4.18 WATER RESOURCES, WATER QUALITY, AND FLOODPLAINS

4.18.1 INTRODUCTION

This section describes the regulatory setting and existing conditions applicable to water resources, water quality, and floodplains in the SVRTC study area. It evaluates the extent to which the Baseline Alternative and BART Alternative would result in impacts to these resource areas and identifies mitigation measures to avoid or reduce these impacts.

4.18.2 EXISTING CONDITIONS

This section describes the existing conditions of groundwater resources, surface water resources, and floodplains in the SVRTC study area as the basis for determining impacts to water quality and supply, flood risk, or encroachment into the floodplain.

Key sources of information consulted on existing hydrologic conditions included the following:

- The current *Fremont General Plan* (City of Fremont 1991);
- The California State Water Resources Control Board's listing of water bodies identified as having limited water quality (California State Water Resources Control Board 2003);
- The most recent Flood Insurance Rate Maps (FIRMs) for the region that includes the SVRTC project area (Federal Emergency Management Agency 2000);
- *BART Warm Springs Extension Draft Environmental Impact Report* (San Francisco Bay Area Rapid Transit District 1991a);
- The Silicon Valley Rapid Transit Corridor Location Hydraulic Study Technical Report (Earth Tech, Inc. 2003).

4.18.2.1 Weather and Climate

The San Francisco Bay Area, like much of California's central coast, enjoys a Mediterranean climate characterized by mild, wet winters and warm summers. Moderated by proximity to San Francisco Bay and the ocean, temperatures are seldom below freezing. Summer weather is dominated by sea breezes caused by differential heating between the interior valleys and the coast, while winter weather is dominated by storms from the northern Pacific Ocean that produce the majority of the region's annual rainfall. The mean annual temperature in the project area is 57°F. The mean annual rainfall is approximately 18 inches, most of which occurs between October and April (City of Fremont 1991).

4.18.2.2 Groundwater Resources

Both the Baseline Alternative and BART Alternative are located within two South Bay groundwater basins. The I-680 to Warm Springs (I-680 WS) and Warm Springs to I-880 (WS I-880) busway connectors of the Baseline Alternative and the northern portion of the BART Alternative in the southern Fremont area are located within the Warm Springs Subarea of the Niles Cone Groundwater Basin (Niles Cone Basin) of the South Bay basins. The I-880 to Montague Expressway (I-880 ME) busway connector of the Baseline Alternative and the southern portion of the BART Alternative in Milpitas and San Jose are located within the Santa Clara Valley Groundwater Basin (Santa Clara Basin) of the South Bay basins.

Niles Cone Basin

The current and potential beneficial uses of groundwater in the Niles Cone Basin are municipal and domestic supply, industrial process supply, industrial service water supply, and agricultural water supply,

as specified in the regional Basin Plan. The Niles Cone Basin produces moderately low groundwater yields to wells (DKS Associates 1991). Groundwater is typically encountered within 50 feet of the ground surface and groundwater flow is generally directed westward. Limited recharge of the Niles Cone Basin occurs from water discharging from the Warm Springs Sub-basin and the Mission Uplands farther to the east. The construction of facilities for artificial recharge or diversion, in conjunction with the availability of imported water, has increased the safe yield of the Niles Cone Basin (RWQCB 2001). Groundwater quality of the Niles Cone Basin in general is good and the RWQCB's groundwater quality objectives are generally met (RWQCB 2001).

Discharges of contaminants from leaking underground storage tanks and infiltration of surface spills are known within the Fremont area to contribute to water quality degradation. Salt water from the Bay and adjacent salt ponds has intruded into fresh water-bearing aquifers in the Niles Cone Basin as far as the Hayward Fault. The Alameda County Water District (ACWD) reports that groundwater from the Niles Cone Basin is blended with water purchased from San Francisco before being delivered to customers (ACWD 2001).

Santa Clara Basin

Groundwater is relatively shallow (10 to 50 feet) in the headwater area of the Santa Clara Basin, increasing to depths of 100 to 300 feet in the interior of the basin, and then decreasing to zero approaching the Bay. In the downtown San Jose portion of the SVRTC, groundwater elevations between 13 and 21 feet below ground surface (bgs) are reported. From the Santa Clara County boundary to Calaveras Boulevard, groundwater elevations are reported as 0 to 5 feet bgs. Between Calaveras Boulevard and Berryessa Creek, groundwater elevations range from 5 to 15 feet bgs. Between Berryessa Creek and US 101, groundwater elevations range from 15 to 30 feet bgs. Between Lower Silver Creek and Coyote Creek, groundwater elevations are from 0 to 5 feet bgs.

Groundwater monitoring results in the Santa Clara Valley show that water quality is excellent to good for all major zones of the Santa Clara Basin. Drinking water standards are met at public water supply wells without the use of treatment methods. Contaminants are generally not detected; however, some limited areas of the Santa Clara Basin contain concentrations of mineral salts, which adversely affect groundwater uses. Groundwater contaminated by hazardous materials releases may have spread underneath the SVRTC project corridor.

The SCVWD has been largely successful in its efforts to prevent groundwater overdraft, curb land subsidence, and protect water quality. Groundwater elevations are generally recovered from previous overdraft conditions throughout the basin, inelastic subsidence has been curtailed, and groundwater quality supports beneficial uses.

4.18.2.3 Surface Water Resources

Westward flowing streams draining the foothills of the Diablo Range characterize the surface hydrology of eastern Fremont and Milpitas. Northward flowing streams draining the foothills of the Diablo Range and the Santa Clara Valley characterize the surface hydrology of eastern and southern San Jose. The lower reaches of many streams have been modified and constructed as storm drainage channels, designed to convey stormwater flow through the urbanized area. The SVRTC includes several major drainage lines in Alameda and Santa Clara counties.

Surface Water in Alameda County

Watercourses

Creeks in the Alameda County portion of the SVRTC drain small watersheds and collect water from a limited urbanized area. Most of these streams have water only during the wet season. In general, the existing drainage structures within the SVRTC in Alameda County have been sized to effectively convey the stormwater flows of the 15-year stormwater runoff event.

Agua Caliente Creek (Line F) and Agua Fria Creek (Line D). Proceeding south from the UPRR Warm Springs Yard in Fremont, the railroad corridor crosses Agua Caliente Creek (Line F)[1] and Agua Fria Creek (Line D) just north of East Warren Avenue. These creeks drain approximately 5.1 square miles of watershed area (DKS Associates 1991). The ACFCWCD original 15-year design flow for Agua Caliente Creek is 586 cubic feet per second (cfs), and 100-year design flow is 945 cfs[2]. Recent ACFCWCD studies on Agua Fria Creek (Line D) indicate the 15-year and 100-year design flows are 434 cfs and 800 cfs, respectively.

Toroges Creek (Line C) and Toroges Creek (Line B1). The railroad corridor crosses Toroges Creek (Line C) to the south of Lipert Avenue in Fremont. The total watershed area drained by this creek is 4.4 square miles. The 15-year and 100-year design flows for Toroges Creek are 378 cfs (ACFCWCD original design flow) and 594 cfs (ACFCWCD recent study), respectively[3]. Another small channel, named Toroges Creek (Line B1), originates west of the railroad corridor and does not cross it. This creek drains an approximately 0.3-square mile urbanized area near the project area. The 100-year design flow of this creek is 90 cfs[4].

Scott Creek (Line B) and Scott Creek (Line A). The railroad corridor crosses Scott Creek (Line B) and Scott Creek (Line A) about 0.4 miles and 0.1 miles north of Scott Creek Road, respectively. The 15-design year flow in Scott Creek (Line B) is 312 cfs (ACFCWCD original design flow)[5], and the 100-year design flow is 555 cfs (DKS Associates 1991). Recent studies performed on Scott Creek (Line A) near I-880 indicate the 15-year and 100-year design flows as 440 cfs and 820 cfs, respectively.

Water Quality

The quality of surface water within the SVRTC in Alameda County has been degraded due to non-point source pollution, a term given to pollution that results when rainwater washes pollutants off surfaces and carries them through the storm drain system and ultimately into receiving bodies of water. As its name implies, non-point source pollution originates from a wide area rather than a single, identifiable point source, such as an outfall pipe. Studies have shown that non-point sources are major contributors of pollutants in San Francisco Bay. Pollutants released during both wet and dry weather eventually find their way to the Bay, carried by rainwater after being deposited on paved surfaces or spilled into gutters, through the storm drain system.

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[1] The Alameda County Flood Control and Water Conservation District) refers to creeks in Alameda County as "Drainage Lines", e.g., Agua Caliente Creek as Drainage Line F. Therefore, the creeks in Alameda County within the SVRTC project study area are also referred to as "Lines."

[2] A letter from Development Services Department of the Alameda County Public Works Agency (ACPWA), October 21, 2002.

[3] A Drainage Information Letter from Development Services Department of the ACPWA, March 20, 2003.

[4] ACPWA, 2003.

[5] ACPWA, 2003.

None of the surface waters in Alameda County in the SVRTC project is listed under Section 303(d) of the federal Clean Water Act (CWA) as impaired. Section 303(d) of the CWA is discussed in Section 4.18.3.1 below.

Surface Water in Santa Clara County

Watercourses

The principal drainage feature of the Santa Clara Basin is Coyote Creek, which originates in the Diablo Range, enters the Coyote Valley at its southeastern end, and flows northwesterly through the Coyote Valley and the Santa Clara Valley before entering San Francisco Bay. Other major drainages passing through the Santa Clara Basin and within the SVRTC study area include the Guadalupe River and Los Gatos Creek, which originate in the Santa Cruz Mountains. Drainages entering the Santa Clara Valley from the east are generally smaller; the largest are Upper and Lower Penitencia creeks and Berryessa Creek. Most of the cross drainage structures across the creeks in the SCVWD have been sized or are in the process of being resized for the 100-year flood event.

Lower Penitencia Creek and its Tributaries. In 1975, Upper Penitencia Creek was diverted along Berryessa Road into Coyote Creek, separating the upper channel from the lower channel. Lower Penitencia Creek is a trapezoidal earth channel located in the northeasterly sector of Santa Clara County and bounded by Berryessa Creek to the east and Coyote Creek to the west. It flows northerly from Montague Expressway to its confluence with Coyote Creek near the intersection of I-880 and Dixon Landing Road. The Lower Penitencia Creek watershed lies in the unincorporated area of Santa Clara County and in the cities of Milpitas and San Jose. Including the watersheds of Berryessa Creek and Penitencia Channel, the only major tributaries to Lower Penitencia Creek, the total watershed area of Lower Penitencia Creek is about 28 square miles, with about 16 square miles lying on the valley floor and the remainder in the hills of the Diablo Range. The major tributaries of Berryessa Creek are Calera Creek, Wrigley Creek, and Wrigley Ditch, and other small tributaries including Tulacitos, Arroyo del Los Coches, Piedmont, Sierra, Crosley, and Swiegert creeks. Penitencia Channel originates near Lundy Place north of Montague Expressway and drains the local urban area. Penitencia Channel merges with Lower Penitencia Creek near the intersection of West Capitol Avenue and South Main Street in Milpitas.

The 100-year design flows of Calera Creek and Wrigley Creek, upstream of the confluence with Berryessa Creek, are 920 cfs and 420 cfs, respectively. The 100-year design flow in Berryessa Creek downstream of the Wrigley Creek discharge point is 5,610 cfs and the design flow upstream of the Lower Penitencia confluence is 6,480 cfs. A peak flow of 1,000 cfs was recorded in Berryessa Creek above Calaveras Boulevard in 1980.

Upper Penitencia Creek. Upper Penitencia Creek is an alluvial stream that drains approximately 24 square miles from the mountains in the Diablo Range and flows generally west to its confluence with Coyote Creek. The 100-year peak flow in this creek, upstream of Coyote Creek near the BART Alternative, is 4,800 cfs.

Lower Silver Creek and its Tributary. This is an alluvial stream that drains from the mountains in the Diablo Range southeast of the SVRTC. Miguelita Creek is the major tributary to Silver Creek. The Silver Creek watershed encompasses approximately 44 square miles in eastern Santa Clara County. The 100-year design flow in this creek upstream of the confluence with Coyote Creek is approximately 5,500 cfs.

Coyote Creek and its Tributaries. Coyote Creek is an alluvial stream that drains from the mountains in the Diablo Range and flows generally northwest toward the Bay. The major tributaries of Coyote Creek in the SVRTC are Silver Creek, Upper Penitencia Creek, and Lower Penitencia Creek. Coyote Creek is approximately 75 miles long and is located within the cities of Morgan Hill, San Jose, and Milpitas, and in the unincorporated area of Santa Clara County. Coyote Creek drains nearly 350 square miles and is

the largest watershed in Santa Clara County. The 100-year design flow for Coyote Creek near the proposed crossing of the BART Alternative along East Santa Clara Street is approximately 14,500 cfs.

Guadalupe River and Los Gatos Creek. The Guadalupe River is an alluvial stream that drains from the mountains of the Coast Range and flows generally north toward the Bay. Its watershed is approximately 60 square miles above the river's confluence with Coyote Creek near the Bay, where the river is known also as Alviso Slough. The watershed is bounded on the south by the Diablo Range, on the west by the Santa Cruz Mountains, on the east by Coyote Creek, and on the north by the Bay. Los Gatos Creek is the major tributary to the Guadalupe River and merges with the river in downtown San Jose between West Santa Clara and West St. John streets. The 100-year design flows for Los Gatos Creek is 8,000 cfs near the BART crossing, and the 100-year design flow of the Guadalupe River upstream of Los Gatos Creek is 16,500 cfs..

Water Quality

A non-point source pollution study conducted in Santa Clara County by the RWQCB found that contaminant loads are directly proportional to stormwater runoff. Water quality varied with the following surrounding land use categories: open space, commercial/residential, and heavy industry. Monitoring results indicated that six trace metals (cadmium, chromium, copper, lead, nickel, and zinc) are generally present in detectable concentrations. Arsenic, mercury, selenium, and silver were not generally detected. The estimated annual pollutant loads are highly variable from year to year, reflecting the variability in runoff volumes. Another source of metals in stormwater runoff in the SVRTC is the erosion of sediments containing naturally occurring minerals. As streams carry eroded materials down from the Diablo Range, heavier coarser sediments are deposited first, while lighter, finer particles are carried farther downstream towards the Bay.

In Santa Clara County in the SVRTC project area, Coyote and Los Gatos creeks are listed under Section 303(d) of the CWA as impaired for diazinon and Guadalupe River is listed as impaired for diazinon and mercury. The diazinon is a result of urban runoff; the mercury is a result from mine tailings. Section 303(d) of the CWA is discussed in Section 4.18.3.1 below.

4.18.2.4 Floodplains

Figures 4-18.1 to 4.18-6 show the approximate boundaries of the 100-year floodplain in the SVRTC based on review of FIRMs. As the maps show, the Baseline Alternative would not encroach upon floodplains, while the BART Alternative would involve encroachments in the 100-year floodplain in several areas, as discussed in the following paragraphs.

Floodplains in Alameda County

Agua Caliente (Line F) Floodplain. Approximately 300 feet of the eastern edge of the BART Alternative would lie in the 100-year floodplain of Agua Caliente Creek (Line F), as shown at the north end of Segment 1 in Figure 4.18-1. The cause of flooding in this area is due to spillage at I-680[6]. Flood depths and elevations are not reported on the FIRMs.

[6] A Drainage Information Letter from Development Services Department of the Alameda County Public Works Agency, March 20, ACPWA (2003).

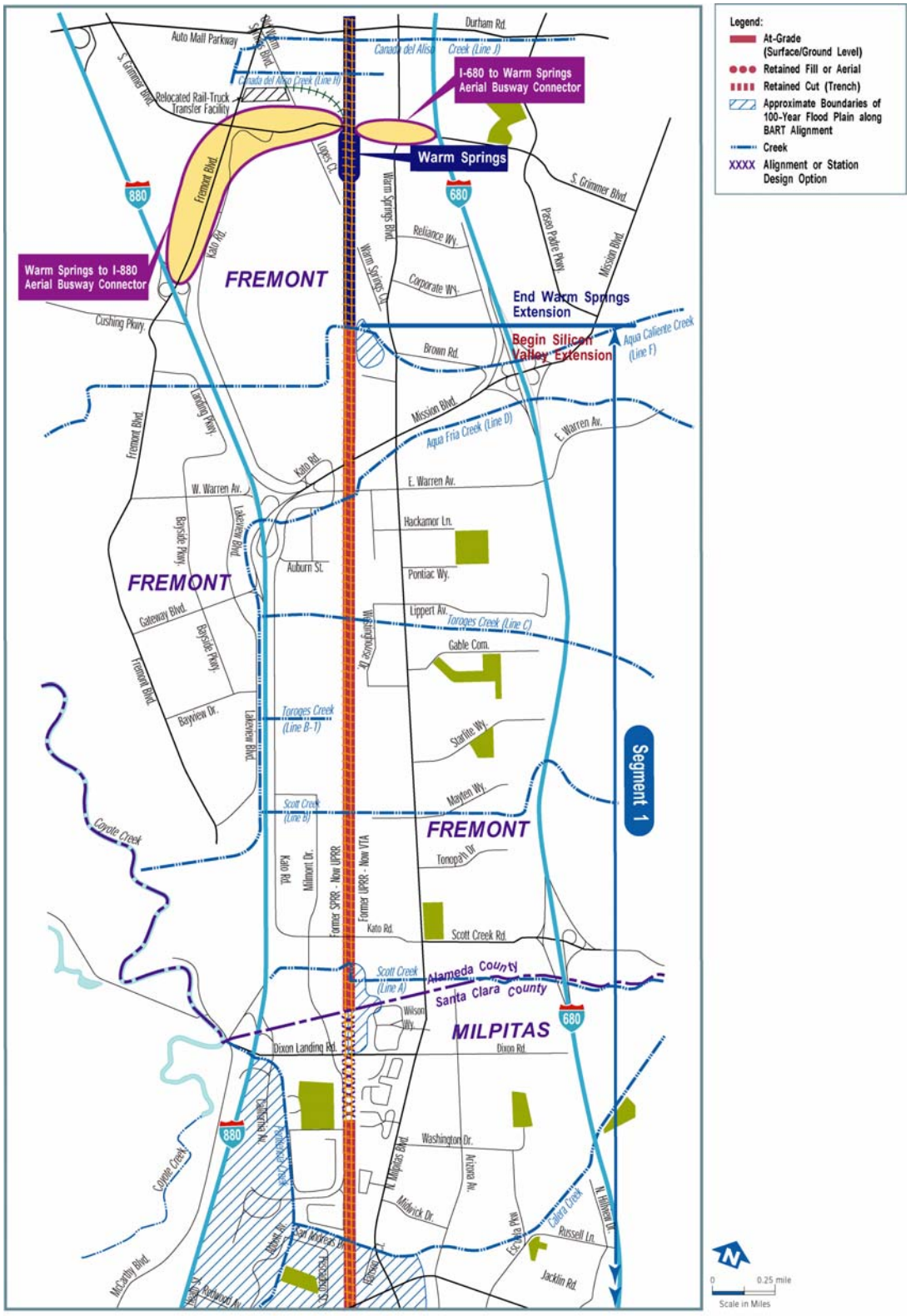

Figure 4.18-1: Segment 1 (Northern Section)- Approximate Boundaries of the 100-year Floodplain in the SVRTC Study Area

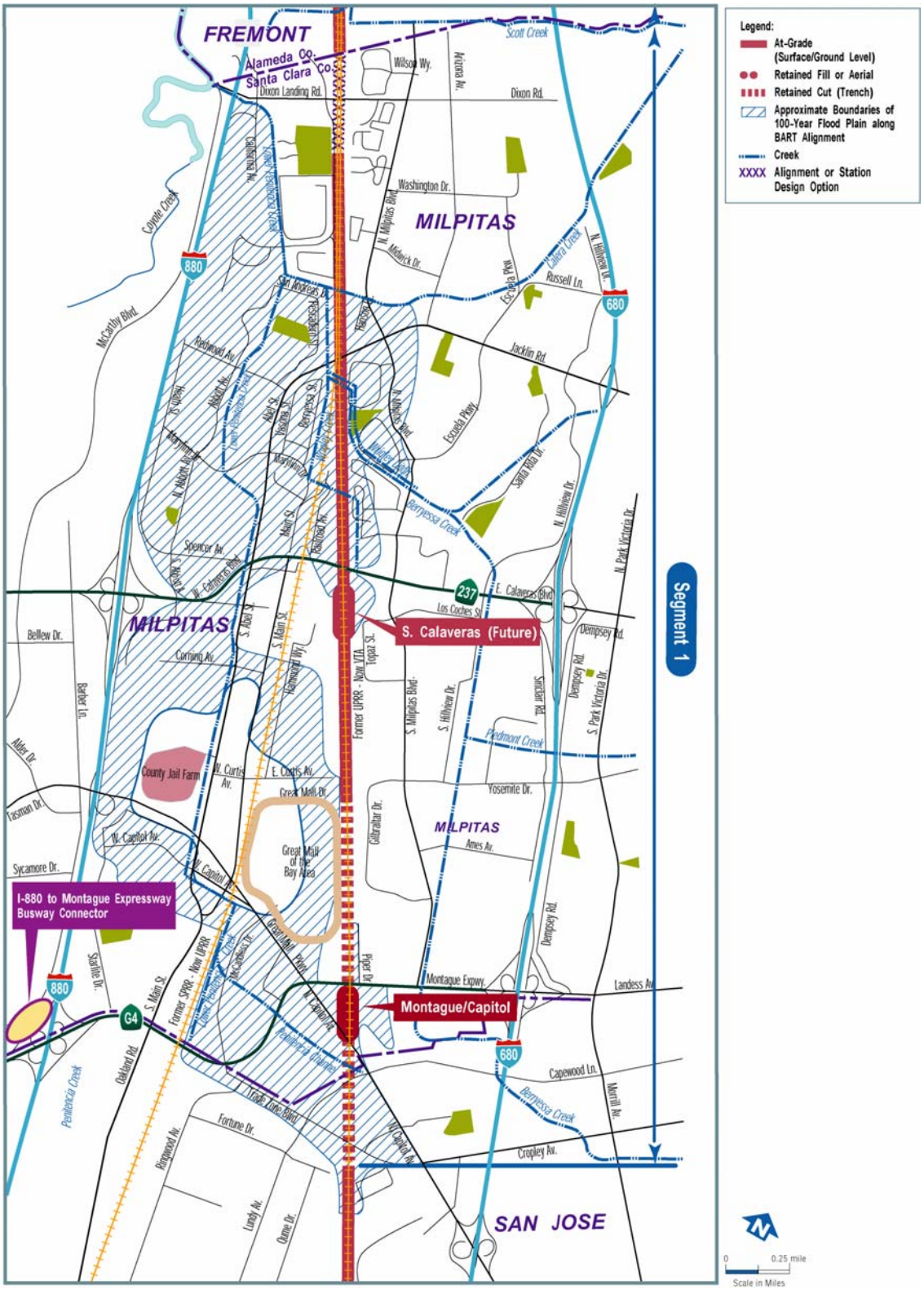

Figure 4.18-2: Segment 1 (Southern Section)– Approximate Boundaries of the 100-year Floodplain in the SVRTC Study

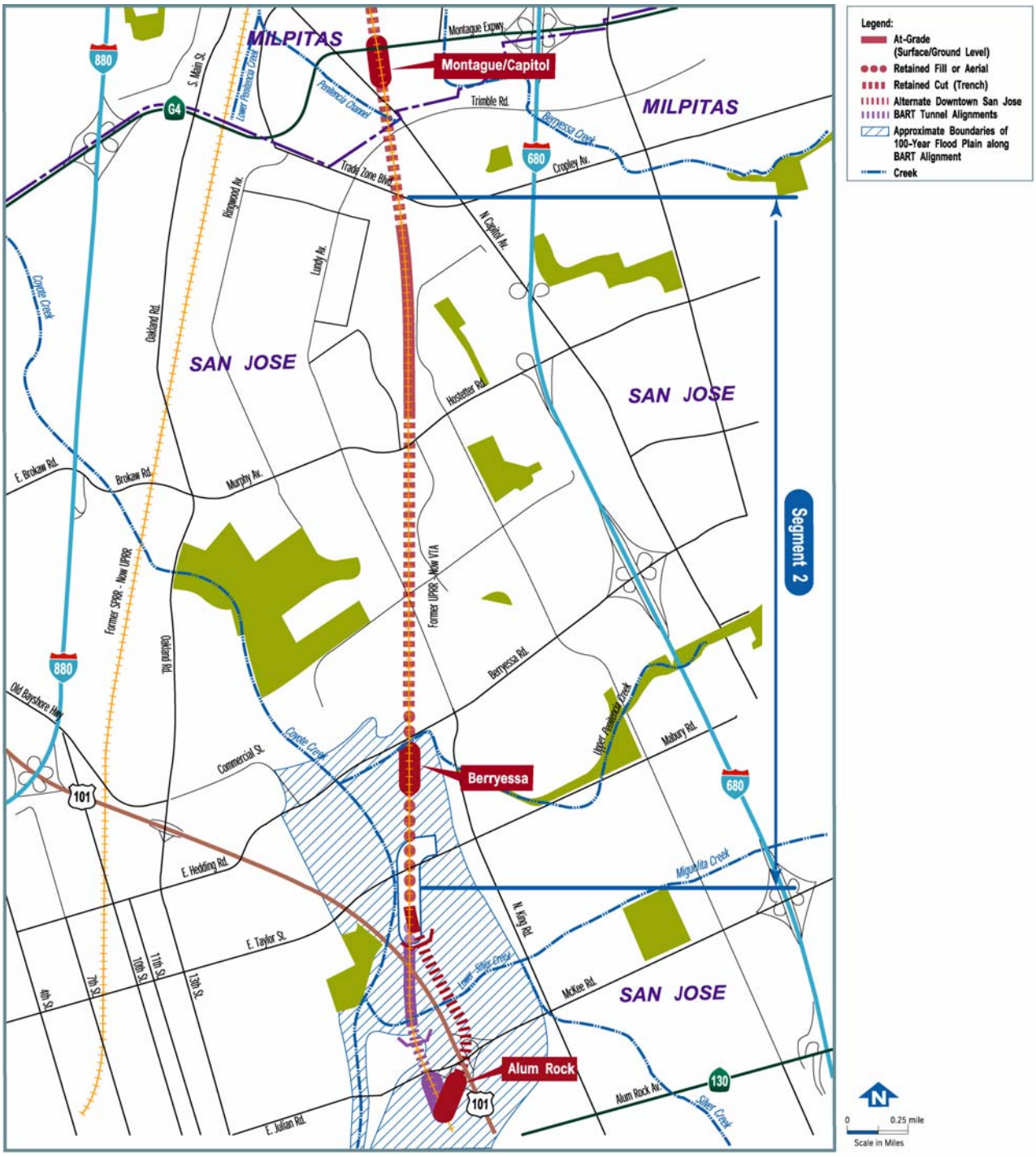

Figure 4.18-3: Segment 2 - Approximate Boundaries of the 100-year Floodplain in the SVRTC Study Area

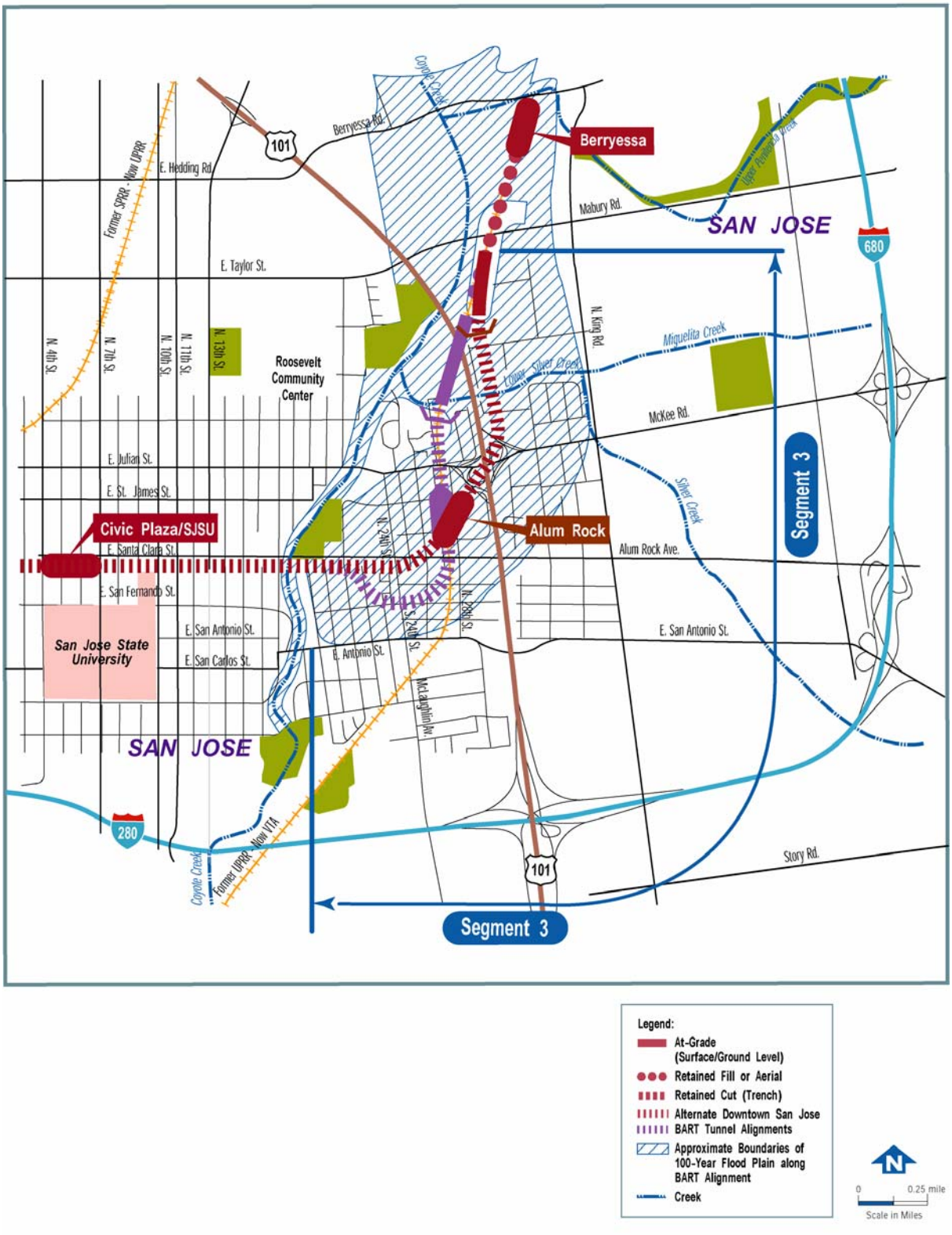

Figure 4.18-4: Segment 3 - Approximate Boundaries of the 100-year Floodplain in the SVRTC Study Area

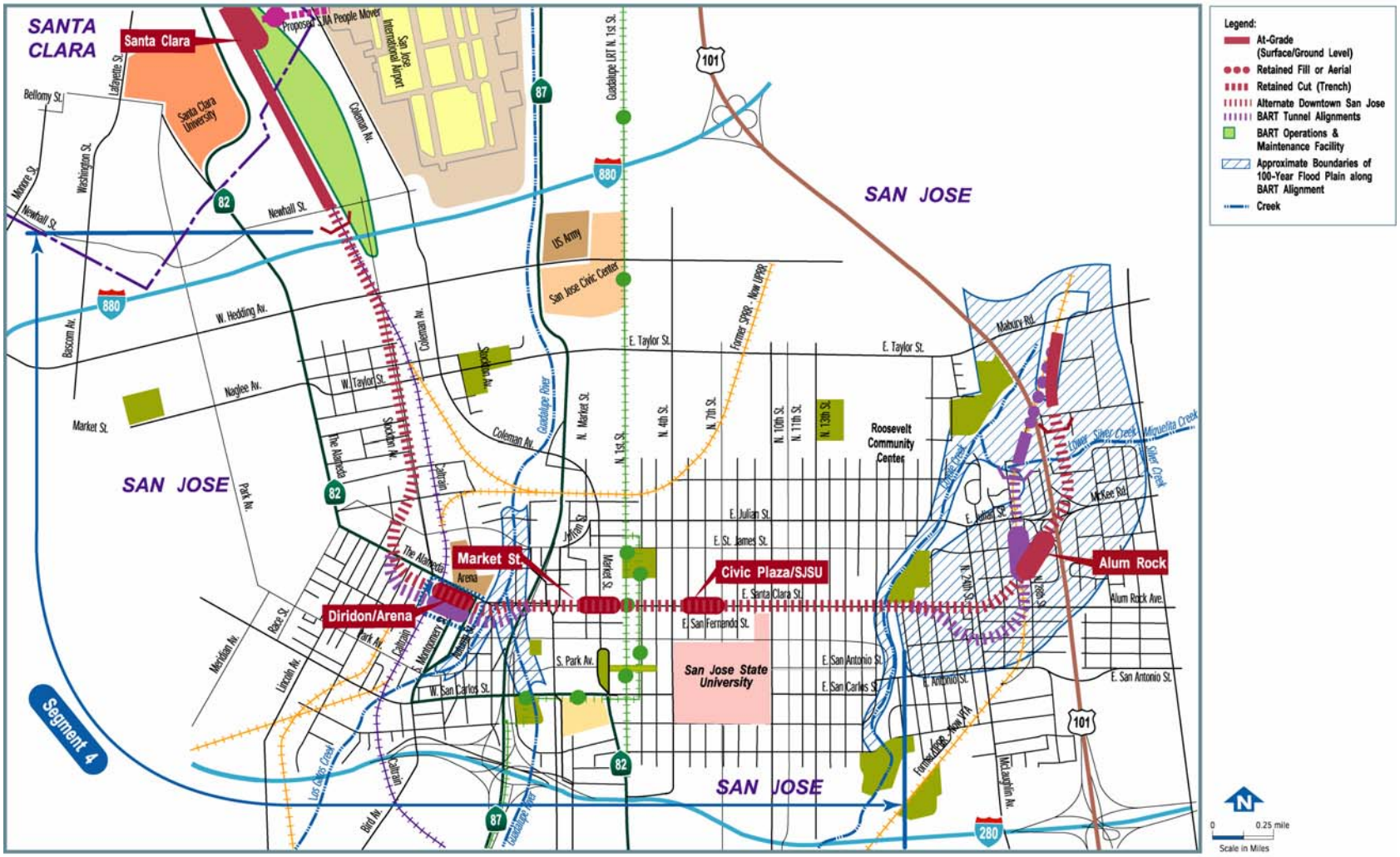

Figure 4.18-5: Segment 4 - Approximate Boundaries of the 100-year Floodplain in the SVRTC Study Area

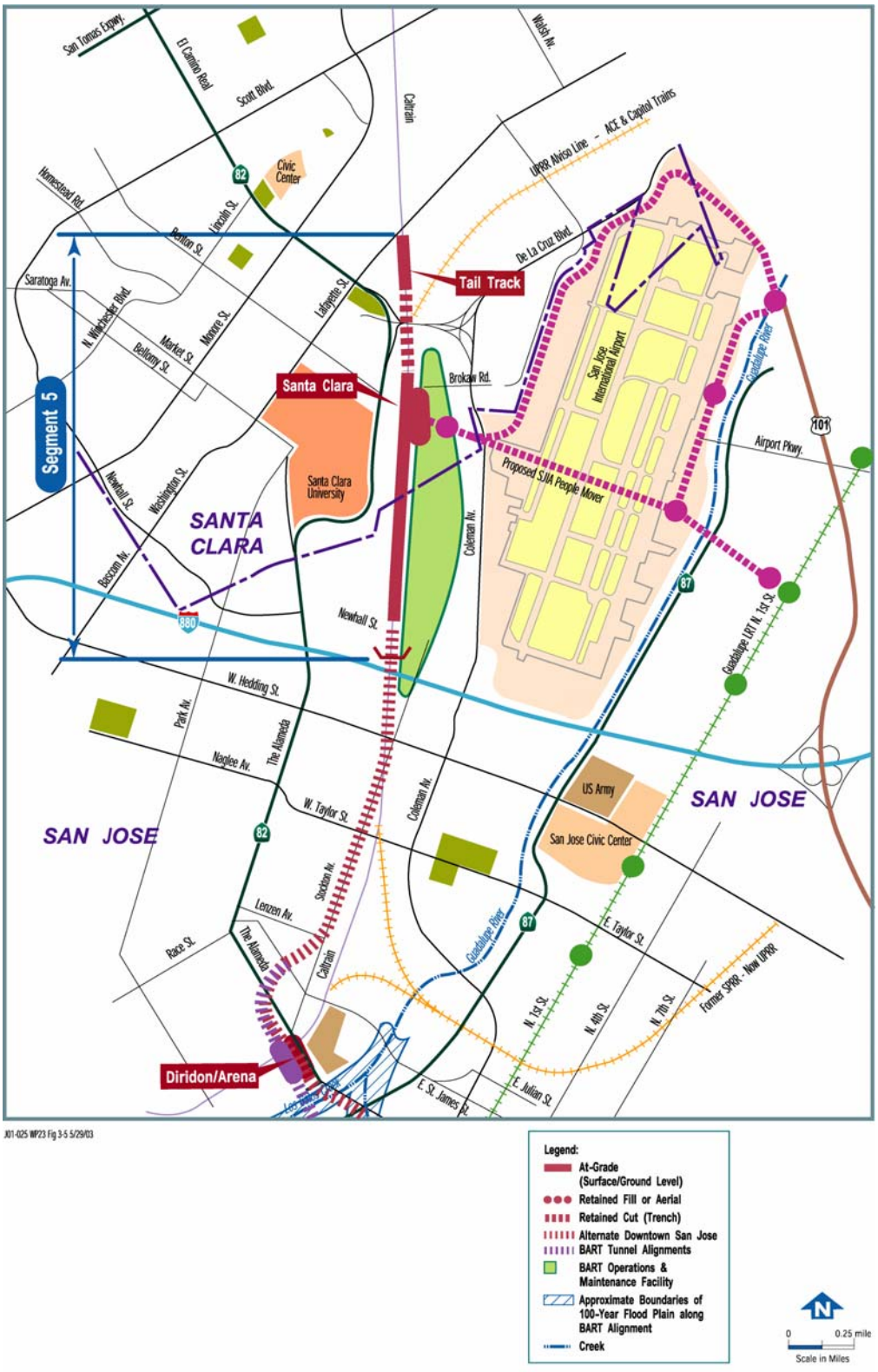

Figure 4.18-6: Segment 5 - Approximate Boundaries of the 100-year Floodplain in the SVRTC Study Area

Scott Creek (Line A) Floodplain. Along Scott Creek (Line A), the alignment of the BART Alternative would pass through approximately 0.3 miles of 100-year floodplain near the county boundary between Scott Creek Road and Dixon Landing Road in Milpitas (Figure 4.18-1). The base flood elevation in this section is about 19.76 feet above the NAVD (North Atlantic Vertical Datum) and flood depths are from 1 to 3 feet. The cause of past flooding has been reported as blockage of culverts beneath the UPRR tracks (DKA Associates 1991).

Floodplains in Santa Clara County

In the Santa Clara County portions of the SVRTC (Milpitas and San Jose), flooding occurs along Lower Penitencia Creek, Wrigley Creek, Berryessa Creek, Upper Penitencia Creek, Lower Silver Creek, Coyote Creek, and the Guadalupe River.

Floodplains of Lower Penitencia Creek and its Tributaries. The alignment of the BART Alternative would pass through approximately 2.7 miles of 100-year floodplain along Lower Penitencia Creek and its associated tributaries. This includes 1.7 linear miles from just north of Calera Creek, in the vicinity of North Milpitas Boulevard to just south of SR 237 (as shown in Figure 4.18-2). On the east side of the BART Alternative, this area of floodplain is due to overspill from Calera Creek, Berryessa Creek, Wrigley Creek, and the major tributaries of Lower Penitencia Creek. The floodplain elevation near Calera Creek is 15.76 feet and increases up to 22.76 feet near the Hetch Hetchy Aqueduct, south of SR 237. The flood depths are 1 to 3 feet.

Farther south towards San Jose, between the Hetch Hetchy Aqueduct and Montague Expressway, the alignment of the BART Alternative would be very near but not within a 0.65-mile stretch of floodplain, which is due to overspill from Berryessa Creek and Lower Penitencia Creek. Flood elevations in this section are approximately 26.76 to 28.76 feet, and flood depths are 1 to 3 feet. Farther south, between Montague Expressway and Cropley Avenue, the BART Alternative alignment would be within the 100-year floodplain of Berryessa and Lower Penitencia creeks for a distance of approximately 1.0 mile. This area includes the Montague/Capitol Station between Montague Expressway and Capitol Avenue. The floodplain elevation around the station area is 51.76 feet, and depths are shallow (1 foot).

The SCVWD is planning the Berryessa Creek Flood Protection Project within the BART Alternative project area to increase the conveyance capacity of the creek to convey 100-year design flow and to remove areas in the cities of San Jose and Milpitas from the 100-year floodplain. The project is divided up into the joint SCVWD/ACOE Berryessa Creek Project and the Berryessa Creek Levees Project (aka Lower Berryessa Creek Project). The joint SCVWD/ACOE Berryessa Creek Project begins at Calaveras Boulevard in Milpitas and ends at Old Piedmont Road in San Jose. The Berryessa Creek Levees Project begins at the confluence with Lower Penitencia Creek in Milpitas and ends at Calaveras Boulevard. Upon completion of these projects, flooding from overflow of Berryessa Creek within the BART Alternative project area will be eliminated.

Upper Penitencia Creek Floodplain. Segment 2 of the BART Alternative would cross Upper Penitencia Creek in the vicinity of Berryessa Road and Lundy Avenue (Figure 4.18-3). The 100-year floodplain for this creek includes portions of the BART Alternative alignment both north and south of Berryessa Road. The Berryessa Station is also in the 100-year floodplain of this creek. The direction of flow is generally northwesterly. The floodplain runs parallel to the BART Alternative alignment for approximately 0.3 miles and its depth is shallow (1 foot). Although the BART Alternative alignment would be outside the 100-year floodplain farther south, the areas along the alignment to the east and west are in the 100-year floodplain.

The SCVWD and the ACOE are reviewing and evaluating various alternatives between Coyote Creek and King Road to address the 100-year flood potential in this area (SCVWD 2002).

Lower Silver Creek and Coyote Creek Floodplain. About 1.8 miles of the BART Alternative alignment (Segment 3) from south of Mabury Road to the intersection of 19th Street and East Santa Clara Street would be within the 100-year floodplain for Lower Silver Creek and Coyote Creek (Figure 4.18-4). The Alum Rock Station site would also be located within the 100-year floodplain. Flooding in this area is due to overflows in Lower Silver Creek and Coyote Creek. Flood elevations in this area vary between 86.76 and 88.76 feet to the southeast side, and between 82.76 and 88.76 feet to the west side. The depths of the 100-year flood east of the proposed BART Alternative alignment and US 101 are about 1 to 3 feet, decreasing to about 1 foot between US 101 and 19th Street.

The SCVWD in cooperation with the Natural Resource Conservation Service and Guadalupe Coyote Resource Conservation District are working on a project, known as the Lower Silver Creek Flood Protection Project, that will improve drainage conditions in the vicinity of the Alum Rock Station. This project is proposed to include enhanced sediment transport capacity, creek bank stabilization, a maintenance road, and improved planting.

Guadalupe River and Los Gatos Creek Floodplain. The 0.4-mile portion of Segment 4 of the BART Alternative alignment between San Pedro Street and Los Gatos Creek is within the 100-year floodplains of the Guadalupe River and Los Gatos Creek (Figure 4.18-5), but would cross under the 100-year floodplain in a subway tunnel. Thus, there would be no encroachment of the floodplain.

Under existing conditions, overflows from the Guadalupe River cause flooding in this area of depths of 1 to 4 feet. In the vicinity of the BART Alternative, from Park Avenue to past I-880, the Guadalupe River Park and Flood Protection Project, a joint effort of ACOE, SCVWD, the City of San Jose, and the San Jose Redevelopment Agency, will provide flood protection to downtown San Jose. The completion date for the project is 2004. It is anticipated that upon completion of this project, the 100-year flood will be contained within the river section, and no overflowing will occur in the vicinity of the BART Alternative. Even based on existing and future projected conditions, nonetheless, the BART Alternative would not encroach in floodplains, as it would be underground in a subway tunnel. Continuing westward, crossing Los Gatos Creek, the Diridon/Arena Station and BART Alternative alignment approaching I-880 would be outside the 100-year floodplain.

Segment 5, from approximately I-880 to north of the Santa Clara Station, is outside the 100-year floodplain (Figure 4.18-6)

4.18.3 REGULATORY SETTING

Management of water resources, water quality, and floodplains in the SVRTC is under the jurisdiction of various federal, state, and regional agencies and is subject to protective laws and regulations. Premier among these are the federal CWA, Executive Order 11988 (Floodplain Management), the National Flood Insurance Program, and the state's Porter-Cologne Water Quality Control Act (PCWQCA), which are described below.

4.18.3.1 Federal Clean Water Act

The CWA is the primary federal law protecting surface water quality in the United States. Its objective is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The CWA authorizes states to adopt water quality standards for their water bodies and includes programs to address both point and non-point sources of pollution.

Sections 401 (certification of state water quality standards), 402 (provisions of the National Pollutant Discharge Elimination System [NPDES]) and 404 (discharge of fill material into waters of the United States and wetlands) of the CWA apply to the SVRTC project. Permits required by sections 401, 402, and 404 will be obtained for the project as described in Section 4.4, *Biological Resources and Wetlands* and

Chapter 9, *Agency and Community Participation*. Regulations and requirements of Section 402 are discussed below, as the NPDES program applies most directly to issues discussed in this section.

Section 404 – Permits for Fill Placement in Waters and Wetlands

Section 404 of the CWA regulates the discharge of dredged and fill materials into "waters of the United States." *Waters of the United States* refers to oceans, bays, rivers, streams, lakes, ponds, and wetlands, including any or all of the following.

- Areas within the ordinary high water mark of a stream, including nonperennial streams with a defined bed and bank, and any stream channel that conveys natural runoff, even if it has been realigned.
- Seasonal and perennial wetlands, including coastal wetlands.

Wetlands are defined for regulatory purposes as areas "inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR Part 328.3, 40 CFR Part 230.3).

Project proponents must obtain a permit from ACOE for all discharges of dredged or fill material into waters of the United States, including wetlands, before proceeding with a proposed activity. ACOE may issue either an individual permit, evaluated on a case-by-case basis, or a general permit evaluated at a program level for a series of related activities. General permits are preauthorized and are issued to cover multiple instances of similar activities expected to cause only minimal adverse environmental effects. Nationwide Permits (NWPs) are a type of general permit issued to cover particular fill activities. Each NWP specifies particular conditions that must be met in order for the NWP to apply to a particular project. Waters of the United States in the SVRTC are under the jurisdiction of the ACOE, San Francisco District.

Section 404 permits may be issued only if there is no practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences. Compliance with Section 404 requires compliance with several other environmental laws and regulations. ACOE cannot issue an individual permit or verify the use of a general permit until applicable requirements of NEPA, the federal Endangered Species Act (see Section 4.4, *Biological Resources and Wetlands*), the federal Coastal Zone Management Act, and the National Historic Preservation Act (see Section 4.6, *Cultural and Historic Resources*) have been met. In addition, ACOE cannot issue or verify any permit until a water quality certification, or waiver of certification, has been issued pursuant to Section 401 of the CWA.

Section 303(d) – List of Impaired Waterbodies

Section 303(d) of the CWA and the California Porter-Cologne Water Quality Control Act of 1969 (discussed below), the State of California is required to establish beneficial uses of state waters and to adopt water quality standards to protect those beneficial uses. Section 303(d) establishes the Total Maximum Daily Load (TMDL) process to assist in guiding the application of state water quality standards, requiring the states to identify streams whose water quality is "impaired" (affected by the presence of pollutants or contaminants) and to establish the TMDL or the maximum quantity of a particular contaminant that a waterbody can assimilate without experiencing adverse effects. Section 303(d) lists Coyote and Los Gatos creeks as impaired for diazinon and the Guadalupe River as impaired for diazinon and mercury. The proposed TMDL deadline for all listed waterbodies is 2004. The SVRTC project will need to be in compliance with all TMDL standards for diazinon and mercury that may be in effect when construction commences. The project will not contribute any detectable concentrations of diazinon and mercury to the listed waterbodies.

National Pollutant Discharge Elimination System (NPDES)

As authorized by Section 402 of the CWA, all point source stormwater discharges to surface waters of the United States are regulated through provisions of the USEPA's NPDES permit program, which is designed to prevent harmful pollutants from being washed into local water bodies. In most cases, the federal program is administered by authorized states. In California, the State Water Resources Control Board oversees the NPDES program through the state's nine Regional Water Quality Control Boards.

The NPDES Storm Water Program uses the NPDES permitting mechanism to ensure stormwater discharges to surface waters meet the state's mandatory standards and the federal minimum standards for clean water. Permits commonly include best management practices, such as installing a screen over a pipe to keep debris out of the waterway, and may also include specific technologies a permittee will utilize to achieve the required protection. The NPDES program includes issuance of the General Industrial Storm Water Permit, which governs discharges into a municipal sewer.

Under the NPDES Storm Water Program, operators of certain types of industrial facilities must obtain a General Industrial Storm Water Permit to discharge stormwater to a municipal storm sewer or directly to waters of the United States. Transportation facilities that have vehicle maintenance shops and equipment cleaning operations, such as the BART Alternative Maintenance Facility, are included in this program. The permit requires the owner or operator of a facility to file an NOI, which identifies the responsible party, location, and scope of operation, with the SWRCB prior to discharge. In addition to the NOI, dischargers must prepare a Storm Water Pollution Prevention Plan (SWPPP), monitor the effectiveness of the plan, and report those results to the RWQCB on a periodic basis.

4.18.3.2 Floodplain Management Regulations

Protection of floodplains and floodways is required by Executive Order 11988, *Floodplain Management*; USDOT Order 5650.2, *Floodplain Management and Protection*; and Federal-Aid Policy Guide 23 CFR Part 650A, *Location and Hydraulic Design of Encroachments on Flood Plains*. The intent of these regulations is to avoid or minimize encroachments within the 100-year (base) floodplain. As stated in 23 CFR Part 650.113, "A proposed action which includes a significant encroachment shall not be approved unless the responsible agency makes a finding that the proposed significant encroachment is the only practical alternative." The major requirements of Executive Order 11988 are to avoid support of floodplain development; to prevent uneconomic, hazardous, or incompatible use of the floodplain; to restore and preserve natural and beneficial floodplain values; and to be consistent with the standards and criteria of the National Flood Insurance Program.

4.18.3.3 National Flood Insurance Program

The National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 were enacted to reduce the need for large publicly-funded flood control structures and to limit disaster relief costs by restricting development on floodplains.

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program to provide subsidized flood insurance to communities that comply with FEMA regulations by limiting development within floodplains. FEMA issues FIRMs for communities participating in the National Flood Insurance Program. These maps delineate flood hazard zones in the community.

4.18.3.4 Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act of 1969 provides for the development and periodic review of Basin Plans (regional water quality control plans). Each Basin Plan establishes: 1) the beneficial uses of water designated for each water body to be protected; 2) water quality standards, known as water

quality objectives, for both surface water and groundwater; and 3) actions necessary to maintain these standards. Basin plans are primarily implemented by using the NPDES permitting system to regulate discharges so that the water quality objectives of Basin Plans are met.

Activities in areas defined as "waters of the state" that are outside ACOE's jurisdiction (e.g., isolated wetlands) and activities on creek banks that are above the ordinary high water mark are regulated by SWRCB and RWQCB. Such activities may require the issuance or waiver of waste discharge requirements from RWQCB. The SWRCB recently adopted General Waste Discharge Requirements for activities that occur in waters of the state that are outside of ACOE jurisdictional waters. Coverage under these requirements may be obtained by filing an NOI with RWQCB. Any additional mitigation above and beyond the mitigation required by ACOE, including best management practices and compensatory mitigation, may be required from RWQCB.

4.18.3.5 Local Agencies, Laws, and Regulations

Alameda Countywide Clean Water Program

The Alameda Countywide Clean Water Program (ACCWP) was initiated with the goal of forging consistent, effective countywide strategies to control sources of stormwater pollution. The San Francisco Bay RWQCB has issued a joint municipal stormwater permit to the 17 agencies and cities participating in the ACCWP (ACCWP 2001). The participating entities include Alameda County; the ACFCWCD; and the cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City. The ACCWP is responsible for helping participant entities ensure that they are fulfilling their obligations under the permit and for preparing detailed reports that describe what each entity is doing to prevent stormwater pollution. The ACCWP coordinates its activities with other pollution prevention programs, such as wastewater treatment, hazardous waste disposal, and waste recycling.

The ACCWP has developed a Storm Water Quality Management Plan that describes the ACCWP's approach to reducing stormwater pollution. Northern portions of the Baseline and BART alternatives are within the boundaries addressed by this plan. The Storm Water Quality Management Plan for Fiscal Years 2001/02 through 2007/08 is the ACCWP's third to date and serves as the basis of the ACCWP's NPDES permit (ACCWP 2001). This permit was re-issued on February 19, 2003. New development and significant redevelopment projects that are constructed after February 2005 are required to comply with the numeric standards for post construction stormwater BMPs in the re-issued permit.

Santa Clara Valley Urban Runoff Pollution Prevention Program

The Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) is an association of 13 cities and towns in the Santa Clara Valley, together with Santa Clara County and SCVWD. The cities of Milpitas, Santa Clara, and San Jose are included. SCVURPPP participants, referred to as co-permittees, share a common permit to discharge stormwater to South San Francisco Bay. To reduce pollution in urban runoff to the "maximum" extent practicable, the SCVURPPP incorporates regulatory, monitoring and outreach measures aimed at improving the water quality of South San Francisco Bay and the streams of the Santa Clara Valley.

As part of the NPDES permit requirements, the SCVURPPP produced (and updates) an Urban Runoff Management Plan and submits annual work plans and reports to the Regional Board. The SCVURPPP also produces specific reports and work products for various projects as they proceed into design and construction. The Urban Runoff Management Plan has been crafted to comply with the regulatory requirements for developing and implementing an urban runoff program. The following sections summarize the federal and state regulatory mandates and guidance for urban runoff pollution prevention and control.

Santa Clara Valley Water District

The SCVWD is the agency responsible for ensuring the protection of surface water resources and groundwater resources within their jurisdiction. A portion of the SVRTC project is located within SCVWD's operational boundaries. SCWVD has developed partnerships with the USEPA, Santa Clara County, numerous cities, and local agencies to ensure the ongoing protection of water resources. These partnerships have resulted in the development of programs to provide guidance and oversight of projects and operations including the proposed SVRTC project. In addition to SCVURPP and the Urban Runoff Management Plan, the SCVWD is developing the Clean, Safe Creeks & Natural Flood Protection Plan. The plan will likely be implemented within the timeframe of the SVRTC project. Its goals will include developing an integrated watershed planning and management strategy that balances the physical, hydrologic, and ecologic functions and processes of streams with the community setting. The plan may require compliance strategies.

Alameda County Flood Control and Water Conservation District

The Alameda County Public Works Agency, acting in its capacity as the ACFCWCD, is responsible for most major flood control operations of Alameda County from Emeryville and Oakland south to Fremont. The ACFCWCD works in cooperative collaboration with the cities throughout the county. The ACFCWCD is divided into ten flood control zones, each of which is located within a drainage basin that collects stormwater runoff and transports it to the Bay. The ACFCWCD minimizes the danger of flood throughout the District by the consistent, vigilant monitoring and maintenance of critical parts of the flood control system. The ACFCWCD also ensures that water passageways, channels, and pipelines are free of debris, silt, and vegetation. Alterations to the drainage system by the SVRTC project will be subject to approval by the ACFCWCD.

4.18.4 IMPACT ASSESSMENT

Project components that would affect groundwater, surface waters, or 100-year floodplains are summarized in Table 4.18-1, by SVRTC alternative and segment. Impacts to groundwater, surface waters, and 100-year floodplains are described in the following sections.

4.18.4.1 Impacts to Groundwater Resources

This section identifies the long-term operational impacts to groundwater of the SVRTC alternatives.

No-Action Alternative

Projects planned under the No-Action Alternative would undergo separate environmental review to define impacts to groundwater resources and determine appropriate mitigation measures. (See Section 3.2.1.2 for a list of future projects under the No-Action Alternative.)

Baseline Alternative

This alternative would include underground foundations of elevated structures. These foundations would involve dispersed development within small areas, with no long-term effect on groundwater quality, flow, or level. During the operations phase of the Baseline Alternative, dewatering would not be required. Because no impact is anticipated, no mitigation measures are required.

Table 4.18-1: Bridges, Stations, Drainage Crossings, Floodplains, Tunnels/Trenches Associated with SVRTC Alternatives

Location Description/Segment	New Bridges/ Expansions	No. of Stations	Creek/ Drainage Crossings	Approx. % in Floodplain	Tunnel or Trench Section
BASELINE ALTERNATIVE					
I-680 to Warm Springs and Warm Springs to I-880 Busway Connectors	2	--	None	None	None
I-880 to Montague Expressway Busway Connector	1	--	None	None	None
BART ALTERNATIVE AND MOS SCENARIOS					
Segment 1					
Starting point (south of Warm Springs) to the Alameda County Boundary (Kato Road) - BART at grade	4	0	Agua Caliente Creek, Agua Fria Creek, Toroges Creek, and Scott Creek	Minor encroach-ments	None
Alameda County Boundary to Great Mall parking lots (north of Montague /Capitol Station) - BART at grade	4	1	Calera Creek, Wrigley Ditch, Berryessa Creek, and Wrigley Creek	80	None
Great Mall parking lots to the Trade Zone Blvd. intersection in San Jose – BART in 20-foot-deep trench	3	1	Penitencia Channel	90	None
Segment 2					
Trade Zone Blvd. intersection to north of Berryessa Road – BART in trench	2	None	None	40	Trench (20 feet bgs)
North of Berryessa Road to south of Mabury Road – BART elevated 15 to 20 feet.	1	1	Upper Penitencia Creek	100	None
Segment 3					
South of Mabury Road to south of 19th Street, BART in subway tunnel	None	None	Lower Silver Creek and Coyote Creek	15	Tunnel (20-60 feet bgs)
Segment 4					
South of 19th Street to west of I-880 – BART in subway tunnel	None	3	Guadalupe River and Los Gatos Creek	Minor encroach-ments	Tunnel (20-90 feet bgs)
Segment 5					
West of I-880 to Santa Clara Station – BART at grade	None	1	None	None	None

Source: Earth Tech, 2002.

BART Alternative

After construction, groundwater flow directions and pathways may be minimally affected by the retained cuts along the BART Alternative alignment and at the downtown stations. The concrete U-walls may divert the normal flow of groundwater, potentially causing the mounding of groundwater up-gradient of these obstacles. However, it is anticipated that the interception will not result in detectable changes to overall groundwater availability or total subsurface water movement. Therefore, an adverse groundwater impact would not result from the BART Alternative. VTA will perform a detailed hydrogeologic study during the design phase of the project to determine mounding of groundwater upgradient of the U-walls. Rising of the water table would be minimized by routing water underneath the U-walls by installing highly permeable preferential flow pathways underneath the walls during construction. Channels of highly permeable gravel placed perpendicularly directly beneath a U-wall, crossing from one side of the U-wall to the other, would create appropriate preferential flow pathways. The frequency of placed gravel channels would be determined based on hydrogeologic analysis during design of the project.

Mounding of groundwater up-gradient of the subway tunnel is not anticipated, as the subway tunnel section would be constructed at a minimum depth of 20 feet bgs at the tunnel crown, well below the water table (approximately 15 feet bgs) in the San Jose area. Therefore, groundwater would be able to flow above and below the tunnel structure. VTA will perform hydrogeological analysis of the future conditions to determine whether mounding of groundwater occurs upgradient of tunnel structures. Highly permeable gravel channels placed in select locations above the subway tunnel and along cut-and-cover stations will facilitate drainage if fill material does not provide adequate permeability. An adverse impact would not result from this alternative.

While dewatering may be necessary during the operation of the BART Alternative to keep the retained cuts and tunnel dry, dewatering would occur only inside the structures. The total quantity of water removed in this process is anticipated to be minimal (the retained cut portions would be designed to prevent water intrusion and the tunnel segment would be sealed) and no detectable changes to the groundwater supply would occur. An adverse impact would not result from this alternative.

The eight stations would not add a substantial amount of impervious surface, as the stations would either replace existing development or would be underground. The amount of new impervious surface for each station varies by station design but is estimated to be 3-5 acres for South Calaveras (future station), 5-10 acres for Montague/Capitol, 5-10 acres for Berryessa, 4-7 acres for Alum Rock, and 3-5 acres for Santa Clara. Although there would be additional areas converted to impervious surfaces, these locations are not extensive. As a result, there would not be a substantial change in groundwater recharge rates by altering the infiltration rate in the project area. An adverse impact would not result from this alternative.

4.18.4.2 Impacts to Surface Water Resources and Water Quality

Surface Water

No-Action Alternative

Projects planned under the No-Action Alternative would undergo separate environmental review to define impacts to surface water resources and determine appropriate mitigation measures.

Baseline and BART Alternatives

Both the Baseline and BART alternatives and all associated design options, as well as the MOS scenarios, would involve new areas of impervious surface in locations that are presently undeveloped or partially developed. The additional impervious cover would reduce the amount of stormwater infiltration and increase the volume of surface water runoff. However, the amount of new impervious surface will not produce runoff volumes that would exceed the capacity of existing or planned drainage systems (Earth Tech, Inc. 2003). Therefore, impacts to local drainage systems would not be adverse.

Water Quality

No-Action Alternative

Projects planned under the No-Action Alternative would undergo separate environmental review to define impacts to water quality and determine appropriate mitigation measures.

Baseline Alternative

Neither the I-680 WS nor WS I-880 busway connector would cross surface watercourses. Two creeks, Canada del Aliso (Line J) and Canada del Aliso (Line H), flow approximately 0.65 miles and 0.40 miles north, and a third, Agua Caliente Creek (Line F), flows about 1.0 mile south of the Baseline Alternative facility locations in Fremont. In Santa Clara County, the I-880 ME busway connector would lie about 0.5 miles east of Coyote Creek. Thus, there is very limited potential for construction or operation of these facilities to affect surface water resources and impacts would not be adverse.

BART Alternative

The BART Alternative alignment, as well as the MOS scenarios, would cross a number of surface watercourses along the SVRTC, as shown in Figures 4.18-1 through 4.18-6. These include Agua Caliente Creek (Line F), Agua Fria Creek (Line D), Toroges Creek (Line C), Scott Creek (Line B), and Scott Creek (Line A) in the Alameda County portion of the project; and Calera Creek, Berryessa Creek, Wrigley Creek, East Penitencia Channel, Upper Penitencia Creek, and Lower Silver Creek in the Santa Clara County portion of the project. The BART Alternative alignment would also cross Coyote Creek, the Guadalupe River, and Los Gatos Creek in the southern portion of the alignment, but there would be no impacts to surface waters from these crossings, as the BART Alternative would be constructed in a 20- to 60-foot deep underground tunnel in this segment.

Impacts to surface waterways could occur from stormwater runoff that contained hazardous materials or other pollutants. The Federal Highway Administration (FHWA) has measured constituents of highway runoff, and has found that solids, such as debris and soil particles, are the largest constituents to runoff. Other constituents of concern include oil, grease, total organic carbons, chloride, iron, nickel, and trace amounts of other heavy metals such as lead. Similar constituents would result from runoff associated with paved parking lots, access roadways, and sidewalks under the BART Alternative. During a storm event, the first water to run off from paved surfaces is typically highest in concentrations of contaminants. After this “first flush,” concentrations are lower. Increased pollutants from runoff are expected to be within the absorption and assimilation capacity of surrounding land, even during the first flush.

Runoff from BART Alternative access roads, parking areas, and other facilities would be directed to the local stormwater systems and eventually to receiving waters. The BART Alternative and the MOS scenarios incorporate drainage and water storage facilities to maintain existing drainage patterns, ensure sufficient drainage capacity, prevent pollutants from entering the local storm drain system, and clean paved areas.

Impacts to waterways from construction operations and mitigations for such impacts are discussed in Section 4.19, *Construction*.

4.18.4.3 Impacts to Floodplains

No-Action Alternative

Projects planned under the No-Action Alternative would undergo separate environmental review to define impacts to floodplains and determine appropriate mitigation measures.

Baseline Alternative

The busway connector facilities that would be constructed for the Baseline Alternative would be outside the 100-year floodplain (Figure 4.18-1 and 4.18-2). Therefore, no adverse floodplain impacts are anticipated.

BART Alternative

The general trend of the 100-year flood on the BART Alternative, as well as the MOS scenarios, is indicated on Figures 4.18-1 through 4.18-6. It is not possible to avoid floodplain encroachment by the BART Alternative given that the proposed BART alignment would run in the existing railroad corridor, which is located within floodplains. BART facilities would be designed to elevations above 100-year flood levels, with critical facilities such as traction power substations designed above 500-year flood levels. Potential impacts on floodplains and mitigation measures are discussed below.

Agua Caliente (Line F) Floodplain. The BART Alternative would be constructed to the east of the existing railroad corridor and would encroach on approximately 300 feet of the 100-year floodplain of this creek (Figure 4.18-1). The existing culvert under the railroad corridor would be extended east of the BART tracks. As noted earlier, the cause of flooding in the area is due to spillage at I-680, however, according to the FIRMs, the 100-year flow is contained in the culvert and would not overflow the tracks. Because only a small section of floodplain encroachment would result from construction of the BART Alternative and the flood depths are shallow at this location, it is anticipated that there would be no adverse floodplain impacts.

Scott Creek (Line A) Floodplain. The eastern side of the BART Alternative alignment would encroach upon the 100-year floodplain of Scott Creek between Scott Creek Road and Dixon Landing Road in Milpitas for about 0.3 miles (Figure 4.18-1). In general, existing ground elevations within the railroad corridor are higher than the 100-year flood elevation, and the BART Alternative in this section would be further elevated about 2 to 4 feet above the existing ground elevation. Three options are under consideration for the Dixon Landing Road crossing: 1) Aerial Option; 2) Retained Cut Option; and 3) At-grade Option (with depressed Dixon Landing Road). The structures at the Dixon Landing Road crossing would be constructed within the existing railroad corridor, but may encroach upon a very small portion of the floodplain. Because only a small section of floodplain encroachment would occur and flood depth is shallow in this location, the increase in flood elevations would not be substantial. Flooding in this area is due to blockage of culverts; otherwise the 100-year flood is contained in the culvert under the railroad corridor. Therefore, there are no adverse floodplain impacts in this area.

Floodplains of Lower Penitencia Creek and its Tributaries. The alignment of the BART Alternative would pass through approximately 2.7 miles of 100-year floodplain along Lower Penitencia Creek and its associated tributaries. This includes 1.7 linear miles from just north of Calera Creek, in the vicinity of North Milpitas Boulevard, to just south of SR 237 (as shown in Figure 4.18-2). Flooding in this area is due to overspill from Calera Creek, Berryessa Creek, Wrigley Creek, and the major tributaries of Lower Penitencia Creek. The SCVWD is undertaking a flood protection program including the Berryessa Creek

Levees Project, ACOE's Berryessa Creek Flood Protection Project, ACOE's Upper Penitencia Creek Flood Protection Project, and Lower Silver Creek Flood Protection Project between Coyote Creek and I-680 that would substantially reduce the floodplain area in this portion of the BART Alternative alignment. No adverse impacts are anticipated at this location with implementation of the SCVWD flood protection program.

Between Montague Expressway and Cropley Avenue, the BART Alternative alignment and the Montague/Capitol Station would be within the 100-year floodplain of Berryessa and Lower Penitencia creeks for a distance of about 1.0 mile. This area would also benefit from the SCVWD flood protection program and no adverse impacts are anticipated.

Upper Penitencia Creek Floodplain. Segment 2 of the BART Alternative would cross Upper Penitencia Creek in the vicinity of Berryessa Road and Lundy Avenue (Figure 4.18-3). The 100-year floodplain for this creek parallels the BART Alternative alignment for about 0.3 miles. The SCVWD and the ACOE are reviewing and evaluating flood control alternatives between Coyote Creek and King Road to accommodate 100-year flood flows. It is anticipated that this project, known as the Upper Penitencia Creek Flood Protection Project, will be completed prior to the BART Alternative and will substantially reduce the flood risk and floodplain at this location and no adverse impacts would result with the BART Alternative.

Lower Silver Creek and Coyote Creek Floodplain. About 1.8 miles of the BART Alternative alignment from south of Mabury Road to about the intersection of 19th Street and East Santa Clara Street would be within the 100-year floodplain for Lower Silver Creek and Coyote Creek (Figure 4.18-4). The SCVWD, the Natural Resource Conservation Service, and Guadalupe Coyote Resource Conservation District are working on a flood control project, known as the Lower Silver Creek Flood Protection Project, that will greatly improve drainage conditions in the vicinity of the Alum Rock Station. This project is proposed to include enhanced sediment transport capacity, creek bank stabilization, a maintenance road, and improved planting. Completion of this project is expected to reduce the floodplain area and potential floodplain encroachment in this segment of the BART Alternative and no adverse impacts would result.

Guadalupe River and Los Gatos Creek Floodplain. The 0.4-mile portion of Segment 4 of the BART Alternative alignment between San Pedro Street and Los Gatos Creek would cross under the 100-year floodplain in a subway tunnel (Figure 4.18-5). There would be no floodplain encroachment. Continuing westward, crossing Los Gatos Creek, the Diridon/Arena Station and BART Alternative alignment approaching the Santa Clara Station would be outside the 100-year floodplain (4.18-6). Therefore, no adverse flooding impacts would occur with the BART Alternative.

Summary of Floodplain Impacts. Table 4.18-2 provides a summary of the BART Alternative floodplain impacts.

Executive Order 11988

In accordance with Executive Order 11988, VTA finds that (1) the BART Alternative project starts south of Warm Springs Station; crosses southern Fremont, Milpitas, and east San Jose to US 101 in a north-south direction; continues through central San Jose in an east-west direction in a subway tunnel, and terminates in Santa Clara at grade at the Santa Clara Station. The alignment cannot avoid crossing floodplains and there is no practicable alternative to the alignment located in the floodplains; (2) the BART Alternative will include all practicable measures to reduce the risk of flood loss and minimize the impacts of floods on human safety, health, and welfare; and (3) the construction of the BART Alternative alignment and associated facilities would comply with applicable federal, state, and local ordinances for flood control and drainage.

Table 4.18-2: BART Alternative and MOS Scenarios Floodplain Impact Summary

Creek Crossing [1]	Extent of Proposed Encroachment	Potential Impact		Mitigation Measures
		Creek	Floodplain	
Agua Caliente Creek (Line F)	Aerial structure support columns for approx. 400 foot length of tracks [2]	No Impact	Not Adverse	Place support columns outside of creek base flood effective flow area.
Scott Creek (Line A)	None	No Impact	N/A	N/A
Calera Creek	None	No Impact	N/A	N/A
Berryessa Creek	Approx. 2,500 feet of at-grade track section to next creek crossing	No Impact	N/A	N/A
Wrigley Creek	Approx. 3,000 feet of at-grade and track section to portions of South Calaveras Future Station	Beneficial Impact	N/A	N/A
	South Calaveras Future Station	Beneficial Impact	Not Adverse	Flood-proof structures. Provide one-foot minimum freeboard above base flood elevation at all access points to underground structures. Design station configuration and ground-level structures/structural elements to minimize obstruction of floodwaters.
East Penitencia Channel	Retained cut section for approx. 4,600- foot length of tracks	No Impact	Not Adverse	Flood-proof structures. Provide one-foot minimum freeboard above base flood elevation at all access points to underground structures. Design tracks U-wall structures to minimize obstruction of floodwaters.
	Montague/Capitol Station	N/A	Not Adverse	Flood-proof structures. Provide one-foot minimum freeboard above base flood elevation at all access points to underground structures. Design station configuration and ground-level structures/structural elements to minimize obstruction of floodwaters.
Upper Penitencia Creek	Retained fill section for approx. 2,400 foot length of tracks and Berryessa Station, aerial structure support columns for approx. 615 foot length of tracks (None) [3]	No Impact (No Impact) [4]	Not Adverse (N/A) [4]	Flood-proof structures. Design retained fill structures to minimize obstruction of floodwaters. (N/A) [4]

Continued

Table 4.18-2: BART Alternative and MOS Scenarios Floodplain Impact Summary				
Creek Crossing [1]	**Extent of Proposed Encroachment**	**Potential Impact**		**Mitigation Measures**
		Creek	**Floodplain**	
Upper Penitencia Creek	Berryessa Station (None) [3]	N/A (No Impact) [4]	N/A	Flood-proof structures. Provide one-foot minimum freeboard above base flood elevation at all access points to underground structures. Design station configuration and ground-level structures/structural elements to minimize obstruction of floodwaters. (N/A) [4]
Lower Silver Creek	None	US 101/Diagonal Option – No Impact Railroad/28th St. Option –- Beneficial Impact	Not Adverse	N/A
	Alum Rock Station	N/A	N/A	Flood-proof structures. Provide one-foot minimum freeboard above base flood elevation at all station entrances and access points to underground structures. Design station support facility configurations and ground-level structures/structural elements to minimize obstruction of floodwaters.
Coyote Creek	None	No Impact		N/A

Notes:

[1] Creek crossings and potential floodplain encroachment locations requiring analysis.

[2] Recommended in lieu of embankment placement and culvert extension.

[3] Projects planned or proposed by others; in particular, the local flood control districts may minimize or eliminate floodplains. In parentheses, separate evaluations are presented where such plans make it appropriate.

[4] Impact evaluation for scenario where SCVWD/ACOE creek improvement project is completed prior to or in tandem with the proposed project. The creek improvement project is scheduled for 2010.

Source: Location Hydraulic Study, Earth Tech, Inc., 2003.

National Flood Insurance Program (23 CFR Part 650, Subpart 6A Section 650)

Regulations governing the National Flood Insurance Program (23 CFR Part 650, Subpart 6A Section 650) were used as guidance for the evaluation of floodway impacts, which focuses on FEMA-defined floodways. Section 650.111 calls for location hydraulic studies to be performed with detailed engineering design drawings and lists five location considerations to be examined for floodplain encroachments:

- Risks associated with implementation of the action.
- Impacts on the natural and beneficial floodplain values.
- Support of incompatible floodplain development.

- Measures to minimize impacts associated with the action.
- Measures to restore and preserve the natural and beneficial floodplain values impacted by the action.

All references to the BART Alternative below also apply equally to the MOS scenarios.

Risks associated with implementation of the action. The flood risks associated with the BART Alternative are minimal. Although the BART Alternative includes encroachment into 100-year floodplains, the majority of these areas are within existing operational railroad ROW. In addition, flood protection projects are being undertaken by local water districts and other agencies that will reduce flooding risk in the areas traversed by the BART Alternative alignment. VTA performed a comprehensive location hydraulic study (Earth Tech, Inc. 2003) on various streams along the BART Alternative to model existing and proposed conditions and evaluate the risk of flooding from the project to develop appropriate design treatments.

Impacts on natural and beneficial floodplain values. The BART Alternative would provide for adequate transport of 100-year flood flows. All culverts crossing beneath BART at-grade trackbeds would be designed for the 100-year flood in accordance with BART Design Criteria[7], which require that "all designs shall consider ultimate development trends in the area." The design of drainage structures would conform to the criteria of the ACFCWCD, SCVWD, Alameda County Public Works Agency (ACPWA), Milpitas Public Works Department (MDPW), City of San Jose Public Works Department (SJDPW), and/or the Department of Public Works for the City of Santa Clara (SCDPW), as appropriate, and would be subject to approval by these agencies. Where inundation of, or damage to, at-grade track beds could occur due to the inability of any storm drain to pass the peak run-off from a 100-year storm, the storm drain would be redesigned for the 100-year flood. Additionally, location hydraulic studies would reveal whether or not there is a need for specific design features or mitigation measures to assure that the BART Alternative would not have any unresolved substantial impacts upon natural and beneficial floodplain values including, but not limited to, support of biological resources, water quality, and groundwater recharge.

Support of probable floodplain development. The BART Alternative would be constructed within an existing freight railroad corridor, and proposed station sites have been selected to serve existing and planned development. The corridor is already heavily built up. This alternative is not expected to stimulate new, incompatible development in undeveloped areas of the 100-year floodplain.

Measures to minimize floodplain impacts associated with the action. It was not possible to fully avoid encroachments in the 100-year floodplain, given the existing location of the railroad ROW and existing activity centers that the BART Alternative would serve. Where possible, VTA will locate traction power stations and other improvements above the 100-year flood elevation; those that cannot be located above the 100-year floodplain would be flood-proofed to avoid flood damage. Critical facilities including vent and traction power substations would be set above the 500-year floodplain.

Measures to restore and preserve the natural and beneficial floodplain values impacted by the action. Additional location hydraulic studies would support refinement of design features and, if necessary, measures to restore natural and beneficial floodplain values including, but not limited to, biological resources, water quality, and groundwater recharge. As defined by the location hydraulic study (Earth Tech, Inc. 2003), an extensive engineering analysis was performed to adequately describe the hydrologic functions in the project area. Additionally, the study analyzed potential effects that may occur to these functions as a result of implementing the proposed project. The encroachments, which occur

[7] Design Criteria for BART System, San Francisco Bay Area Rapid Transit District, December 2001.

along the existing UPRR ROW and developed urban areas, will impart no change to existing conditions. The study determined that the project has been designed to minimize impacts to the floodplain to the maximum extent possible, and that there will be no detectable changes to natural and beneficial floodplain values.

4.18.4.4 Design Requirements and Best Management Practices

Baseline Alternative

While the Baseline Alternative would involve up to three new bridges or bridge expansions, it would cross none of the surface waterways in the SVRTC or encroach upon the 100-year floodplain. The Baseline Alternative would incorporate stormwater treatment best management practices that are consistent with SCVURPPP, ACCWP, and the NPDES permit for non-point stormwater pollutant runoff to reduce stormwater-borne pollutants at their source. VTA will comply with Sections 401 and 402 of the CWA, including any waste discharge requirements and NPDES permit conditions.

BART Alternative

Groundwater Resources

The BART Alternative tunnel will be designed to resist expected hydrostatic pressures and buoyant forces in accordance with BART Design Criteria, which include factors of safety against floatation both during and following construction.

Groundwater flow directions and pathways may be affected by BART Alternative retained cut and tunnel segment structures, possibly resulting in the spread of groundwater contamination and the rise of the water table. To minimize this impact, highly permeable gravel channels will be constructed directly beneath the U-wall sections of retained cuts where needed to allow water to be routed as quickly as possible underneath the U-wall. The subway tunnel will be constructed a minimum of 20 feet bgs to top of tunnel, which is below the water table (approximately 15 feet bgs) in the San Jose area. Thus, groundwater will be able to flow readily both above and below the tunnel structure. Additional hydrogeologic analysis will be conducted during the design phase to determine where highly permeable preferential flow pathways for BART Alternative retained cut and tunnel segment structures will be placed. No adverse impacts are anticipated.

Surface Water Resources

BART Design Criteria require that drainage systems that would collect runoff from BART Alternative facilities be designed to convey the surface flow generated by a 10-year storm event. The design of parking and roadway areas will be submitted to the ACFCWCD, SCVWD, ACPWA, MDPW, SJDPW, and SCDPW, and other regulatory agencies responsible for review, as appropriate.

The BART Alternative and MOS scenarios stormwater treatment best management practices, which are consistent with SCVURPPP, ACCWP, and the NPDES General Industrial Storm Water Permit, will be implemented during the operational phases of the project to reduce stormwater-borne pollutants at their source. VTA will also comply with Sections 401 and 402 of the CWA, including any waste discharge requirements and NPDES permit conditions, as well as the General Waste Discharge Requirements.

VTA has incorporated the following best management practices into the project design in order to ensure that runoff from the facilities during operations and wet weather events will not substantially degrade water quality and will comply with all water quality objectives in the region:

- VTA will ensure that new stormwater inlets in parking areas include trash grates and maintainable silt traps and that outlet structures provide for proper energy dissipation in accordance with standard specifications for storm drainage;
- VTA will ensure that regular maintenance of parking facilities includes a program to clean curbside pavement areas of litter, fuel, and oil spills. Storm drain inlet traps will be inspected at least annually and cleaned as required to maintain function.

VTA performed additional location hydraulic studies on creeks that will be affected by increased runoff from the BART Alternative and MOS scenarios. With the incorporation of all design requirements and best management practice, there will be no substantial impacts to hydrology or water quality.

Floodplains

The project will include flood proofing and minimization of obstructions to the floodwater flows as appropriate. The encroachments are in shallow flooding zones (i.e., less than 3 feet) and none of the encroachments would be considered a "significant encroachment," as defined in the federal regulations. Several flood control projects, in place or scheduled for construction or in the planning phase, will minimize or eliminate the floodplain conditions in the project area. These projects include:

- Berryessa Creek Flood Protection Project, which may completely eliminate the 100-year floodplains around the Montague/Capitol Station, South Calaveras Future Station, and near Calera Creek;
- Upper Penitencia Creek Flood Protection Project, which may completely eliminate the 100-year floodplains around the Montague/Capitol and Berryessa Station areas;
- Lower Silver Creek Flood Protection Project, which will minimize the 100-year floodplains in the Alum Rock Station area; and
- Guadalupe River Park and Flood Protection Project, which will provide flood protection to downtown San Jose.

VTA will continue to coordinate with the local flood control agencies to obtain any updated information that may impact the BART Alternative, as well as the MOS scenarios' project design. VTA will also work closely with these agencies to include appropriate measures for flood protection.

4.18.4.5 Mitigation Measures

With the incorporation of the above design requirements and best management practices, no mitigation measures are required for the Baseline or BART alternative, including the MOS scenarios.

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