipated, so it would not be classified as a Type 1 project. Therefore, the traffic noise criteria for the Proposed Action would be the same as the FTA criteria. The analysis was run for each of the intersections studied in the Proposed Action traffic study, and includes intersections along the entire proposed rail alignment, from Downtown San Rafael to Larkspur.

As shown in Table 3.10-5, Proposed Action-related traffic noise increase would range from 0.0 to 0.4 dB, which would not be a perceptible amount. According to EPA, a change in noise level of at least 5 dB is required before any noticeable change in community response would be expected (EPA 1971). Therefore, the traffic increase resulting from to the Proposed Action would not exceed EPA noise-level increase thresholds. Thus, no adverse effect would occur.

Table 3.10-5: Summary of Cumulative With and Without Proposed Action Traffic Noise Levels and Contour Distances

Roadway	Segment	Cum. No PA Noise Level, L_{dn} at 50 feet	Cumulative (Cum.) Plus Proposed Action (PA) Noise Level, L_{dn} at 50 feet	Cumulative (Cum.) Plus Proposed Action (PA) Contours 70 dB	Cumulative (Cum.) Plus Proposed Action (PA) Contours 65 dB	Cumulative (Cum.) Plus Proposed Action (PA) Contours 60 dB	Change Cum. (Plus PA) vs. Cum. (No PA)	Cumulatively Considerable?
Lincoln Avenue	From Third Street to Fourth Street	63.4	63.4	18	39	85	0.0	No
Lincoln Avenue	From Third Street to Second Street	63.0	63.0	17	37	80	0.0	No
Third Street	From Lincoln Avenue to Francisco Boulevard West	67.0	67.0	31	67	145	0.0	No
Third Street	From Lincoln Avenue to Cijos Street	66.9	66.9	31	67	144	0.0	No
Lincoln Avenue	From Second Street to Third Street	63.0	63.0	17	37	80	0.0	No
Lincoln Avenue	From Second Street to Irwin Street	62.5	62.5	16	34	73	0.0	No
Second Street	From Lincoln Avenue to Francisco Boulevard West	67.2	67.2	32	70	150	0.0	No
Second Street	From Lincoln Avenue to Lindaro Street	66.7	66.7	30	65	139	0.0	No
Francisco Boulevard West	From Third Street to Fourth Street	60.0	60.0	11	23	50	0.0	No
Francisco Boulevard West	From Third Street to Second Street	62.7	62.7	16	35	76	0.0	No
Third Street	From Francisco Boulevard West to Hetherton Street	67.3	67.3	33	71	153	0.0	No
Third Street	From Francisco Boulevard West to Lincoln Avenue	67.0	67.0	31	67	145	0.0	No
Francisco Boulevard West	From Second Street to Third Street	62.7	62.7	16	35	76	0.0	No
Francisco Boulevard West	From Second Street to Irwin Street	64.1	64.1	20	44	94	0.0	No
Second Street	From Francisco Boulevard West to Hetherton Street	67.3	67.3	33	71	154	0.0	No
Second Street	From Francisco Boulevard West to Lincoln Avenue	67.2	67.2	32	70	150	0.0	No
Hetherton Street	From Third Street to Fourth Street	64.4	64.4	21	46	99	0.0	No
Hetherton Street	From Third Street to Second Street	64.3	64.3	21	45	96	0.0	No

Roadway	Segment	Cum. No PA Noise Level, L_{dn} at 50 feet	Cumulative (Cum.) Plus Proposed Action (PA) Noise Level, L_{dn} at 50 feet	Cumulative (Cum.) Plus Proposed Action (PA) Contours 70 dB	Cumulative (Cum.) Plus Proposed Action (PA) Contours 65 dB	Cumulative (Cum.) Plus Proposed Action (PA) Contours 60 dB	Change Cum. (Plus PA) vs. Cum. (No PA)	Cumulatively Considerable?
Third Street	From Hetherton Street to Irwin Street	67.4	67.4	33	72	155	0.0	No
Third Street	From Hetherton Street to Francisco Boulevard West	67.3	67.3	33	71	153	0.0	No
Hetherton Street	From Second Street to Third Street	64.3	64.3	21	45	96	0.0	No
Hetherton Street	From Second Street to US 101 southbound on-ramp	66.2	66.2	28	60	129	0.0	No
Second Street	From Hetherton Street to Irwin Street	66.2	66.2	28	61	130	0.0	No
Second Street	From Hetherton Street to Francisco Boulevard West	67.3	67.3	33	71	154	0.0	No
Irwin Street	From Third Street to Fourth Street	65.1	65.1	24	51	110	0.0	No
Irwin Street	From Third Street to Second Street	66.8	66.8	30	66	141	0.0	No
Third Street	From Irwin Street to Grand Avenue	65.4	65.4	25	53	115	0.0	No
Third Street	From Irwin Street to Hetherton Street	67.4	67.4	33	72	155	0.0	No
Irwin Street	From Second Street to Third Street	66.8	66.8	30	66	141	0.0	No
Irwin Street	From Second Street to US 101 northbound off-ramp	66.2	66.2	28	60	130	0.0	No
Second Street	From Irwin Street to Grand Avenue	65.7	65.7	26	55	119	0.0	No
Second Street	From Irwin Street to Hetherton Street	66.2	66.2	28	61	130	0.0	No
Southbound off-ramp	From Sir Francis Drake Boulevard to southbound off-ramp	63.4	63.5	18	39	85	0.1	No
Sir Francis Drake Boulevard	From southbound on- and off ramps to Francisco Boulevard West	72.3	72.4	72	155	334	0.1	No
Sir Francis Drake Boulevard	From southbound on- and off-ramps to northbound on- and off-ramps	70.5	70.6	54	117	253	0.1	No
Northbound on-ramp	From Sir Francis Drake Boulevard to northbound on-ramp	66.4	66.5	29	63	135	0.0	No

Roadway	Segment	Cum. No PA Noise Level, L_{dn} at 50 feet	Cumulative (Cum.) Plus Proposed Action (PA) Noise Level, L_{dn} at 50 feet	Cumulative (Cum.) Plus Proposed Action (PA) Contours 70 dB	Cumulative (Cum.) Plus Proposed Action (PA) Contours 65 dB	Cumulative (Cum.) Plus Proposed Action (PA) Contours 60 dB	Change Cum. (Plus PA) vs. Cum. (No PA)	Cumulatively Considerable?
Northbound off-ramp	From Sir Francis Drake Boulevard to northbound off-ramp	67.5	67.6	34	74	159	0.0	No
Sir Francis Drake Boulevard	From northbound on- and off-ramps to Larkspur Landing Circle East	72.3	72.4	72	155	334	0.1	No
Sir Francis Drake Boulevard	From northbound on- and off-ramps to southbound on- and off-ramps	71.3	71.3	61	132	284	0.1	No
Larkspur Landing Circle	From Sir Francis Drake Boulevard to Old Quary Roads	65.0	65.2	24	51	111	0.2	No
Larkspur Landing Circle	From Sir Francis Drake Boulevard to South of Sir Francis Drake Boulevard	63.6	63.6	19	41	87	0.0	No
Sir Francis Drake Boulevard	From northbound on- and off-ramps to Larkspur Landing Circle West	70.4	70.5	54	116	249	0.1	No
Sir Francis Drake Boulevard	From northbound on- and off-ramps to southbound on- and off-ramps	72.3	72.4	72	155	334	0.1	No
Larkspur Landing Circle	From Sir Francis Drake Boulevard to Lincoln Village Circle	62.5	62.9	17	36	78	0.4	No
Sir Francis Drake Boulevard	From northbound on- and off-ramps to Drakes Cove Road	70.5	70.6	55	118	254	0.1	No
Sir Francis Drake Boulevard	From northbound on- and off-ramps to Larkspur Landing Circle West	70.4	70.5	54	116	249	0.1	No

Notes:
dB = decibels; L_{dn} = day-night noise level (L_{eq} with a 10-dB nighttime weighting).
Source: AECOM 2014

Railroad Operation Noise

The assessment of railroad operation noise considered noise from the trains themselves, crossing signal noise, track noise, horn operation at grade crossings, and station noise. Each of these sources is discussed below, followed by a results section that describes aggregate noise levels from all sources.

Train activity information was obtained from SMART's proposed operating plan and schedule. The following assumptions were used for the operational noise assessment of the built condition, based on the design characteristics of the Proposed Action:

- **Passenger Train Noise**: Calculations were based on Chapter 6 of the FTA Guidance Manual for train operations, including warning horns, stationary idling noise and the following assumptions:
    - Operations: four operations per hour between 5:30 a.m. and 7:30 p.m., with approximately 28 roundtrip trains per day within the proposed rail alignment from Downtown San Rafael to the planned Larkspur Station.
    - Speeds: 50 miles per hour maximum, with the average speed expected to be 25 miles per hour.
    - Length: two rail cars per train; length of each rail car to be 85 feet; with approximately 90 passengers per rail car.
    - Horns: 0.25 mile from each grade-crossing to be affected by warning horns, with four grade-crossings along the proposed rail alignment.

Crossing Signal Noise: Trains are expected to operate every 30 minutes in both directions during peak periods. Because the trains would be relatively short, they would be able to clear intersections relatively quickly, resulting in less traffic disruption on surface streets. A two-car train at 15 miles per hour is expected to clear a six-lane intersection in approximately 11 seconds. With crossing gate movement delays before and after each crossing, street blockage at crossings is expected to total approximately 35 seconds. The exception to this would be at Andersen Drive, where the long, acute angle of the crossing and the required times to provide clearance of the intersection could require closures for as long as 2 minutes. For the reasons referenced above, the worst-case scenario was taken into account and the crossing signal noise was calculated with 120 seconds as the duration of one street blockage event at at-grade road crossings.

- Elevated Track Noise: The noise level would be greater (by 1 dB) with a train passing by at elevated track segments compared with that for a train at grade level tracks. The northern half of the segment is at the same grade as surrounding land uses, but from approximately the Andersen Drive crossing, the existing trackbed begins to elevate slightly; by the time it reaches Woodland Avenue/Bellam Boulevard, it is approximately 15 feet above the surrounding terrain. Therefore, the worst-case scenario was taken into account and the elevated track noise level was calculated.
- Track Composition: Furthermore, the rail track presumably would be a combination of ballast and slab track with continuous welded rail, consistent with the assumptions in the FTA guidance.

As noted in Section 3.10.1, the FTA assessment guidelines define three classes of land use that may be noise sensitive: Category 1 (outdoor amphitheaters, national landmarks); Category 2 (residences, hospitals/rest homes, hotels); and Category 3 (schools, libraries, theaters, churches). The existing Cal Park Hill Pathway is an active

transportation facility and is therefore not a sensitive land used as defined in the FTA criteria. Accordingly, the Proposed Action only would include Category 2 noise sensitive uses along some rail segments in the vicinity of the Andersen Drive crossing and the Woodland Avenue/Bellam Boulevard area. The noise metric that best identifies the level of noise sensitivity for Category 2 uses is the day-night level (L_{dn}). The FTA assessment guidelines characterize potential noise impacts as having no impact, moderate impact, or severe impact. The severity of the difference associated with a proposed rail project depends on the existing noise exposure. In an existing, very quiet environment, an increase of +10 dB or more would be considered a moderate impact, and increases over 15 dB would be considered severe. As baseline noise levels increase, the project increment that would trigger a moderate or severe finding becomes progressively smaller. The distribution of effect severity is shown again in Table 3.10-6 as a function of a cumulative project contribution to the baseline (decibel [dB] L_{dn}).

Table 3.10-6: Project Only Contribution to Baseline Noise Level

	Project Only Contribution (dB) $L_{eq}(h)$ or L_{dn} (dBA)		
Baseline Noise Level $L_{eq}(h)$ or L_{dn} (dBA)	**No Impact**	**Moderate Impact**	**Severe Impact**
40 dB	<50	<55	>55
50 dB	<54	54-59	>59
60 dB	<58	58-63	>63
65 dB	<61	61-66	>66
70 dB	<65	65-69	>69
75 dB	<66	66-73	>73
>77 dB	<66	66-75	>75

Notes:
dB = decibels; dBA = A-weighted decibels; L_{dn} = day-night noise level (L_{eq} with a 10-dB nighttime weighting); L_{eq} = equivalent noise level (the sound energy averaged over a 1-hour period)
Source: FTA 2006: Table 3-1

Train Horns

Train horn noise is a special condition because it is a localized occurrence, affecting only limited numbers of sensitive receivers near the crossing. Horns can, however, create noise levels exceeding the moving train contribution in close proximity to the crossing. The FTA has supported development of an At-Grade Crossing Noise calculation and suggests a maximum horn noise level of 110 dB at 50 feet.

Station Noise

Noise at the planned Larkspur Station would include train idling. The speed of each train would be reduced at the station when compared with that of a train pass-by, and therefore less noise would be generated. Other likely station noise sources, such as opening and closing doors, and public address announcements, would be negligible because such sites would be situated in a highly-developed urban area with high ambient sound levels already existing (i.e., from US 101). These other noise sources would be less than horn noise at all locations by more than 10 dBA, in accordance with reference source noise levels provided in the FTA assessment guidance.

Results

The train noise with and without horn were calculated for the two closest noise sensitive uses to the track centerline: 1) the RV park near the Andersen Drive crossing; and 2) along Woodland Avenue at the single-family residences. The L_{dn} that were calculated at 50 feet from the track centerline (using the FTA train noise models based on the train activity information shown above) are shown in Table 3.10-7. The comparison of modeled noise levels under the Proposed Action and the measured ambient noise levels is shown in Table 3.10-8.

As shown in Table 3.10-8, operation of the trains themselves without horns would not contribute substantially to ambient noise conditions at the sensitive receptor locations. Therefore, operation of the trains themselves without horns would not create an adverse effect. However, the use of horns would create a substantial contribution to ambient noise conditions, the severity of which is determined by the distance of the rail centerline to the receptors.

The Anderson Drive at-grade crossing is the single location along the proposed rail alignment where warning horns would be used near residential uses. As shown in Table 3.10-8, the use of train horns at the crossing is calculated to add 20 dB L_{dn} to the 59 dB L_{dn} baseline at the nearest residence at the adjacent RV Park of San Rafael. This would be a "severe impact" under the FTA criteria. The effect would occur during pass-bys of both southbound and northbound trains.

Trains approaching from both the north and the south would be required to sound their horns beginning about 0.25 mile from the crossing. For southbound trains approaching the crossing, sounding the horns would not begin to have an effect on sensitive receptors at the RV park until just before the train reached the crossing, because that would be approximately where the RV park and sensitive receptors would be located. Therefore, the noise effects from southbound trains would occur only in the vicinity of the crossing. The situation for the northbound trains would be different. Northbound trains approaching the Andersen Drive crossing would be required to begin sounding their horns approximately 0.25 mile south of the crossing, which is approximately at the location of the residences on Woodland Avenue that are located about 200 feet from the alignment. Therefore, this action would affect those residences. The existing (baseline) noise level at the Woodland Avenue location is 66 dB L_{dn}, and the use of horns near this location would contribute an additional 10 dB L_{dn} above ambient levels. This would constitute a "moderate impact" under the FTA criteria.

Table 3.10-7: Day-Night (L_{dn}) Noise Levels at 50 feet from Track Centerline

			Reference Level at 50 Feet	Reference Level at 50 Feet	Number of Trains	Number of Trains	Projected Source Operating Parameters	Projected Source Operating Parameters	Projected Source Operating Parameters	Projected Source Operating Parameters	Projected Source Operating Parameters		L_{dn}	L_{dn}
Source Type	**Track Type**	**Profile**	**SEL (dBA)**	**L_{max} (dBA)**	**7am - 10pm**	**10pm - 7am**	**Number of cars**	**Speed**	**Vd**	**Vn**	**V**	**E (Seconds)**	**Day**	**Night**
Fixed-guideway	Welded	At-grade											51.9	47.5
Fixed-guideway	Welded	Elevated	85	81	23	5	2	27	1.53	0.56	4		52.9	48.5
At Grade Crossing (Horn)	Welded	At-grade	110	110	23	5	2	27	1.53	0.56	4		78.9	74.5
Stationary - Idling and Signal Crossing	Welded	At-grade	106	70	23	5	2	15	1.53	0.56	4	120	57.5	53.1
Horns Only													81.9	
No Horns													58.8	54.4
													61.8	
Total Noise Level @ 50 Feet (Moving + Horns)													79.0	74.6
													82.0	

Notes:

dB = decibels; dBA = A-weighted decibel; L_{dn} = day-night noise level (L_{eq} with a 10-dB nighttime weighting); L_{max} = maximum noise level; SEL = The equivalent sound level over a 1-second time interval for a discrete sound event; V = average number of vehicles over 1 hour, Vd = average number of vehicles over daytime hours; Vn = average number of vehicles over nighttime hours; E = duration of one event, in seconds.

Sources: FTA 2006:Chapter 6; AECOM 2014

Table 3.10-8: Comparison of Train Noise Level with Ambient Noise Level

Parameter	Anderson Drive	Level of Impact[1]	Woodland Avenue	Level of Impact[1]
Distance to track	100 feet	-	200 feet	-
Measured Ambient Noise Level (L_{dn})	59 dB	-	66 dB	-
Calculated Train with No Horns Noise Level (L_{dn})	59 dB	-	56 dB	-
Calculated Train + Horns Noise Level (L_{dn})	79 dB	-	76 dB	-
Calculated Noise Difference with Horns	20 dB	**Severe**	10 dB	**Moderate**

Notes:

[1] As described previously in Table 3.10-6, the severity of a noise impact is based on the amount of change between existing ambient noise without the project and the noise that would be experienced with the project. At the Andersen Drive crossing the level of change would be 20 dB, which would constitute a "severe" impact. At Woodland Avenue, the change would be 10 dB, which would constitute a "moderate" impact.

dB = decibels; L_{dn} = day-night noise level (L_{eq} with a 10-dB nighttime weighting); $L_{eq(24)}$ = equivalent noise level (the sound energy averaged over a 24-hour period)

Horn Noise Mitigation Options

Based on the moderate and severe impacts identified above, mitigation to lessen the effects of horn use at the Andersen Drive crossing would be implemented. The two below mitigation options are being considered for implementation:

Option 1: Quiet Zone—The City of San Rafael could apply for an exemption to the horn requirement under the Federal Railroad Administration's (FRA) Quiet Zone Establishment Process. Designation of the area as a Quiet Zone would fully mitigate the effect of horn noise. All SMART at-grade crossings would be designed to be "Quiet Zone Ready," meaning that they would contain the required gates, signals, and other infrastructure required for Quiet Zone approval by the FRA. However, under the FRA rules, application for Quiet Zone status must originate from the local jurisdiction, not from the rail operator. Whether the City has determined if it would apply for the exemption currently is unknown. In addition, even if the City were to apply, it cannot be predicted with certainty that the FRA would grant the exemption. Therefore, Quiet Zone designation of the area is uncertain, and cannot be solely relied on as a potential mitigation measure without an alternate mitigation measure option in place.

Option 2: Wayside Horns—Wayside horns are mounted on poles at the crossing itself, and they are used in lieu of train-mounted horns to warn motorists, pedestrians, and cyclists of an approaching train. The horns are triggered by switches on the rails and act in conjunction with gates and lights at the crossing. The horns are directed towards traffic on the roadway, and therefore they create a substantially smaller noise footprint when compared to train-mounted horns. More importantly, the use of wayside horns eliminates the need for train operators to sound their horns as they approach a crossing, which normally would occur at a distance of 0.25 mile from the crossing and would continue until the lead rail vehicle passed through the crossing. Based on each of these considerations, the use of wayside horns could substantially reduce horn noise on nearby sensitive receptors. Noise modeling of the Andersen crossing using FTA criteria indicates that using wayside horns at that location would reduce the noise level at the RV park from 79 dB to 66 dB, which would result in a "moderate

impact" rather than "severe impact" that would occur if only train-mounted horns were used. Noise levels at the Woodland Avenue residences would be reduced to less than "moderate" levels. Based on this analysis, the use of wayside horns at the Andersen Drive crossing would provide complete mitigation for noise effects on these two sensitive noise receptor locations.

Implementation of one of the above mitigation measures would resolve the severe and moderate noise impacts that would occur at the RV park and the Woodland Avenue residences. Therefore, no adverse effect would occur.

Vibration

The Proposed Action would generate two sources of vibration along the proposed rail alignment: 1) temporary construction vibrations; and 2) permanent operational vibrations generated by the proposed transit system extension.

Temporary Construction Vibration

Temporary vibration effects under the Proposed Action could result from construction activities associated with utility relocation, grading, excavation, track work, and installation of structures or systems components. Such effects may occur in vibration-sensitive land uses near the proposed rail alignment. The potential for vibration effects would be greatest at locations close to vibratory compactor operations. The primary concern from construction vibration typically is related to structural damage effects. Track-laying does not entail use of heavy equipment that has a potential for any perceptible structural effects. The accepted construction vibration damage criterion for walls, stucco, or slabs is 0.2 inches/sec (peak particle velocity [PPV]). A loaded truck has a typical PPV of 0.08 inch per second at 25 feet. The damage criterion would be met by the Proposed Action approximately 14 feet from the source. During construction, trucks and equipment would not be operated within 14 feet of any residential structures. The nearest such structure would be approximately 100 feet from the proposed trackwork near the Andersen Drive crossing. Because of the distance of sensitive noise receptors from proposed construction activities, together with the limited use of heavy equipment during construction, no vibration effect would occur during construction. Therefore, no adverse effect would occur.

Permanent Operational Vibration

Vibration from rail operations is caused by railcar wheels rolling on the rails. This energy then is transmitted through the track support system into the ballast, through the ground to the foundations of nearby buildings, and finally throughout the remainder of the building structure. The level of vibration received at the building is a function of the type of trains, their speeds, track system, structure, support and condition, distance from the tracks, geological conditions, and the receiving structure. Ground- borne vibration typically does not annoy people who are outdoors.

Vibration effects were assessed based on a comparison of the predicted Proposed Action vibration level with the FTA impact criterion of 75 VdB shown in Table 3.10-1. The closest sensitive receptors along the proposed rail alignment, together with the predicted vibration levels that would be experienced during train passage, are shown in Table 3.10-9.

Table 3.10-9: Predicted Vibration Levels during Train Passage at Sensitive Receptors

Receptor Area	Distance from Centerline (feet)	Predicted VdB
Anderson Drive	100 feet	67
Woodland Avenue	200 feet	61

Note:
VdB = vibration decibels
Source: FTA 2006:Figure 10-1

To surpass the FTA vibration criteria of 75 VdB, Class 2 sensitive receptors would need to be located 40 feet or less from the rail centerline. Those receptors would experience perceptible vibration, but not at levels that would cause structural damage. Residences located more than 40 feet from the centerline would not experience perceptible vibration. As shown in Table 3.10-9, all of the sensitive receptors adjacent to the proposed rail alignment are located substantially more than 40 feet from the rail centerline. The nearest residence in the RV park near the Andersen Drive crossing is approximately 100 feet from the centerline, and the closest residence along Woodland Avenue is approximately 200 feet from the centerline. Thus, those receptors would not experience perceptible vibration in excess of FTA standards. Therefore, no adverse effect from operational vibration would occur.

3.10.4 References

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3.11 SAFETY AND SECURITY

This section describes the existing public safety and security setting within the Proposed Action area. The section then evaluates what changes the Proposed Action would bring to the area with respect to safety and security, and how the Proposed Action would be designed to mitigate potential effects. Previous analysis for safety and security was undertaken for the overall SMART project as part of the 2005 Draft EIR (SMART 2005), prepared as per CEQA. That analysis can be found in Section 3.12 of the 2005 Draft EIR.

Federal regulations promulgated by the FTA (49 Code of Federal Regulations [CFR] 659) provide for State-controlled oversight of the safety and security of rail systems. Based on this authority, the California Public Utilities Commission (CPUC) has created its own regulations concerning the operation of applicable rail transit agencies within the State (CPUC 2007). CPUC General Order 164-D defines requirements for the following:

1) System safety program plans
2) System security plans
3) Internal safety and security audits
4) Hazard management processes
5) Accident reporting and investigations
6) Corrective action plans
7) At-grade rail crossing
8) Safety certification plans
9) Commission approvals of applicable plans and actions

These requirements are reviewed before the start of operation of CPUC-regulated rail services and before beginning any safety or security-related changes to an approved rail service. Periodic reviews of operating rail systems are undertaken by the CPUC to monitor ongoing compliance with regulations.

3.11.1 Affected Environment

Existing SMART ROW Public Roadway Crossings

The SMART right-of-way (ROW) between Downtown San Rafael and Larkspur includes six public at-grade roadway crossings. From north to south, these are: 1) Third Street; 2) Second Street; 3) West Francisco Boulevard; 4) Irwin Street; 5) Rice Drive; and 6) Andersen Drive. The Third Street crossing is shown in Figure 2-3, Photo 1; the West Francisco Boulevard crossing is shown in Photo 6; and the Andersen Drive crossing is shown in Photos 10 and 11. With the exception of Andersen Drive, each crossing is marked with railroad-crossing signs and defunct flashing signals and gates.

This ROW also crosses Woodland Avenue/Bellam Boulevard (see Figure 2-3, Photo 13). The rail trestle that crosses above the roadway was constructed in the 1920s and lacks sufficient vertical and horizontal clearance to

accommodate modern traffic. Visible evidence exists on this structure that vehicular traffic occasionally impacts the trestle's vertical and horizontal members.

Existing SMART ROW Security Environment

The SMART ROW in the Proposed Action area is an abandoned Northwestern Pacific Railroad corridor, with some existing uses encroaching into the ROW (e.g., at the Bettini Transit Center between Second and Third Streets and the automobile dealership parking areas between Irwin Street and Rice Drive) (see Figure 2-3, Photos 2 and 8, respectively). These areas are well-lit and highly frequented by the people that use them. The Bettini Transit Center maintains some level of activity throughout the day and night, and is regularly patrolled by the San Rafael Police Department. The automobile dealerships are in use throughout the day and into the evening, and at night are well-lit and patrolled by private security contractors.

The 0.5-mile-long ROW segment between Rice Drive and Andersen Drive is a narrow corridor that passes through adjacent commercial and industrial uses. The segment is separated from surrounding parcels by fences and walls. The proposed rail alignment in this area is abandoned, overgrown with vegetation in places, and lacks lighting. Evidence of transient and homeless use exists, along with refuse that indicates the area is occupied for alcohol and drug use. The area is occasionally cleared of vegetation by SMART to prevent such uses.

South of Andersen Drive, the alignment parallels the Cal Park Hill Pathway (Marin County Bicycle Route 5). This segment is not cut off from surrounding uses, and it is relatively well-maintained and open (see Figure 2-3, Photos 12 and 14). The pathway passes through the Cal Park Hill Tunnel, which is well-lit and marked. The pathway is separated from the other half of the tunnel by a concrete block wall that extends to the tunnel's ceiling. The half of the tunnel that is reserved for SMART use is secured on both ends of the tunnel with heavy gates (see Figure 2-3, Photos 15, 16, and 17). South of the tunnel, in the vicinity of the planned Larkspur Station, the ROW is used for overflow Marin Airporter parking (see Figure 2-3, Photos 18 and 19). This area is fenced and access is controlled by the Airporter's vehicle entrance and exit gates.

Fire Protection Service

Fire protection service for the northern portion of the Proposed Action area is provided by the City of San Rafael Fire Department (SRFD) (2014). Service within the southern portion of the Proposed Action area is provided by the City of Larkspur Fire Department (LFD) (2014). Fire stations within 0.5 mile of the proposed rail alignment are listed in Table 3.11-1.

Table 3.11-1: Fire Stations Within 1 Mile of the Proposed Rail Alignment

Fire Department	Location	Equipment	Within 0.5 Mile of Alignment?
Station 51: City of San Rafael	1039 C Street, San Rafael	2 Type 1 engines, ambulance, air unit	Yes
Station 52: City of San Rafael	210 Third Street, San Rafael	Type 1 engine, Type 3 wildland engine	Yes
Station 54: City of San Rafael	46 Castro Avenue, San Rafael	Type 1 engine, aerial ladder truck	Yes
Station 16: City of Larkspur	15 Barry Way, Greenbrae	2 Type 1 engines, Type 3 wildland engine	Yes

Sources: SRFD 2014; LFD 2014

In addition to the facilities and equipment listed in the table, both the City of San Rafael and the Larkspur Fire Protection District maintain other fire stations within their jurisdictions, several of which are within 2 miles of the proposed rail alignment. Both cities also maintain mutual aid agreements with surrounding jurisdictions to provide additional firefighting capacity in the event of a large emergency incident.

Police Service

Police service for the northern portion of the Proposed Action area is provided by the City of San Rafael Police Department. Service within the southern portion of the Proposed Action area is provided by the Central Marin Police Authority.

The City of San Rafael Police Department (SRPD) employs 89 personnel, including 65 sworn officers and 24 civilian employees. SRPD's service population within San Rafael city limits is approximately 58,000 people, with a daily commerce/visiting population of approximately 100,000 people. SRPD maintains one police station at 1400 Fifth Street in Downtown San Rafael, and one substation at the Northgate Mall, approximately 3 miles north of the Proposed Action area (SRPD 2014).

The Central Marin Police Authority (CMPA) provides police service to the communities of Larkspur, Corte Madera, San Anselmo, and a portion of Greenbrae. The communities consolidated their police service in 2013. The CMPA staff includes 45 sworn officers and 13 civilian employees. The CMPA's service population is approximately 35,000 people, served by one police station at 250 Doherty Drive in Larkspur. (CMPA 2014)

The Marin County Sheriff's Department provides law enforcement services in unincorporated areas of Marin County. The Department also works cooperatively with incorporated jurisdictions in the county. Other responsibilities of the Sheriff's Office include maintaining the county jail, operating a countywide communications division, and providing a documentary services division with records, warrants, and civil units. The Department has 207 sworn deputies and 114 professional employees (Marin County Sheriff 2014). The Sheriff's Office is located at 1600 Los Gamos Drive in San Rafael, approximately 5 miles north of the Proposed Action area. The Department also maintains a substation in Kentfield at 831 College Avenue, which is about 2 miles from the planned Larkspur Station site.

3.11.2 Environmental Consequences

No national thresholds exist for safety and security services for an individual project. As defined by the Council on Environmental Quality, the significance of an effect is determined by the context and intensity of the resulting change relative to the existing environment (40 CFR 1508.27).

Alternative 1: No Action Alternative

Under the No Action Alternative, the FTA would take no action and would provide no funding to SMART for the Downtown San Rafael to Larkspur Extension project. The project would not be constructed, and none of the effects associated with the Proposed Action would occur. No construction or operation activities would occur, and the project corridor would remain in its current state.

Alternative 2: SMART Downtown San Rafael to Larkspur Extension (Proposed Action)

System Safety

Because the locally-funded SMART project still is under construction and is not yet operational, safety statistics specific to SMART operations are not available. However, such information is available for similar commuter rail systems in California, and that information is instructive for this analysis.

Commuter rail operations typically operate in densely populated urban and suburban settings. In spite of the relatively high traffic volumes within these areas, accidents involving commuter rail train collisions with motor vehicles are infrequent. The combined total number of grade crossing accidents for the four commuter railroads operating in California—Metrolink, Coaster, Altamont Commuter Express (ACE), and Caltrain—were 13 in 2011, 20 in 2012, and 37 in 2013 (see Table 3.11-2). SMART passenger rail service would have a similar operational profile to ACE (Stockton to San Jose) and Coaster (Oceanside to San Diego) as these two services operate primarily during peak commute hours in a mix of rural, suburban, and urban environments. In operation of the Proposed Action, the SMART transit system would operate within a mix of urban and suburban land uses.

As noted previously, CPUC General Order 164-D defines requirements for safety and security for non-FRA regulated rail systems in California. One of the requirements of the order concerns the design and safe operation of at-grade crossings. At-grade crossings cannot be operated without CPUC approval. Before approving a crossing, the CPUC must be provided with the following as part of the formal General Order 88-B (CPUC 2004) rail crossing application process:

1) Detailed engineering drawings for each crossing;

2) Proposed rail operations;

3) Statements showing the public benefit to be achieved by the crossing, and why a separation of grades is grades is not practicable under the circumstances;

4) Evidence of agreement between the parties relative to the proposed crossings (i.e., SMART and the City of San Rafael);

5) Analysis of identified hazards, including queuing on tracks, pedestrian movements, turning movements, and sightlines; and

6) Identification of hazard mitigation measures, such as crossing and warning devices, active and passive signs, median islands, and fencing.

CPUC staff members conduct field diagnostic reviews of proposed at-grade crossings and provide recommendations for improvement, if needed. Following review and acceptance by CPUC staff, the crossing is approved by the Commission.

As described in Chapter 2, Alternatives, two of the six existing at-grade crossings, West Francisco Boulevard and Irwin Street, would be eliminated as a result of the “flip” of West Francisco Boulevard between the San Rafael Creek crossing and Rice Drive. This modification under the Proposed Action would result in improved safety

Table 3.11-2: Public Grade Crossing Accidents on Commuter Railroads in California

Commuter Railroad	Service Area	Route Miles	Annual Ridership (2013)	Accident Type	Accidents By Year 2011	Accidents By Year 2012	Accidents By Year 2013
Metrolink	Los Angeles/San Bernardino Counties	388	11,543,600	Train struck motor vehicle	3	6	6
				Train struck pedestrian	5	3	10
				Motor vehicle struck train	1	0	0
				Other	1	1	6
				TOTAL	**10**	**10**	**22**
Coaster	San Diego to Oceanside	41	1,689,200	Train struck motor vehicle	0	0	2
				Train struck pedestrian	0	0	1
				Motor vehicle struck train	0	0	0
				Other	0	0	0
				TOTAL	**0**	**0**	**3**
ACE	San Jose to Stockton	86	1,019,700	Train struck motor vehicle	0	0	1
				Train struck pedestrian	0	0	0
				Motor vehicle struck train	0	0	0
				Other	0	0	0
				TOTAL	**0**	**0**	**1**
Caltrain	San Jose to San Francisco	77	16,294,900	Train struck motor vehicle	1	6	6
				Train struck pedestrian	1	4	5
				Motor vehicle struck train	1	0	0
				Other	0	0	0
				TOTAL	**3**	**10**	**11**
				GRAND TOTAL	**13**	**20**	**37**

Note:
According to the Federal Railroad Administration (FRA), commuter rail passenger transportation means short-haul rail passenger transportation in metropolitan and suburban areas usually having reduced fare, multiple-ride and commuter tickets and morning and evening peak period operations.
Source: FRA 2014

conditions at these two crossings and would avoid potential conflicts between SMART trains and other traffic along these streets. The remaining at-grade crossings would be designed and approved in compliance with CPUC requirements. SMART has adopted design standards for its railroad crossings along the locally-funded portions of the SMART project, and those same standards would also be applied to the Proposed Action, subject to CPUC prior approval.

The proposed rail alignment crosses Andersen Drive at an acute angle, which would require additional safety considerations. The City of San Rafael and SMART are working closely on the design of this crossing, taking into account signals, gates, and train operations, so that the tracks are cleared before a train enters the crossing, to avoid inadvertent entry into the crossing when trains are passing through. Section 2.9.4, Andersen Drive At-Grade Crossing provides details on the specific design for this crossing. Figure 2-5 shows a plan view of the conceptual design. The proposed concept has received tentative design approval from CPUC and is expected to receive formal approval in late 2014.

Also as mentioned in Chapter 2, per federal regulations, SMART's train operators would be required to sound their horns or use wayside horns at each of the Proposed Action's four at-grade crossings. All of these at-grade crossings are located in the City of San Rafael. The City could apply for an exemption to the horn requirement under FRA's Quiet Zone Establishment Process. Whether the City has determined if it would apply for the exemption is unknown at this time. Regardless, even if the City was to apply, whether FRA would grant the exemption cannot be predicted. Therefore, as part of the Proposed Action, the rule presumably still would apply and SMART trains would be required to sound their horns or use wayside horns at each crossing. The use of horns at crossings is discussed in more detail in Section 3.10, Noise and Vibration.

As noted in the Section 3.11.1, Affected Environment discussion, the existing rail trestle that crosses above Woodland Avenue/Bellam Boulevard was constructed in the 1920s, is inadequately anchored to its foundations, and does not meet modern design requirements. This structure would be replaced as part of the Proposed Action. The replacement structure would feature required vertical and horizontal clearances in accordance with modern safety standards. This component of the Proposed Action would result in an improved condition at this crossing over existing conditions.

Passenger Safety

Before the start of passenger service between Downtown San Rafael and Larkspur, SMART would submit appropriate safety and security plans to CPUC for approval, in accordance with CPUC General Order 164-D. Consistent with other transit systems operating throughout the U.S., SMART train operators would have primary responsibility for the safety of their passengers. Train operators would be able to contact system administration or SMART's emergency services for assistance, if needed, and would be able to modify train operations as appropriate. SMART staff and assigned law enforcement personnel also would be available, either at stations or as part of standard patrols, to provide assistance in maintaining passenger safety and security. SMART also would publish safety brochures and make safety presentations at schools, businesses, and community facilities to educate the public regarding safe riding protocol. Appropriate placards containing safety information would be posted on SMART vehicles and at stations to inform passengers of safety precautions and procedures. Closed-circuit-television monitoring systems would be installed on trains and at stations, as would "blue box" passenger alarm systems that could be activated in the event of an emergency.

Fire Protection Service

SMART would rely on SRFD and LFD for emergency response and fire safety for the Proposed Action. Before the start of the proposed rail service, training would be provided by SMART to both departments. Training would include vehicle construction for extrication operations, hazard recognition and abatement, and special firefighting tactics. SMART would assure that fire service personnel and equipment would have maximum access to SMART

facilities when responding to emergency incidents. All materials used in construction of SMART vehicles would be evaluated for fire resistance, and the appropriate fire suppression methods would be provided to the fire departments.

Police Service

SMART would rely on local police and County sheriff personnel for law enforcement service on a contract basis. These agencies could dedicate specific personnel to the SMART transit system, or they could respond to calls as needed. SMART also may contract with a private security firm to provide a security presence at stations and along the proposed rail alignment. Fare inspectors also would be part of system security and would serve as additional surveillance to deter crime. Furthermore, roving security checks by contracted law enforcement officers or private security personnel would be a part of system security.

Emergency Response

Construction

The potential for temporary delays would exist in response times of fire and police vehicles because of increased traffic congestion and/or road closure during construction activities on at-grade crossings. Although road closures would be limited and of short duration, emergency vehicles may need to alter their routes to avoid those areas when construction is occurring. The number of delays would vary, depending on location, type of improvement, and surrounding conditions (e.g., traffic demands, access, and pedestrian activity). SMART would notify local emergency service providers before beginning construction activities regarding road closures and would coordinate with local protection service providers to establish alternative routes and post appropriate signage. SMART has adopted such procedures for the IOS, currently under construction, and these same procedures would be implemented as part of the Proposed Action. This coordination with local protection service providers before beginning construction would avoid any adverse effect during construction activities.

Operation

As discussed in Chapter 2, Alternatives, weekday transit service between Santa Rosa and Larkspur is envisioned to operate on 30-minute headways in both southbound and northbound directions during AM and PM peak periods. Weekend service would operate on 3-hour headways.

Paramedic, fire, and police service providers could experience delays when approaching at-grade crossings, if a passenger rail train was present and the gates were down. Safe operating procedures require emergency responders to stop before at-grade crossings when the gates are in the down position, and to wait for trains to clear the crossing before proceeding. This may result in travel delays on average of about 40 seconds at the Third Street, Second Street, and Rice Drive crossings, and perhaps as much as 1.5 minutes at the Andersen Drive crossing.

Train operators may minimize emergency vehicle delays by remaining stopped at station platforms when emergency vehicles are in the area, slowing down or stopping to permit emergency vehicles to pass the train, or to proceed as quickly as possible through the crossing. In addition, if conditions allow, emergency vehicles could attempt a “queue jump” maneuver that would allow them to move to the front of the vehicle queue and immediately pass through when the gates were raised. In the event that a grade crossing was blocked because of a

train-related incident, emergency aid may be required from fire or police stations or from a neighboring jurisdiction, until the crossing was clear.

Safety and Security at Larkspur Station

The planned Larkspur Station would create a new activity center with increased pedestrian activity, passenger drop-offs and loadings, and bicycle traffic. These conditions would increase the potential for safety and/or security incidents at and in the vicinity of the station. In general, the activities at the station would require mixed circulation of autos and pedestrians in parking and drop-off areas, with an increased potential for auto-pedestrian conflicts, primarily during busy peak periods. The safety and security of SMART passengers using station facilities would be a concern during all time periods, although AM and PM peak periods would be the periods for greatest concern because of the higher levels of activity.

Before the start of passenger service, SMART would submit appropriate safety and security plans to CPUC for approval, in accordance with CPUC General Order 164-D. SMART stations are being designed to be open and well demarcated for pedestrian access. Sidewalks and pedestrian paths through parking areas would help separate pedestrian traffic from auto and bus traffic. Fencing or other barriers would be provided to direct pedestrian movements appropriately. Special provisions would be made for pedestrian access to station platforms. Pathways of travel for disabled individuals would be maintained and would conform with relevant federal regulations (e.g., compliance with the Americans with Disability Act). The station platform and nearby areas would be well lighted. Passenger drop-off and loading would be allowed only in designated areas.

SMART would rely on local police and County sheriff personnel for law enforcement services on a contract basis. These agencies could dedicate specific personnel to the SMART transit system, or they could respond to calls as needed. SMART also may contract with a private security firm to provide security at stations. Fare inspectors also would be part of system security and would serve as additional surveillance to deter crime. Furthermore, roving security checks by contracted law enforcement officers or private security personnel also would be a part of system security.

3.11.3 References

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3.12 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

The purpose of the Environmental Justice analysis, as defined in Executive Order 12898 (59 Federal Register 7629), is to consider whether project-related impacts are disproportionately borne by minorities or low income populations. Pursuant to this executive order and Department of Transportation (DOT) Order 5610.2(a) (DOT 2012), NEPA documents must analyze health and environmental effects on minorities and low-income populations living near a proposed project. This section addresses Executive Order 12898 by first determining whether Environmental Justice communities (defined as predominantly minority or predominantly low income, per federal guidelines) are within the Proposed Action area and, if so, whether potential effects of the Proposed Action would affect these communities disproportionately.

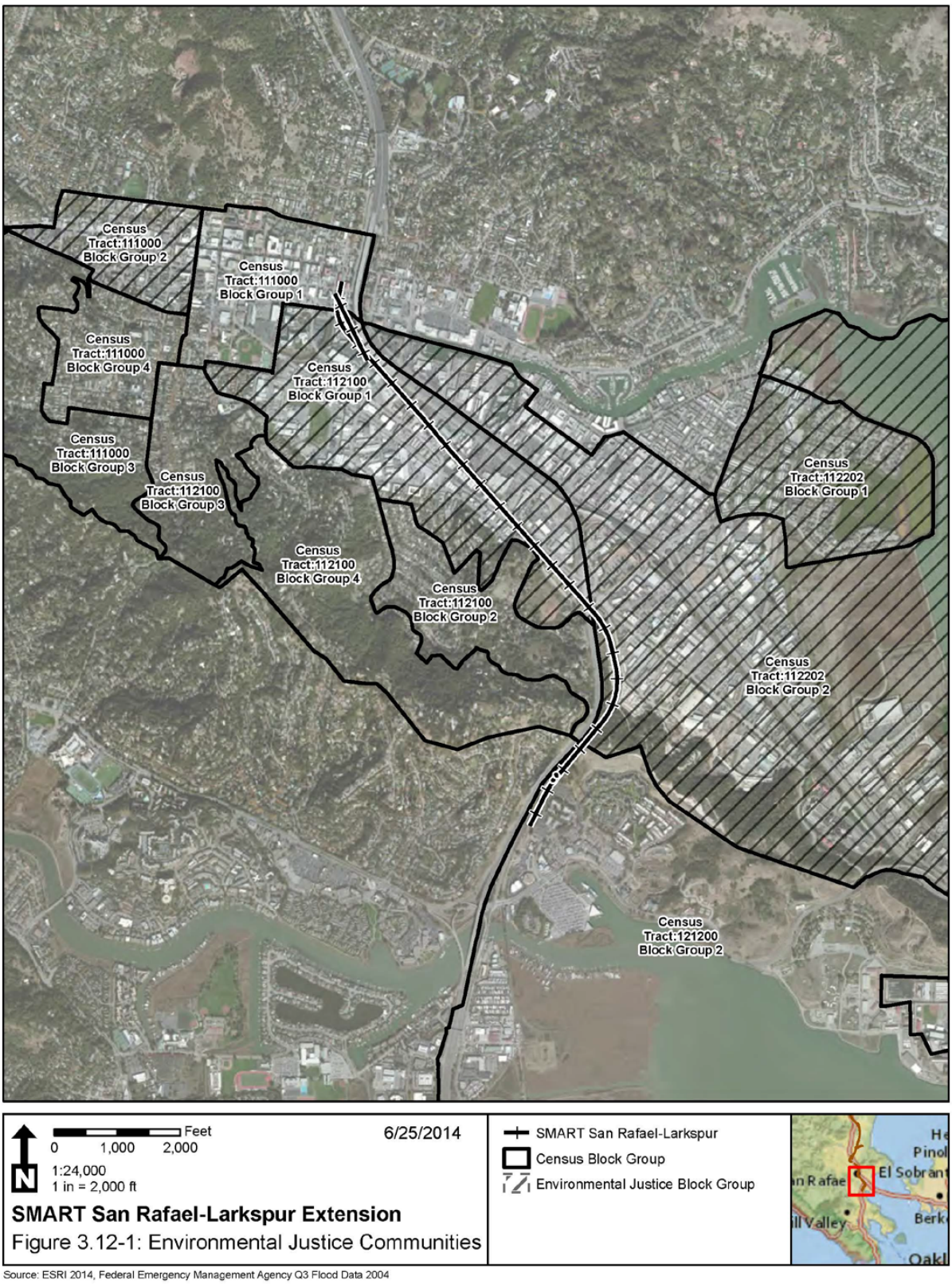
Previous analysis related to socioeconomics and environmental justice was not undertaken for the overall SMART project as part of the 2005 Draft EIR (SMART 2005), prepared as per CEQA, because the assessment of these topics is not required under CEQA.

Relevant guidance for implementing the executive order and evaluating environmental justice is provided by a number of federal agencies, including the following: Council on Environmental Quality (CEQ 1997); U.S. Department of Transportation (DOT 2012); FTA Circular 4703.1 (FTA 2012); and the U.S. Department of Health and Human Services (HHS 2014).

For the proposed rail alignment, the demographic characteristics of Census tract block groups surrounding the proposed rail alignment were evaluated based on data gathered from the 2010 Census. Figure 3.12-1 shows the block groups that were evaluated. The demographic characteristics reviewed include:

- Total population;
- Percent of population of minority status;
- Percent of population of low-income status;
- Percent of population of minority status in the regional area, defined as the City of San Rafael, the City of Larkspur, the County of Marin, and the State of California; and;
- Percent of population of low-income status in regional area, as defined above.

To determine if an Environmental Justice Community is present in the project area, comparisons were made between the demographic characteristics in and around the project area and those in Marin County and the State of California.



Source: ESRI 2014, Federal Emergency Management Agency Q3 Flood Data 2004

3.12.1 Affected Environment

Race and Ethnicity

Ethnic population data for the Census block groups adjacent to the Proposed Action rail alignment are presented in Table 3.12-1. Based on race and ethnicity data presented in the table, four Census block groups are adjacent to the alignment that are considered minority Environmental Justice Communities. This determination is based on the fact that the percentage of minority groups in those block groups are substantially greater than those reported for Marin County as a whole, and to a lesser degree, the State of California. The following Census Tract block groups are Environmental Justice Communities: Census Tract 1122.02 (Block Groups 1 and 2); Census Tract 1121 (Block Group 1); and Census Tract 1110 (Block Group 2). Figure 3.12-1 shows the locations of these block groups.

Income

The U.S. Department of Health and Human Services poverty guidelines for 2014 defined the poverty threshold as annual income of less than $11,670 for an adult individual under the age of 65 and annual income of less than $23,850 for a family of four persons (HHS 2014). Based on income data presented in Table 3.12-2, one block group (Census Tract 1121, Block Group 1) would be considered a low income community. The percentage of persons living below the poverty threshold in that block group is more than 10 percentage points higher than for Marin County. The residents of the remainder of the block groups in the Proposed Action vicinity would not be considered an Environmental Justice Community on the basis of income status, because the percentage of persons living below the poverty threshold does not vary substantially from that reported for the State of California, Marin County, San Rafael, or Larkspur. However, four of the Census block groups still would be considered Environmental Justice Communities based on ethnicity, as discussed previously.

3.12.2 Environmental Consequences

Based on applicable federal guidelines, the following alternatives would not have adverse and disproportionate effects on Environmental Justice communities. A *disproportionate effect* is defined as an effect that is predominantly borne, more severe, or of a greater magnitude in areas with environmental justice populations than in other areas.

Alternative 1: No Action Alternative

Under the No Action Alternative, the FTA would take no action and would provide no funding to SMART for the Downtown San Rafael to Larkspur Extension project. The project would not be constructed, and none of the effects associated with the Proposed Action would occur. No construction or operation activities would occur, and the project corridor would remain in its current state.

Alternative 2: SMART Downtown San Rafael to Larkspur Extension (Proposed Action)

Under the Proposed Action, the Downtown San Rafael to Larkspur Extension would be constructed and operated as described in Section 2, Alternatives of this EA. Potential effects on each environmental resource area are described next.

Air Quality

As discussed in Section 3.1, Air Quality, implementation of the Proposed Action would not violate applicable air quality standards or surpass defined thresholds during construction or operation. Therefore, implementation of the Proposed Action would not result in an adverse effect on air quality and would not disproportionally affect Environmental Justice Communities in the Proposed Action area.

Biological Resources

The analysis presented in Section 3.2, Biological Resources, determined that, with mitigation, implementation of the Proposed Action would not result in adverse impacts on sensitive species, sensitive habitats, or wetlands and waters of the U.S. Mitigation for the conservation of Southern DPS of green sturgeon and green sturgeon critical habitat would adequately lessen environmental effects on those special-status resources, and a number of Proposed Action activities, such as removal of derelict creosote-treated wooden piles, would have a beneficial effect for the species and other aquatic organisms. Therefore, with mitigation, implementation of the Proposed Action would not result in adverse effects on biological resources and would not disproportionally affect Environmental Justice Communities in the Proposed Action area.

Cultural Resources

Section 3.3, Cultural and Paleontological Resources, examined the potential for the Proposed Action to adversely affect historic resources, archaeological resources, paleontological resources, or human remains within the Proposed Action area. The analysis determined that no adverse effects on any of these resources would occur from implementation of the Proposed Action. The State Historic Preservation Officer has concurred with the finding of no effect to historic properties (see Appendix C). Therefore, implementation of the Proposed Action would not create an adverse effect related to cultural and paleontological resources and would not disproportionally affect Environmental Justice Communities in the Proposed Action area.

Energy

Section 3.4, Energy, assessed energy use associated with the Proposed Action. The analysis found that the Proposed Action, with mitigation, would have a beneficial effect related to energy consumption because it would reduce the amount of vehicle miles traveled within the region. The Proposed Action would not result in wasteful, inefficient or unnecessary use of energy, and it would not place a substantial demand on regional energy supply or require substantial additional capacity. Therefore, implementation of the Proposed Action would not create an adverse effect related to energy and would not disproportionally affect Environmental Justice Communities in the Proposed Action area.

Geology and Soils

Section 3.5, Geology and Soils, assessed the potential effects of the Proposed Action related to geology and soils. The analysis found that, with mitigation, no adverse effect would occur related to erosion, topsoil loss, alteration of topography, seismically-induced ground shaking or ground failure, liquefaction, landslides or slope failures, or

Table 3.12-1: Race, Ethnicity, and Proportion of Total Minority

Geographic Area	Race: White alone	Race: White alone	Race: Black or African American alone	Race: Black or African American alone	Race: American Indian and Alaska Native alone	Race: American Indian and Alaska Native alone	Race: Asian alone	Race: Asian alone	Race: Native Hawaiian and Other Pacific Islander alone	Race: Native Hawaiian and Other Pacific Islander alone	Race: Some Other Race alone	Race: Some Other Race alone	Race: Two or More Races	Race: Two or More Races	Ethnicity: Hispanic or Latino	Ethnicity: Hispanic or Latino	Total Minority	Total Minority	EJ Minority Community?
	White alone	White alone	Black or African American alone	Black or African American alone	American Indian and Alaska Native alone	American Indian and Alaska Native alone	Asian alone	Asian alone	Native Hawaiian and Other Pacific Islander alone	Native Hawaiian and Other Pacific Islander alone	Some Other Race alone	Some Other Race alone	Two or More Races	Two or More Races	Hispanic or Latino	Hispanic or Latino	Total Minority	Total Minority	
	Number of Persons	Percent	Number of Persons	Percent	Number of Persons	Percent	Number of Persons	Percent	Number of Persons	Percent	Number of Persons	Percent	Number of Persons	Percent	Number of Persons	Percent	Number of Persons	Percent	
Block Group 1, Census Tract 1122.02	1,680	31.5%	60	1.1%	52	1.0%	497	9.3%	1	0.0%	912	17.1%	207	3.9%	1,932	36.2%	3,661	68.5%	**Yes**
Block Group 2 (part), Census Tract 1122.02	338	23.0%	13	0.9%	31	2.1%	7	0.5%	10	0.7%	374	25.5%	35	2.4%	659	44.9%	1,129	77.0%	**Yes**
Block Group 2 (part), Census Tract 1212	976	69.1%	51	3.6%	3	0.2%	56	4.0%	0	0.0%	86	6.1%	57	4.0%	183	13.0%	436	30.9%	No
Block Group 1 (part), Census Tract 1121	567	29.9%	18	0.9%	10	0.5%	43	2.3%	0	0.0%	489	25.8%	41	2.2%	729	38.4%	1,330	70.1%	**Yes**
Block Group 2 (part), Census Tract 1121	563	77.1%	8	1.1%	1	0.1%	41	5.6%	1	0.1%	11	1.5%	31	4.2%	74	10.1%	167	22.9%	No
Block Group 3, Census Tract 1121	953	72.0%	16	1.2%	6	0.5%	48	3.6%	2	0.2%	54	4.1%	83	6.3%	161	12.2%	370	28.0%	No
Block Group 4 (part), Census Tract 1121	772	74.7%	15	1.5%	7	0.7%	40	3.9%	0	0.0%	45	4.4%	41	4.0%	114	11.0%	262	25.3%	No
Block Group 1, Census Tract 1110	858	55.6%	61	4.0%	14	0.9%	136	8.8%	4	0.3%	113	7.3%	85	5.5%	272	17.6%	685	44.4%	No
Block Group 2, Census Tract 1110	568	49.3%	45	3.9%	13	1.1%	48	4.2%	1	0.1%	159	13.8%	50	4.3%	267	23.2%	583	50.7%	**Yes**
Block Group 3, Census Tract 1110	1,458	72.1%	26	1.3%	26	1.3%	75	3.7%	1	0.0%	113	5.6%	79	3.9%	243	12.0%	563	27.9%	No
Block Group 4, Census Tract 1110	1,376	54.5%	49	1.9%	50	2.0%	73	2.9%	16	0.6%	274	10.8%	81	3.2%	608	24.1%	1,151	45.5%	No
Total	10,109	49.4%	362	1.8%	213	1.0%	1064	5.2%	36	0.2%	2,630	12.9%	790	3.9%	5,242	25.6%	10,337	50.6%	
Communities																			
San Rafael	40,727	54.3%	1,154	1.5%	709	0.9%	3,513	4.7%	126	0.2%	8,513	11.3%	2,964	4.0%	17,302	23.1%	34,281	45.7%	n/a
Larkspur	10,311	80.3%	186	1.4%	26	0.2%	563	4.4%	13	0.1%	343	2.7%	484	3.8%	918	7.1%	2,533	19.7%	n/a
County																			
Marin	201,963	69.3%	6,987	2.4%	1,523	0.5%	13,761	4.7%	509	0.2%	16,973	5.8%	10,693	3.7%	39,069	13.4%	89,515	30.7%	n/a
State																			
California	21,453,934	41.8%	2,299,072	4.5%	362,801	0.7%	4,861,007	9.5%	144,386	0.3%	6,317,372	12.3%	1,815,384	3.5%	14,013,719	27.3%	29,813,741	58.2%	n/a

Source: U.S. Census Bureau 2010

Table 3.12-2: Population Below the Poverty Level and Key Economic Indicators

Geographic Area	Median household income in the past 12 months (in 2011 inflation-adjusted dollars)	Per capita income in the past 12 months (in 2011 inflation-adjusted dollars)	Below Poverty Line	Below Poverty Line	Total Population:	EJ Poverty Community?
			#	%		
Block Group 1, Census Tract 1110	$63,490	$45,805	31	2.6%	1,172	No
Block Group 2, Census Tract 1110	$46,005	$39,767	33	4.6%	712	No
Block Group 3, Census Tract 1110	$102,188	$60,106	73	5.2%	1,411	No
Block Group 4, Census Tract 1110	$52,000	$32,461	192	9.2%	2,084	No
Block Group 1, Census Tract 1121	$45,824	$22,819	247	18.0%	1,369	Yes
Block Group 2, Census Tract 1121	$100,302	$59,051	35	3.7%	937	No
Block Group 3, Census Tract 1121	$73,472	$50,787	111	12.6%	880	No
Block Group 4, Census Tract 1121	$121,250	$62,208	61	5.2%	1,177	No
Block Group 1, Census Tract 1122.02	$49,792	$34,375	186	6.2%	3,023	No
Block Group 2, Census Tract 1122.02	$32,714	$12,325	40	8.7%	459	No
Block Group 1, Census Tract 1212	$84,519	$54,132	0	0.0%	1,050	No
Block Group 2, Census Tract 1212	$69,282	$28,972	35	1.6%	2,165	No
Block Group 3, Census Tract 1212	$135,441	$64,914	148	8.2%	1,815	No
Block Group 4, Census Tract 1212	$74,914	$42,244	14	2.4%	589	No
Total	n/a	n/a	1206	6.4%	18,843	
Communities						
San Rafael	$71,343	$43,042	5974	10.8%	55,299	n/a
Larkspur	$86,046	$64,646	551	4.7%	11,779	n/a
County						
Marin	$89,605	$54,605	17502	7.2%	242,120	n/a
State						
California	$61,632	$29,634	5211481	14.4%	36,211,794	n/a

Source: U.S. Census Bureau 2012

expansive or corrosive soils. No adverse effect would occur related to geology and soils from implementation of the Proposed Action, and it would not disproportionally affect Environmental Justice Communities in the Proposed Action area.

Greenhouse Gas Emissions and Climate Change

Section 3.6, Greenhouse Gas Emissions and Climate Change, assessed the Proposed Action's potential effects on climate change. GHG emissions were evaluated in terms of short-term, temporary construction-related emissions and long-term operational emissions. Operation of the Proposed Action would result in net beneficial effects associated with GHG emissions through reduction of vehicle miles traveled. The Proposed Action would contribute a further beneficial effect of supporting and furthering GHG emission reduction plans, policies, and regulations. Because implementation of the Proposed Action would not create an adverse effect related to climate change, it would not disproportionally affect Environmental Justice Communities in the Proposed Action area.

Hazards and Hazardous Materials

Section 3.7, Hazards and Hazardous Materials, discusses the known hazardous materials located in the vicinity of the Proposed Action area. Acutely hazardous materials are not known to exist in the Proposed Action area, and their use is not part of the Proposed Action. Other recognized environmental conditions have not been recorded or are not known to exist within the Proposed Action area. Some potential would exist for encountering previously unknown hazardous materials during construction, particularly phenol and creosol during removal of old railroad ties. However, the 2005 Draft EIR prescribed a mitigation measure to address this potential effect. Implementation of this mitigation measure would be applied to the Proposed Action. This mitigation measure already has been integrated with SMART construction protocols, and it would address the potential effects that could arise from encountering previously unknown hazardous materials during construction. Therefore, implementation of the Proposed Action, with mitigation, would not result in an adverse effect related to hazardous materials and would not disproportionately affect Environmental Justice Communities in the Proposed Action area.

Hydrology and Water Quality

Potential effects on water quality of surface waters, depletion of groundwater resources, and downstream flooding are discussed in Section 3.8, Hydrology and Water Quality. The Proposed Action would include construction activities along the banks of San Rafael Creek and an unnamed channel. With implementation of the relevant mitigation measures from the 2005 Draft EIR, in addition to the implementation of standard environmental compliance measures already incorporated within the SMART construction protocols, no adverse effect would occur related to erosion, sedimentation, or contamination of local waterways.

Implementation of Mitigation Measure WR-2 from the 2005 Draft EIR would require that the proposed replacement trestles and retaining wall be designed and constructed so that they would not raise flood levels and work in the floodplain would be avoided or minimized. In addition, any potentially adverse effect associated with non-point source pollutants created as part of the Proposed Action would be mitigated through implementation of standard best management practices, which have already been integrated into SMART's construction protocols. Therefore, implementation of the Proposed Action, with mitigation, would not result in an adverse effect on

hydrology and water quality, and would not disproportionally affect Environmental Justice Communities in the Proposed Action area.

Land Use

The analysis presented in Section 3.9, Land Use, discussed the potential for the Proposed Action to result in a change in land use that would be incompatible with surrounding areas, conflict with an applicable land use plan, policy, or regulation, or physically divide an established community. The analysis found that the Proposed Action would not conflict with established uses, land use goals or plans, or be incompatible with adjacent and planned uses. The proposed rail alignment is an established rail corridor that would not require the use of lands adjacent to the Proposed Action area. Furthermore, the City of San Rafael and City of Larkspur General Plans call for the use of the existing NWP Railroad right-of-way for passenger rail service, and the Station Area Plans for the City of San Rafael include a long-range vision to create land uses to support mixed-use and transit-oriented development. Thus, the Proposed Action would facilitate realization of these goals and policies, and would not conflict with the land use goals for either jurisdiction. Therefore, implementation of the Proposed Action would not result in an adverse effect related to land use and would not disproportionately affect Environmental Justice Communities in the Proposed Action area.

Noise and Vibration

The analysis presented in Section 3.10, Noise and Vibration, found that no potential effect would occur related to vibration during construction and operation of the Proposed Action. However, two noise-sensitive receptor locations would be affected by the use of train horns during train passbys at the Andersen Drive crossing. Two mitigation options could be implemented to reduce operational noise effects to a level below the FTA's Moderate Impact criteria. These are the implementation of Quiet Zones and the use of wayside horns rather than train-mounted horns. Implementation of either of these mitigation measures would attenuate the effects of train horn noise on the sensitive receptors. With implementation of these mitigation measures, no adverse noise effect would occur and would not result in disproportionally affecting Environmental Justice Communities in the Proposed Action area.

Safety and Security

The analysis presented in Section 3.11, Safety and Security, found that any safety and security effects that could result from implementation of the Proposed Action could be effectively mitigated through appropriate design and operation strategies. SMART has integrated physical safety and security features into the design of its rail alignment, rail vehicles, at-grade crossings, and rail operations. Before the start of operation of the Proposed Action, SMART would be required to comply with the applicable planning and reporting requirements of the California Public Utilities Commission and the Federal Railroad Administration. Implementation of agency-approved safety and operation plans, together with implementation of standard safe operating practices, would ensure that the Proposed Action would be operated in a safe and secure manner for the riding public and surrounding communities. Therefore, implementation of the Proposed Action would not result in an adverse effect related to safety and security and would not disproportionately affect Environmental Justice Communities in the Proposed Action area.

Transportation and Parking

The analysis in Section 3.13, Transportation and Parking, found that, with mitigation, implementation of the Proposed Action would not create an adverse effect on regional access roadways, local access roadways, intersection operating conditions, area transit services, bicycle and pedestrian users, or parking. Therefore, implementation of the Proposed Action would not result in an adverse effect related to transportation and parking and would not disproportionately affect Environmental Justice Communities in the Proposed Action area.

Visual Resources

As discussed in Section 3.14, Visual Resources, no specific scenic resources, such as distinctive buildings, historic structures, or high-quality views, exist in the Proposed Action area. Therefore, no visual resources would be affected by implementation of the Proposed Action. The Proposed Action would be constructed within an existing rail alignment, and operation of the Proposed Action would be consistent with the existing environment and visual character of the area. The analysis also determined that any additional lighting associated with the Proposed Action's operation would be consistent with the existing urban environment in the Proposed Action area. Further, the 2005 Draft EIR prescribed mitigation measures to direct project design in such a manner as to reduce visual effects. Therefore, with mitigation, implementation of the Proposed Action would not result in an adverse effect related to visual resources and would not disproportionately affect Environmental Justice Communities in the Proposed Action area.

3.12.3 Determination of Disproportionate Effects

The purpose of the preceding potential effects assessment summary of this EA is to disclose any potential adverse environmental effects of the Proposed Action. In every instance that the Proposed Action was found to potentially have adverse effects on Environmental Justice Communities, feasible mitigation measures, that would apply to the entire alignment, were identified that would reduce or negate the adverse effects. With implementation of the mitigation measures, the offsetting project benefits, and compliance with standard regulatory and legal requirements, any adverse effects on Environmental Justice Communities within the Proposed Action area would be reduced to levels that would not be adverse. The Proposed Action would result in benefits to environmental justice populations, including improved connectivity and access to transit, , greater access to the regional transit network, and improved mobility. These project benefits help offset potential adverse effects that may occur on environmental justice populations. Iimplementation of the Proposed Action would not disproportionately affect Environmental Justice Communities in the Proposed Action area.

SMART will continue to actively solicit input regarding Proposed Action alternatives and design. Environmental Justice Communities of concern would receive the same level of mitigation that other population groups along the proposed rail alignment would receive. Such mitigation measures would include best management practices during construction, noise and vibration abatement controls, and compliance with federal and state laws for property acquisition.

3.12.4 References

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3.13 TRAFFIC AND TRANSPORTATION

This section summarizes the potential traffic and transportation effects, including potential transit, bicycle, and pedestrian effects that would result from implementation of the EA alternatives. Previous analysis for traffic and transportation was undertaken for the entire SMART alignment as a part of the 2005 Draft EIR (SMART 2005), prepared as per CEQA. That analysis can be found in Section 3.6 of the 2005 Draft EIR.

3.13.1 Affected Environment

Regional and Local Access

Regional Access Roadways

U.S. Highway 101 (US 101) runs roughly parallel to the proposed rail alignment and serves as a major regional connector for Marin County and the North San Francisco Bay (North Bay) region. The nearest interchange to the northern terminus of the Proposed Action area is the Central San Rafael Interchange (Exit 452), a full-access, modified diamond interchange with south ramps at Hetherton Street/Second Street (southbound on-ramp) and Irwin Street/Second Street (northbound off-ramp), and north ramps at Hetherton Street/Mission Avenue (southbound off-ramp) and Irwin Street/Mission Avenue (northbound on-ramp). Regional access to and from the Proposed Action area and the East San Francisco Bay (East Bay) is provided by Interstate 580 (I-580), which has a junction with US 101 in southeastern San Rafael.

US 101 and I-580 serve as the primary regional access roadways for Larkspur. The nearest US 101 interchange to the southern terminus of the Proposed Action area is located at Sir Francis Drake Boulevard (Exits 450A and 450B), a full-access, modified diamond interchange in close proximity to the site of the planned Larkspur Station. The nearest I-580 interchange is located at Francisco Boulevard East (Exit 2B), a full-access, modified diamond interchange at San Quentin Point east of Larkspur, with additional flyovers from westbound I-580 (Exit 2A) to westbound Sir Francis Drake Boulevard and from eastbound Sir Francis Drake Boulevard to eastbound I-580.

Local Access Roadways: Downtown San Rafael

The Proposed Action rail alignment would begin in Downtown San Rafael at Third Street, immediately south of the Downtown San Rafael Station. The station is currently under construction and will serve as the southern termini for the locally-funded SMART project. Principal local access roadways in the vicinity of the alignment in the City of San Rafael are described below.

Third Street is a major westbound arterial that operates as a one-way couplet with Second Street to the north. In the immediate vicinity of the Downtown San Rafael station site, Third Street generally consists of three travel lanes with no on-street parking provided.

Lincoln Avenue is a two-way, north-south collector and the major north-south local access through Downtown San Rafael. In the immediate vicinity of the Downtown San Rafael Station site, Lincoln Avenue is a two-lane road with metered on-street parking on both sides.

Hetherton Street is a minor southbound collector in Downtown San Rafael. In the immediate vicinity of the Downtown San Rafael Station site, Hetherton Street operates as a one-way couplet with Irwin Street. South of Fourth Street, Hetherton Street consists of four travel lanes with no on-street parking.

Irwin Street is a minor northbound collector in Downtown San Rafael that operates as a one-way couplet with Hetherton Street between the US 101 southbound on-ramp and the northbound off-ramp at Second Street, and US 101 southbound off-ramp and northbound on-ramp at Mission Avenue. Between Second Street and Third Street, Irwin Street consists of four travel lanes, narrowing to three travel lanes between Third Street and Fourth Street; no on-street parking is provided on either of these segments. South of US 101, Irwin Street is a two-lane roadway within the commercial and industrial area south of Downtown San Rafael.

Francisco Boulevard West is a heavily traveled, two-lane arterial, oriented generally in a northbound/southbound direction. The roadway serves as a frontage road along the west side of US 101, and also provides access to businesses in the commercial and industrial area adjacent to the freeway and south of Downtown San Rafael. Based on data collected in 2003, average daily traffic (ADT) on Francisco Boulevard West is approximately 7,700 vehicles north of Rice Drive.

Rice Drive is a minor two-lane collector that lies within the commercial and industrial area south of Downtown San Rafael.

Andersen Drive is a heavily traveled, two-lane arterial, oriented generally in a northbound/southbound direction. A southbound left-turn pocket, located at the intersection of Andersen Drive and Francisco Boulevard West, serves as a feeder to a southbound US 101 on-ramp. Based on data collected in 2008, ADT on Andersen Drive is over 15,000 vehicles north of Francisco Boulevard West and over 24,000 vehicles south of Francisco Boulevard West.

At-Grade Crossings

Six existing and inactive grade crossings are located in the City of San Rafael on the Proposed Action rail alignment. There are no grade crossings in the City of Larkspur. The six crossings in San Rafael are located on the following roadways:

- Third Street;
- Second Street;
- West Francisco Boulevard;
- Irwin Street;
- Rice Drive; and
- Andersen Drive.

Andersen Drive currently is not recognized as an existing crossing by the California Public Utilities Commission (CPUC). Andersen Drive was constructed over the former Northwestern Pacific (NWP) Railroad tracks in the late 1990s. A grade crossing had not been located there because at the time of NWP operations, Andersen Drive did not cross the rail line. When Andersen Drive was extended over the tracks in the late 1990s, the trackbed and rails were covered with paving material. Because the tracks at that time were inactive, no crossing controls or signage

was installed. Despite this lack of official recognition as a crossing, for all practical purposes the area is a crossing and would be recognized officially as such on approval of the CPUC, installation of required crossing controls, and the return of rail service to the area envisioned as part of the Proposed Action.

Local Access Roadways: Larkspur

Sir Francis Drake Boulevard is major east-west arterial providing secondary regional and primary local access through Larkspur. In the immediate vicinity of the Larkspur Ferry Terminal and Larkspur Landing mixed-use development, Sir Francis Drake Boulevard generally consists of two travel lanes in each direction, separated by a median, widening to three travel lanes in each direction at the US 101 interchange, with additional left- and right-turn pockets provided at many intersections. On-street parking is provided along the north side of the road, from Larkspur Landing Circle (West) to approximately 500 feet east of Larkspur Landing Circle (East). East of Larkspur, Sir Francis Drake Boulevard continues east to Andersen Drive, with flyovers connecting to the Richmond–San Rafael Bridge.

Larkspur Landing Circle is a minor collector road, serving the Larkspur Landing development opposite Sir Francis Drake Boulevard from the Larkspur Ferry Terminal, connecting with Sir Francis Drake Boulevard at two points approximately 1,500 feet apart. Larkspur Landing Circle generally provides one to two travel lanes in each direction, with additional left-turn pockets to access adjacent surface parking lots. No on-street parking is provided along Larkspur Landing Circle, and all intersections are stop-controlled.

Traffic

Traffic operations were analyzed at 12 signalized study intersections—eight in the City of San Rafael and four in the City of Larkspur—which represent locations where the Proposed Action operations potentially could affect traffic. See Figure 3.13-1 for the location of the study intersections addressed in the transportation analysis.

The intersection analysis was conducted using the Synchro 8.0 software package and the 2000 Highway Capacity Manual (HCM) methodology (Transportation Research Board 2000) that is based on level of service (LOS). The LOS methodology is a qualitative description of the performance of an intersection based on average delay per vehicle. For signalized intersections, the HCM methodology determines the capacity of each lane group approaching the intersection.

The LOS then is based on average delay (in seconds per vehicle) for the various movements within the intersection. A combined weighted average delay and LOS then are presented for the intersection. Intersection LOS ranges from LOS A, which indicates free flow or excellent conditions with short delays, to LOS F, which indicates congested or overloaded conditions with extremely long delays. Consistent with previously approved studies for the SMART project (the 2006 certified Sonoma-Marin Area Rail Transit Project Final Environmental Impact Report [SMART 2006]), LOS A through LOS D are considered excellent to satisfactory levels of service, and LOS E and LOS F represent unacceptable levels of service. The LOS criteria for intersections are summarized in Table 3.13-1.

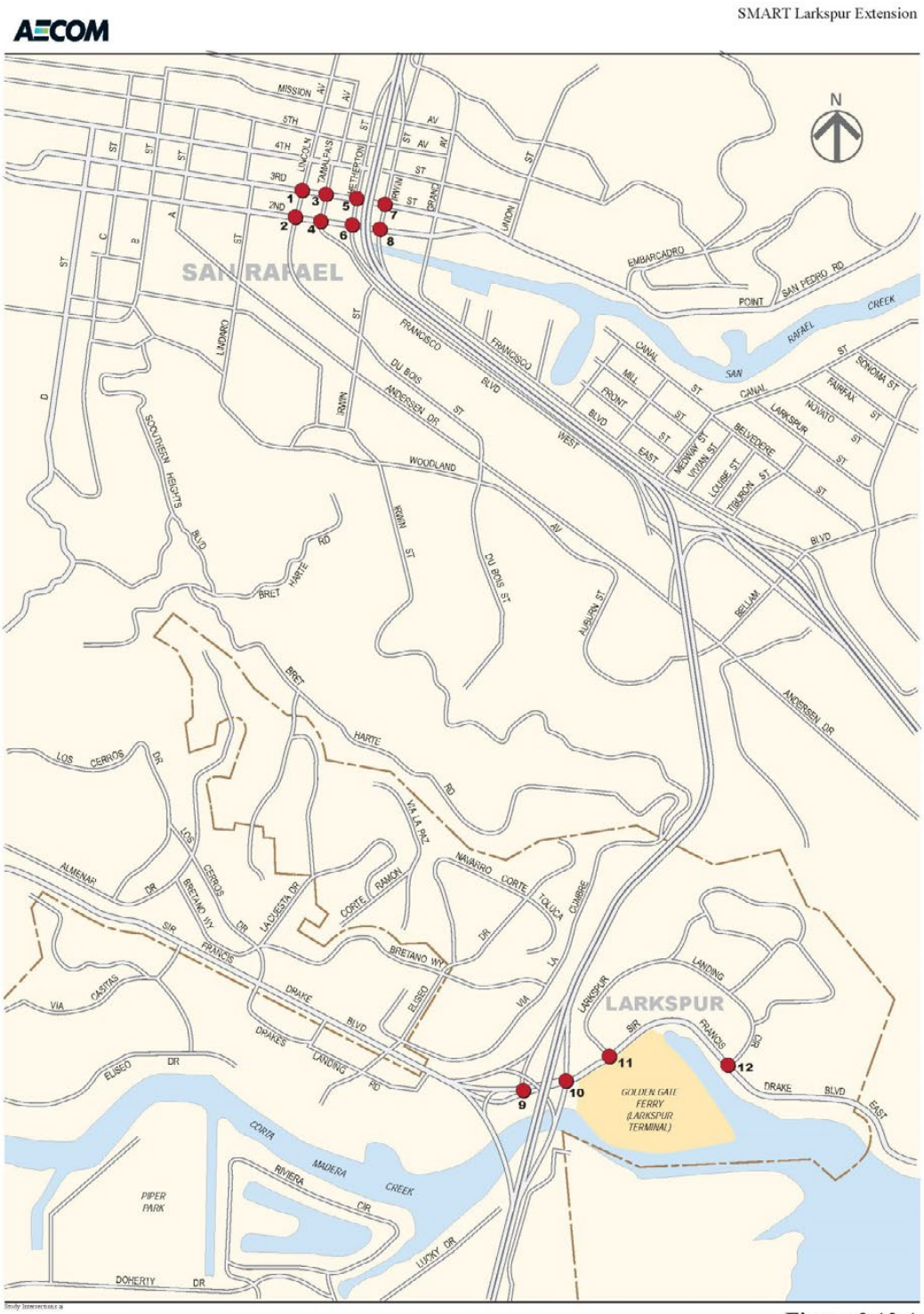


Figure 3.13-1
Intersection Analysis Locations

Table 3.13-1: Level of Service Criteria for Intersections

LOS	Control Delay per Vehicle (seconds)	Description
A	≤ 10.0	No delay
B	> 10.0 and ≤ 20.0	Minor delay
C	> 20.0 and ≤ 35.0	Moderate delays
D	> 35.0 and ≤ 55.0	Unacceptable delays
E	> 55.0 and ≤ 80.0	High delays
F	> 80.0	Very high delays

Source: Transportation Research Board 2000

This analysis also included an analysis of traffic conditions for the local access roadways serving the Proposed Action project area. Local general plans include LOS standards for roadway segments in the Proposed Action area. The LOS criteria for these local roadway segments are based on the volume-to-capacity (v/c) ratio, a calculation of the actual traffic carried by the roadway compared to its theoretical capacity. Roadway segment LOS ranges from LOS A, which indicates a roadway segment operating well below capacity, to LOS F, which represents a roadway segment operating above capacity. Table 3.13-2 provides a summary of the local roadway segment LOS criteria used in this analysis.

Table 3.13-2: Level of Service Criteria for Local Roadway Segments

LOS	v/c Range	Description
A	≥ 0.00 and ≤ 0.60	Low volumes: primarily free-flow operations. Vehicle density is very low and drivers can freely maneuver within the traffic stream. Drivers can maintain their desired speeds with little or no delay.
B	> 0.60 and ≤ 0.70	Stable flow with potential for some restriction of operating speeds because of traffic conditions. Maneuvering is only slightly restricted and travel delays are very small with vehicle density remaining low.
C	> 0.70 and ≤ 0.80	Stable operations; however, the ability to maneuver is more restricted by the increase in traffic volumes. Relatively satisfactory operating speeds prevail, but adverse roadway conditions or demand increases result in some travel delay.
D	> 0.80 and ≤ 0.90	Approaching unstable traffic flow, where small increases in volume can cause noticeable travel delays. Most drivers are restricted in their ability to maneuver and in their selection of travel speeds. Comfort and convenience are low but tolerable.
E	> 0.90 and < 1.00	These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.
F	Varies (≥ 1.00)	This level, considered to be unacceptable to most drivers, often occurs with over saturation—that is, when arrival flow rates exceed the capacity of the intersection. It also may occur at high v/c ratios below 1.0, with many individual cycle failures. Poor progression and long cycle lengths also may be major contributing causes to such delay levels.

Note:
Volume-to-capacity ratio represents the average traffic volume divided by the theoretical roadway capacity.
Source: Transportation Research Board 2000

Operating Conditions of Regional Access Roadways

A regional access roadway analysis was conducted for the segment of US 101 between North San Pedro Road in San Rafael and Sir Francis Drake Boulevard in Larkspur. US 101 is the only continuous north-south regional access roadway that serves Marin County within the vicinity of the Proposed Action area. Similar to the local access roadway analysis, the regional access roadway LOS criteria were based on the volume-to-capacity ratio of the roadway segment. These LOS criteria are summarized in Table 3.13-3, and they are consistent with the accepted California Department of Transportation (Caltrans) standards as presented in the Guide for the Preparation of Traffic Impact Studies (Caltrans 2002).

Table 3.13-3: Level of Service Criteria for Regional Roadway Segments

LOS	v/c Range	Description
A	≥ 0.00 and ≤ 0.30	Free flow operations with average operating speeds at, or above, the speed limit. Vehicles are unimpeded in their ability to maneuver.
B	> 0.30 and ≤ 0.50	Free flow operations with average operating speeds at the speed limit. Ability to maneuver is slightly restricted. Minor incidents cause some local deterioration in operations.
C	> 0.50 and ≤ 0.71	Stable operations with average operating speeds near the speed limit. Freedom to maneuver is noticeably restricted. Minor incidents cause substantial local deterioration in service.
D	> 0.71 and ≤ 0.89	Speeds begin to decline slightly with increasing flows. Freedom to maneuver is more noticeably restricted. Minor incidents create queuing
E	> 0.89 and < 1.00	Operations at capacity. Vehicle spacing causes little room to maneuver. Any disruption to the traffic stream can cause a wave of delay that propagates throughout the upstream traffic flow. Minor incidents cause serious breakdown of service with extensive queuing. Maneuverability is extremely limited.
F	Varies (≥ 1.00)	Operations with breakdowns in vehicle flow. Volumes exceed capacity, causing bottlenecks and queue formation.

Note:
[1] Maximum volume-to-capacity ratios are based on freeway capacity assuming a 65-mile per hour free flow speed.
Sources: Caltrans 2002; Transportation Research Board 2000; City of Larkspur 2014a, 2014b

Traffic volumes in the northbound and southbound directions of US 101 in the vicinity of the Proposed Action area were obtained from the Freeway Performance Measurement System for the weekday AM and PM peak periods, and were calculated as the average of three typical weekdays in 2013 (March 26, 2013 to March 28, 2013). The v/c ratio was determined assuming a theoretical freeway capacity of 9,900 vehicles per hour (2,200 vehicles per mixed-flow lane, and 1,100 vehicles per high-occupancy vehicle [HOV]/auxiliary lane). The resulting v/c ratio and LOS for existing conditions are summarized in Table 3.13-4.

Table 3.13-4: Regional Access Roadway Segment Level of Service—Existing Conditions (US 101)

		Weekday AM Peak Hour	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday PM Peak Hour
Roadway	**Direction**	**LOS**	**v/c**	**LOS**	**v/c**
US 101	NB	A	0.25	B	0.45
	SB	C	0.60	B	0.47

Source: AECOM 2014

As shown in Table 3.13-4, both the northbound and southbound directions of US 101 operate at acceptable conditions (LOS D or better) under existing conditions.

Intersection Operating Conditions

Intersection turning movement counts were obtained from the Larkspur SMART Station Area Plan Existing Conditions Report (SMART 2012b) and the SMART Traffic Analysis Update for Downtown San Rafael (SMART 2013). Because the intersection turning movement counts presented in these reports were collected in October 2011, a typical growth rate of 1 percent per year was applied to these volumes to approximate traffic volumes in 2013. Existing conditions lane geometry and traffic volumes for each study intersection are shown in Figure 3.13-2.

Downtown San Rafael

Existing conditions LOS is summarized in Table 3.13-5.

Table 3.13-5: Intersection Level of Service—Existing Conditions (Downtown San Rafael)

Intersection	Control Type	Existing Conditions Weekday AM Peak Hour LOS	Existing Conditions Weekday AM Peak Hour Delay[1]	Existing Conditions Weekday PM Peak Hour LOS	Existing Conditions Weekday PM Peak Hour Delay[1]
1 Lincoln/Third	Signal	C	21.9	B	13.2
2 Lincoln/Second	Signal	B	17.8	B	15.9
3 Tamalpais/Third	Signal	A	6.5	A	8.5
4 Tamalpais/Second/Francisco West	Signal	A	9.4	B	13.4
5 Hetherton/Third	Signal	B	17.7	C	26.7
6 Hetherton/Second/US 101 SB On-Ramp	Signal	D	45.0	D	41.3
7 Irwin/Third	Signal	B	19.2	C	24.5
8 Irwin/Second/US 101 NB Off-Ramp	Signal	B	17.5	D	48.7

Note:
[1] Delay presented in seconds per vehicle.
Source: AECOM 2014

As shown in Table 3.13-5, all study intersections currently operate at acceptable conditions (LOS D or better) during the weekday AM and PM peak hours. Field observations of existing traffic conditions in Downtown San Rafael indicated that some concentrated congestion exists near freeway access points.

Andersen Drive

Andersen Drive would be crossed at-grade under the Proposed Action. A southbound left-turn pocket, located at the intersection of Andersen Drive and Francisco Boulevard West, serves as a feeder to a southbound US 101 on-ramp. Existing conditions LOS for the intersections studied along Andersen Drive and Francisco Boulevard are summarized in Table 3.13-6.

As shown in Table 3.13-6, all intersections studied as part of the analysis for the Andersen Drive crossing operate at an acceptable LOS under existing conditions.

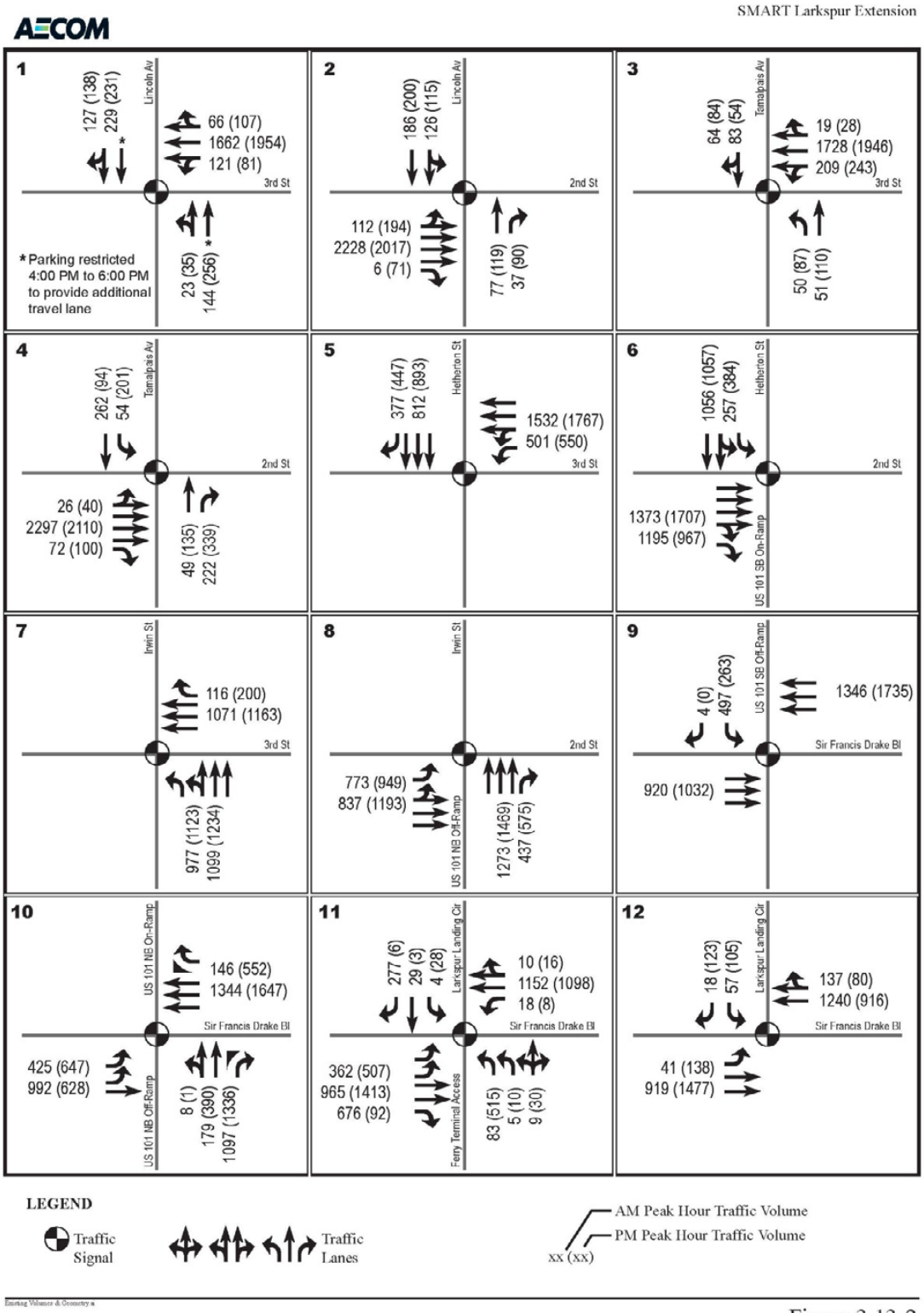


Figure 3.13-2
Intersection Lane Geometry and Traffic Volumes - Existing Conditions

Table 3.13-6: Intersection Level of Service—Existing Conditions (Andersen Drive)

Intersection	Control	Existing Conditions LOS	Existing Conditions Delay[1]
Francisco Boulevard West/US 101 SB Ramps	Signal	C	30.8
Andersen Drive/Francisco Boulevard West	Signal	C	29.6
Andersen Drive/Old US 101 SB Ramps	Signal	A	0.9
Bellam Boulevard/Andersen Drive	Signal	D	53.5
Andersen Drive/DuBois Street	Signal	C	31.6

Note:
[1] Delay presented in seconds per vehicle.
Source: AECOM 2014

Larkspur

Existing conditions LOS along Sir Francis Drake Boulevard is summarized in Table 3.13-7. As shown in this table, all study intersections currently operate at acceptable conditions (LOS D or better) during the weekday AM and PM peak hours. Field observations of existing traffic conditions in Larkspur indicated that some concentrated congestion exists near freeway access points along Sir Francis Drake Boulevard.

Table 3.13-7: Intersection Level of Service—Existing Conditions (Larkspur)

Intersection	Control Type	Existing Conditions Weekday AM Peak Hour LOS	Existing Conditions Weekday AM Peak Hour Delay[1]	Existing Conditions Weekday PM Peak Hour LOS	Existing Conditions Weekday PM Peak Hour Delay[1]
9 Sir Francis Drake/US 101 SB Ramps	Signal	B	19.4	B	13.6
10 Sir Francis Drake/US 101 NB Ramps	Signal	B	18.8	D	35.5
11 Sir Francis Drake/Larkspur Landing (W)	Signal	C	20.5	D	35.5
12 Sir Francis Drake/Larkspur Landing (E)	Signal	A	8.1	B	13.6

Note:
[1] Delay presented in seconds per vehicle.
Source: AECOM 2014

Roadway Segment Operating Conditions

Downtown San Rafael

Access to US 101 within the vicinity of the Proposed Action area is provided by the local roadway network, specifically Second Street and Third Street in Downtown San Rafael. These streets also will provide the primary roadway access for the Downtown San Rafael Station. Existing conditions v/c ratios and LOS for these local access roadways are summarized in Table 3.13-8.

Table 3.13-8: Roadway Segment Level of Service—Existing Conditions (Downtown San Rafael)

Roadway	Direction	Weekday AM Peak Hour	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday PM Peak Hour
		LOS	v/c	LOS	v/c
Second Street	EB	A	0.43	A	0.59
Third Street	WB	B	0.67	C	0.78

Source: AECOM 2014

Larkspur

In Larkspur, access to US 101 within the vicinity of the Proposed Action area is provided by the local roadway network, specifically Sir Francis Drake Boulevard. Sir Francis Drake Boulevard also will serve as the primary roadway access for the planned Larkspur Station. Existing conditions v/c ratios and LOS for Sir Francis Drake Boulevard in the vicinity of U.S. 101 and the station are summarized in Table 3.13-9.

Table 3.13-9: Roadway Segment Level of Service—Existing Conditions (Larkspur)

Roadway	Direction	Weekday AM Peak Hour	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday PM Peak Hour
		LOS	v/c	LOS	v/c
Sir Francis Drake Boulevard	EB	C	0.75	D	0.83
	WB	C	0.72	**F**	**1.05**

Note:
Bold indicates the roadway segment is operating at unacceptable LOS (LOS E or LOS F).
Source: AECOM 2014

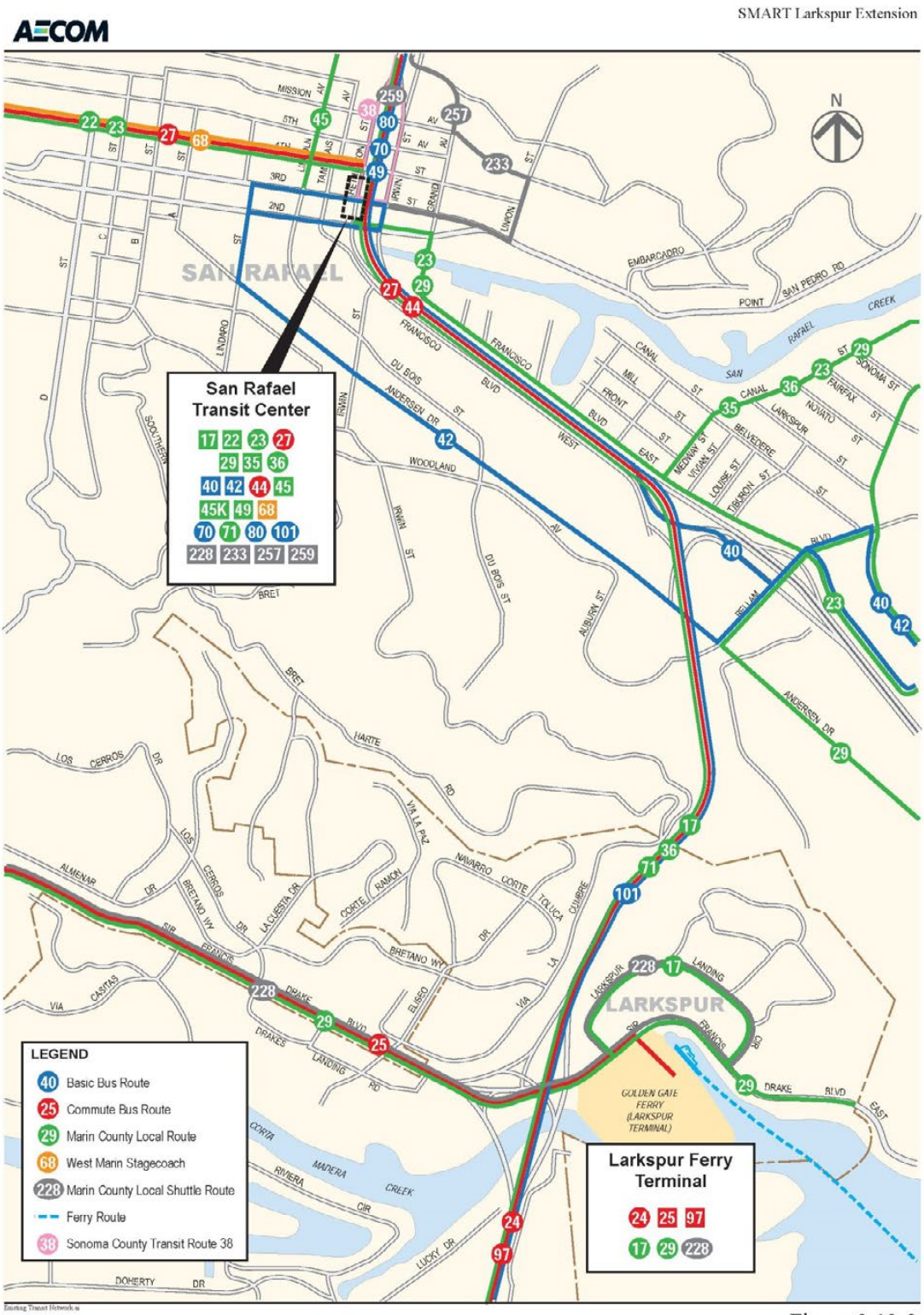
Transit

The Downtown San Rafael and Larkspur station sites are served by both local and regional public transit services, described in further detail next. Transit services operating in the Proposed Action area under existing conditions are shown in Figure 3.13-3 and are summarized in Table 3.13-10.

Downtown San Rafael

The Downtown San Rafael Station site was formerly the San Rafael (Fourth Street) Station of the NWP Railroad. The site is adjacent to The Whistlestop building (originally the train depot, currently operating as a senior service center) and across Third Street from the Bettini San Rafael Transit Center (occupying the block bounded by Third Street, Second Street, Hetherton Street, and Tamalpais Avenue). The San Rafael Transit Center is the hub for transit service in Downtown San Rafael and primarily is served by Golden Gate Transit and Marin Transit, with additional routes operated by several public and private transit operators.

Golden Gate Transit bus service is operated by the Golden Gate Bridge Highway and Transportation District (GGBHTD), and serves San Francisco, Marin, and Sonoma counties. Golden Gate Transit operates several different types of service at the San Rafael Transit Center, described in detail in the following subsections.



Source: Golden Gate Transit Bus and Ferry Map.

Figure 3.13-3
Transit Network - Existing Conditions

Table 3.13-10: Existing Transit Service in the Proposed Action Area

Route		Approximate Headways (minutes) Weekday AM Peak	Approximate Headways (minutes) Weekday Midday	Approximate Headways (minutes) Weekday PM Peak	Approximate Headways (minutes) Weekend/ Holiday[1]
Golden Gate Transit (operated as Marin Transit routes)					
Marin County Local Routes					
17	Marin City – Mill Valley – Strawberry – San Rafael[2]	30	60	30	60
22	Sausalito – Marin City – Strawberry – San Anselmo – San Rafael[3]	30	60	30	60
23	Manor – Fairfax – San Anselmo – San Rafael[4]	60	60	60	60
29	Manor – San Anselmo – College of Marin – Marin General Hospital – Larkspur Landing – San Rafael	30	60	30-60	60
35	Canal – San Rafael[5]	5-15	30	10-20	30
36	Marin City – Canal – San Rafael	30		30	
45 45K	San Rafael – Marin Civic Center – Northgate Mall – Kaiser Hospital[6]	30	30	30	60
49 49K	San Rafael – Marin Civic Center – Kaiser Hospital – Hamilton – Novato – San Marin[7]	60	60	60	60
71	Marin City – San Rafael - Novato[8]	30	60	60	
Basic Bus Routes					
40	San Rafael – San Quentin – El Cerrito del Norte Bay Area Rapid Transit BART Station	60		60	30-60
42	San Rafael – San Quentin – Richmond BART Station – El Cerrito del Norte BART Station	60	60	60	
770	San Francisco – Marin City – San Rafael – Novato	30-60	60	30-60	60
80	San Francisco – Marin City – San Rafael – Novato – Petaluma – Cotati – Rohnert Park – Santa Rosa[9]				60
101 101X	San Francisco – San Rafael – Novato – Petaluma – Cotati – Rohnert Park – Santa Rosa[10]	60	60	60	60
Commute Bus Routes					
27	San Francisco – San Rafael – San Anselmo	15-30		30	
44	San Francisco – San Rafael – Lucas Valley – Marinwood	60		60	
Supplemental School Service					
114	San Rafael – Strawberry Village – Marin City – Redwood High School		Irregular schedule11		
126	San Rafael – San Anselmo – Sleepy Hollow		Irregular schedule12		

Route		Approximate Headways (minutes) Weekday AM Peak	Approximate Headways (minutes) Weekday Midday	Approximate Headways (minutes) Weekday PM Peak	Approximate Headways (minutes) Weekend/ Holiday[1]
Marin Transit					
Marin County Local Shuttle Routes					
233	San Rafael – Santa Venetia	60	60	60	60
257	San Rafael – Smith Ranch Road	60	60	60	
259	San Rafael – Marinwood	60	60	60	
Sonoma County Transit					
38	San Rafael – Schellville – Temelec – Sonoma – El Verano – Boyes Hot Springs – Agua Caliente – Glen Ellen – Kenwood		Irregular schedule[13]		
Marin Airporter					
San Rafael – San Francisco International Airport		60	60	60	60
Sonoma County Airport Express					
Sonoma County Airport – Santa Rosa – Rohnert Park – Petaluma – San Rafael – Oakland International Airport		120	120	120	120

Notes:

[1] Some Golden Gate Transit trips only operate on Saturdays.

[2] Some trips on weekdays and most trips on weekends are interlined with Route 19 (Marin City – Tiburon). On weekdays, some supplemental school service (not serving the San Rafael Transit Center) also is provided. On Saturdays, some late night trips do not serve the San Rafael Transit Center.

[3] Early morning southbound runs on weekdays continue to San Francisco as Route 18 via Larkspur and Corte Madera.

[4] On weekdays, some supplemental school service (not serving the San Rafael Transit Center) also is provided. On weekends, most trips only operate between Manor (Sir Francis Drake Boulevard/Olema Road) and the San Anselmo Hub (Sir Francis Drake Boulevard/Center Boulevard).

[5] On weekdays, some northbound trips continue to Mill Valley as Route 17 or to Terra Linda as Route 45.

[6] Route 45 terminates at Las Gallinas Avenue/Nova Albion Way, while Route 45K continues further to the Kaiser Permanente San Rafael Medical Center. Some southbound trips on weekdays and weekends continue to Canal as Route 35.

[7] On weekdays, this route operates on Route 49 between San Marin and the San Rafael Transit Center. On weekends, it operates on Route 49K, between San Marin and the San Rafael Transit Center via the Kaiser Permanente San Rafael Medical Center.

[8] The route is operated primarily as a supplementary service for Route 70 and Route 80 between Novato and Marin City, with irregular schedules in the northbound direction during the AM and PM peak hours on weekdays and in both directions on weekends.

[9] Limited service is provided on weekdays during the early morning and late evening.

[10] Headways are for Route 101. Route 101X provides supplementary express service on weekdays on an irregular schedule (two southbound trips and one northbound trip).

[11] The route operates only one roundtrip a day, southbound in the morning and northbound in the evening.

[12] The route operates on irregular headways, with two morning trips from the San Rafael Transit Center to San Anselmo and Sleepy Hollow and two to four early afternoon trips from San Anselmo and Sleepy Hollow to the San Rafael Transit Center.

[13] The route operates on irregular headways, with seven roundtrips Monday through Saturday and four roundtrips Sunday.

[14] The route operates only one roundtrip a day, southbound in the morning and northbound in the evening.

Sources: GGBHTD 2013; Marin Transit 2013; Sonoma County Transit 2013; Marin Airporter 2013; Sonoma County Airport Express 2013

Marin County Local Routes primarily serve local demand within Marin County and are operated by Golden Gate Transit under a contract with Marin Transit. Included among these routes is Route 29, which operates between the San Rafael Transit Center and the San Anselmo Hub (Center Boulevard/Sir Francis Drake Boulevard/Red Hill Avenue) via the Larkspur Ferry Terminal. The Proposed Action would provide transit riders with an alternative transit option to travel between the Larkspur Ferry Terminal and Downtown San Rafael.

Basic Bus Routes provide basic regional service to the East Bay (Route 40, Route 42) and San Francisco (Route 70, Route 80, and Route 101/101X). The SMART corridor between Santa Rosa and Larkspur would parallel much of the service currently provided by Route 70, Route 80, and Route 101/101X.

Commute Bus Routes operate only on weekdays, during the commute period. Service is provided in the commute direction only (southbound into San Francisco in the morning and northbound into Marin County in the evening).

Supplemental School Service routes provide supplementary service to local schools, typically only operating a limited number of trips a day (to schools in the morning and from schools in the early afternoon). In addition to routes specifically identified as "supplemental school service" routes, some trips on Marin County local routes also are designed specifically to serve school demand.

In addition to Golden Gate Transit, **Marin Transit** also provides its own local transit services out of the San Rafael Transit Center, including three local shuttle routes and one West Marin Stagecoach route. **Sonoma County Transit** operates one regional bus service out of the San Rafael Transit Center, connecting communities in eastern Sonoma County along the Sonoma Highway (State Route 12). Two private transit operators (**Marin Airporter** and **Sonoma County Airport Express**) provide express coach service to and from San Francisco International Airport and Oakland International Airport.

Larkspur

The planned Larkspur Station site is on the east side of US 101 adjacent to Larkspur Landing, approximately 1,100 feet from the Larkspur Ferry Terminal. Current transit service in the area consists primarily of Golden Gate Transit bus and ferry services, in addition to Marin Airporter service to and from San Francisco International Airport. These services are summarized in Table 3.13-11.

Bicycle

Bikeways are typically classified into one of three categories: Class 1 facilities are dedicated paths fully separated from roadways, Class 2 facilities are separate bicycle lanes adjacent to the curb lane on roadways, and Class 3 facilities are signed routes, where bicyclists must share travel lanes on roadways with other vehicles.

The existing bikeway network and planned routes in the Proposed Action area are shown in Figure 3.13-4, and are described in further detail next.

Table 3.13-11: Transit Service in Larkspur

Route		Approximate Headways (minutes) Weekday AM Peak	Approximate Headways (minutes) Weekday Midday	Approximate Headways (minutes) Weekday PM Peak	Approximate Headways (minutes) Weekend/ Holiday
Golden Gate Transit					
Marin County Local Routes					
29	Manor – San Anselmo – College of Marin – Marin General Hospital – Larkspur Landing – San Rafael	30	60	30-60	60
Commute Bus Routes					
24	San Francisco – Greenbrae – College of Marin – Kentfield – Ross – San Anselmo – Fairfax – Manor[1]				
97	Larkspur – San Francisco[2]				
Ferry					
Larkspur – San Francisco			Irregular schedule[3]		
Marin Airporter					
San Rafael – San Francisco International Airport		60	60	60	60

Notes:

[1] Only one trip (early morning, southbound direction) serves the Larkspur Ferry Terminal.

[2] Route 97 only has one regularly-scheduled trip (early morning, southbound), although unscheduled trips are occasionally provided to serve overflow demand exceeding ferry capacity during the weekday AM peak.

[3] Schedule is irregular, consisting of 18 southbound trips and 19 northbound trips on weekdays and four roundtrips on weekends.

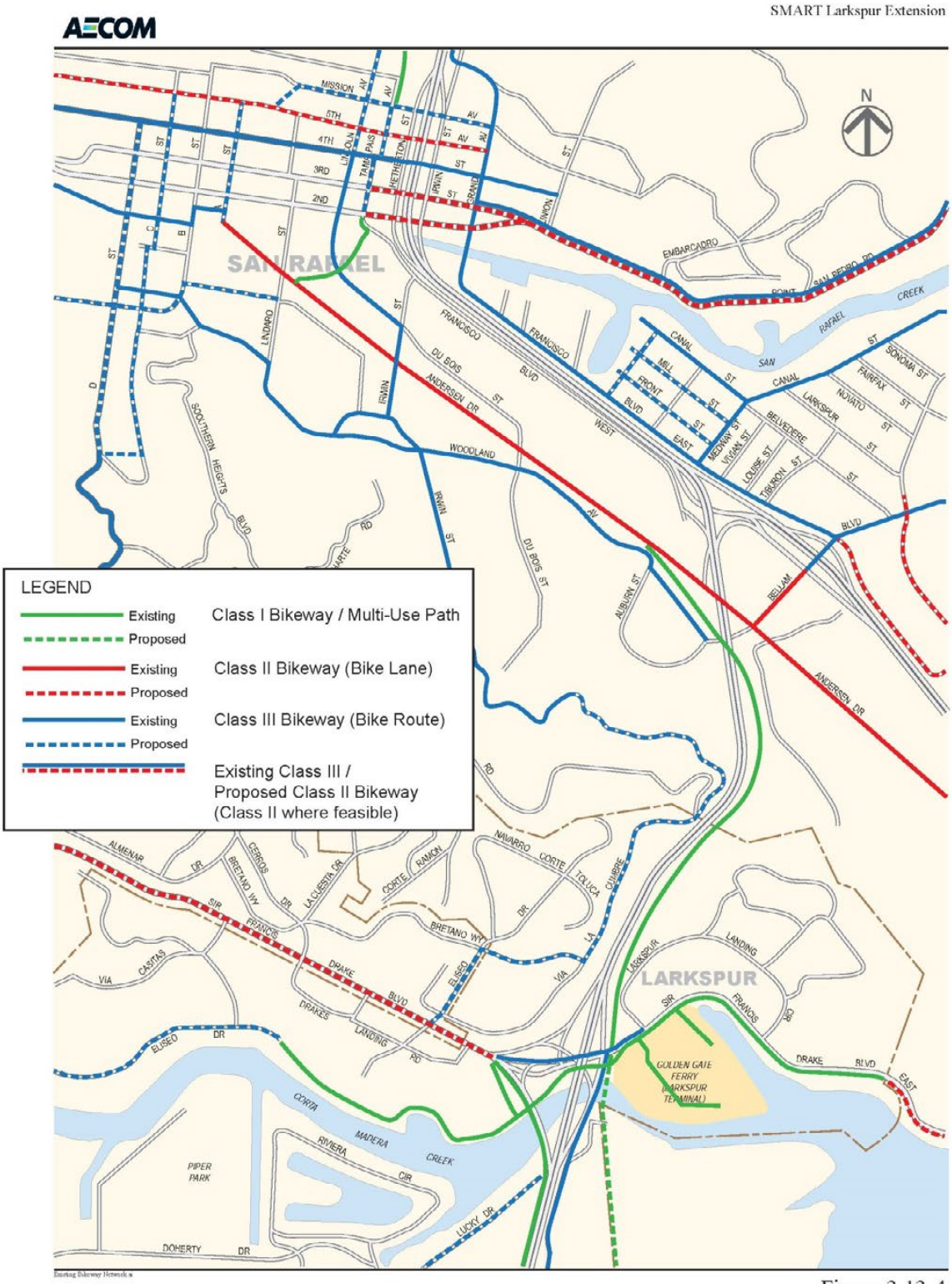
Sources: GGBHTD 2013; Marin Airporter 2013

Downtown San Rafael

A Class 1 shared pedestrian/bicycle trail (Route 5) connects Downtown San Rafael (Mission Avenue/Stevens Place intersection) at the northern edge of Downtown San Rafael with Merrydale Road near Pilgrim Way in Santa Venetia, close to the US 101/North San Pedro Road interchange. This trail will connect to and become part of the continuous north-south bicycle path that is being built in conjunction with the locally-funded SMART project, and it parallels US 101, closely following the NWP Railroad alignment. Another short segment of Class 1 bicycle facility, the Mahon Creek path, is provided along the northern bank of San Rafael Creek, connecting the Tamalpais Avenue/Second Street/Francisco Boulevard West and Lindaro Street/Andersen Drive intersections.

The remainder of the existing bikeways in Downtown San Rafael consists of Class 2 bikeways:

- **Fourth Street (Route 24)**: This bikeway connects west to Greenfield Avenue and San Anselmo and east to San Rafael High School, connecting via the Grand Avenue bikeway east along Point San Pedro Road to McNears Beach and China Camp State Park.
- **Grand Avenue/Francisco Boulevard East**: This bikeway connects north to the Dominican University of California and the Class 1 Route 5 bike path (at US 101/Lincoln Avenue interchange), and continues south along Francisco Boulevard East to the Canal neighborhood.



Sources: San Rafael Bicycle/Pedestrian Master Plan (2011); Larkspur SMART Station Area Plan Existing Conditions Report (2012); Marin County Unincorporated Area Bicycle and Pedestrian Master Plan (2008).

Figure 3.13-4
Bicycle Network - Existing Conditions

- **Lincoln Avenue/Irwin Street**: This bikeway begins at the San Rafael Transit Center and extends south into the Bret Harte neighborhood. Portions of this bikeway are designated as part of Route 22, which veers east from the Irwin Street/Andersen Drive intersection to San Quentin.

Future proposed bikeways would include new bike lanes (Class 1 facilities) along Fifth Avenue, Francisco Boulevard West, and Point San Pedro Road (extending to the San Rafael Transit Center via Fourth Street and Third Street). New bike routes (Class 1 facilities) also would be established along Lincoln Avenue, Mission Avenue, A Street, and C Street/D Street.

Bicycle traffic in the area is low to moderate, and it is highest on the completed segment of the Class 1 bike path extending north of the Mission Avenue/Stevens Place intersection. Bike racks at the San Rafael Transit Center can accommodate 41 bicycles.

Andersen Drive

Andersen Drive is a major bicycle commute route, featuring Class 2 bicycle facilities in both directions and a connection to already-completed portions of the Class 1 Cal Park Hill bicycle path, including the recently constructed bridge over Woodland Drive/Bellam Boulevard and the Cal Park Hill Tunnel.

Larkspur

The existing bikeway network in the vicinity of the planned Larkspur Station also is limited and consists primarily of Route 20, a Class 1 facility that parallels Sir Francis Drake Boulevard on the south side from Remillard Park in the east to the US 101 interchange in the west. Additional Class 1 bikeways directly connect Route 20 with the Larkspur Ferry Terminal.

At the US 101 interchange, Route 20 continues west as a Class 1 facility underneath US 101, along the north bank of Corte Madera Creek to Kentfield/College of Marin, Ross, San Anselmo, and Fairfax. Additional connections are provided at the US 101/Sir Francis Drake Boulevard interchange to Route 5 (south to Corte Madera, Mill Valley, Marin City, and Sausalito via Tamal Vista Boulevard, Meadowsweet Drive, and the Mill Valley–Sausalito Bike Path) and Route 17 (south to Corte Madera and Tiburon via Redwood Highway, Paradise Drive, and Trestle Glen Boulevard). A pedestrian/cyclist bridge is currently under construction across Sir Francis Drake Boulevard as part of the Central Marin Ferry Connector project. After completion, the bridge will connect each of these existing pathways with the Cal Park Hill bicycle path to the north.

Bicycle traffic in the area is low, with the highest volumes observed near the Larkspur Ferry Terminal and around the bikeway junction near US 101/Sir Francis Drake Boulevard interchange. Bike parking at the Larkspur Ferry Terminal can accommodate 71 bicycles, and cyclists can also take their bikes aboard the ferry.

Pedestrian

Pedestrian conditions at the two proposed station sites are described in further detail next.

Downtown San Rafael

Pedestrian facilities in the area surrounding the Downtown San Rafael Station site generally are adequate. Sidewalks generally are provided along all streets in the area, with the exception of Francisco Boulevard West,

the on- and off-ramps from US 101, and the south side of Second Street underneath US 101. Likewise, crosswalks (standard striping) and curb ramps are provided at most intersections, although many legs lack crossings, prioritizing vehicular traffic flow and circulation at the expense of pedestrian connectivity and safety. With the exception of curb ramps at the San Rafael Transit Center, most curb ramps in the area are not Americans with Disabilities Act (ADA)-compliant, and they lack tactile detection devices, such as truncated dome tiles. Pedestrian activity is moderate and primarily is concentrated at the San Rafael Transit Center.

Larkspur

Pedestrian facilities in the area surrounding the planned Larkspur Station site are limited. In general, marked crossing locations and sidewalks are sparse. Intersection design prioritizes vehicular traffic flow, frequently requiring pedestrians to make lengthy detours to cross intersections and/or requiring substantial crossing distances.

Within the Larkspur Landing complex, a minimal level of pedestrian connectivity is provided by crosswalks across Larkspur Landing Circle and through portions of the surface parking areas, connecting to sidewalks surrounding specific buildings in the complex. The number of connections is limited, generally requiring pedestrians to make circuitous detours or to put themselves in conflict with oncoming traffic by crossing at unmarked locations or walking through parking lots.

Of the four study intersections along Sir Francis Drake Boulevard, only the two intersections with Larkspur Landing Circle provide adequate pedestrian facilities—both have crosswalks with ladder striping. The Larkspur Landing Circle (East) intersection has crosswalks across all three legs, and the Larkspur Landing Circle (West) intersection has crosswalks across three of the four legs (no crosswalk across the west leg). Sidewalks or pedestrian paths generally are provided along both sides of all streets at these two intersections, with a shared bicycle–pedestrian recreational path provided along the south side of Sir Francis Drake Boulevard, east of the Larkspur Ferry Terminal. However, sidewalk provisions at the Larkspur Landing Circle (East) intersection along both sides of Larkspur Landing Circle are limited. Curb ramps are provided at all crosswalks, but some lack tactile detection devices (truncated dome tiles), and therefore are not ADA-compliant. The south crosswalk at the Larkspur Landing Circle (West) intersection crosses the access road to the Larkspur Ferry Terminal parking lot and requires pedestrians to traverse three distinct crossing roadways, including a potentially hazardous exclusive right-turn lane from eastbound Sir Francis Drake Boulevard. This latter crossing is uncontrolled, and vehicles attempting to enter the Ferry Terminal parking lot frequently travel at high speeds in this turn.

Within the Ferry Terminal area, pedestrian facilities are limited as well, although a sidewalk is provided along the western and southern edges of the parking lot, connecting to the primary pedestrian access to and from the terminal along the east side. A pedestrian bridge is provided over Sir Francis Drake Boulevard, facilitating access between the terminal and the Larkspur Landing complex. Crosswalks to carry pedestrian traffic to and from the terminal's surface parking are provided at several strategic locations, with one large, highly-visible pedestrian zone at the southeast corner of the parking area that connects directly into the terminal.

Pedestrian flows are high between the terminal parking lot and piers, exhibiting "platooning," or pulsed arrivals and departures, in coordination with the ferry schedules. Outside the terminal area, however, pedestrian traffic is minimal.

Andersen Drive

Pedestrian facilities provided in the vicinity of the proposed at-grade crossing along Andersen Drive consist of a sidewalk on the west side of the street. Additionally, a Class 2 multi-use pathway provides non-motorized access between Downtown San Rafael and the Larkspur Ferry Terminal via the recently constructed bridge over Auburn Street and the Cal Park Hill Tunnel.

Parking

Existing off-street parking facilities for the study area (shown in Figure 3.13-5) were analyzed as part of the Downtown San Rafael Station Area Plan Existing Conditions Report (SMART 2010b) and the Larkspur Station Area Plan Existing Conditions Report (SMART 2012b). Available data from these documents regarding existing on- and off-street parking supply and occupancy, as they pertain to the Proposed Action, are summarized below.

Downtown San Rafael

Downtown San Rafael on-street parking primarily consists of metered and/or time-limited parallel parking. Four park-and-ride lots, maintained and operated by Caltrans, are located underneath the US 101 viaduct in the vicinity of the Downtown San Rafael Station site and the Bettini Transit Center.

Combined, the four park-and-ride lots provide 197 parking spaces (plus 16 bicycle lockers) for all-day use by transit passengers. Occupancy surveys conducted on August 26, 2010 indicated that the lots are well-used throughout the day, approaching close to 100 percent occupancy during the midday.

Larkspur

On-street parking in the vicinity of the planned Larkspur Station is limited to parallel parking along the north side of Sir Francis Drake Boulevard from Larkspur Landing Circle (East) to approximately 500 feet east of Larkspur Landing Circle (West), with approximately 69 spaces provided.

In the vicinity of the Proposed Action area in Larkspur, off-street public parking is available only at the Larkspur Ferry Terminal. The parking lot is owned and operated by GGBHTD and is intended for use by ferry passengers. The GGBHTD's 2008 Regional Customer Study indicated that 76 percent of Larkspur Ferry passengers drive to/from the terminal, and occupancy of the lot currently reaches close to 100 percent by 9:00 a.m. on weekdays.

Additional off-street parking is provided for existing uses at the Larkspur Landing commercial complex, directly adjacent to the planned Larkspur Station. That parking is open only to patrons of the commercial businesses at the complex, and restrictions on other uses, such as parking for overflow ferry passengers, is actively enforced.

The following is a summary of the off-street parking facilities in the vicinity of the Proposed Action area in Larkspur:

1. Larkspur Ferry Terminal: 1,806 spaces (1,748 available for public use);
2. Larkspur Landing Complex: 1,780 spaces:
    - Marin Airporter station: 340 spaces;

- Larkspur Landing Offices/Cinema: 630 spaces; and
- Marin Country Mart: 810 spaces.

3.13.2 Environmental Consequences

The Proposed Action would adhere to the guidance of the following regulatory plans/program:

- Transportation 2035 Plan for the San Francisco Bay Area: Change in Motion (MTC 2009);
- Marin County Congestion Management Program;
- Marin and Sonoma County transportation plans;
- City of San Rafael General Plan (2013); and
- City of Larkspur General Plan (1990).

The general plans published by the City of San Rafael and the City of Larkspur each include a transportation element that establishes acceptable LOS traffic standards. In particular, the City of San Rafael calls for LOS C as a general goal for peak hour periods, with exceptions for intersections in the downtown area (LOS E), highway interchanges and arterial intersections (LOS D), and Second Street and Third Street (LOS D). The City of Larkspur calls for a minimum standard of LOS D during peak hour periods.

Assessment Methods

The following scenarios were evaluated to identify the potential transportation effects of the Proposed Action:

- Existing Conditions
- 2040 Baseline Conditions
- 2040 Baseline plus Proposed Action Conditions

Intersections: LOS was analyzed at 12 signalized study intersections—eight in the City of San Rafael and four in the City of Larkspur—which represent locations where the Proposed Action potentially could affect operations. See Figure 3.13-1 for the location of the study intersections addressed in the transportation analysis. Consistent with standard industry practice, all 12 study intersections were analyzed for the weekday AM and PM peak hours, defined as the peak 1-hour period (four consecutive 15-minute intervals) of the weekday AM and PM peak hour periods (7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m., respectively).

Transit: The analysis of potential effects on transit operations primarily focused on the potential effect of the Proposed Action on ridership for transit services in the City of San Rafael and the City of Larkspur. Existing transit ridership and capacity were assessed for the Larkspur–San Francisco ferry service and Golden Gate Transit bus routes that potentially may be affected by the Proposed Action. Potential effects on ridership and capacity on existing transit services from the Proposed Action were quantified.

Bicycles: Potential effects on bicycle conditions from the Proposed Action were qualitatively assessed.

Pedestrians: Potential effects on pedestrian conditions from the Proposed Action were qualitatively assessed.

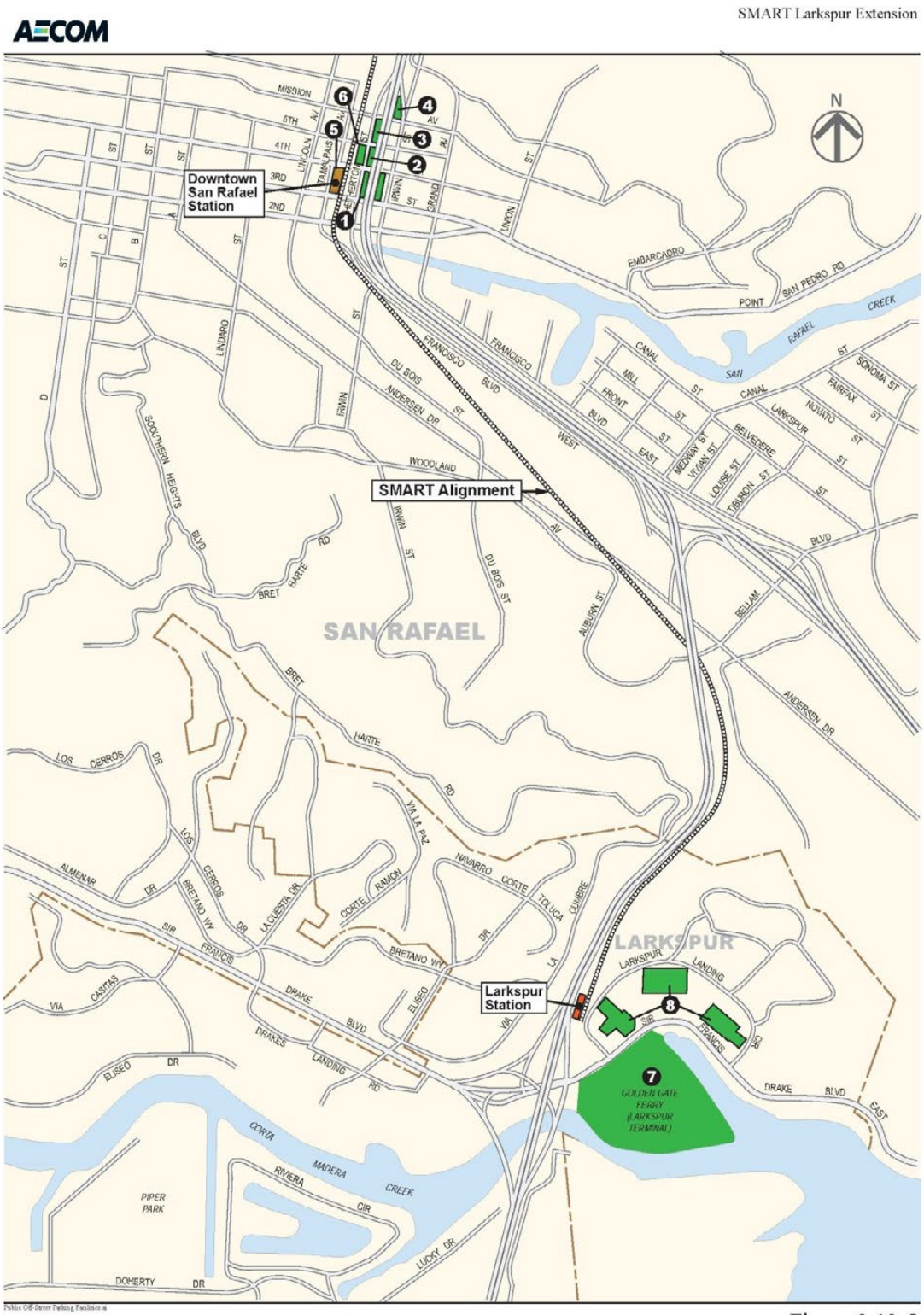


Figure 3.13-5
Off-Street Parking Facilities

Parking: Existing average weekday on- and off-street parking conditions, including off-street parking supply and occupancy where data are available, already have been evaluated as part of the Downtown San Rafael Station Area Plan (City of San Rafael 2012a) and the Public Review Draft of the Larkspur SMART Station Area Plan (City of Larkspur 2014; hereafter referred to as the "Larkspur Station Area Plan"). The Proposed Action would not add parking at the Downtown San Rafael Station. The proposed supply of parking spaces at the planned Larkspur Station was evaluated against parking demand estimated to be generated by the Proposed Action, to determine and address any potential vehicular parking effects that the Proposed Action may have.

Project Travel Demand Methodology

Details of the methodology used for travel demand—trip generation, mode split, trip distribution/assignment, and parking demand—are discussed next.

Trip Generation

The methodology used to estimate the Proposed Action's trip generation was based on projections of boardings and alightings at the Downtown San Rafael and Larkspur stations. Ridership projections at these two stations were extracted from the Metropolitan Transportation Commission (MTC) BAYCAST travel demand model, calibrated in 2011 to account for SMART, with adjustments made to account for the Marin Narrows project (described in more detail in subsequent subsections). As the BAYCAST model assumes a 2035 horizon year, the forecasted ridership was extrapolated to a 2040 horizon year, using per-annum growth rates.

As previously mentioned, the Downtown San Rafael Station will be operational under the locally-funded SMART project. Therefore, Proposed Action-generated trips at the Downtown San Rafael Station are expected to be negligible, as most riders would have trip starts/ends north of Downtown San Rafael.

Mode Split

The mode split for the Proposed Action was determined using outputs from the MTC BAYCAST model, which forecasted boardings and alightings at SMART stations for two modes—walk and drive. To determine the estimated vehicle-trips to be generated by the Proposed Action, kiss-and-ride passengers were assumed to be 10 percent of all drive-access boardings, with park-and-ride passengers making up the remainder of boardings. In addition, 10 percent of all park-and-ride boardings were assumed to carpool to and from the station at an average vehicle occupancy of two persons per vehicle.

Trip Distribution/Assignment

The estimated trips generated by the Proposed Action were distributed to the four Larkspur study intersections based on select link model runs that forecasted future travel patterns for new travel demand generated by the planned Larkspur Station. The project traffic volumes were added to 2040 Baseline Conditions traffic volumes, to determine 2040 Baseline plus Proposed Action Conditions traffic volumes.

Parking Demand

The Proposed Action's parking demand was assumed to be equivalent to the estimated number of park-and-ride vehicle trips to be generated. Therefore, the Proposed Action is estimated to create a parking demand of approximately 91 parking spaces at the planned Larkspur Station.

Background Growth

Previous analysis work conducted for the Sonoma-Marin Area Rail Transit Traffic Analysis Update for Downtown San Rafael (SMART 2013) was reviewed; it assumed a growth rate of 1 percent per year to develop a "Near-Term Conditions" scenario (2017) and used traffic volumes from the City of San Rafael's General Plan for a "Cumulative Conditions" scenario (2020) (City of San Rafael 2013). A typical growth rate of 1 percent per year was applied to the Cumulative Conditions (2020) traffic volumes to develop 2040 Baseline Conditions traffic volumes for the Downtown San Rafael study intersections. This approach was deemed appropriate because it was based on previous work performed for a microscopic-level analysis of Downtown San Rafael intersections.

For study intersections and station access roadways in Larkspur, including the study freeway segment (US 101 between North San Pedro Drive and Sir Francis Drake Boulevard), the growth rate was estimated based on projections used in the Larkspur Station Area Plan EIR (City of Larkspur 2014a) for a 2035 horizon year, extrapolated to 2040.

Because ridership data for some of the existing transit services in the vicinity of the Proposed Action area were not readily available, ridership projections were taken directly from the MTC BAYCAST model for the 2035 horizon year, without extrapolation to 2040.

Alternative 1: No Action Alternative

Under the No Action Alternative, the FTA would take no action and would provide no funding to SMART for the Downtown San Rafael to Larkspur Extension project. The project would not be constructed, and none of the effects associated with the Proposed Action would occur. No construction or operation activities would occur, and the project corridor would remain in its current state.

Alternative 2: SMART Downtown San Rafael to Larkspur Extension (Proposed Action)

The Proposed Action would extend SMART passenger rail service from the existing locally-funded SMART project terminus in Downtown San Rafael southwards to Larkspur. For purposes of evaluation, the analysis of 2040 Baseline Conditions assumes completion and operation of the locally-funded SMART project from Downtown San Rafael northwards to Santa Rosa.

Regional Access Roadways

An additional review of funded projects listed in Transportation 2035 Plan for the San Francisco Bay Area: Change in Motion (MTC 2009) and projects identified by other studies also was conducted to determine planned, funded, and approved future changes to the transportation network. Specifically, the following two projects were identified:

- **Highway 101 Greenbrae/Twin Cities Corridor Improvements** project, sponsored by Caltrans in cooperation with the Transportation Authority of Marin (TAM), proposes modifications to several existing roadway segments

on US 101 between Tamalpais Drive in the Town of Corte Madera and Sir Francis Drake Boulevard in the City of Larkspur. The project would include the modification, realignment, addition, and/or removal of on- and off-ramps; the construction of auxiliary lanes and collector–distributor roadways; as well as construction of new transit, bicycle, and pedestrian facilities. The project also would include the optimization of traffic signals at several local roadway intersections.

- **Marin–Sonoma Narrows** project is proposed by Caltrans and the Federal Highway Administration (FHWA) to improve a 16.1-mile segment of US 101, generally from the City of Novato (in Marin County) and stretching north to the City of Petaluma (in Sonoma County). The improvements would include, among other upgrades, constructing HOV lanes, widening and realigning portions of the roadway, constructing new interchanges, upgrading drainage systems, and constructing new frontage roads and bikeways.

For purposes of evaluation, the analysis of 2040 Baseline Conditions assumes completion and operation of these two projects by 2040.

Local Access Roadways

The Downtown San Rafael Station Area Plan (City of San Rafael 2012) proposes the following changes to the roadway network within the vicinity of the Proposed Action:

- Provision of a second right-turn lane from Hetherton Street to Third Street;
- Conversion of sections of Tamalpais Avenue to one-way travel, to streamline traffic flow in the vicinity of the Downtown San Rafael Station site;
- Redesign of the section of Tamalpais Avenue between Third Street and Fourth Street, to serve as a passenger pick-up/drop-off zone, resulting in additional restrictions on through-traffic; and,
- Installation of new signal controllers and upgraded signal interconnection, to allow for advanced rail preemption at several intersections in Downtown San Rafael.

For purposes of evaluation, the analysis of 2040 Baseline Conditions assumes completion and operation of these projects by 2040. Although improvements to Sir Francis Drake Boulevard in Larkspur have been identified in previous studies and approved projects, no detailed plans for such improvements exist currently; therefore, no specific changes to the local roadway network serving the planned Larkspur Station have been assumed.

The assumed 2040 Baseline Conditions, and the 2040 Baseline plus Proposed Action Conditions for the intersection lane geometry and traffic volumes are shown in Figure 3.13-6 and Figure 3.13-7, respectively.

Traffic

Regional Access Roadway Segment Operating Conditions

The projects discussed as part of the transportation network modifications are expected to affect US 101 at a macroscopic level by improving general driving conditions and alleviating downstream traffic to and from San Francisco. However, these projects are not expected to result in material changes to freeway mainline operations in the immediate vicinity of the Proposed Action area.

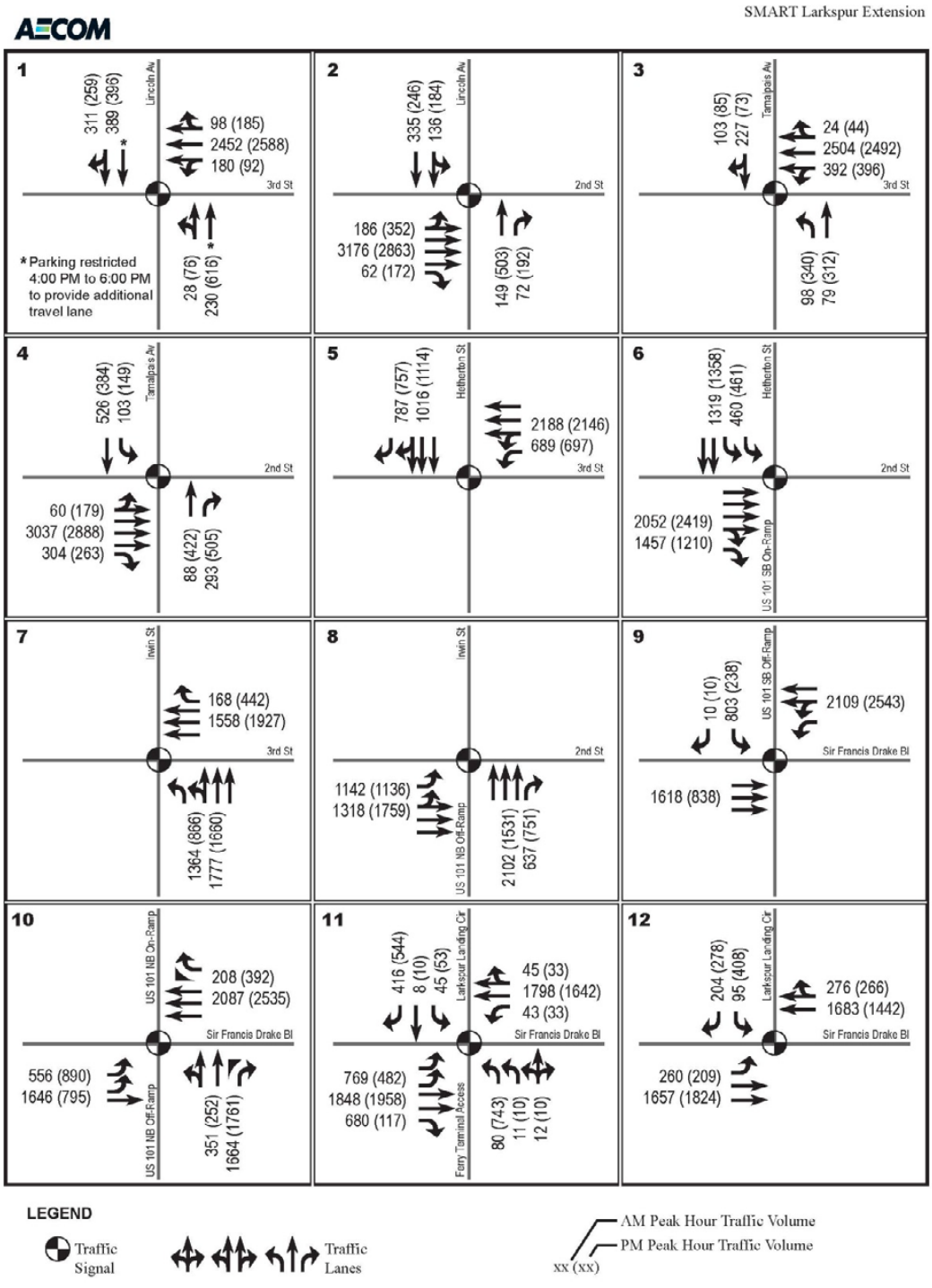


Figure 3.13-6
Intersection Lane Geometry and Traffic Volumes - 2040 Baseline Conditions

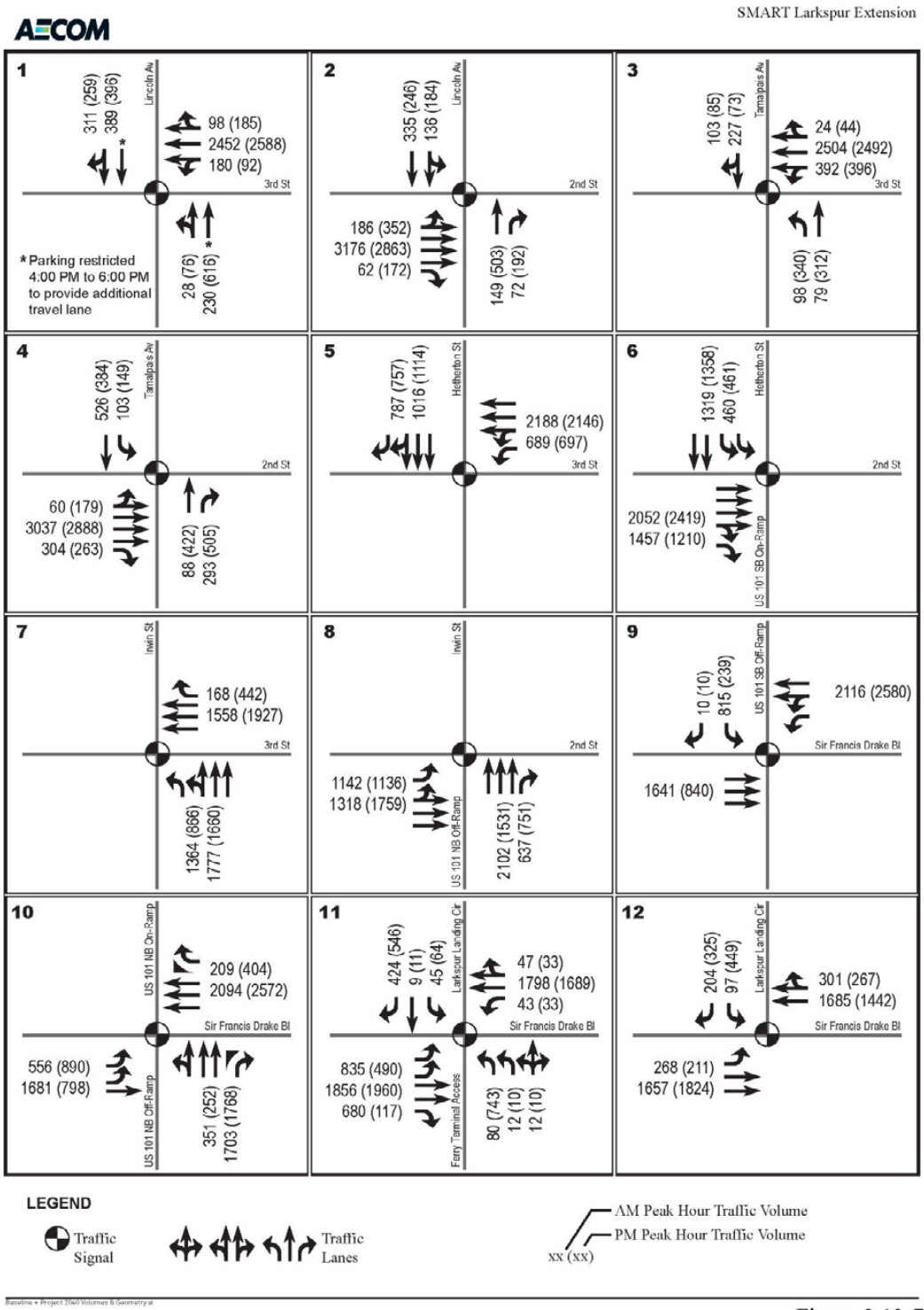


Figure 3.13-7
Intersection Lane Geometry and Traffic Volumes - 2040 Baseline Plus Project Conditions

The LOS and v/c for US 101 in the vicinity of the Proposed Action area under 2040 Baseline Conditions and the 2040 Baseline plus Proposed Action Conditions are summarized in Table 3.13-12.

Table 3.13-12: Regional Access Roadway Segment Level of Service—2040 Baseline plus Proposed Action Conditions (US 101)

		2040 Baseline Conditions	2040 Baseline Conditions	2040 Baseline Conditions	2040 Baseline Conditions	2040 Baseline plus Proposed Action Conditions	2040 Baseline plus Proposed Action Conditions	2040 Baseline plus Proposed Action Conditions	2040 Baseline plus Proposed Action Conditions
		Weekday AM Peak Hour	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday PM Peak Hour	Weekday AM Peak Hour	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday PM Peak Hour
Roadway	**Direction**	**LOS**	**v/c**	**LOS**	**v/c**	**LOS**	**v/c**	**LOS**	**v/c**
US 101	NB	B	0.42	D	0.75	B	0.42	D	0.75
	SB	E	0.93	D	0.73	E	0.93	D	0.73

Source: AECOM 2014

As shown in Table 3.13-14, both directions of US 101 in the vicinity of the Proposed Action area are expected to operate at acceptable conditions (LOS E or better) under 2040 Baseline plus Proposed Action Conditions.

Intersection Operating Conditions

Downtown San Rafael

The 2040 Baseline Conditions weekday AM and PM peak hour intersection LOS for the Downtown San Rafael study intersections are summarized in Table 3.13-13. Under future conditions without the Proposed Action alternative, seven out of eight study intersections would worsen to unacceptable service levels.

Table 3.13-13: Intersection Level of Service—2040 Baseline Conditions (Downtown San Rafael)

	Existing Conditions	Existing Conditions	Existing Conditions	Existing Conditions	2040 Baseline Conditions	2040 Baseline Conditions	2040 Baseline Conditions	2040 Baseline Conditions
	Weekday AM Peak Hour	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday PM Peak Hour	Weekday AM Peak Hour	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday PM Peak Hour
Intersection	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**
1 Lincoln/Third	C	21.9	B	13.2	D	51.9	**F**	**81.3**
2 Lincoln/Second	B	17.8	B	15.9	**F**	**103.9**	**E**	**62.4**
3 Tamalpais/Third	A	6.5	A	8.5	**E**	**70.2**	**F**	**111.6**
4 Tamalpais/Second/Francisco West	A	9.4	B	13.4	D	36.0	D	51.1
5 Hetherton/Third	B	17.7	C	26.7	**F**	**116.8**	**F**	**84.6**
6 Hetherton/Second/US 101	D	45.0	D	41.3	**F**	**101.1**	**F**	**128.3**

		Existing Conditions	Existing Conditions	Existing Conditions	Existing Conditions	2040 Baseline Conditions	2040 Baseline Conditions	2040 Baseline Conditions	2040 Baseline Conditions
		Weekday AM Peak Hour	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday PM Peak Hour	Weekday AM Peak Hour	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday PM Peak Hour
	Intersection	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
	SB On-Ramp								
7	Irwin/Third	B	19.2	C	24.5	**F**	**89.4**	**E**	**67.8**
8	Irwin/Second/US 101 NB Off-Ramp	B	17.5	D	48.7	**E**	**74.7**	**F**	**123.7**

Notes:
Bold indicates intersection is operating at unacceptable LOS (LOS E or LOS F).
[1] Delay presented in seconds per vehicle.
Source: AECOM 2014

As previously described, the Proposed Action is anticipated to result in a negligible increase in traffic volumes in Downtown San Rafael. Therefore, intersection operations under 2040 Baseline plus Proposed Action Conditions would be similar to intersection operations under 2040 Baseline Conditions. Because the intersections in Downtown San Rafael are projected to deteriorate to unacceptable levels without the Proposed Action and would not change appreciably with it, no adverse effects on intersection operations resulting from the Proposed Action would occur.

Larkspur

Proposed Action-generated traffic volumes were added to 2040 Baseline Conditions traffic volumes to develop 2040 Baseline plus Proposed Action Conditions traffic volumes. The resulting 2040 Baseline plus Proposed Action Conditions weekday AM and PM peak hour intersection LOS for the Larkspur study intersections are summarized in Table 3.13-14.

Table 3.13-14: Intersection Level of Service—2040 Baseline plus Proposed Action Conditions (Larkspur)

		2040 Baseline	2040 Baseline	2040 Baseline	2040 Baseline	2040 Baseline plus Proposed Action	2040 Baseline plus Proposed Action	2040 Baseline plus Proposed Action	2040 Baseline plus Proposed Action
		Weekday AM Peak Hour	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday PM Peak Hour	Weekday AM Peak Hour	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday PM Peak Hour
	Intersection	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
9	Sir Francis Drake/US 101 SB	**E**	**55.2**	B	16.9	**E**	**57.2**	B	17.5
10	Sir Francis Drake/US 101 NB	D	48.2	**F**	**83.3**	D	49.1	**F**	**87.0**
11	Sir Francis Drake/Larkspur Landing (W)	D	42.3	**E**	**61.4**	D	44.4	**E**	**66.0**

	2040 Baseline	2040 Baseline	2040 Baseline	2040 Baseline	2040 Baseline plus Proposed Action	2040 Baseline plus Proposed Action	2040 Baseline plus Proposed Action	2040 Baseline plus Proposed Action
	Weekday AM Peak Hour	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday PM Peak Hour	Weekday AM Peak Hour	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday PM Peak Hour
Intersection	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**
12 Sir Francis Drake/Larkspur Landing (E)	D	35.2	D	43.9	D	37.5	D	52.2

Notes:
Bold indicates intersection is operating at unacceptable LOS (LOS E or LOS F).
[1] Delay presented in seconds per vehicle.
Source: AECOM 2014

As shown in the table, one study intersection during the weekday AM peak hour and two study intersections during the weekday PM peak hour would operate at unacceptable conditions (LOS E or LOS F) under 2040 Baseline plus Proposed Action Conditions:

- Sir Francis Drake Boulevard/US 101 Southbound Ramps (weekday AM peak hour);
- Sir Francis Drake Boulevard/US 101 Northbound Ramps (weekday PM peak hour); and,
- Sir Francis Drake Boulevard/Larkspur Landing (West) (weekday PM peak hour).

In each of these cases, however, the intersections already would operate at unacceptable conditions without the Proposed Action, and delay associated with Proposed Action-generated traffic would not represent an increase of 5 seconds or more in average delay. Although a minor increase in traffic would occur on Sir Francis Drake Boulevard under 2040 Baseline plus Proposed Action Conditions, the Proposed Action would include the reuse and repurposing of vacant, undeveloped land and rail alignment. Therefore, the Proposed Action is not expected to have a substantial effect on any of the Larkspur study intersections.

Andersen Drive

The City of San Rafael analyzed the potential effects of the Proposed Action on the at-grade crossing at Andersen Drive. The results of this analysis are summarized in Table 3.13-15.

Table 3.13-15: Intersection Level of Service—Existing plus Recommended Alternative Conditions (Andersen Drive)

Intersection	Existing Conditions	Existing Conditions	Existing plus Recommended Alternative Conditions	Existing plus Recommended Alternative Conditions
	LOS	Delay[1]	LOS	Delay[1]
Francisco Boulevard West/US 101 Southbound Ramps	C	30.8	C	34.2
Andersen Drive/Francisco Boulevard West	C	29.6	C	29.9
Andersen Drive/Old US 101 Southbound Ramps	A	0.9	A	0.9
Bellam Boulevard/Andersen Drive	D	53.5	**E**	**55.0**
Andersen Drive/DuBois Street	C	31.6	D	40.1

Notes: **Bold** indicates intersection is operating at unacceptable LOS (LOS E or LOS F).
[1] Delay presented in seconds per vehicle.
Source: AECOM 2014

As shown in the table, one intersection (Bellam Boulevard/Andersen Drive) is anticipated to operate at unacceptable LOS (LOS E). However, the City of San Rafael determined that although the LOS at the intersection of Bellam Boulevard/Andersen Drive would worsen from LOS D to LOS E, the change in intersection delay (1.5 seconds) would be negligible. Therefore, the Proposed Action is not expected to result in any additional adverse effects on traffic conditions at and in the vicinity of the Andersen Drive crossing.

Roadway Segment Operating Conditions

Downtown San Rafael

Local roadway segment LOS under 2040 Baseline Conditions is summarized in Table 3.13-16. As shown in this table, Third Street is anticipated to operate at an unacceptable LOS (LOS F) during both the weekday AM and PM peak hours under 2040 Baseline Conditions. As previously described, the Proposed Action is anticipated to result in a negligible increase in traffic volumes in Downtown San Rafael.

Therefore, roadway segment operations under 2040 Baseline plus Proposed Action Conditions would be similar to roadway segment operations under 2040 Baseline Conditions. Because operations along the roadway segments in Downtown San Rafael are projected to deteriorate to unacceptable levels without the Proposed Action and would not change appreciably with it, no adverse effects on the roadway operation from the Proposed Action would occur.

Table 3.13-16: Roadway Segment Level of Service—2040 Baseline Conditions (Downtown San Rafael)

		Existing Conditions	Existing Conditions	Existing Conditions	Existing Conditions	2040 Baseline Conditions	2040 Baseline Conditions	2040 Baseline Conditions	2040 Baseline Conditions
		Weekday AM Peak Hour	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday PM Peak Hour	Weekday AM Peak Hour	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday PM Peak Hour
Roadway	**Direction**	**LOS**	**v/c**	**LOS**	**v/c**	**LOS**	**v/c**	**LOS**	**v/c**
Second Street	Eastbound	A	0.43	A	0.59	B	0.64	D	0.81
Third Street	Westbound	B	0.67	C	0.78	**F**	**1.04**	**F**	**1.02**

Note:
Bold indicates intersection is operating at unacceptable LOS (LOS E or LOS F).
Source: AECOM 2014

Larkspur

Local roadway segment LOS under 2040 Baseline plus Proposed Action Conditions for Larkspur (Sir Francis Drake Boulevard) is summarized in Table 3.13-17.

Table 3.13-17: Roadway Segment Level of Service—2040 Baseline Conditions (Larkspur)

		2040 Baseline Conditions	2040 Baseline Conditions	2040 Baseline Conditions	2040 Baseline Conditions	2040 Baseline plus Proposed Action Conditions	2040 Baseline plus Proposed Action Conditions	2040 Baseline plus Proposed Action Conditions	2040 Baseline plus Proposed Action Conditions
		Weekday AM Peak Hour	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday PM Peak Hour	Weekday AM Peak Hour	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday PM Peak Hour
Roadway	**Direction**	**LOS**	**v/c**	**LOS**	**v/c**	**LOS**	**v/c**	**LOS**	**v/c**
Sir Francis Drake	Eastbound	**F**	**1.27**	**F**	**1.17**	**F**	**1.25**	**F**	**1.15**
	Westbound	**F**	**1.03**	**F**	**1.34**	**F**	**1.00**	**F**	**1.31**

Note:
Bold indicates intersection is operating at unacceptable LOS (LOS E or LOS F).
Source: AECOM 2014

As shown in the table, both directions of Sir Francis Drake Boulevard are anticipated to operate at unacceptable LOS under 2040 Baseline plus Proposed Action Conditions during both the weekday AM and PM peak hours. However, worse conditions (i.e., greater v/c ratios) are forecast in 2040 without the Proposed Action. The Proposed Action is expected to decrease overall traffic along Sir Francis Drake Boulevard as a result of drivers switching to SMART and walking, biking, or taking transit to and from the Downtown San Rafael Station. Therefore, no adverse effect on local roadway segments would occur from the Proposed Action.

Transit

The analysis of 2040 Baseline Conditions assumes the completion and operation of the locally-funded SMART project from Santa Rosa to San Rafael. SMART would contract out connecting shuttle services at the Downtown San Rafael Station and the planned Larkspur Station to provide timed connections with rail service in the southbound direction during the weekday AM peak period and in the northbound direction during the weekday PM peak period. Two shuttle routes operating in one-way loops would be provided at the Downtown San Rafael Station, serving Downtown San Rafael and the commercial strips along Francisco Boulevard East and Francisco Boulevard West, while one shuttle route would be provided out of the planned Larkspur Station, serving four major activity centers—the Larkspur Landing shopping center, San Quentin Prison/Marin County Mart and nearby offices, Marin General Hospital, and the College of Marin.

The Downtown San Rafael Station Area Plan (City of San Rafael 2012) includes near-term improvement recommendations for the Bettini Transit Center, such as reconstruction of Platform D to provide additional bus right-of-way and the provision of additional passenger loading zones to accommodate taxis and kiss-and-ride activity. These recommendations consist of physical improvements to the Bettini Transit Center and are not anticipated to materially affect existing transit operations or ridership.

Ridership projections with the Proposed Action for horizon year 2035 are summarized in Table 3.13-18. As shown in this table, although SMART ridership is expected to increase in 2035 with the Proposed Action, the Proposed Action would not result in material changes to ridership on other bus routes in the vicinity of the Proposed Action area. In addition, SMART would provide shuttles as part of the Proposed Action, primarily serving SMART patrons at the "work" end of their trips. These shuttles would be likely to minimize any effects on local bus service as a result of passengers transferring between bus and rail.

In addition, although GGBHTD and SMART would coordinate schedules for rail and ferry services at Larkspur, the Proposed Action is not expected to result in a material change in ferry ridership, as indicated in Table 3.13-18. During discussions with Golden Gate Transit planning staff, Golden Gate Transit also indicated that sufficient capacity exists on most ferry trips to accommodate any projected ridership increase as a result of the Proposed Action. Based on these considerations, no significant effect on transit conditions would occur from the Proposed Action.

Bicycle

Downtown San Rafael

The Downtown San Rafael Station Area Plan (City of San Rafael 2012) proposes various improvements to the existing bicycle network:

- Creation of a southbound Class 2 bike lane along the west side of Tamalpais Avenue, from Second Street to Fourth Street;
- Designation of a northbound Class 3 bike route on East Tamalpais Avenue, from Fourth Street to Mission Avenue; and,
- Inclusion of a bicycle parking facility to be shared by the Bettini Transit Center and the SMART station.

The locally-funded SMART project does not explicitly propose any changes to bikeways in the Downtown San Rafael area. To encourage bicycle use, however, SMART has proposed providing six bicycle racks and eight bicycle lockers at the Downtown San Rafael Station. The SMART project is not anticipated to disrupt existing bicycle facilities, interfere with planned bicycle facilities, or create inconsistencies with adopted bicycle system plans, guidelines, policies, or standards. Therefore, no adverse effect on bicycle conditions in Downtown San Rafael would occur from the Proposed Action.

Table 3.13-18: Forecasted Transit Ridership (2035 plus Proposed Action)

			Forecasted Ridership	Forecasted Ridership	Forecasted Ridership	Forecasted Ridership	Forecasted Ridership	Forecasted Ridership
			2035 without Proposed Action	2035 without Proposed Action	2035 without Proposed Action	2035 with Proposed Action	2035 with Proposed Action	2035 with Proposed Action
Route		**Direction**	**Peak**	**Off-Peak**	**Total**	**Peak**	**Off-Peak**	**Total**
Bus Services								
Marin County Local Routes								
29	Manor – San Anselmo – College of Marin – Marin General Hospital – Larkspur Landing – San Rafael	SB	449	553	1,002	372	553	925
Subtotal			*449*	*553*	*1,002*	*372*	*553*	*925*
Basic Bus Routes								
70	San Francisco – Marin City – San Rafael – Novato	NB	109	35	144	121	35	156
		SB	400	1,173	1,573	400	1,173	1,573
80	San Francisco – Marin City – San Rafael – Novato – Petaluma – Cotati – Rohnert Park –	NB	1,091	573	1,664	1,065	573	1,638
		SB	2,455	1,065	3,520	2,454	1,065	3,519

Route		Direction	Forecasted Ridership 2035 without Proposed Action Peak	Forecasted Ridership 2035 without Proposed Action Off-Peak	Forecasted Ridership 2035 without Proposed Action Total	Forecasted Ridership 2035 with Proposed Action Peak	Forecasted Ridership 2035 with Proposed Action Off-Peak	Forecasted Ridership 2035 with Proposed Action Total
	Santa Rosa							
Subtotal			*4,055*	*2,846*	*6,901*	*4,040*	*2,846*	*6,886*
Commute Bus Routes								
27	San Francisco – San Rafael – San Anselmo	SB	218		218	218		218
44	San Francisco – San Rafael – Lucas Valley – Marinwood	SB	146		146	146		146
Subtotal			*364*		*364*	*364*		*364*
Ferry Services								
Larkspur Ferry			12,667	79	12,746	12,673	79	12,752
Subtotal			*12,667*	*79*	*12,746*	*12,673*	*79*	*12,752*
Rail Services								
SMART (Operating Segment)		NB	2,946		2,946	2,989		2,989
		SB	2,272		2,272	2,460		2,460
Subtotal			*5,218*		*5,218*	*5,449*		*5,449*
Total			**22,753**	**3,478**	**26,231**	**22,898**	**3,478**	**26,297**

Source: MTC 2009

The analysis of grade-crossing improvement alternatives by the City of San Rafael determined that no impacts would occur on bicycle conditions at Andersen Drive because existing connections between Downtown San Rafael and the Cal Park Hill Tunnel, ultimately leading to Larkspur and the Ferry Terminal, would be maintained. The proposed changes under the recommended alternative for the crossing would not disrupt existing bicycle facilities, interfere with planned bicycle facilities, or create inconsistencies with adopted bicycle system plans, guidelines, policies, or standards. Therefore, no adverse effect on bicycle conditions at Andersen Drive would occur from the Proposed Action.

Larkspur

Future planned changes to the bicycle network include closing gaps in the existing bicycle network, creating accessibility, improving wayfinding signage, and providing convenient and secure bicycle parking.

The Proposed Action does not explicitly propose any changes to bikeways within the Proposed Action area. To encourage bicycle use, however, SMART proposes to provide six bicycle racks and eight bicycle lockers at the Larkspur Station. The Proposed Action is not anticipated to disrupt existing bicycle facilities, interfere with planned bicycle facilities, or create inconsistencies with adopted bicycle system plans, guidelines, policies, or standards. Therefore, no adverse effect on bicycle conditions in Larkspur would occur from the Proposed Action.

Pedestrian

Downtown San Rafael

Various improvements are planned at the Downtown San Rafael Station to promote transit use, as discussed in the Downtown San Rafael Station Area Plan (City of San Rafael 2012).

The Proposed Action does not explicitly propose any changes to pedestrian facilities in the Downtown San Rafael area. The Proposed Action is not anticipated to disrupt existing pedestrian facilities, interfere with planned pedestrian facilities, or create inconsistencies with adopted pedestrian system plans, guidelines, policies or standards. As a result, no adverse effect on pedestrian conditions in Downtown San Rafael would occur from the Proposed Action.

The analysis of grade crossing improvement alternatives by the City of San Rafael determined that no effects would occur on pedestrians because existing connections between Downtown San Rafael and the Cal Park Hill Tunnel, ultimately leading to Larkspur and the Ferry Terminal, would be maintained. The proposed changes under the recommended alternative for the crossing would not disrupt existing pedestrian facilities, interfere with planned pedestrian facilities, or create inconsistencies with adopted pedestrian system plans, guidelines, policies, or standards. Therefore, no adverse effect on pedestrians at Andersen Drive would occur from the Proposed Action.

Larkspur

The shared bicycle–pedestrian improvements discussed previously also are anticipated to improve pedestrian conditions in the vicinity of the Proposed Action. In addition, the City of Larkspur Bicycle and Pedestrian Master Plan (City of Larkspur 2004) encourages the development of projects aimed at improving the visibility of pedestrians around Sir Francis Drake Boulevard and local schools. Together, these improvements are expected to increase pedestrian safety and improve overall pedestrian connectivity in the vicinity of the Proposed Action.

The Proposed Action does not explicitly propose any changes to pedestrian facilities. The project is not anticipated to disrupt existing pedestrian facilities, interfere with planned pedestrian facilities, or create inconsistencies with adopted pedestrian system plans, guidelines, policies or standards. Therefore, no adverse effect on pedestrian conditions in Larkspur would occur from the Proposed Action.

Parking

For the purposes of this EA, the Proposed Action-generated parking demand was estimated based on the model projections of park-and-ride patronage. The proposed changes to parking supply at both the Downtown San Rafael Station and proposed Larkspur Station are summarized next.

Downtown San Rafael

The Downtown San Rafael Station Area Plan (City of San Rafael 2012) proposes the following changes to the existing parking conditions in the vicinity of the Proposed Action area:

- Removal of 56 on-street parking spaces (26 parking spaces from The Whistlestop and 30 spaces from the proposed rail alignment area) to accommodate the locally-funded SMART project alignment and the Downtown San Rafael Station;
- Removal of five parking spaces at the south end of the Bettini Transit Center;
- Construction of a new municipal parking garage;
- Introduction of strategies to encourage the use of public parking (e.g., electronic meters, signage) and protection of residential neighborhood parking through use of residential parking permit districts;
- Management of parking demand through pricing;
- Encouragement of shared use of off-street parking between land uses (i.e., daytime use by office or retail/commercial uses and nighttime use by residential land uses); and,
- Implementation of priority parking for electric vehicle parking.

As discussed previously, the Proposed Action is anticipated to result in a negligible increase in traffic volumes in Downtown San Rafael. Therefore, no adverse effect on parking demand or parking conditions in Downtown San Rafael would occur from the Proposed Action.

Larkspur

SMART would provide a surface parking lot at the planned Larkspur Station as part of the Proposed Action, which would have approximately 77 parking spaces, but construction of the planned station would eliminate approximately 200 existing parking spaces for the Marin Airporter, resulting in a net loss of approximately 123 parking spaces. Based on the forecasted station ridership and access mode shares, the station is expected to generate a parking demand of 91 parking spaces.

Parking conditions are not static, as parking supply and demand varies from day to day, from day to night, and from month to month. Thus, the availability of parking spaces (or lack thereof) is not a permanent physical condition but changes over time as people change their travel modes (i.e., switching to walking, biking, and transit) and patterns of travel (e.g., carpooling or foregoing trips altogether), reducing overall parking demand. In addition, strategies such as the following measures can be readily implemented to better manage parking demand relative to supply:

- Encouragement of alternative modes of transportation through various strategies, including those described as part of the bicycle and pedestrian improvements;

- Implementation of parking pricing for all on- and off-street short-term parking; and
- Coordination with the GGBHTD on the implementation of parking management policies and programs at the Larkspur Ferry Terminal.

Construction

The estimated construction time frame for the Proposed Action is approximately 12 months. Trackwork would consist of replacement of ballast, ties, rails, and other track material in place. Most work would be completed with rail-mounted equipment, and all access for construction work would be from within the SMART right-of-way.

At-grade crossing rehabilitation would include removal of any existing track, roadway, and old signals, and the installation of new track and crossing panels, new roadway approaches, drainage improvements, and new signal protection including signal system software. Construction work would be coordinated with the City of San Rafael regarding the grade-crossing shutdown schedule (if required) and traffic detour plans. Temporary detours related to construction activities would occur but would be short-term and generally would not occur during peak traffic demand periods.

Roadway and at-grade crossing work at Francisco Boulevard West and Andersen Drive may potentially require occasional night work and/or road closures. Based on experience constructing similar crossings along the locally-funded SMART project, the needed time for such closures would not be likely to exceed 48 hours. Because the planned Larkspur Station site is located on the edge of existing commercial uses, street closures and other potential disruptions would not occur during station construction.

Temporary or short-term effects would occur on local roadways. Heavy equipment and materials would be required to be transported to and from each construction site. Workers driving to various construction sites also would add traffic to the local and regional street network. A designated construction staging area would be located at the end of the proposed rail alignment, within the SMART right-of-way. The average duration that the staging site would be used would depend on construction sequencing and type of construction.

To address potential transportation effects during construction, SMART would implement the following mitigation measure:

- **Mitigation Measure T-1:** SMART will develop a construction phasing/sequencing and traffic management plan to be developed and implemented by the contractor to minimize Proposed Action effects during construction. This plan will define each construction operation, approximate duration, and the necessary traffic controls to maintain access for vehicles. The plan will require the movement of heavy equipment and transport materials during off-peak travel demand periods. To reduce the effect on parking supply, the plan will encourage workers to carpool and use public transit. To address safety issues, clearly defined access for non-motorized modes will be maintained during construction. Staging areas will be fenced and signed. Where roadways and sidewalks are impassable for bicycles and pedestrians, safe alternate routes and pathways will be signed and maintained during construction. This plan will be coordinated with the cities of San Rafael and Larkspur, local fire and police departments, and transit providers.

With implementation of the above mitigation measure, no adverse effects would occur from any Proposed Action construction activities.

3.13.3 References

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3.14 VISUAL RESOURCES

This section discusses visual resources in the vicinity of the Proposed Action area. Previous analysis for visual resources was undertaken for the overall SMART project as a part of the 2005 Draft EIR (SMART 2005), prepared as per CEQA. That analysis can be found in Section 3.13 of the 2005 Draft EIR.

The visual quality of an environment is shaped by the built and natural features that make up the visual landscape or setting. Built features include human-made structures, such as buildings, parking areas, roads, roadway interchanges and overpasses, aboveground utilities, signs, and lighting fixtures. Natural features include landforms, rock outcrops, vegetation, and water bodies. These resources together define the scale relationships as well as the line, form, color, and texture of an area's landscape. A project may enhance or adversely affect the visual quality of a landscape setting by its effect on the built and natural features that define the setting. Scenic views to and from a project area also are important considerations in characterizing the effects of a proposed project. A proposed project may interfere with or eliminate scenic views or may result in the removal of a scenic resource.

3.14.1 Affected Environment

Views and Visual Character

The Proposed Action rail alignment follows the former Northwestern Pacific (NWP) Railroad rail right-of-way (ROW), which has been acquired by SMART. Former NWP Railroad structures, such as abandoned rails, trestles, and other features, still are present along much of the proposed rail alignment. The existing environment along the alignment is described in Section 2.2.2, under the heading *Description of the Existing Downtown San Rafael to Larkspur Rail Alignment*. Photos of the alignment are also provided in Section 2.2.2, Figures 2-2 and 2-3.

Within the northerly two-thirds of the alignment in the City of San Rafael, the visual setting can be characterized as highly industrial and urban, with the backs of industrial buildings, nearby elevated freeway, adjacent commercial buildings, and inactive rail facilities visible throughout. Much of the Proposed Action area has a somewhat blighted appearance, with weeds, trash, and inactive rails in view.

The landscape in the vicinity of the northern entrance to the Cal Park Tunnel becomes brushy with scattered oaks. Views of San Francisco Bay are visible to the east. Within the Cal Park Hill Tunnel, a wall separates the alignment on the west side from the bicycle/pedestrian pathway on the east side. When the alignment emerges on the south side of the Cal Park Hill Tunnel, office buildings, apartments, and retail and commercial uses in Larkspur can be seen. The Greenbrae Interchange to the west, Sir Francis Drake Boulevard to the south and east, Marin Mart Shopping Center, and the Larkspur Ferry Terminal also are visible. In the direction of the proposed Larkspur Station site, glimpses of the San Francisco Bay are visible beyond the Larkspur Ferry Terminal parking lot.

No State or federally designated scenic resource, such as a State Scenic Highway, Wild and Scenic River, scenic vista, or other scenic resource area, is within or near the proposed rail alignment.

Light and Glare

The proposed rail alignment has existing sources of light and glare, typical of built urban environments. These sources include lighting associated with commercial buildings and parking lots, vehicles along adjacent roadways, street lamps, and traffic signals.

3.14.2 Environmental Consequences

Alternative 1: No Action Alternative

Under the No Action Alternative, the FTA would take no action and would provide no funding to SMART for the Downtown San Rafael to Larkspur Extension project. The project would not be constructed, and none of the effects associated with the Proposed Action would occur. No construction or operation activities would occur, and the project corridor would remain in its current state.

Alternative 2: SMART Downtown San Rafael to Larkspur Extension (Proposed Action)

No scenic resources, including scenic vistas, are within or near the proposed rail alignment. Therefore, the following analysis discusses potential effects on the visual character of the Proposed Action area and vicinity, and potential effects from light and glare.

Construction

Views and Visual Character

All Proposed Action construction activities would be conducted within the existing NWP rail alignment except at the planned Larkspur Station, where a small stairway would be constructed outside the ROW to allow pedestrian access to adjoining parcels. Construction would be relatively short in duration because of the existence of the remnant NWP Railroad rail alignment, and it would not be staged at any one location for more than a few days. The greatest construction visibility would occur at the planned Larkspur Station, the West Francisco Boulevard partial realignment, the at-grade crossing at Anderson Drive, and the three trestle bridge replacements. Some of the rail-specific equipment would be trucked to each construction site, placed on the rails, and then moved down the tracks as construction proceeded. These and other materials and construction equipment that would be stored on site temporarily could affect the visual setting in the immediate vicinity.

The 2005 Draft EIR prescribed the following mitigation measure to address potential impacts associated with views and visual character during construction. The measure would also be applicable to the Proposed Action:

- **Mitigation Measure V-1:** SMART shall install temporary fencing where views from adjacent residences are adversely affected during construction. These areas shall be identified in greater detail during design review and the type of temporary fencing selected, as part of the design review. Fencing materials would remain in place until finish work has been completed.

With implementation of the above mitigation measure, no adverse effect would occur from changes to visual character during construction.

Light

The majority of Proposed Action construction activities would take place during daylight hours. However, to avoid disruption to traffic during the day, some nighttime construction could occur during certain phases of the Woodland Avenue/Bellam Boulevard trestle replacement and the at-grade crossing construction at Andersen Drive. Lighting would be required during nighttime construction activities. However, experience with similar construction activities along portions of the locally-funded SMART project alignment to the north has shown that grade crossing work usually can be accommodated over the course of two or three nights, and that trestle work usually can be accommodated in a similar time frame. Thus, the duration of any nighttime work at each of the locations would be relatively short. Therefore, although construction activities would introduce a new source of light temporarily within the proposed rail alignment, this lighting would be directed to discrete locations and would be temporary and short-term. No adverse effect would occur from Proposed Action construction.

Operation

Views and Visual Character

The Proposed Action would occur within an existing rail alignment, and although no rail operations have occurred on it in the recent past, the Proposed Action would not introduce a new linear feature into the landscape or any unrelated uses within this alignment. The planned Larkspur Station would be constructed in a built urban environment where the introduction of station elements, such as platforms, waiting area shelters, parking lots, and bicycle facilities would not adversely affect the visual character of the Proposed Action area or vicinity. Views from the proposed rail alignment would not differ substantially from what already exists.

California Public Utility Code 105096 requires SMART to comply with the design review process of local jurisdictions in which rail transit facilities are located (including railway stations), although the local jurisdiction's design review and approval would be advisory only. As part of this commitment, the 2005 Draft EIR prescribed the following mitigation measure to address potential impacts associated with design elements such as lighting fixtures associated with the project. The measure would also be applicable to the Proposed Action:

- **Mitigation Measure V-2:** Fixture types, cut off angles, shields, lamp arm extensions, and pole heights will be determined in consultation with the local jurisdictions.

Working with design standards of the local communities, the planned Larkspur Station would be designed to be visually compatible with the character of the surrounding area. SMART would work with the City of Larkspur so that the planned station and the associated parking lot would be consistent with the visual guidelines in the immediate vicinity. Therefore, because the Proposed Action would not introduce unrelated uses within the existing rail alignment, and because the planned Larkspur Station and associated parking lot design would be visually compatible with the surrounding area, no adverse effect would occur on the visual character of this location from implementation of the Proposed Action.

Light and Glare

Lighting would be incorporated into the design of the planned Larkspur Station, associated parking lot, and the four public at-grade crossings for visibility, safety, and security. The planned Larkspur Station would have a boarding platform and would be equipped with a shelter, schedule displays, bike lockers, leaning bars,

information kiosks and at least two ticket vending machines. Lighting would be required at the station and the stairway leading to the Century Theaters' Larkspur Landing movie theatre parking lot. The planned station site is located in a built urban area with existing lighting sources, as part of the adjacent movie theater, in the extensive parking area for the adjacent Marin Airporter, and on US 101. The additional lighting required at the new station and its parking lot would not be substantial and would be directed in a manner to reduce light spillage off site. Therefore, no adverse effect would occur from lighting at the planned Larkspur Station and associated parking lot.

Automobile traffic at the four public at-grade crossings would be controlled by bells, flashing beacons, and gates. In addition, various methods could be used to identify and report unusual conditions at the Anderson Drive at-grade crossing to SMART's train operators, including active in-pavement lighting to delineate the trackway that could flash and/or change color when a train was approaching. The flashing beacons and potential in-pavement lighting would create a new source of lighting in the immediate area, but this would be along existing rail, vehicle, bicycle, and pedestrian transit corridors where extensive lighting already exists. Furthermore, the lighting would be used only during train crossings, from approximately 6 a.m. to 7:30 p.m., and would not be used during later nighttime hours. Therefore, no adverse effect would occur from lighting at the at-grade crossings.

The diesel multiple units (DMUs) that are to be used for the SMART passenger rail system would have lighting built-in. The DMUs would operate on 30-minute headways in both southbound and northbound directions, from approximately 6 a.m. to 7:30 p.m. between the San Rafael and Larkspur stations. The DMUs would not operate during later nighttime hours, and they would not create a new stationary source of lighting because they would be moving along the tracks. The DMUs would operate adjacent to existing transit corridors and within an urban built environment where extensive lighting already exists. Therefore, the light created by passing DMUs would be consistent with the existing lighting environment, and a substantial new source of lighting would not be created that would affect views in the area. No adverse effect would occur.

3.14.3 References

Sonoma-Marin Area Rail Transit (SMART). 2005. *SMART Draft Environmental Impact Report*. Website: http://www2.sonomamarintrain.org/index.php/docs/eir/. Accessed October 6, 2014.

3.15 ENVIRONMENTAL RESOURCES NOT SUBJECT TO FURTHER EVALUATION

A number of topical issue areas are not evaluated in detail in this EA, generally because the identified environmental resources are not present within or around the Proposed Action area or because implementation of the Proposed Action would clearly have no effect with respect to the topic issue area. These issue areas are described in this section with an explanation of why they are not evaluated further in this EA.

3.15.1 Agricultural and Forestry Resources

The Proposed Action area is classified as "Urban and Built-up" by the California Farmland Mapping and Monitoring Program (California Department of Conservation 2010), which is a classification used for lands that present constraints for agricultural use. The proposed rail alignment is intensively developed and urbanized along its entire length. No agricultural or forestry operations or resources are present along any portion of the alignment. The closest agricultural operation to the Proposed Action area is a small dairy operation adjacent to U.S. Highway 101, approximately 4 miles north of Downtown San Rafael. Therefore, agricultural and forestry resources are not present in the Proposed Action area, and no effect would occur on such environmental resources from implementation of either of the EA alternatives.

3.15.2 Mineral Resources

Soils in the northern two-thirds of the Proposed Action area are made up exclusively of artificial fill material, underlain by deposits of Bay mud that extend to substantial depths. These types of strata typically are not associated with valuable mineral resources. The southern one-third of the Proposed Action area passes through and over rocks associated with the Franciscan Complex, a formation that is not known to contain substantial quantities of important minerals. Regardless, the entire Proposed Action area is heavily urbanized and built-up, and mineral extraction activities are not known to have ever occurred in this area. Therefore, mineral resources are not present in the Proposed Action area, and no effect would occur on such environmental resources from implementation of either of the EA alternatives.

3.15.3 Section 4(f)

There are no qualifying Section 4(f) properties in the project area. The SMART Non-Motorized Pathway (NMP) lies adjacent to the Proposed Action alignment from Andersen Drive southwards to the proposed Larkspur Station location. This portion of the NMP is known locally as the Cal Park Hill Pathway. An additional NMP segment may be constructed in the future using local funds alongside the Proposed Action alignment from Andersen Drive northwards to the vicinity of Rice Drive.

The NMP is entirely within the right-of-way of the Proposed Action, is identified as a transportation facility in local general plans and bicycle and pedestrian master plans, and was constructed using federal Congestion Mitigation and Air Quality funds that are intended to offer traffic congestion relief. The NMP and the larger right-of-way of which it is a part have a long history of being dedicated for transportation purposes. The acquisition of the Northwestern Pacific Railroad (NWP) right-of-way by the Golden Gate Bridge Highway and Transportation District (GGBHTD) was the result of the 1969 California Legislature's direction to the GGBHTD

to prepare a transportation facilities plan. A key recommendation of that 1971 plan was the acquisition of any portion of the NWP right-of-way that might be in danger of being pre-empted for non-transportation uses. Subsequently, in 1995, a Joint Powers Authority (JPA) comprised of the GGBHTD, Marin County and the North Coast Railroad Authority (NCRA), collectively the Northwestern Pacific Railroad Authority (NWPRA), was formed to hold title to the right-of-way until such time as a successor agency was created to operate rail services on the corridor. The SMART District was created by the California Legislature in 2002. With the creation of SMART and its mandate to operate and maintain rail transit facilities within the NWP right-of-way, work began on the dissolution of the NWPRA. In light of these circumstances and the history of this corridor, the NMP has been and continues to function primarily as a transportation facility.

The SMART District is governed by the California Public Utilities Code (Part 16, Sections 105000-105337). Section 105003(c) provides definitions used within Part 16 and provides that: "Rail transit works or rail transit facilities means any or all real and personal property, equipment, rights or interests owned or to be acquired by the district for rail transit service purposes, including ancillary bicycle and pedestrian pathways that provide connections between and access to station sites." Until SMART commences revenue rail services associated with the Proposed Action, an MOU among Marin County, the Cities of San Rafael and Larkspur, and the Twin Cities Police Authority governs the operations and maintenance of the NMP. Per 23 CFR 774.17, SMART is the official with jurisdiction for the NMP facility, in that SMART is "the agency that own[s] or administer[s] the property in question and who [is] empowered to represent the agency on matters related to the property."

Because the NMP was built before operation of the Proposed Action and has been reserved as a transportation facility, it is not subject to Section 4(f), pursuant to 23 CFR 774.11(i), which provides that Section 4(f) does not apply when a park or recreational area and a transportation facility are jointly planned. Furthermore, the NMP is a transportation facility and is therefore exempt from evaluation as a Section 4(f) property. This determination is in accordance with exemptions found in 23 CFR 774.13(f), which provides an exception for "Trails, paths, bikeways, and sidewalks that are part of the local transportation system and which function primarily for transportation [23 CFR 774.13(f)(4)]" and further documented in SMART's November 30, 2014 letter to FTA regarding the applicability of Section 4(f) (see Appendix I).

3.15.4 References

California Department of Conservation. 2010. *Marin County Important Farmland*. Available: ftp://ftp.consrv.ca.gov/pub/dlrp/FMMP/pdf/2010/. Accessed June 23, 2014.

4.0 CUMULATIVE IMPACTS

Section 1508.7 of the Council on Environmental Quality (CEQ) regulations for the implementation of the National Environmental Policy Act defines a *cumulative impact* as the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. CEQ interprets this regulation as referring to the cumulative impacts of the direct and indirect effects of the proposed action and its alternatives when added to the aggregate effects of past, present, and reasonably foreseeable future actions (CEQ 2005). The contribution of a proposed action and its alternatives to an overall cumulative impact is of particular concern when an agency determines whether a proposed action is cumulatively considerable.

The effects of a proposed action or group of proposed actions must meet all of the following criteria to be considered cumulative impacts:

- Effects of several actions would occur in a common locale or region.
- Effects would not be localized (i.e., they could contribute to effects of a proposed action in a different location).
- Effects on a particular resource would be similar (i.e., the same specific element of a resource would be affected).

The process of analyzing cumulative impacts includes the traditional components of an environmental impact assessment: conducting scoping, describing the affected environment, and determining the environmental consequences (CEQ 1997).

4.1 CUMULATIVE PROJECTS

Determining cumulative projects for this EA entailed contacting the following agencies for information regarding past, ongoing, and reasonable foreseeable projects in the vicinity of the Downtown San Rafael to Larkspur Extension (Proposed Action) area that would be appropriate to analyze in combination with the EA alternatives: For purposes of this analysis, a 0.25-mile distance from the Proposed Action area was used to determine whether a cumulative project is in the vicinity of the Proposed Action area.

- San Rafael Planning Department
- Larkspur Planning Department
- Metropolitan Transportation Commission (MTC)

Projects identified as having potential to contribute incrementally to cumulative environmental impacts are listed in Table 4-1.[8] The table includes projects that have been completed recently or are anticipated to be completed within the next 5 years.[9]

[8] Where applicable, environmental analysis of the projects listed in Table 4-1 has been or would be conducted separately, with the results of those analyses incorporated into environmental review documents prepared specifically for these projects.

Table 4-1: SMART San Rafael to Larkspur Extension Cumulative Projects

Number	Project Name	Address	Project Description	Status
City of San Rafael				
1	1203 Lincoln Avenue	1203 and 1211 Lincoln Avenue	A five-story condominium with 36 residential units (20 one-bedroom units, and 16 two-bedroom units).	Project approved by City Council on August 13, 2006; entitlements have been extended three times and are valid through August 7, 2015.
2	The Village at Loch Lomond Marina Project	110 Loch Lomond Drive	81 residential units, 22,500 square feet of neighborhood commercial space, with a grocery store and public shoreline park improvements.	Project approved by City Council on August 20, 1997, and entitlements are valid through August 20, 2016. Grading permits were issued.
3	815 B Street Mixed Use Project	815 B St	A four-story, mixed-use building with 41 "rental" residential units or apartments, located above 2,095 square feet of commercial retail space, on a combined area of approximately 23,800 square feet.	A Notice of Preparation for a CEQA-compliant Environmental Impact Report was issued on June 24, 2013.
4	Downtown Station Area Plan Circulation Improvements	Several locations	1) Provision of a second right-turn lane from Hetherton Street to Third Street; 2) Conversion of sections of Tamalpais Avenue to one-way travel, 3) Redesign section of Tamalpais Avenue between Third Street and Fourth Street; and 4) new signal controllers and upgraded signal interconnection, to allow for advanced rail preemption at intersections in Downtown San Rafael.	Some of the components are expected to be completed prior to operation of the locally-funded SMART project in 2016.
City of Larkspur				
None				
Metropolitan Transportation Commission (Transportation 2035 Plan)				
4	U.S. Highway 101 (US 101) Gap Closure	Between Lucky Drive in Corte Madera to the south of North San Pedro Road in San Rafael	Widen US 101 for HOV lanes (one in each direction) as part of the 2002 Traffic Congestion Relief Program (TCRP) project.	Project completed in March 2011.
5	Canal St. Lifeline Phase 2 (Construction) Project	Canal Street	Implement initial set of transportation improvements identified in the Canal Neighborhood Community-Based Transportation Plan. These improvements include pedestrian accessibility, safety lighting, and transit facility improvements and upgrades.	Funds allocated for project in fiscal year 2011/2012; approved by the City Council of the City of San Rafael.

[9] CEQ regulations do not require agencies to catalogue or exhaustively list and analyze all individual cumulative projects; rather, agencies must summarize the most pertinent cumulative projects.

Number	Project Name	Address	Project Description	Status
6	Andersen Drive	Andersen Drive	Signalize Anderson Drive/East Sir Francis Drake Boulevard Intersection	$3 million to be used from discretionary funds.
7	Westbound Interstate 580 (I-580)/US 101 Connector Project	I-580 to US 101	Permanent two-lane connector from I-580 to northbound US 101 and a new westbound bridge over Bellam Boulevard.	Project completed in November 2010.
8	Major Roads and Related Infrastructure	I-580 to US 101	Implement local arterial improvements parallel to US 101 and I-580 (includes signalization, signal controller upgrades, signal coordination, and geometric improvements).	$10 million to be used from discretionary funds.
9	Central Marin Ferry Connection Multi-Use Pathway Project (CMFCP)	City of Larkspur	Extends the Cal Park Hill Multi-Use Pathway to the south with a new steel bridge structure crossing over Sir Francis Drake Boulevard; provides a southern connection to the future SMART Larkspur Station; provides pedestrian and bicycle improvements to the existing multi-use pathway on the south side of Sir Francis Drake Boulevard; creates and enhances 1.4 acres of salt marsh habitat at Hal Brown Creekside Park.	Construction is expected to be completed by spring 2015.
Sonoma Marina Area Rail Transit (SMART)				
10	Locally-Funded SMART Initial Operating Segment (IOS)	City of Santa Rosa southward to downtown area of City of San Rafael	SMART locally-funded IOS project includes upgrading tracks and trestles for passenger rail activities and construction of related rail stations, including the Downtown San Rafael Station.	Under construction; expected to be completed and operational in 2016.

Source: Compiled by AECOM in 2014

The Larkspur Station Area Plan was a previous planning action undertaken by the City of Larkspur. The plan included a number of alternative development scenarios that would have provided for a mix of expanded commercial and residential development possibilities. The plan also considered circulation and parking improvements to better serve a substantially more dense residential population than currently exists. The City Council voted to abandon the plan in June 2014. In the absence of a plan for the area, any future private development or public improvement projects will be proposed and evaluated on a case-by-case basis, in accordance with the City's General Plan and standard planning process. No planning or project actions are underway at this time.

4.2 CUMULATIVE IMPACTS ANALYSIS

4.2.1 Air Quality

Generally, if a project results in an increase of a pollutant above a significance threshold, then it also would be considered to contribute to a cumulative impact. The Proposed Action would not exceed de minimis significance thresholds for criteria air pollutants (CAPs). Project emissions of CAPs that do not exceed thresholds could be cumulatively considerable when compounded with other cumulative emissions. However, in the case of the Proposed Action, all planned development and growth has been included in the assumptions that were used to generate the traffic data analysis, because it made direct use of traffic volume data and assessed air emissions based on cumulative future traffic conditions. Furthermore, implementation of the cumulative projects shown in Table 4-1, specifically the transit and bicycle and pedestrian pathway aspects, would serve to reduce overall CAPs emissions rather than combine with the Proposed Action to contribute incrementally to a cumulative impact.

The Proposed Action would emit new emissions of diesel particulate matter (PM) related to operation of the diesel multiple units (DMUs). Although these new emissions would not lead to violations of PM_{10} and $PM_{2.5}$ ambient standards, the Proposed Action is expected to result in higher diesel PM concentrations near the planned Larkspur Station and proposed rail alignment. However, cumulative impacts resulting from diesel PM are not expected to be an issue, as numerous regulations that will decrease diesel PM emissions dramatically have been enacted or are anticipated to be enacted in the near future. The U.S. Environmental Protection Agency's (EPA) Clean Diesel Trucks and Buses Rule and the California Air Resources Board's (CARB) efforts to reduce diesel PM emissions from a variety of sources would reduce diesel PM levels substantially by the time the Proposed Action is implemented. The goal of CARB was to reduce diesel PM emissions and associated cancer risk by 75 percent by 2010, and now the goal is to reduce diesel PM emissions and associated cancer risk by 85 percent by 2020. EPA also plans to have new standards in place for locomotives and marine vessels that would reduce diesel emissions from these sources by approximately 90 percent. Because the Proposed Action already includes a restriction that the best available emission control technologies are to be used on the DMUs, the Proposed Action would be consistent with EPA and CARB goals. The Proposed Action would not contribute incrementally to a cumulative impact related to diesel PM emissions.

4.2.2 Biological Resources

A review of past, present, and reasonably foreseeable projects (see Table 4-1) has identified three residential and commercial developments and seven transportation improvement projects (primarily associated with US 101, Andersen Drive, and the locally-funded SMART project) in close proximity to the proposed rail alignment.

As with construction of the Proposed Action, construction projects have the potential to affect local plant communities, wetland resources, and wildlife habitats by direct removal or temporary disturbance during construction. Nearly all of the construction sites, however, can be characterized as urban infill, since all but one of them is entirely surrounded by existing urban development. In general, projects on urban infill sites are not expected to result in substantial losses of plant communities, wetland resources, or wildlife habitats, or to have substantial adverse effects on special-status plant or wildlife species. As such, these types of urban infill projects would not be expected to result in an adverse cumulative effect to these types of resources.

Only one of the listed projects, the Central Marin Ferry Connection Multi-Use Pathway Project (CMFCP), is located in an area where impacts to biological resources would be likely to occur. Portions of the project are located adjacent Corte Madera Creek, and some saltmarsh wetlands are present in the area. The project, however, also includes the creation and enhancement of 1.4 acres of salt marsh habitat at Hal Brown Creekside Park, upstream of the project area in the Corte Madera Creek watershed. The area that will be restored will provide suitable habitat for endangered species such as clapper rail and salt marsh harvest mouse. The 1.4-acre restoration site is substantially larger than the marsh area that will be affected by the CMFCP project, and will more than offset the project's impacts to wetlands and sensitive species. As such, the CMFCP project will have a net beneficial cumulative effect with respect to these resources.

4.2.3 Cultural Resources

Impacts on historic resources tend to be site-specific and generally are assessed on a case-by-case basis. However if a project was to result in development features or changes to existing environmental conditions that would be incompatible with historical resources that exist within the vicinity of the project site, a cumulative impact on historical resources could result. A review of recent or proposed projects within the vicinity of the Proposed Action's area (see Table 4-1) did not identify any potential cumulative impacts on historical resources. None of the historic architecture assessments conducted over the last 30 years within the Proposed Action area have recorded a historic resource that is eligible for the NRHP. No incremental contribution to a cumulative impact on historic resources would occur.

Cumulative impacts can result from incremental actions that are collectively adverse to an environmental resource. If a project results in development features or changes to existing environmental conditions that are incompatible with archaeological resources that exist within the vicinity of the project site, an incremental contribution to a cumulative impact could result. A review of residential and commercial developments near the proposed rail alignment between San Rafael and Larkspur did not identify any adverse effects on archeological resources. None of the present and future cumulative projects listed in Table 4-1 would affect known prehistoric or historical archaeological sites. None of the nearly two dozen archaeological resource assessments conducted over the last 30 years in the vicinity of the Proposed Action area have recorded an archaeological resource that is eligible for the NRHP. Thus, no incremental contribution to a cumulative impact on prehistoric or historic archaeological sites would occur.

4.2.4 Energy

As described in Section 3.4, implementation of the Proposed Action would provide a net beneficial impact with respect to energy consumption. Provision of passenger rail service between San Rafael and Larkspur as envisioned with the Proposed Action would result in a net reduction in energy consumption by providing an alternative to private vehicle travel. Therefore, the Proposed Action would contribute incrementally to a cumulative beneficial effect related to energy.

4.2.5 Geology and Soils

Based on a review of cumulative projects proximate to the proposed rail corridor and existing available information regarding the sites of the other projects (see Table 4-1), none of the projects would result in an impact on geology, soils, or seismicity. In addition, the majority of the projects would occur at a far enough distance from

the Proposed Action area so as not to create incremental contributions to a cumulative impact from a geotechnical perspective. Therefore, the Proposed Action would not contribute incrementally to a cumulative impact related to geology and soils.

4.2.6 Greenhouse Gas Emissions and Climate Change

Because greenhouse gas (GHG) emissions are global air emissions with an atmospheric residence time of at least 200 years, GHG emissions associated with the cumulative projects listed in Table 4-1 and the Proposed Action were considered in this cumulative analysis. Operation of the Proposed Action from Downtown San Rafael to Larkspur in conjunction with these cumulative projects would generate cumulative emissions of CO2e. These cumulative emissions of GHGs would be below 25,000 MTCO2e per year; therefore, operations would not make a considerable contribution to cumulative GHG emissions and global climate change. Generally, implementation of these projects, specifically the transit and bicycle and pedestrian pathway aspects, would serve to reduce overall GHG emissions rather than combine with the Proposed Action to create a cumulative environmental impact.

Sea level rise could cause flooding in some of the coastal and tidally influenced areas of San Rafael. However, because the cumulative project sites are at higher elevations (12 to 24 feet above mean sea level) than the Pacific Ocean (0 feet above mean sea level), no incremental contributions to a cumulative climate change–related sea level rise impact would occur to which the Proposed Action also would contribute. Therefore, the cumulative projects would not be unprepared for inevitable environmental changes that could occur from climate change, and thus, they would not result in harm to persons or property or degradation of natural resources or ecosystems. No incremental contribution from the Proposed Action to a cumulative impact would occur.

4.2.7 Hazards and Hazardous Materials

As development progresses, the Proposed Action area could be affected by use of hazardous construction materials (e.g., fuels, oils, mechanical fluids, and other chemicals). However, transportation, storage, use, and disposal of hazardous materials during Proposed Action construction activities and operation, as well as that of the other projects listed in Table 4-1, would be mitigated by compliance with applicable federal, State, and local statutes and regulations. This compliance would avoid exposing humans and the environment to hazardous materials. No incremental contribution from the Proposed Action to a cumulative impact would occur.

4.2.8 Hydrology and Water Quality

The original construction of US 101 and subsequent related adjacent land use changes (e.g., agriculture to residential) and population increases in cities along this transportation corridor have adversely affected basin water quality. Impervious surface areas primarily surround this transportation corridor. Three residential and commercial cumulative projects (see Table 4-1) are planned for the US 101 corridor that would be in the proximity of the Proposed Action area. These planned developments could contribute to the cumulative degradation of water quality in the San Rafael and San Francisco bays.

Recognizing the importance of water quality and quantity, required compliance with federal and State regulations and guidelines, as well as implementation of best management practices related to stormwater management and runoff, by all the cumulative projects would minimize the cumulative impact on water resources in the region.

Water body impairments in the region mainly result from agricultural practices and urban runoff. The limited amount of impervious surfaces and associated runoff added by the Proposed Action would not represent a considerable contribution to a cumulative impact. Therefore, no incremental contribution to a cumulative impact on hydrology and water quality would occur.

4.2.9 Land Use

The implementation of the Proposed Action in conjunction with other past, present and future cumulative projects (listed in Table 4-1) would not contribute to a cumulative impact on the land use in Marin County. The cumulative projects are located in existing developed areas, in proximity to the Proposed Action area, and they would not physically divide communities. These projects in combination with the Proposed Action would not make incremental contributions to a cumulative impact related to community connectivity. Although transit-oriented development is not proposed as part of the Proposed Action, several such projects are being proposed near planned rail station sites associated with the overall SMART. The City of San Rafael, for instance, has developed a Station Area Plan for the Downtown San Rafael Station area, with the express intent of developing compatible transit-oriented projects in the vicinity of the station. The City of Larkspur also developed a similar plan for the Larkspur Station, though that plan was abandoned by vote of the City Council and the City has now indicated that it will review and approve proposed private projects in the station area on a case-by-case basis within the context of the City's existing General Plan. Therefore, the Proposed Action combined with the cumulative projects generally would be consistent with local general plans, would have compatible land uses with each other and with surrounding land uses, and would support infill development. No incremental contribution to a cumulative impact on land use would occur.

4.2.10 Noise and Vibration

For locations with higher background noise levels, the amount of additional noise that a project is allowed to contribute decreases. The Proposed Action area generally experiences relatively high noise levels. The Proposed Action would contribute only temporary noise increases from construction and operational train pass-bys. Implementation of the mitigation measures prescribed in Section 3.10 of this EA would effectively reduce these impacts on surrounding sensitive receptors. Therefore, the Proposed Action would not contribute incrementally to a cumulative noise impact.

4.2.11 Safety and Security

Other cumulative projects (listed in Table 4-1) are not expected to result in any adverse impact on emergency response times, with the exception of the locally-funded SMART project, as well as the Proposed Action. The potential delays associated with the locally-funded SMART project and the Proposed Action would be caused by construction around the planned train stations and at at-grade crossings, and by the presence of trains at at-grade crossings when emergency vehicles would need to cross them. To the extent that any road closures or detours required for construction of the cumulative projects would occur at the same time as the Proposed Action's construction, the Proposed Action's contribution to any combined delays would not contribute adverse effects because of SMART's coordination with local emergency providers to establish alternative routes and appropriate signage. The potential effect of the Proposed Action on increased delays of emergency response vehicles at at-grade crossings because of the presence of trains would be unique to the rail project and would not combine with

other cumulative projects to have a cumulative impact. No incremental contribution to a cumulative impact would occur.

With regard to the potential impact on demand for emergency response services from local providers, three of the cumulative projects would increase the number of residential units and commercial enterprises within the proximity of the Proposed Action area. This increase would result in a cumulative demand on public facilities and services, including schools, hospitals, fire protection, emergency services, and police services. However, these projects would be subject to approval by the local jurisdictions and would be designed and implemented within the guidelines of local general plans. Therefore, local jurisdictions would be expected to increase their facilities and services to accommodate all approved development. In addition, the Emergency Preparedness Plan required to be developed for the Proposed Action, in consultation with local emergency providers, would avoid an adverse effect on emergency response services. Furthermore, SMART's implementation of the community education program, Operation Lifesaver, would be intended to reduce the likelihood of accidents at at-grade crossings for both the locally-funded SMART project and Proposed Action's passenger rail service. Considering the very low accident rate associated with passenger rail service, no adverse public safety impact would be expected. No incremental contribution to a cumulative impact would occur.

4.2.12 Socioeconomics and Environmental Justice

As discussed in Section 3.12, the northern two-thirds of the proposed rail alignment would pass through environmental justice communities. However, in every instance that the Proposed Action could have an adverse effect on Environmental Justice communities, feasible mitigation measures have been identified that would reduce the adverse effects. With implementation of the mitigation measures and compliance with standard regulatory and legal requirements, these adverse effects to Environmental Justice populations adjacent to the Proposed Action area would be reduced. Because implementation of the Proposed Action would not create an adverse effect after mitigation, Environmental Justice communities in the vicinity of the Proposed Action area would not be disproportionally affected.

The other cumulative projects listed in Table 4-1 generally fall into two categories: 1) urban infill development projects; and 2) transportation improvement projects. The development projects are small in scale and are widely dispersed around the area. These types of small urban infill projects would not be expected to result in adverse cumulative effects. The transportation projects would generally be restricted to existing rights-of-way, and the most likely potential impacts would be to traffic and circulation. All of the projects would result in beneficial effects to transportation circulation, and some benefits to local air quality would also be realized through the more efficient movement of traffic in the area. The Westbound I-580/US-101 Connector Project (#7 in Table 4-1) and the US-101 HOV Gap Closure Project (#4 in Table 4-1), for example, were completed in 2010 and 2011, respectively, and have greatly improved the seriously deficient traffic conditions that were formerly present in central San Rafael. The other transportation projects listed in Table 4-1 would have similar beneficial effects to local and regional transportation, and would also enhance safety and circulation efficiency in the area. The Canal Street Lifeline Project (#5 in Table 4-1), for example, would address identified pedestrian safety and transit improvement needs in an area of San Rafael that qualifies as an Environmental Justice community. The locally-funded SMART project (#10 in Table 4-1) would increase the availability of transit options to the entire region, with resultant benefits to the Environmental Justice populations that live and work in the region. The Proposed

Action would further extend those benefits. Therefore, the no cumulative adverse effects to Environmental Justice communities would occur.

4.2.13 Traffic and Transportation

Evaluation of cumulative impacts includes identifying potential effects that would be generated by the Proposed Action in combination with the cumulative projects (see Table 4-1) in the region that have been recently completed, are under construction, approved for implementation, or reasonably foreseeable to be implemented in the future, such as the seven transportation improvement projects (primarily associated with US 101, Andersen Drive, and the locally-funded SMART project) in close proximity to the Proposed Action area.

The transportation analysis of the Proposed Action represents a cumulative impact evaluation that incorporates other regional projects and planned transportation improvements. The travel demand model used to evaluate the potential impacts of the Proposed Action incorporated future planned transportation projects, among them the Marin Gap HOV project (US 101), US 101 interchange improvements north and south of the Proposed Action area, and roadway improvements along Sir Francis Drake Boulevard. These approved or planned transportation improvements were included in the model for each future scenario for a consistent comparison of future conditions with and without the Proposed Action.

In addition to these planned transportation improvements, the transportation model incorporated regional population and employment growth projections. Therefore, most of the cumulative projects listed in Table 4-1 are part of the cumulative growth already factored into the model. The analysis found that no cumulative effect would occur from implementation of the Proposed Action. Therefore, no incremental contribution to a cumulative impact on transportation and traffic would occur.

4.2.14 Visual Resources

Among the cumulative projects listed in Table 4-1 that are reasonably foreseeable in the region, a visual change would occur related to the locally-funded SMART project in areas currently undeveloped where increase development or redevelopment would occur. Also, developments such as the Village at Loch Lomond Marina project would increase the overall visual experience of development, but this would not be related to SMART's proposed passenger rail project. However, for all the cumulative projects, the respective jurisdictions have design review processes for any proposed developments. None of the projects would interrupt scenic views and vistas. Therefore, because of the combination of (1) the proposed location of the Proposed Action in an existing rail corridor, (2) the cumulative projects proposed within already developed areas of San Rafael and Larkspur, and (3) development of the areas around the planned train stations under the locally-funded SMART project with input from local design review, no incremental contribution to a cumulative visual impact would occur.

4.3 REFERENCES

Council on Environmental Quality (CEQ). 1997 (January). *Considering Cumulative Effects under the National Environmental Policy Act.* Washington, DC. Available: http://ceq.hss.doe.gov/publications/cumulative_effects.html. Accessed July 6, 2011.

———. 2005 (June 24). *Guidance on the Consideration of Past Actions in Cumulative Effects Analysis Memorandum to Heads of Federal Agencies.* Washington, DC. Available: http://ceq.hss.doe.gov/nepa/regs/Guidance_on_CE.pdf. Accessed July 6, 2011.

Sonoma-Marin Area Rail Transit (SMART). 2005. *SMART Draft Environmental Impact Report*. Website: http://www2.sonomamarintrain.org/index.php/docs/eir/. Accessed October 6, 2014.

5.0 COORDINATION AND COMMENTS

The National Environmental Policy Act (NEPA) environmental review process is intended to provide public awareness and inform decision-makers and the public of any potential environmental effects resulting from implementation of the Proposed Action. The process also requires coordination with appropriate agencies, jurisdictions, and organizations, to receive their input on the environmental review process. This section outlines the coordination and public outreach efforts that have been undertaken by SMART during preparation of this EA.

5.1 PREVIOUS ENVIRONMENTAL REVIEW OF THE SMART PROJECT

The entire SMART project, which encompasses both the Proposed Action and the locally-funded SMART project, was reviewed under CEQA in the 2005 Draft EIR, certified in 2006. A Supplemental EIR that assessed specified changes to the SMART project was prepared and certified in 2008.

A comprehensive public outreach effort was undertaken as part of both the 2005 Draft EIR and 2008 Supplemental EIR certification process. This effort included mailings, meetings, and public presentations. This outreach is ongoing because construction of the locally-funded Initial Operating Segment (IOS) of the SMART project, from Santa Rosa to Downtown San Rafael, is underway. Close coordination is being maintained with the affected communities through which the SMART project will pass. SMART maintains a website (http://main.sonomamarintrain.org/) that informs the public of construction activities, ongoing planning efforts, SMART Board meetings, and other project-related activities. The website also provides links to the project's environmental documents (http://www2.sonomamarintrain.org/index.php/docs/eir/).

Because federal funds were not expected to be used for the SMART project in 2005, when the Draft EIR was circulated, clearance under NEPA was not undertaken. SMART has since elected to apply for federal funds from the Federal Transit Administration (FTA), using New Starts/Small Starts funds to construct the Downtown San Rafael to Larkspur Extension. Accordingly, this EA assesses the environmental effects of the Downtown San Rafael to Larkspur Extension (the Proposed Action) pursuant to NEPA. The coordination, consultation, and public outreach efforts associated with this NEPA-regulated document will occur in concert with the ongoing construction of the IOS.

5.2 FEDERAL AGENCY CONSULTATION

SMART has undertaken the appropriate coordination efforts with the applicable agencies having oversight for environmental issues associated with all components of the Proposed Action. These efforts have been in addition to the broad coordination efforts that were undertaken previously for the SMART project as part of the 2005 Draft EIR process and ongoing coordination with the agencies during permitting and construction of the IOS.

5.2.1 National Marine Fisheries Service Consultation

The National Marine Fisheries Service (NMFS) was contacted on April 11, 2013, to determine if federally listed threatened or endangered species under its jurisdiction would be likely to occur in the Proposed Action area. NMFS responded by e-mail on April 18, 2014, and noted that the following listed species and habitats could occur: 1) Distinct Population Segment of North American Green Sturgeon; and 2) Essential Fish Habitat (EFH)

for Pacific Groundfish and Coastal Pelagic fish species. Accordingly, in coordination with FTA, SMART prepared a Biological Assessment (BA) for the Proposed Action area that considered the likelihood of occurrence for green sturgeon and EFH, and the potential effects that could occur from implementation of the Propose Action. The findings of the BA are discussed in Section 3.2 of this EA, and the BA and associated correspondence with NMFS is also included with this EA in Appendix B. The BA was forwarded to NMFS on November 13, 2014, for its review, together with a request that NMFS concur with the BA's findings. Before issuance of a Finding of No Significant Impact for the Proposed Action, the FTA must receive concurrence from NMFS that the Proposed Action would not create an adverse effect on listed species.

NMFS was invited to attend an April 1, 2014 technical assistance meeting for the Proposed Action with regulatory agency representatives. On February 27, 2014, NMFS Supervisory Biologist, Gary Stern, communicated by email to SMART's Chief Engineer, Bill Gamlen, that NMFS representatives would not be attending the meeting because "San Rafael Creek is a highly modified channel with little fish habitat value. There are no runs of salmonids in this creek. Thus, we are not concerned with the culvert design for a ditch that is tributary to San Rafael Creek."

5.2.2 U.S. Fish and Wildlife Service Consultation

The U.S. Fish and Wildlife Service (USFWS) was contacted to determine whether federally listed threatened or endangered species under its jurisdiction would be likely to occur in the Proposed Action area. The USFWS response letter is provided in Appendix B, and includes a list of federal-listed species under the management of the USFWS that have a potential to occur in the project vicinity. As discussed in Section 3.2 of this EA, a review of the list provided by USFWS and a subsequent habitat assessment found that the Proposed Action area does not contain suitable habitat for any USFWS-managed listed species. Accordingly, FTA has satisfied its consultation requirements with USFWS, and further consultation is not necessary.

5.2.3 U.S. Army Corps of Engineers Coordination

A technical assistance meeting with the U.S. Army Corps of Engineers (USACE) and other regulatory agency representatives was hosted by SMART on April 1, 2014 in San Rafael, California. The USACE was represented by Bryan Matsumoto, San Francisco District.

At the meeting SMART introduced the regulatory agencies to the Larkspur Extension project and solicited feedback on design concepts that had the potential to impact waters of the United States and waters of the State. SMART toured the proposed project alignment with the agency representatives, with particular attention paid to the identified jurisdictional areas at San Rafael Creek and the unnamed drainage ditch.

The USACE indicated that, as the waterways in the Proposed Action area are tidal, they are subject to Section 10 of the Rivers and Harbors Act (33 U.S.C. 401 *et seq.*); therefore, any structures proposed over a tidal waterway would require a Section 10 permit. Any impacts (e.g., fill) below the ordinary high water mark would require a Section 404 permit, most likely a Nationwide Permit 14 for linear transportation projects. The USACE also indicated that they would not issue a Section 404 permit for a project that is not the Least Environmentally Damaging Practicable Alternative (LEDPA).

5.2.4 Consultations Pursuant to Section 106 of the National Historic Preservation Act

In accordance with Section 106 of NHPA, an area of potential effect (APE) was delineated around the Proposed Action area, to encompass potential direct and indirect effects on cultural resources that could occur from implementation of the Proposed Action. Two APEs, one for archaeological resources and another for historic and architectural resources, were delineated. In coordination with FTA, the State Historic Preservation Office (SHPO) approved both APEs on May 22, 2013. Required records searches and surveys were taken for both APEs, and reports were prepared and submitted to SHPO with a request for concurrence of a Finding of No Effect. SHPO concurred with the request and determined that the Proposed Action would result in no historic properties affected on May 14, 2014. All relevant correspondence with SHPO is provided in Appendix C.

5.2.5 Federal Railroad Administration

Along with the California Public Utilities Commission (CPUC), the Federal Railroad Administration (FRA) is responsible for the promulgation and enforcement of rail safety regulations. In addition to its regulatory responsibilities, the FRA also provides technical assistance for the safe and reliable operation of railroads. Since portions of the locally-funded SMART project north of the Proposed Action will be sharing tracks with freight trains, SMART has designed its entire system in compliance with FRA's design guidelines. The SMART system will be operating under FRA rules, regulations and oversight even within those portions of the SMART system where freight trains are not planned to operate. The locally-funded SMART project is currently under construction and has already been the subject of FRA review. The Proposed Action will be designed and operated in a similar manner.

5.3 STATE AND LOCAL AGENCY COORDINATION

5.3.1 California Public Utilities Commission

SMART has been working with the City of San Rafael and the California Public Utilities Commission (CPUC) concerning the design of grade crossings along the Proposed Action Alignment, particularly the crossing at Andersen Drive. The CPUC issued a ruling that the City is responsible for finding a solution to the design challenges associated with the crossing (see Chapter 2 for a detailed discussion of the crossing). To that end, the City has taken the lead in the design of the crossing and coordination with CPUC. SMART has provided technical assistance and personnel for the City's efforts. Conceptual design plans for the crossing have been submitted by the City to the CPUC and the CPUC has indicated its tentative approval of the design.

SMART conducted a meeting with CPUC on September 3, 2014, followed by site visits to several locations along SMART's corridor. The Andersen Drive Crossing Project, its history and all previous communications with CPUC and the City of San Rafael were discussed extensively. The City of San Rafael has their "At Grade Design of the Andersen Drive Crossing" ready. Upon completion of the NEPA process for the Proposed Action, the City will formally submit its design to the CPUC for its approval.

5.3.2 California Department of Fish and Wildlife

A technical assistance meeting with the California Department of Fish and Wildlife (CDFW) and other regulatory agency representatives was hosted by SMART on April 1, 2014 in San Rafael, California. The CDFW was represented by Tim Dodson of the Bay Delta Region (Region 3) of CDFW.

CDFW indicated that any work in the project area that would impact channels (bed or bank) would require a Streambed Alteration Agreement from CDFW.

5.3.3 Regional Water Quality Control Board

A technical assistance meeting with the Regional Water Quality Control Board (RWQCB) and other regulatory agency representatives was hosted by SMART on April 1, 2014 in San Rafael, California. The RWQCB was represented by Paul Modrell of the San Francisco Bay RWQCB.

At the meeting SMART introduced the regulatory agencies to the Larkspur Extension project and solicited feedback on design concepts that had the potential to impact waters of the United States and waters of the State. SMART toured the proposed project alignment with the agency representatives, with particular attention paid to the identified jurisdictional areas at San Rafael Creek and the unnamed drainage ditch.

The RWQCB indicated that impacts to waters of the State would require a Section 401 Water Quality Certification in conjunction with a Section 404 permit from the USACE. The permit application must include channel crossing designs to accommodate a 100-year flood capacity and sea level rise or documentation identifying engineering constraints on accommodating such flood capacity.

The RWQCB also indicated that they cannot issue a Water Quality Certification for a project that is not the LEDPA. The permit application therefore must include a practicable alternatives analysis that demonstrates the project is the LEDPA.

5.3.4 City of San Rafael

SMART has cooperated with the City of San Rafael in its development of a Station Area Plan for the SMART Downtown San Rafael Station. The City and SMART have coordinated regularly concerning the ongoing construction of the locally-funded SMART project, and also hold regular meetings concerning construction activities and project design. These same types of efforts have been conducted for the Proposed Action, particularly concerning the Andersen Drive crossing, as discussed previously in Section 5.3.1. Other areas of regular coordination include traffic impacts, traffic signal synchronization, and grade crossing operations. SMART and the City regularly share information and data to assist in the development and operation of the SMART project.

5.3.5 City of Larkspur

SMART cooperated with the City of Larkspur on the development of a Station Area Plan for the SMART Larkspur Station. SMART provided technical assistance and comments on drafts during the planning process. The SMART City Council adopted a resolution asking the SMART Board to include a station in Larkspur. The City

also provided SMART with a letter of support in 2014 concerning SMART's application for FTA funding to construct the Downtown San Rafael to Larkspur Extension.

5.4 PUBLIC REVIEW OF THIS ENVIRONMENTAL ASSESSMENT

5.4.1 Environmental Assessment

SMART has prepared this EA to identify potential effects of the Proposed Action. The analysis describes potential temporary (construction) and long-term (operational) effects, as well as potential cumulative effects. As appropriate, mitigation measures have been proposed that would be implemented to reduce the identified potential adverse effects. A 30-day public review period is being provided for the public and agencies to comment on the EA regarding its accuracy, its characterization of potential effects, and the anticipated effectiveness of the proposed mitigation measures.

5.4.2 Final Environmental Assessment and Finding of No Significant Impact

Following the public review period, SMART and the FTA will review the comments received on the EA. FTA, as the lead federal agency under NEPA, will consider the comments and responses, and then will determine whether significant or adverse environmental effects would be likely to result from the Proposed Action. If the FTA determines that no adverse effects would occur, then FTA would issue a Finding of No Significant Impact (FONSI). If a FONSI is issued, SMART would be able to begin final design and construction of the Proposed Action, beginning as early as 2015, assuming that other requirements associated with the New Starts/Small Starts processes are met.

5.5 OUTREACH AND DISTRIBUTION

5.5.1 Public Notice and Availability

The Notice of Availability (NOA) will be posted in the Marin Independent Journal and the Sonoma Press Democrat at the beginning of the public comment period. Information on the project, as well as the EA, will be posted on the SMART website at http://www2.sonomamarintrain.org/index.php/docs/eir/. Copies of the EA will also be made available for public review at the following area libraries:

San Rafael Public Library
Downtown Branch
1100 E Street
San Rafael, CA, 94901

Larkspur Public Library
400 Magnolia Avenue
Larkspur, CA 94939

Petaluma Regional Library
100 Fairgrounds Drive
Petaluma, CA 94952

Central Santa Rosa Library
211 E Street
Santa Rosa, CA 95404

5.5.2 Distribution of the Notice of Availability

The following agencies, organizations, and individuals will receive a copy of the Notice of Availability for this EA. A copy of the EA will be forwarded to all agencies, organizations, and individuals who request it. In addition, the EA will be available for download and review on SMART's website: http://www2.sonomamarintrain.org/index.php/docs/eir/.

Federal Agencies

National Marine Fisheries Service
Protected Resources Division
777 Sonoma Avenue, Room 325
Santa Rosa, CA 95404

U.S. Army Corps of Engineers
1325 J Street, Room 1480
Sacramento, CA 95814-2922

U.S. Fish and Wildlife Service
2800 Cottage Way, W-2605
Sacramento, CA 95825

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