4.15 WATER RESOURCES

4.15.1 INTRODUCTON

This section discusses the water resources in the SVRTC including surface waters, floodplains, and groundwater. Much of the technical information contained in this section is taken from several hydrologic and hydraulic studies prepared during the Preliminary Engineering phase of the project (see Chapter 14, References*)*. These studies supported the design of the system so that the trackway, stations, and other facilities would be protected from a 100-flood event; critical facilities would be protected from the 500-year flood event; and there would be no exacerbation of the flooding upstream and downstream of the alignment or change local flooding conditions resulting from operation of the system.

Additional information related to water resources is found in Section 4.2, Biological Resources, Section 4.8, Hazardous Materials, and Chapter 6, Construction.

4.15.2 SURFACE WATERS

The quality of surface water within the SVRTC in Alameda County has been degraded primarily 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. For example, pollutants deposited on paved surfaces or spilled into gutters in both wet and dry weather eventually find their way to the San Francisco Bay. A non-point source pollution study conducted in Santa Clara County by the San Francisco Regional Water Quality Control Board (SFRWQCB) found that contaminant loads are directly proportional to storm water runoff. Monitoring results indicated that six trace metals (cadmium, chromium, copper, lead, nickel, and zinc) were 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 storm water runoff in the project vicinity is the erosion of sediments containing naturally occurring minerals.

Point source pollution originates from municipal and industrial sources, including treated wastewater, process water, cooling water, and storm water runoff from drainage systems. Point source pollution is regulated, as discussed in Regulatory Considerations section below.

Under the federal Clean Water Act (CWA), Section 303(d), States are required to identify streams whose water quality is “impaired” (affected by the presence of pollutants or contaminants). In the SVRTC, Coyote and Los Gatos creeks are listed as impaired for diazinon and the 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 Regulatory Considerations section below.

Watercourses in Alameda County

The surface hydrology of Alameda County and Milpitas in the SVRTC is characterized by generally westward-flowing streams draining the foothills of the Diablo Range towards San Francisco Bay. Creeks in Alameda County drain small watersheds and collect water from a limited urbanized area. Most of the creeks have water only during the wet season. The lower reaches of many creeks have been modified and constructed as drainage channels, designed to convey storm water flow through the urbanized area.

The creeks crossing the BEP and SVRTP alternative alignments in Alameda County and the drainage areas near each crossing are presented in Table 4.15-1, with the drainage structures described below. The locations of the creeks are shown on in Appendices B and C, which are the plans and profile drawings for the BEP and SVRTP alternatives.

Table 4.15-1: Creeks and Drainages within the Project Area[1] in Alameda County

Creek/Drainage Line	Location of Project Crossing	Total Drainage Area Near Project Crossing
Agua Caliente Creek/Line F[a]	Fremont, STA 45+20	2.47 square miles
Agua Fria Creek/Line D	Fremont, STA 74+00	2.75 square miles
Toroges Creek/Line C	Fremont, STA 101+50	1.5 square miles
Unnamed creek/Line B-1	Fremont, does not cross alignment, located west of the alignment and near STA 122+50	0.13 square miles
Unnamed Creek/Line B	Fremont, STA 146+00	1.34 square miles
Scott Creek/Line A	Fremont, STA 173+00	1.8 square miles

[a] 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 project area are also referred to as “Lines.”

Source: HNTB Corporation and Earth Tech, Inc., 2005

Agua Caliente Creek/Line F

On the east side of the railroad corridor (upstream side), Agua Caliente Creek flows in a concrete-lined trapezoidal channel and then flows into the following structures: a concrete transition structure, an 8-foot wide by 6-foot high reinforced concrete box (RCB) culvert, a drop-in structure, and a single 6.75-foot diameter reinforced concrete

[1] Project area is defined in this section as the BEP and/or SVRTP alternative footprint and surrounding vicinity.

pipe (RCP) for approximately 620 feet on the west side of the corridor under the UPRR Warm Springs Yard. The RCP outfalls to a concrete-lined trapezoidal channel.

Agua Fria Creek/Line D

On the east side of the railroad corridor, Agua Fria Creek flows south in a concrete-lined trapezoidal channel parallel to the railroad corridor. North of East Warren Avenue, the creek turns west into the railroad right-of-way and enters a 10-foot wide by 6-foot high RCB culvert. The RCB culvert carries flow west under the railroad tracks into the following structures: a second concrete lined channel, a special galvanized steel pipe arch, and a second 10-foot wide by 6-foot high RCB culvert. This RCB culvert turns southwest and passes under East Warren Avenue. On the south side of East Warren Avenue, the RCB culvert turns west, passes under Kato Road, and outfalls into a concrete lined channel.

Toroges Creek/Line C

On the east side of the railroad corridor, Toroges Creek flows in a concrete-lined trapezoidal channel with earthen embankments and then flows into the following structures: a concrete transition structure, an 11-foot wide by 5-foot high RCB culvert, an 11-foot wide and 3.5-foot high rectangular channel with earthen embankments, and a transition drop-in structure. On the west side of the railroad corridor, the creek flows in a trapezoidal earthen channel. Within the corridor, timber trestle structures support a walkway and the UPRR westernmost freight tracks over the rectangular channel.

Unnamed Creek/Line B-1

On the east side and upgradient of the railroad corridor, storm water from commercial and residential areas flows into two 24-inch storm drains and then into a 36-inch RCP that continues under the railroad corridor. On the west side and downgradient of the corridor, water from the RCP flows into Line B-1, a trapezoidal earthen channel.

Unnamed Creek/Line B

On the east side of the railroad corridor, Line B flows in a trapezoidal earthen channel and then flows into the following structures: a transition structure consisting of 12.5-feet long concrete channel; a 6-foot diameter RCP; an approximately 9-foot long transition box chamber with a 2.25-foot drop at the outlet; a 6-foot diameter RCP; and an 8-foot wide, 3.5-foot high, and 14-foot long RCB culvert. On the west side of the railroad corridor, the creek flows in a trapezoidal earthen channel.

Scott Creek/Line A

On the east side of the railroad corridor, Scott Creek flows west through a 90 degree bend and then north in a concrete-lined trapezoidal channel parallel to the railroad corridor for 400 feet. The creek turns west again through another 90 degree bend and, beginning approximately 40 feet upstream of the railroad corridor, flows under the corridor in a concrete-lined rectangular channel. On the west side of the corridor, the creek flows in an earthen channel. Within the railroad corridor, two timber trestle structures support the UPRR freight tracks over the rectangular channel, with a timber walkway in between these structures.

Watercourses in Santa Clara County

The principal drainage feature in Santa Clara County in the project area is Coyote Creek, which originates in the Diablo Range, enters the Coyote Valley at its southeastern end, and flows northwesterly through the Coyote and Santa Clara valleys before entering San Francisco Bay. Other major drainages 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.

The creeks crossing the BEP Alternative (only to Upper Penitencia Creek) and SVRTP Alternative in Santa Clara County and the drainage areas near each crossing are presented in Table 4.15-2, with the drainage structures described below. The locations of the creeks are shown on in Appendices B and C, which are the plan and profile drawings for the BEP and SVRTP alternatives.

Calera Creek

On the east side of the railroad corridor, Calera Creek flows in a concrete rectangular channel and then into a twin 11-foot wide by 6-foot high RCB culvert. On the west side of the railroad corridor, the creek flows in a trapezoidal channel. Just downstream of the corridor, Calera Creek merges with Berryessa Creek.

Berryessa Creek

On the east and west sides of the railroad corridor, Berryessa Creek flows in a concrete-lined trapezoidal channel. Two approximate 90 degree turns exist in the channel near the corridor, one upstream and the other downstream of the corridor. Two bridges structures, approximately 70 feet long and 100 feet wide support the UPRR freight tracks over the concrete channel.

Wrigley Creek

Wrigley Creek runs adjacent to the railroad corridor from north of Capitol Avenue near STA 379+00, crosses the corridor east of the intersection of Railroad Avenue and Railroad Court, and merges with Ford Creek to form Wrigley-Ford Creek approximately 600 feet west of the corridor at STA 274+00. On the east side of the corridor, the creek flows in an earthen trapezoidal channel. The creek flows under the railroad corridor in three 8-foot wide by 6-foot high elliptical corrugated metal pipe (CMP) culverts. On the west side of the corridor, the creek flows in a concrete-lined trapezoidal channel.

Table 4.15-2 Drainage Areas at Each Crossing

Creek/Drainage Line	Location of Project Crossing	Total Drainage Area Near Project Crossing
Calera Creek	Milpitas, STA 230+70	2.9 square miles
Berryessa Creek	Milpitas, STA 246+00	22 square miles[a]
Wrigley Creek	Milpitas, STA 274+00	<2 square miles
Lower Penitencia Creek	Milpitas, does not cross alignment, runs parallel to and the west of the alignment from STA 192+00 to STA 373+00	27.7 square miles[b]
East Penitencia Channel	San Jose, does not cross alignment; box culvert that collects storm water and feeds channel crosses at STA 390+00	1.7 square miles
Upper Penitencia Creek	San Jose, STA 521+00	24 square miles
Lower Silver Creek	San Jose, STA 581+00	44 square miles
Coyote Creek	San Jose, STA 644+00 (a East Santa Clara Street near 17th Street)	247 square miles
Guadalupe River	San Jose, STA 725+40	144 square miles
Los Gatos Creek	San Jose, STA 732+30	54.8 square miles

[a] Drainage area for Berryessa Creek includes its tributaries Calera Creek and Wrigley Creek.
[b] Drainage area for Lower Penitencia Creek includes its tributaries Berryessa Creek and East Penitencia Channel.
Source: HNTB Corporation and Earth Tech, Inc., 2005.

Lower Penitencia Creek

Lower Penitencia Creek flows in a trapezoidal earth channel between approximately 1,000 to 3,000 feet west of the railroad corridor from STA 192+00 to STA 373+00, and does not cross the alignment.

East Penitencia Channel

East Penitencia Channel originates west of the railroad corridor near Lundy Place, south of Montague Expressway. A storm drain collects water on the east side of the corridor. This water flows through an inverted siphon (consisting of a 78-inch CMP with liner and a 72-inch RCP) that crosses under the railroad corridor and outfalls into the channel. East Penitencia Channel merges with Lower Penitencia Creek northwest of Montague Expressway near McCandless Drive in Milpitas.

Upper Penitencia Creek

On the east and west sides of the railroad corridor, Upper Penitencia Creek is an alluvial stream that flows generally west to its confluence with Coyote Creek approximately 1,400 feet west of the railroad crossing. Within the railroad corridor, a timber trestle structure supports the UPRR freight tracks. Two other bridges cross the creek in close proximity to the corridor. The first is located approximately 250 feet east of the corridor and serves a business complex. The second bridge is King Road and is located about 1,600 east of the corridor.

Lower Silver Creek

Lower Silver Creek is a perennial stream drains that discharges into Coyote Creek approximately 1,700 feet downstream of the entrance to culverts under US 101. The railroad corridor under the BEP Alternative would not cross the creek; however, the southern boundary of the Las Plumas Yard Option would be set back from the northern bank of the creek. The tunnel alignment under the SVRTP Alternative would pass under the creek about 60 feet upstream from the culverts under US 101. In the project area, the creek has been recently modified by the Lower Silver Creek Flood Protection Project, Reaches 1 and 2, which included widening the creek and installing gabions on the banks where necessary.

Coyote Creek

Coyote Creek is an alluvial stream that passes the Berryessa and Alum Rock station areas to the west. The tunnel alignment would pass under the creek near the intersection of East Santa Clara and 17th streets. At this location, the creek flows under the East Santa Clara Street Bridge. This bridge was constructed in 1918, and is supported on numerous timber piles.

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. The tunnel alignment crosses the creek approximately 140 feet south of the West Santa Clara Street Bridge. In the project area, the river has been modified by the recently completed Guadalupe River Park and Flood Protection Project, Reaches 3a and 3b, which included constructing two underground bypass channels that redirect high flows and installing other flood protection features. The Guadalupe River merges with Los Gatos Creek north of the alignment between West Santa Clara and West St. John streets.

Los Gatos Creek

Los Gatos Creek is an alluvial stream and major tributary to the Guadalupe River. Los Gatos Creek merges with the Guadalupe River as described above. The tunnel alignment crosses the creek approximately 220 feet south of the West Santa Clara Street Bridge.

Drainage at Newhall Yard and Shops and Santa Clara Station

There are no watercourses in the immediate vicinity of the Newhall Yard and Shops and Santa Clara Station sites. The area is composed of hard-packed earth, rubble, or degraded asphalt with a gradual downward slope to the north. Little vegetation is present other than dry grasses at the perimeter. There is no standing water or evidence of extended storage of water. No evidence of high velocity overland flows is apparent. Existing drainage of the area is from a combination of storm drains, overland flows, and infiltration.

The drainage system removes storm water and overland flow through storm drains that connect to the San Jose International Airport area systems and then discharge to the Guadalupe River. A 27-inch RCP storm drain along Newhall Street owned by the City of San Jose drains a portion of the site and another 27-inch RCP storm drain along Brokaw Road owned by the City of Santa Clara drains much of the remainder of the site. The City of Santa Clara also owns a 42- and 60-inch RCP storm drain system at De La Cruz Boulevard that crosses the project site.

4.15.3 FLOODPLAINS

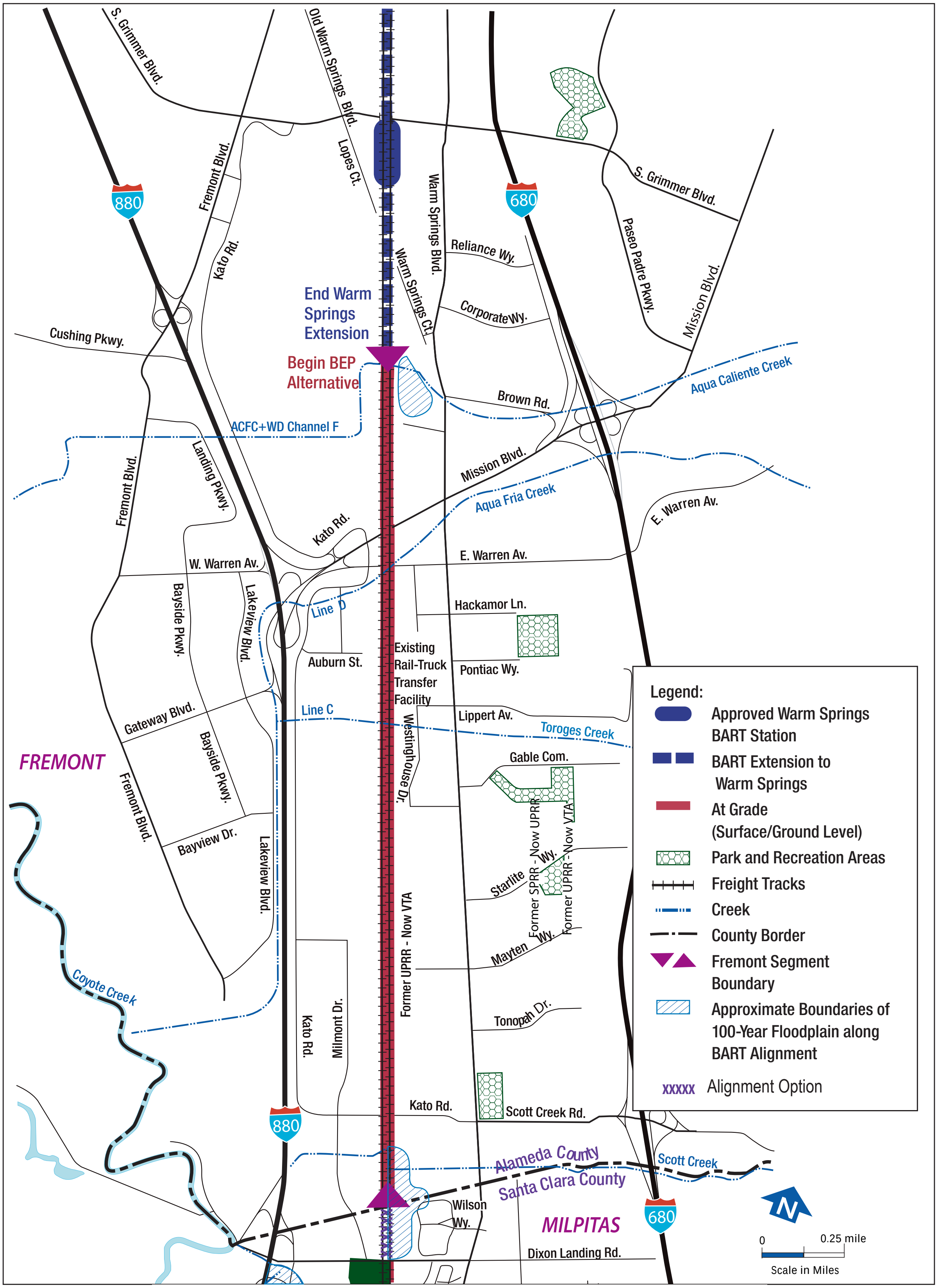
The term floodplain refers to land areas in and adjacent to watercourses subject to continuous or periodic inundation from flood events. A 100-year flood event has a 1.0 percent chance of occurrence in any year. A 500-year flood event has a 0.2 percent chance of occurrence in any year.

To establish the existing conditions of the drainage conditions and potential for flooding for the BEP and SVRTP alternatives, the Flood Insurance Rate Maps (FIRMs) and the Flood Insurance Study (FIS) from the Federal Emergency Management Agency (FEMA) were reviewed. In addition, hydrologic and hydraulic analysis was performed that included reviewing available data such as existing hydrologic and hydraulic reports and studies, conducting reconnaissance surveys, and determining 100-year (and in some cases 500-year) design flows and design water surface elevations for existing (and future with project) conditions, which included the use of the Hydrologic Engineering Center River Analysis System (HEC-RAS) computer model.

The FIRMs indicate that several locations along the railroad corridor are located within 100-year floodplain (see Figures 4.15-1 through 4.15-5). For some locations, the computer model indicates flooding during a 100-year storm event that is not representative of the floodplains shown on the FIRMs. Both the information from the FIRMs and the model are briefly described below for railroad corridor and adjacent area. For information about the larger surrounding area, refer to the hydrologic and hydraulic studies prepared during the Preliminary Engineering phase of the project.

Floodplains in Alameda County

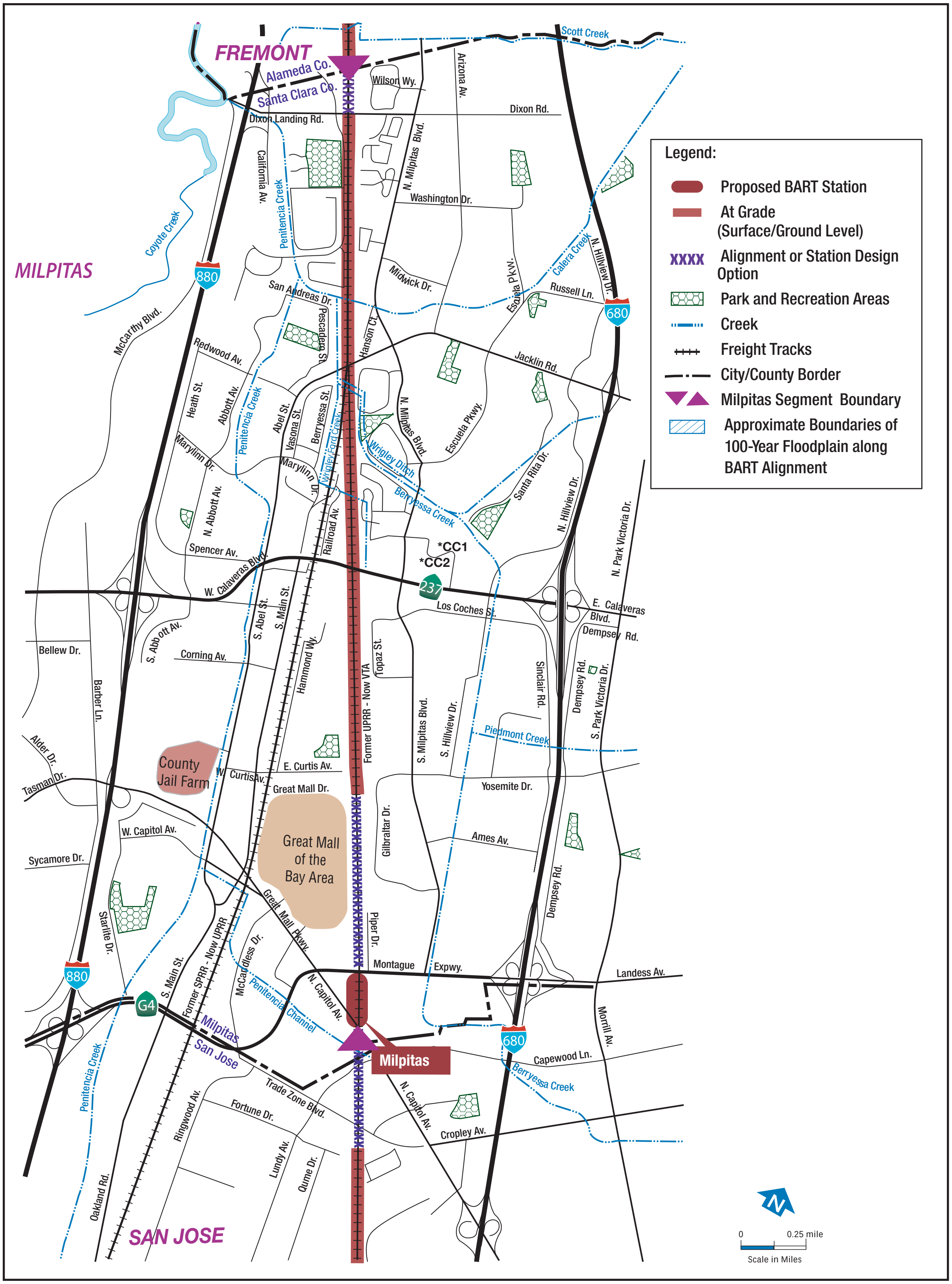
Many of the cross-drainage structures within the railroad corridor in Alameda County were designed in the 1960s and 1970s to convey flow from a 15-year storm event (15-year design flow), but have inadequate capacity to convey flow from a 100-year storm event (100-year design flow). In addition, changes in land use patterns and new developments since the 1960s and 1970s have increased impervious surface areas and storm water runoff. Therefore, under existing conditions, there is the potential of



Source: VTA, 2008.

Note: Approximate Locations Shown, Study Area Limits = 0.25 miles on either side of BART Alternative

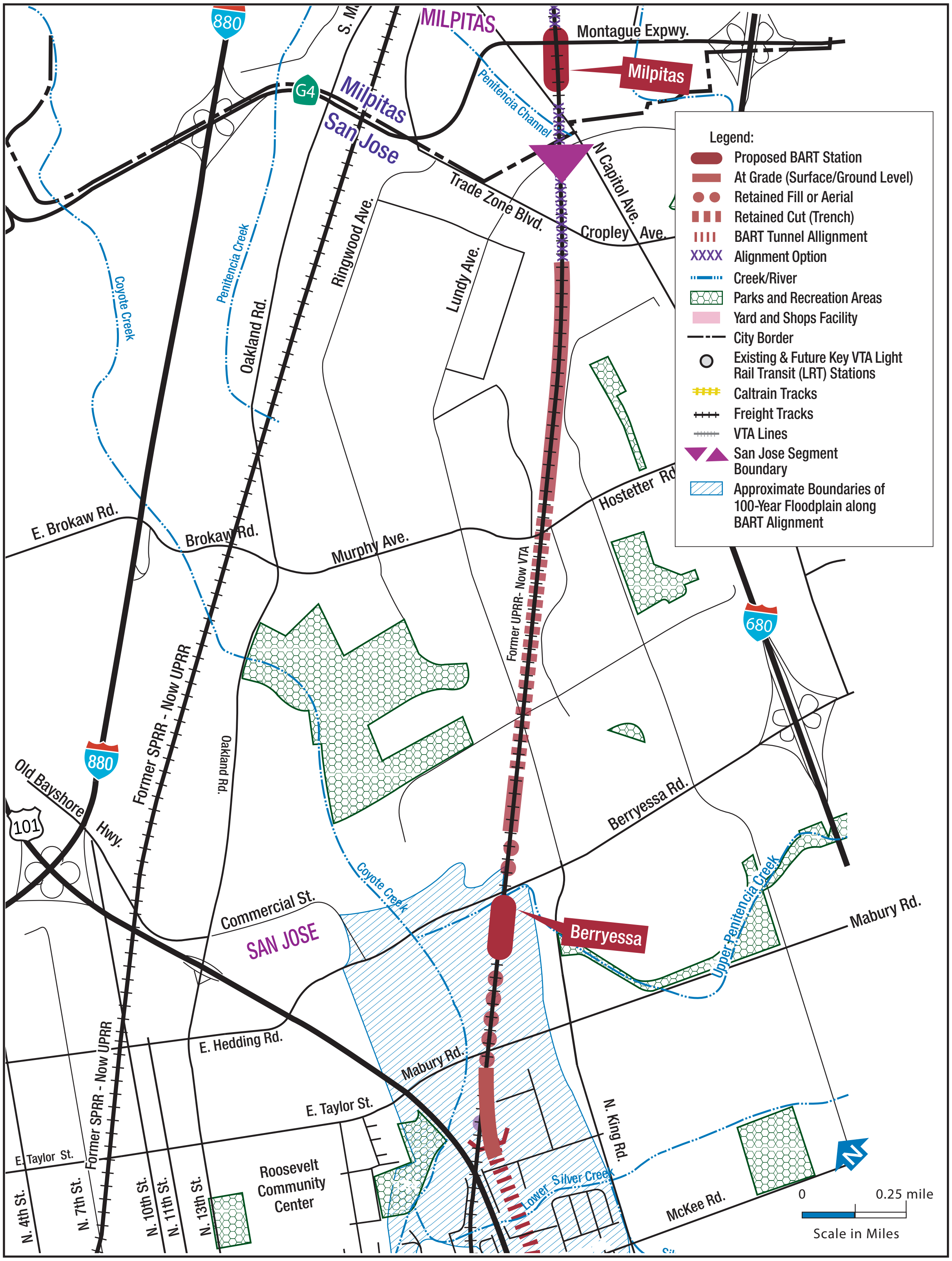
Figure 4.15-1 100-Year Floodplain Within the SVRTC – City of Fremont



Source: VTA, 2008.

Note: Approximate Locations Shown; Study Area Limits = 0.25 miles on either side of the proposed alignment

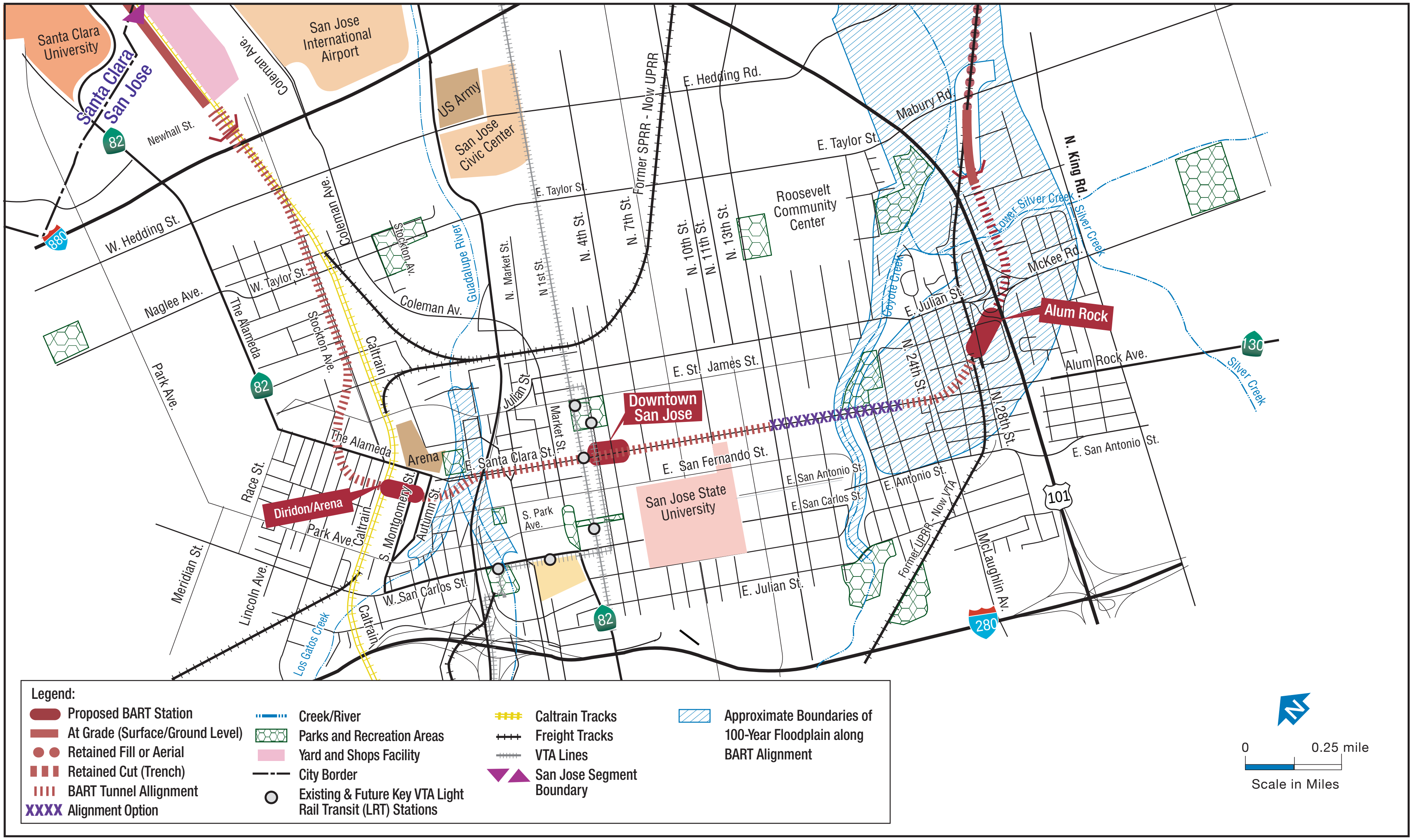
Figure 4.15-2: 100-Year Floodplain Within the SVRTC – City of Milpitas



Source: VTA, 2008.

Note: Approximate Locations Shown; Study Area Limits = 0.25 miles on either side of the proposed alignment

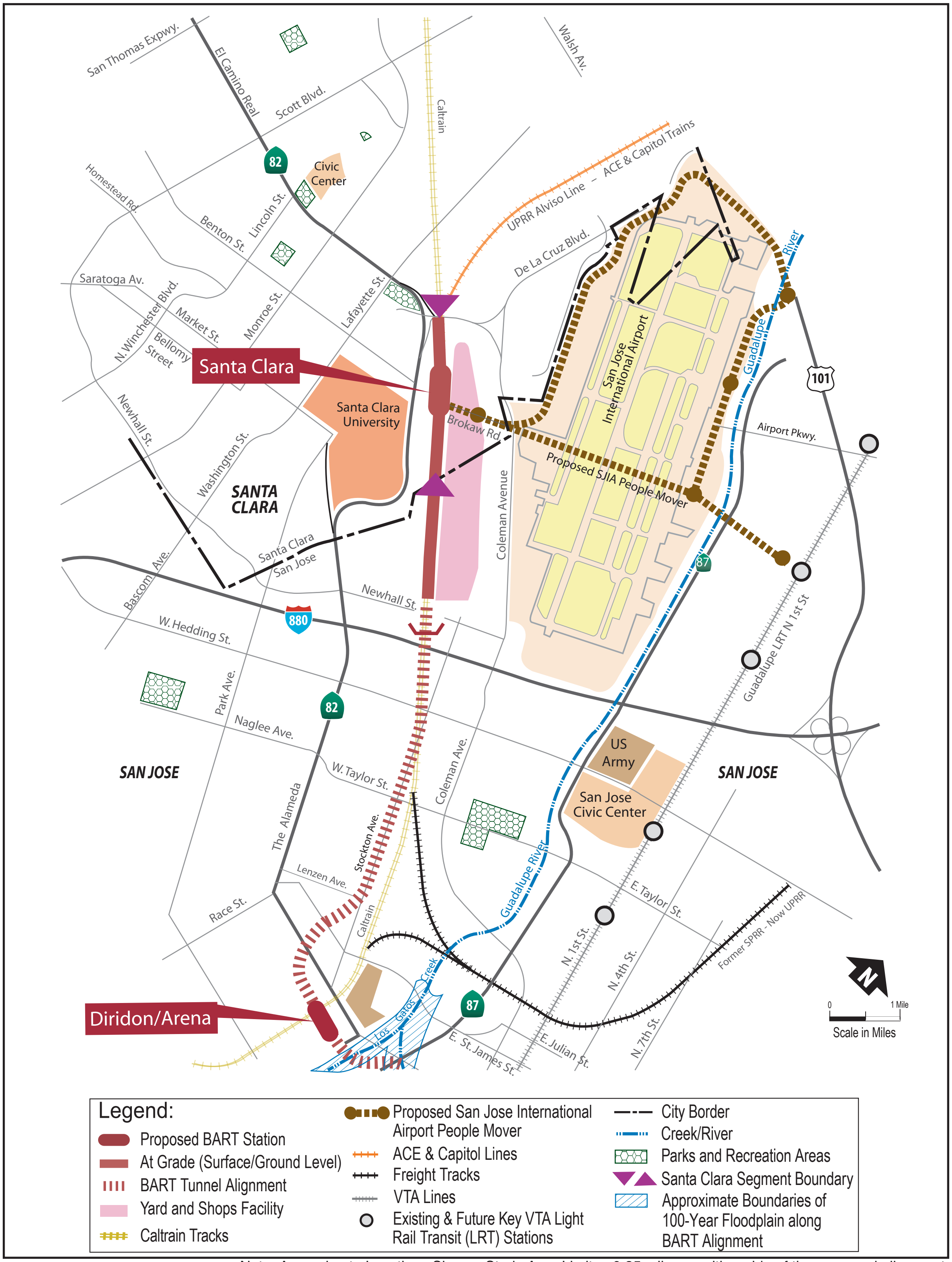
Figure 4.15-3: 100 Year Floodplain Within the SVRTC – City of San Jose



Source: VTA, 2008.

Note: Approximate Locations Shown; Study Area Limits = 0.25 miles on either side of the proposed alignment

Figure 4.15-4: 100-Year Floodplain Within the SVRTC - City of San Jose (continued)



Source: VTA, 2008.

Note: Approximate Locations Shown; Study Area Limits= 0.25 miles on either side of the proposed alignment

Figure 4.15-5: 100-Year Floodplain Within the SVRTC - City of Santa Clara

flooding from a 100-storm event at several of the creek crossings along the BEP and SVRTP alternatives alignment in Alameda County, due to either undersized cross-drainage structures and/or increased flows.

Agua Caliente Creek/Line F

The FIRM for Agua Caliente Creek (Panel Number 065028 0046D) indicates that in the upper reach of the creek between the railroad corridor and Warm Springs Boulevard, the FEMA-established 100-year discharge of 945 feet per second (cfs) is contained in the channel until approximately 400 feet east of the corridor, where flooding starts to widen to approximately 400 feet. The 100-year flood is contained in the culvert under the corridor and floodwaters do not overtop the freight tracks. A higher flow of 1,100 cfs was used in the computer model at the railroad crossing to consolidate spilt flow conditions upstream from I-680. The model indicates that due to flow restrictions in the existing cross drainage structures, the base floods for both 945 cfs and 1,100 cfs are not contained in the channel and overtop the existing freight tracks and adjacent area.

Agua Fria Creek/Line D

The FIRM For Agua Fria Creek (Panel Number 065028 0046D) indicates that the FEMA-established 100-year discharge of 780 cfs is contained in the channel. A higher flow of 1,165 cfs for a 100-year flood event was determined in the hydraulic analysis. However, further analysis of the existing conditions was not performed for this creek, as the drainage structures at this crossing are scheduled for upgrades by the Warren Avenue/Union Pacific Railroad Grade Separation and Mission/Warren/Truck Rail Program.

Toroges Creek/Line C

The FIRM for Toroges Creek (Panel Number 065028 0048D) indicates that upstream of the railroad corridor, the FEMA-established 100-year discharge of 460 cfs is contained in the channel and in the drainage structures under railroad corridor. There is no floodplain mapped on the FIRM at this location. The ACFCWCD 100-year design flow of 594 cfs for Toroges Creek near the corridor was used in the computer model. The model indicates that flow is restricted by the RCB culvert, which causes a rise in the headwater elevations upstream. Floodwaters may not overtop the tracks but may flow along the east edge of the railroad corridor.

Unnamed Creek/Line B-1

There are no studies completed for Line B-1 by FEMA, as the drainage area contributing to Line B-1 is small (less than 1 square mile) and there is an underground drainage system. The FIRMs do not show any 100-year floodplains around Line B-1.

The ACFCWCD 100-year design flow for Line B-1 is 90 cfs. However, a higher flow of 129 cfs was used in the computer model at the railroad crossing to reflect calculations made in the hydraulic analysis. As the existing 36-inch RCP storm drain under the railroad corridor was originally designed for a 10-year flood event, a 100-year flood event results in overland flow that potentially moves southwest towards the Line B drainage area.

Unnamed Creek/Line B

The FIRM for Line B (Panel Number 065028 0048D) indicates that the FEMA-established 100-year discharge is contained in the existing channel upstream of the corridor and in the drainage structures under the corridor, except for a short reach of channel just east of the corridor where silt build up in the culvert limits discharge through it. As a result, a flow of approximately 200 cfs breaks out of the channel and flows south, paralleling the corridor.

The ACFCWCD 100-year design flow of 557 cfs near the railroad corridor was used in the computer model. The model indicates that the flow is restricted by the inlet/transition structures to the east of the corridor and by the RCP and RCB culverts under the corridor. The flow restrictions cause a rise in headwater elevation above existing ground elevations. Therefore, excessive flow during a 100-year flood event results in overland flow on the east side of the corridor towards Scott Creek and Kato Road to the south. Floodwaters may not overtop the existing tracks.

Scott Creek/Line A

The FIRM for Scott Creek (Panel Number 065028 0048D) indicates flooding within a 200-foot wide area immediately east of the railroad corridor that extends approximately 1,800 feet south past Dixon Landing Road. The 100-year flood is fully contained within the channel from the corridor to just west of Milmont Drive, a distance of approximately 920 feet.

The 100-year design flow for Scott Creek of 820 cfs near the railroad corridor was used in the computer model.[2] The model indicates that the 100-year flood overtops both timber trestle structures. Excessive vegetation in the lined channel upstream of the corridor exacerbates flooding due to the increased resistance to free flow. The rectangular channel within the railroad corridor is under sized and cannot handle the design flow resulting in flooding of the corridor and adjacent areas upstream.

<u>Floodplains in Santa Clara County</u>

The hydraulic analysis indicates that east of BEP and SVRTP alternative alignments, Calera Creek, Berryessa Creek, and Upper Penitencia Creek are currently unable to convey the 100-year design flows, which results in flooding in Milpitas and San Jose. In Milpitas, Calera Creek, Berryessa Creek, and Wrigley Creek are connected to each

[2] Schaaf and Wheeler, Hydrology and Hydraulics Investigation, Scott Creek Watershed, Prepared for Alameda County Flood Control and Water Conservation District, March 1988.

other in close proximity to the railroad corridor, and their floodplains are commingled. The floodplains of Upper Penitencia Creek are commingled with Berryessa Creek near the Milpitas Station area. Upper Penitencia Creek also floods near the Berryessa Station area.

Calera Creek

The FIRM for Calera Creek (Panel Number 060344 0001G) indicates that about 0.7 mile east of the railroad corridor, the creek overflows along the south bank and flows southwest over Jacklin Road, merging with the base floodplain of Berryessa Creek to the southwest. Just upstream of the corridor, the base floodplain extends approximately 700 feet north of Calera Creek between the corridor and North Milpitas Boulevard. The floodwater does not overtop the railroad tracks. To the south, the commingled floodplain between Calera and Berryessa creeks does overtop the tracks. However, the base floodplain elevations (15.75 feet) on the FIRM are lower than the topographic elevations (19 feet) within the corridor. Therefore, floodwaters do overtop the tracks.

The Santa Clara Valley Water District 100-year design flow of 920 cfs for Calera Creek near the railroad corridor was used in the computer model. The model indicates that the design flow is contained in Calera Creek upstream of the corridor and in the existing RCB culvert under the corridor. The design flow water surface elevation just upstream of the corridor is about 19 feet, which is higher than the FEMA-established floodplain elevation and about the same as the topographic elevations (19 feet) within the corridor. Due to the existing Berryessa Creek levees, floodwaters do not overtop the tracks within the corridor. It should be noted that the water surface elevation resulting from the 100-year storm event in Calera Creek at the corridor is impacted by the design water surface elevation in Berryessa Creek at the confluence with Calera Creek.

Berryessa Creek

The FIRM for Berryessa Creek (Panel Numbers 060344 0001G and 0003G) indicates that the FEMA-established 100-year discharge overflows at two locations: 1) between the railroad corridor and east of Escuela Parkway and 2) south of Montague Expressway around the Milpitas Station area. The Santa Clara Valley Water District 100-year design flow for Berryessa Creek of 5,279 cfs just upstream of the railroad crossing was used in the computer model. The model indicates that most of the project area between Abel Street in Milpitas and the Capitol Avenue crossing in San Jose is within the 100-year floodplain. Some of the flow enters Wrigley Creek near the Milpitas Yard.

Wrigley Creek

The FIRMs for Wrigley Creek (Panel Number 060344 001G and 003G) indicate that the base flood of this creek does not contribute to the floodplains in the vicinity of the railroad corridor; however, flooding originating from Berryessa Creek, Lower Penitencia Creek, and Upper Penitencia Creek appears to encompass Wrigley Creek upstream and downstream of the railroad crossing. The 100-year design flow used in the computer model is based on information in the City of Milpitas Storm Drain Master Plan and incorporates 100-year discharges (obtained from additional hydrologic analysis) at several points along the Wrigley Creek and Wrigley-Ford Creek.

Like the FIRMs, the model indicates that the design flow can be contained in the channel immediately upstream and downstream of railroad crossing. Hydraulic analysis conducted by the City of Milpitas also concludes that Wrigley Creek and Wrigley-Ford Creek contain the 100-year design flow within their banks from Calaveras Boulevard to the Wrigley-Ford Pump Station.[3] However, the city's Master Plan indicates flooding problems that originate from Wrigley Creek and Ford Creek in areas that include the relocated locomotive wye and Milpitas Station, in part due to inadequate or ineffective drainage infrastructure.

Lower Penitencia Creek

The FIRMs for Lower Penitencia Creek (Panel Numbers 060344 0001G and 0003G) indicate floodplains on the west and east sides of the creek. On the eastern side of the creek, west of the railroad corridor, there are areas with flood depths of 1 to 3 feet and a base flood elevation of 14.75 feet, and other areas with average flood depths of 1 foot. Based on topographic elevations of the area, the base floodplain elevations would not overtop the freight tracks. The Santa Clara Valley Water District 100-year design flow used in the computer model for Lower Penitencia Creek incorporates 100-year discharges at several points along the creek. The model indicates that the design flows are not contained in the channel to the north of the Elmwood Rehabilitation Center, and do not overtop the freight tracks.

East Penitencia Channel

The FIRM for East Penitencia Channel (Panel Number 060344 0003G) indicates that the 100-year flow is contained in the channel. Flooding around this channel is from Berryessa and Upper Penitencia creeks. The 100-year design flow of 810 cfs used in the computer model was based on the most conservative estimate. The model indicates that East Penitencia Channel can handle the design flows without overtopping the banks, though the actual flow at the beginning of the channel would be less than 100-year event. This is because the City of San Jose storm drains under the railroad corridor that collects storm water from the upstream storm drain system was designed for 10-year peak flows. Therefore, the flows at the beginning of East Penitencia Channel would not be significantly higher than the 10-year peak flow that can be conveyed by the culverts. The excess flow during 100-year storm would enter the channel along the downstream banks and by overland flow.

[3] Wrigley and Ford Creeks in Milpitas – VTA Project Impacts and Ford Capacity Analysis, Technical Memorandum, Schaaf & Wheeler Consulting Civil Engineers, December 2007

Upper Penitencia Creek

The FIRMs for Upper Penitencia Creek (Panel Number 060349 0014E (revised), 0015E, 0019) and the floodplain map prepared by U.S. Department of Agriculture (USDOA), Soil Conservation Service (2003) indicate that upstream of I-680, the creek starts overflowing just downstream of the Old Piedmont Road bridge at Penitencia Creek Road. The base flood flows northwest between Berryessa and Penitencia Creek roads. At North Capitol Avenue, the flow splits into several directions: south towards McKee Road; north where the flow crosses I-680 at North Capitol Avenue, continues to the Milpitas Station area, crosses the railroad corridor, and enters East Penitencia Channel, and; along the south side of Berryessa Road where the flow re-enters the creek near King Road and the Berryessa Station area.

The FIRMs and the USDOA floodplain map indicate that overflows from the creek upstream of King Road move as sheet flow towards the railroad corridor. Downstream of the corridor, this sheet flow merges into Coyote Creek. Therefore, the railroad corridor and Berryessa Station area are in the base floodplain from approximately 600 feet north of Berryessa Road to Mabury Road. The 100-year design flow of 4,750 cfs used in the computer model for Upper Penitencia Creek was obtained from the Army Corps of Engineers' *Hydrologic Engineering Office Report for Upper Penitencia Creek* (2001). The model reflects the split flows and sheet flow as indicated by the FIRMs and the USDOA floodplain map.

Lower Silver Creek

The FEMA maps for Lower Silver Creek indicate that the railroad corridor near the creek and surrounding areas, which includes the locations for the Las Plumas Yard Option, east tunnel portal, and Alum Rock Station, are in the 100-year floodplain for the creek. However, these maps have not been updated to include the recently constructed Lower Silver Creek Flood Protection Project, Reaches 1 and 2 between the confluence with Coyote Creek and McKee Avenue. This project eliminates the 100-year flood flows in the area. The 100-year design flow used in the computer model for Lower Silver Creek incorporates 100-year discharges both with and without the flood protection project, using information from the U.S. Army Corp of Engineers and Santa Clara Valley Water District. The model indicates that the 100-year flood flows, as well as the 500-year flood flows, are contained within Lower Silver Creek with the flood improvement project, except near the confluence with Coyote Creek.

Coyote Creek

Coyote Creek is an alluvial stream that that travels west of the Berryessa and Alum Rock station areas, and crosses the tunnel alignment near the intersection of East Santa Clara and 17th streets. The extent and depth of flooding from Coyote Creek is complicated by the fact that the creek is perched between I-280 and the confluence with Lower Silver Creek. Consequently, there is no floodway, as defined by FEMA, and once Coyote Creek overflows, a considerable area is inundated by sheet flow. At the East Santa Clara Street crossing, the street slopes downward and away from the creek. Once the creek overflows, a significant portion of the project alignment is within the floodplain.

The Santa Clara Valley Water District 100-year design flow of 14,500 cfs for Coyote Creek near East Santa Clara Street was used in the computer model. The model indicates that Coyote Creek overflows its banks during a 100-year flood event in the project area. Between I-280 and East William Street, the creek overflows on both sides of the creek. Overflow from the west side of the creek returns back to the channel, downstream from East William Street, but overflow on the east side flows towards the Alum Rock station area. For the 500-year design flow, Coyote Creek overflows both banks along the entire reach between I-280 and Santa Clara Street. Flows that spill onto the east side of the creek travel towards the Alum Rock Station area as sheet flows. Overflow from west side of the creek flows down the streets in a northwesterly direction, into a swale with a low point at 10th Street. The extent of the flooding to the west along Santa Clara Street is limited by a rise in ground elevation between 10th and by 9th Streets.

Guadalupe River

The FIRM for Guadalupe River (Panel Number 060349 0025D) indicates the river overflows at several locations upstream of the tunnel alignment during a 100-year flood. The extent of the 100-year floodplain in the project area is from the west bank of Los Gatos Creek to Almaden Avenue. However, the FIRMs have not been updated to include the recently constructed Guadalupe River Park and Flood Protection Project, Reaches 3a and 3b, from Park Avenue to Coleman Avenue. This project eliminates the 100-year flood flows in the area. The 100-year design flow used in the computer model for the Guadalupe River incorporates 100-year discharges both with and without the flood protection project, using information from the U.S. Army Corp of Engineers and Santa Clara Valley Water District. The model indicates that the 100-year flood flows are contained within the Guadalupe River with the flood improvement project. However, for the 500-year flood, the river overflows its banks at numerous locations, including towards the east along West Santa Clara Street.

Los Gatos Creek

The FIRM for Los Gatos Creek (Panel Number 060349 0025D) indicates that the creek overflows its banks during a 100-year flood event approximately 150 feet south of the tunnel alignment. The 100-year design flow of 7,800 cfs for Los Gatos Creek at the confluence with the Guadalupe River was used in the computer model. The model indicates that Los Gatos Creek overflows the east bank and floods the tunnel alignment area. For the 500-year flood, Los Gatos Creek overflows both the east and west banks in the project area.

Flooding at Newhall Yard and Shops and Santa Clara Station

The FIRMs for the Newhall Yard and Shops and Santa Clara Station sites (Panel Numbers 060349 0018D, 060350 0003D and 0005D) indicate that the area is subject to flooding between a 100-year and a 500-year flood event. Overflow from the Guadalupe River during a 500-year event does not extend to the area. Flooding is primarily due to overland flow. While the exact quantity of water from overland flows is not known, it is approximated by determining an upstream watershed area that can reasonably be expected to potentially drain toward the project area. Using the United States Geological Survey San Jose West Quadrangle map, a watershed of approximately 4 square miles potentially flows toward the area.

4.15.4 GROUNDWATER

The project area is located within two South Bay groundwater basins: the Niles Cone Groundwater Basin (Niles Cone Basin) and the Santa Clara Valley Groundwater Basin (Santa Clara Basin).

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 Basin Plan. The Niles Cone Basin produces moderately low groundwater yields to wells. Groundwater is typically encountered within 50 feet below ground surface (bgs) 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.

Groundwater quality of the Niles Cone Basin in general is good and the RWQCB's groundwater quality objectives are generally met (RWQCB 2003). However, 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.

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 downtown San Jose, groundwater elevations between ground surface and 21 feet 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. In some areas groundwater contaminated by hazardous materials releases has spread underneath the railroad corridor.

The Santa Clara Valley Water District 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.

4.15.5 REGULATORY CONSIDERATIONS

<u>Surface Waters</u>

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 303(d) (Identification of Areas with Insufficient Controls, Maximum Daily Load, Certain Effluent Limitation Revision), 401 (Certification), 402 (National Pollutant Discharge Elimination System) and 404 (Permits for Dredged or Fill Material) of the CWA apply to the BEP and SVRTP Alternatives. Section 402 is discussed below. Sections 401 and 404 are discussed in Section 4.2, Biological Resources.

Section 303(d) – Identification of Areas with Insufficient Controls, Maximum Daily Load, Certain Effluent Limitation Revision

Section 303(d) and the California Porter-Cologne Water Quality Control Act of 1969 (discussed below) require the State of California 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. Once a TMDL has been adopted, new water quality criteria are developed. Section 303(d) lists Coyote and Los Gatos creeks as impaired for diazinon and the Guadalupe River as impaired for diazinon and mercury. TMDLs have been approved by EPA for the pollutant diazinon in Coyote and Los Gatos creeks and the Guadalupe River.

Section 401 Certification and Section 404 – Permits for Dredged or Fill Material

Please refer to Section 4.2 for a discussion the Clean Water Act, Section 401.

Section 402 – National Pollutant Discharge Elimination System

As authorized by Section 402 of the CWA, all point source storm water discharges to surface waters of the United States are regulated through provisions of the USEPA's National Pollutant Discharge Elimination System (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 storm water discharges to surface waters meet the state's mandatory standards and the federal minimum standards for clean water. Under the program, permits are required for storm water discharges from municipal separate storm sewer systems (MS4s). MS4 permits require dischargers to the storm sewer system to develop and implement a Storm Water Management Plan/Program with the goal of reducing the discharge of pollutants to the maximum extent practicable. MS4 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.

Also under the NPDES Storm Water Program, operators of certain types of industrial facilities must obtain a General Industrial Storm Water Permit to discharge storm water to a municipal storm sewer or directly to waters of the United States. Transportation facilities that have vehicle maintenance shops and equipment cleaning operations are included in this program. The permit requires the owner or operator of a facility to file a Notice of Intent with the RWQCB prior to discharge to identify the responsible party, location, and scope of operation. In addition to the Notice of Intent, dischargers must prepare a Storm Water Pollution Prevention Plan, monitor the effectiveness of the plan, and report those results to the RWQCB on a periodic basis.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Act, passed in 1969, implements the federal CWA at the state level. The Act establishes the State Water Resources Control Board (SVRCB) and divides the state into nine regions, each overseen by a Regional Water Quality Control Board (RWQCB). The SWRCB is the primary state agency responsible for protecting the quality of the state's surface water and groundwater supplies, but much of its daily implementation authority is delegated to the RWQCBs, which are responsible for implementing Sections 303(d), 401, and 402 of the federal CWA. In general, the SWRCB manages both water rights and statewide regulation of water quality, while the RWQCBs focus exclusively on water quality within their regions. The Act also 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 federal NPDES permitting program to regulate discharges so that the water quality objectives of the Basin Plans are met.

Activities in areas defined as "waters of the state," which are areas outside the U.S. Army Corp of Engineers' jurisdiction such as isolated wetlands or activities on creek banks that are above the ordinary high water mark, are regulated by the SWRCB and RWQCB. The SWRCB recently adopted General Waste Discharge Requirements for such activities that occur in waters of the state, and these activities may require the issuance or waiver of waste discharge requirements. Coverage under these requirements may be obtained by filing a Notice of Intent with the RWQCB. Best management practices must be implemented to protect waters of the state and compensatory mitigation may be required when adverse effects occur.

Local Requirements

The Alameda Countywide Clean Water Program (ACCWP) addresses countywide strategies to control sources of storm water pollution. Seventeen agencies participate in the program, including the City of Fremont and the ACFCWCD in the project area. The RWQCB has issued a joint NPDES municipal storm water permit to the 17 agencies participating in this program and each agency is responsible for complying with the NPDES permit requirements for discharges from the municipal storm drain system. The program includes a Storm Water Quality Management Plan (February 2003), which describes the ACCWP's approach to reducing storm water pollution. The Storm Water Quality Management Plan serves as the basis of the NPDES permit. New development and significant redevelopment projects constructed after February 2005 are required to comply with the numeric standards for post construction storm water best management practices included in the permit.

Similar to the ACCWP, the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) aims to reduce pollutions in urban runoff to the maximum extent practicable and improve water quality through regulatory, monitoring, and outreach measures. Fifteen agencies participate in the program, including Milpitas, San Jose, Santa Clara, and the Santa Clara Valley Water District in the project area. SCVURPPP participants share a joint NPDES permit. The program includes an Urban Runoff Management Plan (September 2004, revised 2005), which describes the SCVURPPP's approach to reducing storm water pollution and serves as the basis of the NPDES permit.

Floodplains

Executive Order 11988

Executive Order 11988, Floodplain Management, directs federal agencies to avoid conducting, allowing, or supporting construction in the 100-year floodplain. The Executive Order also directs federal agencies to take action to reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values served by floodplains. The agencies are required to make a finding that there is no practicable alternative before taking action that would encroach on a base floodplain.

US Department of Transportation Order 5650.2

The US Department of Transportation (DOT) Order 5650.2, Floodplain Management and Protection, prescribes policies and procedures for ensuring that proper consideration is given to the avoidance and mitigation of adverse floodplain impacts in an agency action, planning programs, and budget requests. The Order defines a “significant encroachment” as an encroachment that results in one or more of the following construction or flood-related impacts:

- A considerable probability of loss of human life.
- Likely future damage associated with the encroachment that could be substantial in cost or extent, including interruption of service or loss of a vital transportation facility.
- A notable adverse impact on natural and beneficial floodplain values.

It is the policy of the DOT to: 1) encourage a broad and unified effort to prevent uneconomic, hazardous, or incompatible use and development of the Nation’s floodplains, 2) avoid, where practicable, encroachments by DOT actions, 3) minimize the adverse impacts which such actions may have on base floodplains, including direct or indirect support for development, and 4) restore and preserve natural and beneficial floodplains values that are adversely affected by such actions.

National Flood Insurance Program

The Federal Emergency Management Agency (FEMA) is the administrator of the National Flood Insurance Program, a program established by the National Flood Insurance Act of 1968. Under the program, FEMA has the lead responsibility for flood hazard assessment and mitigation. FEMA has adopted the 100-year floodplain as the base flood standard for the National Flood Insurance Program. FEMA is also concerned with construction in a 500-year floodplain if a proposed project is considered a "critical action,” defined as any activity where even a slight chance of flooding is too great. FEMA issues the Flood Insurance Rate Maps (FIRMs) for communities participating in the National Flood Insurance Program. These maps delineate flood hazard zones in the community.

Groundwater

Laws and regulations applicable to groundwater resources are included in the discussion above for surface water resources such as the Porter-Cologne Water Quality Control Act.