Upper Llagas Creek Flood Protection Project

DRAFT Environmental Impact Statement

US Army Corps of Engineers

SAN FRANCISCO DISTRICT

DECEMBER 2015

UPPER LLAGAS CREEK PROJECT
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Responsible Agency: The lead agency is the U.S. Army Corps of Engineers (USACE), San Francisco District

Abstract: The Santa Clara Valley Water District (SCVWD) as the Applicant proposes to construct the Upper Llagas Creek Flood Protection Project located in southern Santa Clara County, approximately 25 miles southeast of San Jose, in the communities of Morgan Hill, San Martin, and Gilroy for the purpose of providing flood risk management and protection for residents, businesses, and infrastructure in those communities. This Draft Environmental Impact Statement (EIS) evaluates the potential effects of authorizing, via Department of the Army permit pursuant to Section 404 of the Clean Water Act (33 U.S.C. Part 1344), the discharge of dredged or fill material into Waters of the United States necessary to construct the project. Considered alternatives include: the NRCS Alternative, the Tunnel Alternative (Applicant's Proposed Action), Culvert/Channel Alternative, the Reach 6 Bypass Alternative, and the No Action Alternative. As proposed, the Project would result in 44.82 acres of temporary and 3.81 acres of permanent impacts to waters of the United States.

Upper Llagas Creek has flooded the San Martin and Morgan Hill communities repeatedly, as documented between 1937 and 2009. This flooding has caused damage to private and public property, resulting in economic losses in the inundated urban areas. The original Llagas Creek Flood Watershed Project Plan (LCWPP), developed in the late 1960's by the United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS), formerly known as the Soil Conservation Service (SCS), included both the upper reaches of the watershed and a set of lower reaches along the West Branch of Llagas Creek in Gilroy and mainstem Llagas Creek below Buena Vista Avenue. The lower reaches were constructed beginning in the 1970s, and are not part of the analysis presented in this EIS. The Project consists of the upper seven reaches (4, 5, 6, 7A, 7B, 8, and 14) of Llagas Creek, East Little Llagas Creek, and West Little Llagas Creek above Buena Vista Avenue.

This Draft EIS is prepared in compliance with NEPA, the Council on Environmental Quality's Regulations for Implementing NEPA, and USACE NEPA Regulations. Consistent with NEPA requirements, this Draft EIS evaluates the direct, indirect, and cumulative impacts on the environment that would result from the Proposed Action and the previously mentioned alternatives.

THE OFFICIAL CLOSING DATE FOR RECEIPT OF COMMENTS IS 45 DAYS FROM THE DATE ON WHICH THE NOTICE OF AVAILABILITY OF THIS DRAFT EIS APPEARS IN THE FEDERAL REGISTER

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EXECUTIVE SUMMARY

DRAFT ENVIRONMENTAL IMPACT STATEMENT
Upper Llagas Creek Flood Protection Project, Santa Clara County, California

A. BACKGROUND

The Project Applicant is the Santa Clara Valley Water District (SCVWD) who is requesting regulatory authorization from the United States Army Corps of Engineers (USACE), in the form of a Department of the Army (DA) permit pursuant to Section 404 of the Clean Water Act (33 U.S.C. §1344) (CWA),, to construct a flood protection project with Llagas Creek, within southern Santa Clara County.

The flood protection project has a lengthy history as the project was first conceived as part of the Llagas Creek Flood Watershed Project Plan (LCWPP), which was developed in 1968 by the United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS), formerly known as the Soil Conservation Service (SCS), and included both the upper reaches of the watershed and a set of lower reaches along the West Branch of Llagas Creek in Gilroy and mainstem Llagas Creek below Buena Vista Avenue. The LCWPP was revised by the NRCS, local sponsors, and citizen groups several times over for a period of nearly a decade before a joint Environmental Impact Statement (EIS)/Environmental Impact Report (EIR) was completed in 1982 on the revised LCWPP. The NRCS, the lead federal agency for the project at the time, completed about half of the authorized lower LCWPP, from the confluence with the Pajaro River to Buena Vista Avenue between 1973 and 1994. Due to lack of funding, the NRCS did not complete the remaining portion of the project. The upper reaches of Llagas Creek are now proposed for completion and presented in this Draft Environmental Impact Statement (EIS).

The upper reaches of Llagas Creek are located approximately 25 miles southeast of San Jose, in the communities of Morgan Hill, San Martin, and Gilroy. The total length of the action area is approximately 13.9 miles and consists of seven reaches (4,5,6,7a,7b,8,14) of Llagas Creek, East and West Little Llagas Creeks. To the north, the physical limits of the project are at the creeks intersection with Llagas Road on West Little Llagas Creek in Morgan Hill; and in the south, approximately 1000 feet downstream of the creeks intersection with Buena Vista Avenue in Gilroy.

The USACE anticipates a decision on the proposed activities would constitute a Major Federal Action in accordance with 40 Code of Federal Regulations (C.F.R.) Section 1501.8 and has prepared this Draft EIS to comply with requirements of the National Environmental Policy Act (NEPA) of 1969 [42 United States Code (USC) §§ *4321 et seq.*].

The decision to prepare an EIS was based on the potentially positive and negative effects, both individually and cumulatively, of the Applicant's Proposed Action (Upper Llagas Creek Project-Tunnel Alternative) on the quality of the human environment. The Applicant is requesting approval for placement of dredge and fill materials into waters of the United States (US) under Section 404. This EIS is necessary to inform any final decision on the permit application.

B. NEED FOR PROPOSED ACTION

The Applicant's stated purpose of the anticipated action is to provide for public safety to manage flood risk in Upper Llagas Creek Watershed. The project has been designed to contain the 1-percent flood exceedance (i.e. 100-year flood) on West Little Llagas Creek which encompasses the urban center of downtown Morgan Hill. For the rural sections of Morgan Hill, San Martin, and Gilroy the project assures no additional flooding induced on Llagas Creek by the upstream improvements along the reaches from Morgan Hill and provide a 10 percent flood exceedance capacity (10 year flood) on East Little Llagas Creek, Reach 14.

The Applicant deems the proposed action is necessary as flooding is frequent and pervasive in Morgan Hill, San Martin and Gilroy with documented floods which damaged residents and businesses resulting in economic loss in inundated areas in 1937, 1955, 1958, 1962, 1963, 1969, 1982, 1986, 1996, 1997, 1998, 2002, 2008, 2009 and 2011. The largest recorded flood, estimated to be a 33-year event, occurred in December 1955.

In addition to managing public safety, additional project objectives developed by the Applicant include;

- Completion of the Project in accordance with the NRCS watershed plan for Llagas Creek;
- Design a horizontally and vertically stable channel that will neither widen or narrow, down-cut or aggrade, on a large scale over the long-term;
- Provide for adequate maintenance access throughout the Project, while minimizing maintenance needs of the Project, especially due to sedimentation; and,
- Preserve and enhance desirable vegetation, fish, and wildlife habitat present in Llagas Creek and connected water bodies.

The USACE has determined that the Proposed Action is water dependent. The basic project purpose is to construct flood control management features to provide flood protection. Therefore, the USACE finds that the basic project purpose is water dependent.

The overall project purpose as defined by the USACE is to construct flood control management features in the Upper Llagas Creek Watershed to provide flood protection generally to the communities of Morgan Hill, San Martin, and Gilroy. Specifically, the project purpose is to provide a 1-percent flood (100-year flood) exceedance capacity on West Little Llagas Creek through the community of Morgan Hill and a 10-percent flood (10-year flood) exceedance capacity on East Little Llagas Creek.

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C. SCOPE OF ANALYSIS

The USACE determined the scope for the Draft EIS includes the project area where construction activities associated with the Proposed Action occur.is action on the project site. The action area identified in this Draft EIS includes 6.1 miles of the mainstem of Llagas, 2.8 miles along West Little Llagas Creek; and, 3.4 miles along a tributary of Llagas Creek, known as East Little Llagas Creek. An additional 1.6 miles of new channel would also be constructed along West Little Llagas Creek to Llagas Creek. Additionally, wetland creation and stream restoration also requires construction in waters of the US and includes filling an abandoned quarry pit, Lake Silveira to create wetlands and restablishing flows in 2000 linear of feet of Llagas Creek.

Construction activities for the Proposed Action would include channel modifications (e.g. widening and deepening), installation/replacement grade control structures, constructing or replacing culverts, installing maintenance roads and access ramps, upgrading bridge crossings and construction of a diversion channel.

D. ALTERNATIVES CONSIDERED

This Draft EIS evaluates construction of the Applicant’s Proposed Action as well as a range of alternatives to determine if the Applicant’s Proposed Action is the least environmentally damaging practicable alternative (LEDPA), and is not contrary to the public’s interest. The range of alternatives considered in this EIS include the No Action Alternative, the Applicant’s Proposed Action Tunnel Alternative, NRCS Alternative, Culvert/Channel Alternative, and Reach 6 Bypass Alternative. The NRCS Alternative is not preferred by the Applicant as it results in 12 residences that would need to be purchased in order to implement the project. The Culvert/Channel Alternative would require the purchase of seven residences. Both of these alternatives have a greater impacts on utilities and public services as well as impacts to waters United States and botanical resources. The Reach 6 Bypass and Tunnel Alternatives would only require the purchase of three residences. Although the Reach 6 Bypass Alternative would have the smallest impact to waters of the United States, it would impact Highway 101 and would not provide a geomorphically stable channel, with ongoing incision and bank erosion resulting in water quality and aquatic habitat degradation in Reach 5 and 6 on the mainstem of Llagas Creek. Therefore, the Tunnel Alternative is the Applicant’s Preferred Alternatives as it would require the purchase of three residences, has the least impacts to public services and utilities and includes less impacts to waters of the United States and botantical resources then the NRCS and Culvert/Channel Alternatives.

To offset losses to biological functions and values within the Llagas Watershed as result of the Proposed Action, the Lake Silveria compensatory mitigation element was developed by the SCVWD in coordination with the USACE and resource agencies and is common to all alternatives analyzed in the EIS except for the No Action Alternative.

Common Features and Channel Modifications for all Action Alternatives

There are project features and channel modifications which are common to all of the action alternatives described in the EIS. Most of the differences between the action alternatives are focused on the project alignment for flood routing and the type of flood management features used in areas in Reach 8. All of the action alternatives provide flood management for a 1-percent flood in Morgan Hill (Reaches 8, 7B, and 7A); 10-percent flood management for the semi-urban area around East Little Llagas Creek (Reach 14); and avoid induced flooding elsewhere on Llagas Creek (Reaches 6, 5, and 4) due to upstream modifications. All of the action alternatives reduce the flood extent for the 1-percent exceedance from approximately 3,074 acres to approximately 1,365 acres.

The channel modifications for all the action alternatives in Reaches 4, 5, 6, 7B, and 14 would consist of widening and deepening, and would result in a cross section with a low-flow channel, bankfull channel, benches, and engineered banks that are 3H:1V slope. The channel would be properly sized for sediment transport, geomorphic stability and to allow for unimpeded fish passage. A low flow channel conveying approximately 2 cfs, would meander along the channel bottom within the bankfull channel. Channel benches would typically be located on at least one side and sometimes both sides of the channel, ranging from 9 to 21 feet wide. The channel bench is set at approximately the 2-year-flow event elevation. The total width of the new channels in the action alternatives for these reaches would be approximately 125 feet which is approximately 30-60 feet wider than the No Action Alternative. Channel depths would range up to approximately 14 feet, which is typically about 4 to 5 feet deeper than the No Action Alternative.

All of the action alternatives depend on a newly constructed 1.25-mile-long channel segment in Reach 7A that will direct flow from West Little Llagas Creek at Watsonville Road to Llagas Creek just downstream from Lake Silveira. Most of the flood management features that would be implemented in Reaches 7A, 7B, 4, 5, 6, parts of Reach 8, and 14 are the same in each of the alternatives, except the Reach 6 Bypass Alternative would not require channel widening, deepening or other flow capacity improvements in Reaches 5 and most of 6. The common flood management features and activities for all of the action alternatives include:

- Permanent access roads at top of both banks in all reaches, (except for some areas in Reach 8);
- Aquatic habitat enhancements Reaches 4, 5, 6, and 7A (except for Bypass Alternative in Reach 5 and most of Reach 6, which have no planned enhancements);
- Grade control structures constructed of natural boulders, in all reaches;
- Culverts at two tributary drainages where they confluence with Reach 6 and three drainages in Reach 14 to provide for maintenance access;
- Exhume buried bridge crossings in Reach 7A at Watsonville Road and West Middle Avenue;
- Replacing and/or modifying culverts at four road crossing locations in Reach 7B;
- Replacing culverts in Reach 8 (culvert replacement locations vary by alternative);

- Removal of a cinder block/brick wall that constricts flows at the Llagas Road culvert; cleaning of rocks, dirt and debris for all culverts and under the Hillwood Lane bridge in Reach 8;
- Relocation/replacement of some homes and other structures within the Project right of way (ROW);
- Replacement of the existing pedestrian footbridge on the private property at the corner of Llagas Creek Drive and Marianna Court;
- Installation of a stream gage upstream of the Church Avenue percolation ponds in Reach 6;
- Approximately 25 acres would be used in each of the actions alternatives for staging during Project construction;
- Relocation/replacement of utilities within the Project construction footprint; and
- Acquisition of fee title and easements of adjacent land needed for Project construction and maintenance.

In addition to the common flood conveyance features listed above, all of the action alternatives would require the same type and extent of vegetation and sediment maintenance activities to provide the design flood capacity, as well as maintenance of other features such as roads, culverts, and grade-control structures.

E. DESCRIPTION OF ALTERNATIVES

No Action Alternative

The no action alternative which is used as benchmark for comparison of the environmental effects of the other selected alternatives, would result from the USACE not issuing a DA permit for discharge of dredged or fill material into in waters of the US regulated pursuant to Section 404 of the Clean Water Act. Under the No Action Alternative, the Project would not be built, and no new land purchases or construction activities would occur. Flooding in the residential and rural areas of Morgan Hill, San Martin and Gilroy would continue as the existing 1-percent exceedance flood inundates approximately 3,074 acres of lands locally. Additionally, no habitat improvements would occur (i.e. stream restoration, wetland creation) and channel maintenance, sediment removal, stream bank protection and vegetation management would continue to occur within the proposed action area under the SCVWD’s current Stream Maintenance Program.

Upper Llagas Creek in its current state is incising 0.4 to 0.8 feet per decade. Historic channel incision is evidenced by oversteepened stream banks and opportunistic placement of hardscape (i.e. concrete rubble) to protect failing banks and adjacent properties. Without the proposed action, the construction of a properly sized channel to allow for sediment transport and geomorphic stability, the creek will continue to incise contributing to degradation of water quality and aquatic habitat. Additionally, the no action alternative will generate the need for increased maintenance activities in the future for bank protection and flood control owing to the channels current instability.

Tunnel Alternative (Applicant's Proposed Action)

The Applicant developed the Tunnel Alternative because there was an opportunity to reduce the construction footprint associated with the NRCS Alternative in Reach 8. The Tunnel Alternative would require a smaller ROW, reduce the amount of vegetation to be removed and excavation needed along the existing West Little Llagas channel in Reach 8, reduce the extent of utilities to be relocated, reduce the culvert replacements required, which would result in less construction related interference with the commercial and residential area of Morgan Hill.

This Alternative has the same features as previously described for Reaches 4, 5, 6, 7B, and 14. The key feature of the Tunnel Alternative is the use an underground concrete tunnel instead of channel widening and deepening proposed through downtown Morgan Hill under the NRCS design. The main components of the Tunnel Alternative would include:

- A 250-foot-long sediment trap and an inlet weir (diversion) structure in the 600 feet of channel between Wright Avenue and Hillwood Lane. A new 18-foot-wide maintenance/access road would be installed along the sediment detention basin at the top of the south bank of the channel between Hillwood Lane and Wright Avenue.

- A 36-inch-diameter reinforced concrete pipe (RCP) culvert would be constructed paralleling Hale Avenue, stretching from the weir structure 2,400 feet downstream and discharging into the existing West Little Llagas Creek channel south of West Main Avenue. The 2,400-foot-long earthen channel section of West Little Llagas Creek between Wright Ave and West Main Ave would be replaced with the RCP culvert. The RCP culvert would maintain low flows up to 50 cfs in the existing creek through the downtown area without exceeding the channel capacity.

- Two high flow bypass culverts would be constructed. One would be 10 feet by 8 feet in size, while the other would be 10 feet by 9 feet in size. Both culverts would extend from the weir structure parallel to Hale Avenue and stretch 2,750 feet to Warren Avenue where they would convey high flows to the tunnel.

- A 2,100-foot-long tunnel would be constructed, extending under Nob Hill between Warren Avenue and Del Monte Avenue, continuing under Nob Hill Terrace. This modification also includes using open cut box culverts for transition to and from the tunnel, and construction of a tunnel portal at the upstream end.

There would be no change to the existing culverts at 5th Street, 4th Street/Monterey Highway, 3rd Street, 2nd Street / Del Monte Avenue, and Warren Avenue, nor would the channel be widened and deepened in this section of Reach 8 as proposed under the NRCS Alternative described below. The channel would be deepened and widened downstream from the bridge to the inlet of the sediment detention basin near Hillwood Lane.

Also as part of this alternative, Reach 7B would be modified as follows:

- Double box culverts would be constructed; one 10 feet by 8 feet in size, and the other 10 feet by 9 feet in size, from the tunnel outlet at West Dunne Avenue to downstream of Ciolino Avenue. The Tunnel Alternative differs from the proposed NRCS design, which would replace the existing culvert along the current alignment of West Little Llagas Creek.

NRCS Alternative

The NRCS Alternative was originally conceived and evaluated as Alternative F in the 1982 EIS/EIR. Subsequent modifications to the NRCS Alternative have been considered and incorporated since the 1982 EIS/EIR, in response to the changing physical environment, and to changes in environmental regulations. The NRCS Alternative evaluated in this EIS is based on all subsequent modifications to Alternative F.

The current NRCS alternative has the same features as previously described for Reaches 4, 5, 6, 7B, and 14. The key difference with this action alternative is the proposed channel modifications through the urbanized City of Morgan Hill in Reach 8 beginning at Llagas Road and extending downstream to West Dunne Avenue. The features designed for Reach 8 under this alternative would include the following modifications:

- The channel will be deepened and widened along a 2,500-foot section of channel downstream from the Llagas Road bridge to Hillwood Lane.

- Widen and deepen approximately 600 feet of channel between Wright Avenue and Hillwood Lane with an 8-foot-deep trapezoidal channel, with a 20-foot bottom width and 70-foot top width. This channel would be designed to pass the 1-percent flow.

- Widen and deepen approximately 3,000 feet of channel between West Dunne Avenue and Main Avenue to form a trapezoidal vegetated channel, a channel with two vertical walls, or a hybrid section (SCVWD 2014, Draft EIR Figures 2.4-3, 2.4-4, and 2.4-5, respectively), as appropriate depending upon the ROW available.

- Replace approximately 2,200 feet of the existing creek between Main Avenue and Wright Avenue with two 10-foot wide by 7- to 8-foot-deep reinforced concrete box culverts following the existing stream alignment, but under Hale Avenue. Replace culverts at West Main Avenue and Wright Avenue. There would be no changes to the culverts at Llagas Creek Drive or at Hillwood Lane.

- Replace five additional existing undersized culverts with new culverts, 10 feet wide by 9 feet deep, at the following locations: 5th Street, 4th Street/Monterey Highway, 3rd Street, 2nd Street/Del Monte Avenue, and Warren Avenue.

- Maintenance roads would be constructed downstream from Llagas Road to Hillwood Road. There would be no maintenance roads in the downtown area of Morgan Hill.

Culvert/Channel Alternative

The Applicant developed the Culvert/Channel Alternative to reduce the construction footprint associated with the NRCS Alternative in Reach 8. This alternative would require a smaller ROW, reduce the amount of vegetation to be removed along the existing West Little Llagas channel, reduce the extent of utilities to be relocated, reduce the culvert replacements required which would result in less construction related interference with the commercial and residential area of Morgan Hill.

All reaches would have the same constructed features as described for the NRCS and Tunnel alternatives, with a few differences in Reach 8. The key feature of the Culvert/Channel Alternative is elimination of the need for channel deepening and widening through residential properties, and fewer culvert replacements, as proposed for the NRCS Alternative between West Main Avenue and West 2nd Street in Reach 8. The main components of the Culvert/Channel Alternative that are different from those previously described for the NRCS Alternative include the following (all focused in Reach 8):

- Realign an 800-foot segment of the double 10-foot-wide box culverts that, in the NRCS design, would be parallel to Hale Avenue through the Britton School athletic fields up to Del Monte Avenue;

- Continue the double box culvert under Del Monte Avenue approximately 900 feet to West 2nd Street; and

- From West 2nd Street to West Dunne Avenue perform the same channel widening and deepening, along with culvert replacements at 2nd, 3rd, 4th, and 5th Streets as described for the NRCS Alternative for Reach 8.

The upstream most portion of the Culvert/Channel Alternative from Llagas Road to Hillwood Lane, thence along Hale Avenue up to the Britton School athletic field would remain the same as the NRCS Alternative.

Reach 6 Bypass Alternative

The Reach 6 Bypass Alternative would construct a high flow bypass channel between Reach 6 of Llagas Creek and Reach 14 of East Little Llagas Creek. The bypass would be designed so that no flood capacity improvements would be needed along the remaining section of Reach 6 or Reach 5 of Llagas Creek downstream of the proposed bypass. Flood conveyance improvements for the upstream Project Reaches 8, 7A, and 7B and for the downstream Reach 4 would remain the same as described for the Tunnel Alternative. Reach 14 would be designed similar to the Tunnel Alternative, except that the channel dimensions will be larger to accommodate the additional high flow routed from the upstream reaches (8, 7B, and 7A) through the Reach 6 bypass, so as not to cause induced flooding.

Under existing conditions, Reach 6 of Llagas Creek has capacity to carry up to approximately the 10-year flow. Flows larger than the 10-percent exceedance flow overtop the channel banks and flood the surrounding areas. The bypass would convey the future extra flow (i.e., new capacity) from Reach 8, 7A, and 7B directly to Reach 14. East Little Llagas Creek downstream of the bypass (Reach 14) would be designed to carry the extra flow from the upstream channel capacity. The design flow for the Reach 6 high flow bypass segment would be 1,200 cfs. The existing flow capacity in Reach 6 downstream from the bypass channel (2090 cfs, which is approximately a 10-percent exceedance flow) would continue to be maintained. The existing flow capacity in Reach 5 would also continue to be maintained. In Reach 14 the design flow would be 2,900 cfs at the confluence with the high flow bypass, which would maintain a 10 percent flow exceedance capacity in this reach.

The proposed high flow bypass would start near the top of Reach 6, about 0.5 mile downstream of Monterey Highway. The 0.5 mile section of Reach 6 between Monterey Highway and the bypass would be widened and deepened as proposed for all of the action alternatives; however, no construction would occur downstream from the bypass channel, over a distance of approximately 2.7 miles in Reach 6 and the entire 0.5 mile length of Reach 5. Consequently, there would be no instream aquatic habitat enhancements as proposed for the other action alternatives in Reach 6 downstream from the bypass channel or in Reach 5. Construction in Reach 4 would be the same as previously described for all the action alternatives. The bypass channel would run east through open fields, continue under Murphy Avenue and U.S. 101, and connect to Reach 14. The alignment of the bypass channel is situated near the upstream portion of Reach 6. The proposed high flow bypass would be approximately 1,660 feet long and would provide a 1-percent exceedance flood protection through the bypass segment. To accommodate the higher flows, Reach 14 would need to be widened starting 500 feet upstream of the confluence with the bypass to 0.5 mile downstream of East San Martin Avenue. A hydraulic control structure consisting of trapezoidal-shaped weir and five 6-foot by 6-foot individual working sluice gates would be installed at Reach 6 to redirect high flows into the bypass.

This alternative would also require the construction of three bridges at the following locations: Murphy Avenue, U.S. 101 southbound, and U.S. 101 northbound. Temporary traffic control routes would need to be constructed to accommodate local traffic on Murphy Avenue and two construction phases would be needed to divert traffic through temporary traffic routes on U.S. 101 northbound and southbound for approximately 270 days.

F. SUMMARY OF SOCIOECONOMIC AND ENVIRONMENTAL EFFECTS

The short-term and long-term effects of the alternatives on the human environment were evaluated. Many of the environmental effects were similar between Action Alternatives. However, changes to the affected environment are seen in Hydrology and Water Quality, Botanical Resources, Aquatic Resources, Agricultural and Forest Resources, Land Use and Planning, Traffic and Circulation, Air Quality and Greenhouse Gases, Noise, Utilities and Public Service, Socioeconomic Resources, Hazards and Hazardous Material, Environmental Justice, as a result of the Alternatives and discussed further in Chapter 4 of this EIS.

Summary of Socioeconomic and Environmental Effects

Resource Category	No Action Alternative	Tunnel Alternative	NRCS Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
Geology and Soils	NI	LTSM	LTSM (-)	LTSM (-)	LTSM (+)
Hydrology and Water Quality	SU	LTSM	LTS	LTS	SU
Mineral Resources	NI	LTSM	LTSM (+)	LTSM(+)	LTSM (-)
Botanical Resources	NI	SU	SU(+)	SU(+)	SU(-)
Wildlife Resources	LTS	LTSM	LTSM(+)	LTSM(+)	LTSM(-)
Aquatic Resources	SU	LTSM	LTSM(=)	LTSM(=)	LTSM(+)
Agricultural and Forest Resources	NI	SU	SU(=)	SU(=)	SU(-)
Land Use and Planning	SU	LTS	LTS(+)	LTS(+)	LTS(-)
Cultural Resource	NI	LTSM	LTSM(+)	LTSM(+)	LTSM(-)
Traffic and Circulation	SU	LTSM	LTSM(+)	LTSM(+)	SU
Air Quality and Greenhouse Gases	LTS	SU	SU(-)	SU(-)	SU(-)
Noise	LTS	SU	SU(-)	SU(-)	SU(=)
Aesthetic Resources	NI	LTSM	LTSM(+)	LTSM(+)	LTSM(+)
Utilities and Public Services	SU	LTSM	LTSM(+)	LTSM(+)	LTSM(-)
Recreation Resources	NI	LTSM	LTSM(=)	LTSM(+)	LTSM(=)
Population and Housing	NI	LTS	LTS(+)	LTS(+)	LTS(-)
Socioeconomic Resources	SU	LTS	LTS(=)	LTS(=)	LTS(-)
Hazards and Hazardous Materials	SU	LTSM	LTSM(+)	LTSM(+)	LTSM(-)
Environmental Justice	DAE	DAE	NDAE	NDAE	DAE(=)

NI: No Impact
LTS: Less Than Significant
LTSM: Less Than Significant with Mitigation
SU: Significant and Unavoidable
DAE: Disproportionate Adverse effect
NDAE: No disproportionate Adverse Effect

(-): Level of impacts are less severe than the Tunnel Alternative
(=): Level of impacts are equal to the Tunnel Alternative
(+): Level of impacts are more severe than the Tunnel Alternative

Summary of Impacts to Jurisdictional Wetlands and other Waters of the US by Alternative (acres)

Alternative	Permanent Impacts		Total Permanent Impacts	Temporary Impacts		Total Temporary Impacts
	Wetlands	Other Waters		Wetlands	Other Waters	
No Action	N/A	N/A	N/A	N/A	N/A	N/A
Tunnel Alternative	1.03	2.2	3.23	5.03	32.1	37.13
NRCS Alternative	1.35	3.43	4.78	5.03	32.1	37.13
Culvert/Channel Alternative	0.72	2.95	3.67	5.03	32.1	37.13
Reach 6 Bypass Alternative	1.0	2.05	3.05	4.29	25.68	29.97

The evaluation of environmental impacts indicates that among the alternatives evaluated the Reach 6 Bypass incurs fewer impacts to waters of the U.S. than the other action alternative. However, the Reach 6 Bypass would minimize potential environmental effects when compared to the other alternatives, particularly in relation to Biological Resources, Cultural Resources, Agricultural Resources, Land Use and Planning, Utilities and Public Services, Population and Housing, Socioeconomics, and Hazards and Hazardous Materials. The severity of many of the impacts is less due to the elimination of construction in Reaches 5 and 6; and particularly in Reach 6, which has a section of perennial water that supports aquatic habitat. However, the Reach 6 Bypass is not the Proposed Action, because it has significant impacts associated with traffic effects on U.S. 101 and over the long term, without improvements to arrest incision in Reaches 5 and 6, the ecology of the stream will degrade significantly when compared to the Tunnel Alternative, therefore, eventually requiring greater bank erosion control and maintenance. Therefore, with the mitigation implemented to restore the riparian habitat after construction, and the aquatic benefits of additional channel stability, the Proposed Action (Tunnel Alternative) would be the Environmentally Superior Alternative.

G. AREAS OF POTENTIAL CONTROVERSY

The Applicant has made refinements to the Proposed Action (Tunnel Alternative) based on input from federal and state agencies, local agencies and the public. The Applicant consulted with the USFWS, NMFS, EPA CDFW, CCRWQCB during design development to address concerns regarding impacts such as wetlands, water quality, flood protection, wildlife and habitat, and threatened and endangered species. Numerous meetings have occurred with the various agencies and the public in the context of identifying areas of potential controversy and resolving or mitigating for those concerns. At this time, an area of potential controversy is how to address impacts for a federal threatened species, the California tiger salamander since the Project is located in the same footprint as the Valley Habitat Conservation Plan (VHP). The controversy lies with the fact that the SCVWD does not want to compete for mitigation lands within the same geographically areas as the VHP. Ideally, it would be best coordinate with the VHP and obtain mitigation credit through that program if both USFWS and CDFW can agree upon this course of action.

H. LIST OF OTHER GOVERNMENT ACTIONS REQUIRED

The Applicant shall be responsible for obtaining federal, state and local permits, licenses and meet other consultation requirements for the proposed project, as described in this section and Chapter 8.

The USACE's permitting decision is required to comply with many federal requirements including the NEPA, CWA, Endangered Species Act (ESA), Fish and Wildlife Coordination Act, and the National Historic Preservation Act. The USACE will consider other relevant environmental laws and Executive Orders for protection of wetlands, floodplain management, environmental justice, and invasive/exotic species as well as public and agency comment on the Project's effect on public interest in deciding if to issue, issue with special conditions, or deny a permit for the Proposed Action.

State requirements that will need to be satisfied for this project include a Streambed Alteration Agreement (CDFW), Incidental Take Permits for state-listed species (CDFW), California Department of Transportation encroachment permit, Bay Area Air Quality Management District (BAAQMD) permit, and Central Coast Regional Water Quality Control Board (CCRWQCB) 401 Certification.

I. UNRESOLVED ISSUES

The Applicant must complete the purchase of the required ROW required for the Proposed Action. As of December 2015, approximately 50 parcels still remain to be acquired, including the compensatory wetland mitigation site (Lake Silveria).

The Applicant continues to complete Phase 1 and Phase II Hazardous Substance Liability Assessment (HSLA) Investigations. Phase II HSLA's are only conducted when the Phase 1 Investigation recommends a subsequent Phase II investigation because of a known contamination/hazardous within the vicinity. In addition to completing these HSLA investigations for the Proposed Action, the Applicant is completing an HSLA investigation on each parcel required for the Project prior to acquisition. A portion of the Project is located in the rural portions of the communities of Gilroy and San Martin that has a history of farming orchards and row crops. Despite these HSLA investigations, the Applicant will not know the complete extent of any soil contamination until the Project is underway and the excavation of soils required for the Proposed Action is completed. During construction, the contractor will be required to adhere to a Soil Management Plan to stockpile and test materials for contaminates prior to the proper and legal disposal of excess soils.

The Applicant must coordinate the relocation of many existing utilities in conflict with the Applicant's Proposed Action. Whenever possible to minimize possible delays during construction and thereby reducing the duration of the construction impacts, the Applicant desires to have the respective utility owner relocate their facility prior to construction. In some cases, to reduce repetitive impacts, for instance to Traffic and Circulation, the utility owner will complete the necessary relocation work in conjunction with the construction of the project.

J. COMPENSATORY MITIGATION TO OFFSET THE LOSS OF WETLAND FUNCTION AND VALUE

The Applicant's proposed compensatory wetland mitigation plan (Lake Silveria) for the Action Alternatives includes hydrologic, vegetation and geomorphic benefits contiguous with the Project footprint. By creating wetlands in an abandoned quarry pit adjacent to the creek and restoring 2000 linear feet of Llagas Creek, biological functions and values will improved within the Llagas Watershed. Wetland seeps were historically abundant in this watershed and now are considered rare due to land use changes in the last century. Creating wetland habitat adjacent to a perennial stream will provide numerous benefits to the species utilizing the watershed over existing conditions. The Applicant will assess pre-post project conditions for wetlands and riverine corridor using the California Rapid Assessment Methodology (CRAM) however it is anticipated that the biotic conditions within the 52 acre site would improve from the current condition.

Concurrent with the EIS and as part of the evaluation of the DA permit application, the USACE will determine if the Applicant's proposed compensatory mitigation plan is sufficient to offset unavoidable impacts to aquatic resources as a result of the Proposed Action. Prior to issuance of any permit, the Applicant would be required to submit a final mitigation plan determined by the USACE to meet the requirements of 33 C.F.R. Part 332.

K. COORDINATION

Throughout the evolution of project design alternatives, federal and state agencies, county officials, and the public have been kept informed through a scoping meeting, property acquisition meetings, compensatory mitigation meetings, website updates, design update meetings, public mailers, and public notices designed to inform, gather input, and respond to questions regarding the proposed project. The public, government agencies and interested parties are afforded the opportunity to provide input regarding this project by reviewing and commenting on the draft and final EIS. Project information, schedules, documents, and presentations to the public are also kept updated and available on the Applicants website: http://valleywater.org/Services/UpperLlagas.aspx

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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
$\mu g/m_3$	micrograms per cubic meter
11988	Executive Order (EO) 11988—Floodplain Management
A.D.	Anno Domini
AASHTO	American Association of State and Highway Transportation Officials
AB	Assembly Bill
ACHP	Advisory Council on Historic Preservation
ADT	average daily traffic
AF	acre-feet
APE	Area of Potential Effects
ATCM	Airborne Toxic Control Measure
B.C.	Before Christ
B.P.	before the present
BA	biological assessment
BAAQMD	Bay Area Air Quality Management District
Basin Plan	Water Quality Control Plan for the Central Coast Region
bcy	bank cubic yards
BETX	benzene, ethylbenzene, toluene, xylenes
bgs	below ground surface
BLS	Bureau of Labor Statistics
BMPs	Best Management Practices
BMX	bicycle motorcross
BO	biological opinion
BY	Reach Bypass
C_2H_3Cl	vinyl chloride
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAL FIRE	California Department of Forestry and Fire Protection
Cal/EPA	California Environmental Protection Agency
Cal/OSHA	California Occupational Safety and Health Administration
Cal-IPC	California Invasive Plant Council
Caltrans	California Department of Transportation
CAR	Coordination Act Report
CARB	California Air Resources Board
cc	cubic centimeter
CC	Culvert/Channel
CCR	California Code of Regulations
CCRWQCB	Central Coast Regional Water Quality Control Board
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CDMG	California Division of Mines and Geology
CDP	Census Designated Place
CEQ	Council of Environmental Quality
CEQA	California Environmental Quality Act

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGP	Construction General Permit
CGS	California Geological Survey
CH4	methane
CHHSLs	California Human Health Screening Levels
CMP	Congestion Management Program
CNDDB	California Natural Diversity Data Base
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CRF	Code of Federal Regulations
COCs	Constituents of Concern
CPI	Consumer Price Index
C-RC	C-Resource Code
CRHR	California Register of Historical Resources
CRLF	California red-legged frog
CTS	California tiger salamander
CUPA	Certified Unified Program Agency
CWA	Clean Water Act
CY	cubic yards
DA	Department of the Army
dB	decibels
dBA	decibel scale
dbh	diameter at breast height
DECS	Diesel Emission Control Strategy
DO	dissolved oxygen
DOT	U.S. Department of Transportation
DPM	diesel particulate matter
DSOD	Division of Safety of Dams
DTSC	Department of Toxic Substances Control
DWR	California Department of Water Resources
DPS	Distinct Population Segment
EFH	essential fish habitat
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESAs	Environmental Site Assessments
ESLs	Environmental Screening Levels
ESU	Evolutionary Significant Unit
FAA	Federal Highway Administration
FCWA	Fish and Wildlife Coordination Act
FEMA	Federal Emergency Management Agency
FESA	Federal Endangered Species Act
FHWA	Federal Highway Administration
FIFRA	Federal Insecticide, Rodenticide, and Fungicide Act

FIRE	Finance, Insurance and Real Estate
FMMP	Farmland Mapping and Monitoring Program
FTA	Federal Transit Administration
FWCA	Fish and Wildlife Coordination Act
FYLF	foothill yellow-legged frog
GHGs	greenhouse gases
GRP	Gross Regional Product
GWP	Global Warming Potential
HAPs	Hazardous Air Pollutants
HCP	Habitat Conservation Plan
HEC-RAS	Hydrologic Engineering Center—River Analysis System
HFCs	hydrofluorocarbons
HIS	Habitat Suitability Index
HMSO	Hazardous Materials Storage Ordinance
HRA	Health Risk Assessment
HSC	Health and Safety Code
HSLA	Hazardous Substance Liability Assessment
Hz	hertz
IMPLAN	Impact Analysis for Planning
IPCC	Intergovernmental Panel on Climate Control
IPM	Integrated Pest Management
ISTEA	Intermodal Surface Transportation Efficiency Act
ITP	Incidental Take Permit
JTU	Jackson Turbidity Units
KOPs	key observation points
LEDPA	Least Environmental Damaging Practicable Alternative
L_2	a weighted sound level which happens 2 percent or more of the time of the measurement
L_{10}	a weighted sound level which happens 10 percent or more of the time of the measurement
L_{50} and L_{90}	measures represent 50 percent and 90 percent of the case
LAFCO	Local Agency Formation Commission
lbs	pounds
LCFS	Low Carbon Fuel Standard
LCWPP	Llagas Creek Watershed Project Plan
L_{DN}	day-night sound level
L_{EQ}	equivalent sound level
$L_{EQ}(24)$	level of sound with the same energy as the time-varying sound of interest, averaged over a 24-hour period
L_{max}	highest sound level measured during measurement of time
LOP	Local Oversight Program
LOS	level of service
LUST	Leaking Underground Storage Tank
LWD	large woody debris
M	magnitude
MBTA	Migratory Bird Treaty Act
MCLs	Maximum Contaminant Limit
MEI	Maximally Exposed Individual
mg/kg	milligram(s) per kilogram
mg/L	milligram(s) per liter
mmBTU	million British Thermal Units

MMRP	Mitigation Monitoring and Reporting Program
MMT	million metric tonnes
MND	Mitigated Negative Declaration
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
mph	miles per hour
MRZs	mineral resource zones
MSA	Metropolitan Statistical Area
MSATs	mobile source air toxics
MT	metric tonnes
MW	molecular weight, g/mole
N_2O	nitrous oxide
NA	No Action
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NAICS	North American Industry Classification System
NAVD	North Atlantic Vertical Datum
NEPA	National Environment Policy Act
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NIDCD	National Institute on Deafness and Communication Disorder
NIHL	Noise-Induced Hearing Loss
nm	nanometer
NMFS	National Marine Fisheries Service
NO	nitric oxide
NO2	nitrogen dioxide
NOA	naturally-occurring asbestos
NOAA	National Oceanic and Atmospheric Administration
NOC	Notice of Completion
NOD	Notice of Determination
NOI	Notice of Intent
NOP	Notice of Preparation
NO_X	Nitrogen oxides (NO_2 and NO collectively)
NPDES	National Pollutant Discharge Elimination System
NPPA	Native Plant Protection Act
NPW	Notice of Proposed Work
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
O&M	Operations and Maintenance
O_3	ozone
OCC	Occupational Code
OEHHA	Office of Environmental Health Hazard Assessment
OES	Occupational Employment Statistics
OHP	Office of Historic Preservation
OHWM	ordinary high water mark
Ordinance	Santa Clara County Geologic Ordinance
OSHA	Occupational Safety and Health Administration
OSMRE	Office of Surface Mining Reclamation and Enforcement
PAHs	polycyclic aromatic hydrocarbons
Pb	lead

PCB	polychlorinated biphenyl
PCE	perchloroethylene
PEM	Perennial Marsh
PERP	Portable Equipment Registration Program
PFCs	perfluorocarbons
PFO	Riparian Forest
PG&E	Pacific Gas and Electric Company
Phase I ESA	Phase I Environmental Site Assessment
Phase II ESA	Phase II Environmental Site Assessment
PL	Public Law
PM_{10}	respirable particulate matter, 10 microns
$PM_{2.5}$	fine particulate matter, 2.5 microns
ppb	parts per billion
PPE	personal protective equipment
ppm	parts per million
ppt	parts per trillion
PPV	peak particle velocity
PRC	Public Resources Code
Project	Upper Llagas Creek Project
Proposition 65	Safe Drinking Water and Toxic Enforcement Act of 1986
psi	pound(s) per square inch
PSS	Riparian Scrub-shrub
PTO	permit to operate
PTH	protect human health
QC	Quality Control
RCB	reinforced concrete box
RCP	reinforced concrete pipe
RCRA	Resource Conservation and Recovery Act
RHA	Rivers and Harbors Act
Rn	Radon
ROCs	reactive organic compounds
ROGs	reactive organic gases
ROW	right-of-way
RPR	Rare Plant Rank
RPWs	relatively permanent waters
RSL	Regional Screening Levels
RWQCB	Regional Water Quality Control Board
RWQCB-SF	California Regional Water Quality Control Board—San Francisco Bay Region
S-CCC ESU	South-Central California Coast Steelhead Evolutionarily Significant Unit
SCAQMD	South Coast Air Quality Management District
SCJAP	Santa Clara Joint Area Plan
SCS	Soils Conservation Service
SCVCD	Santa Clara Vector Control District
VHP	Santa Clara Valley Habitat Plan
SCVWD	Santa Clara Valley Water District
SEIR	Supplemental Environmental Impact Report
SEIS	Supplemental Environmental Impact Statement
SF_6	sulfur hexafluoride
SFBAAB	San Francisco Bay Area Air Basin

SGMP	Soil and Groundwater Management Plan
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SLE	St. Louis encephalitis virus
SMARA	Surface Mining and Reclamation Act of 1975
SMCWD	San Martin County Water District
SMP	Stream Maintenance Program
SO_2	sulfur dioxide
Society	American Meteorological Society
SOI	Sphere of Influence
SO_x	sulfur oxides
SPCC	Spill Prevention, Control, and Countermeasure Plans
SPCP	Spill Prevention Control Plan
SPL	Sound Pressure Level
SSC	suspended sediment concentration
SVOCs	Semi-volatile Organic Compounds
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
T	tunnel
TCMs	Transportation Control Measures
TNWs	traditionally navigable waters
TMDL	total maximum daily loads
TMP	Transportation Management Plan
TOB	Top of bank
TOI	Total Industry Output
TPH	Total petroleum hydrocarbons
U.S. 101	United States Highway 101
UNFCCC	United Nations Framework Convention on Climate Change
UPRR	Union Pacific Railroad
URV	Unit Risk Value
USA	Urban Service Area
USC	United States Code
USACE	U.S. Army Corps of Engineers
USBM	U.S. Bureau of Mines
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
U/H	Upland Herbaceous
VdB	vibration decibels
VOCs	volatile organic compounds
VTA	Valley Transportation Authority
WEE	western equine encephalomyelitis virus
Weiss	Weiss Associates
WNV	West Nile Virus
WPT	western pond turtle
WRDA	Water Resources Development Act (WRDA) of 1999
YOY	young of the year
ZBP	ZIP Code Business Patterns

CHAPTER 1 PURPOSE AND NEED

1.1 INTRODUCTION

The Santa Clara Valley Water District (SCVWD) has submitted an application to the U.S. Army Corps of Engineers, San Francisco District, Regulatory Division (USACE) for a Department of the Army (DA) permit authorizing the discharge of dredge or fill material into waters of the United States pursuant to Section 404 of the Clean Water Act (CWA) for the construction of the Upper Llagas Creek Project. The project as proposed by the SCVWD includes construction of flood conveyance features and deepening and widening of Upper Llagas Creek as additional flood protection measures for the communities of Morgan Hill, San Martin, and Gilroy.

The USACE has determined that the proposed activities would constitute a Major Federal Action in accordance with 40 Code of Federal Regulations (C.F.R.) Section 1501.8 and is preparing documentation to comply with requirements of the National Environmental Policy Act (NEPA) of 1969 [42 United States Code (USC) §§4321 et seq.]. NEPA is the "basic national charter for protection of the environment" [40 C.F.R. §1500.1(a)] and requires federal agencies to be fully informed about the environmental consequences of their decision to provide financial assistance, exercise permit or regulatory authority, or to conduct an action that may significantly affect the environment. In addition, NEPA mandates that the public be informed of the proposed actions, the consequences of the actions, and the ultimate agency decision. Based on the size of the project area, the current purpose for the site, and the potential positive and negative environmental effects, both individually and cumulatively, of the anticipated action (the Upper Llagas Creek Project), the USACE has determined that the project would "significantly" affect the human environment. Therefore, an Environmental Impact Statement (EIS) is necessary to inform any final decision on the permit application. The USACE's decision will be to either issue, issue with modifications to the applicant's proposal, or deny a DA permit for the proposed action.

This document is an EIS that provides a comprehensive environmental analysis to aid in the decision making process for the DA permit application for the Upper Llagas Creek Flood Protection Project. The USACE has prepared this EIS in accordance with the Council of Environmental Quality (CEQ) Regulations (40 C.F.R. Parts 1500-1508), 33 C.F.R. Part 325, Appendix B "National Environmental Policy Act Implementation Procedures for the Regulatory Program," and 40 C.F.R. §230.10(a), which implement the procedural provisions of the NEPA (42 USC §§4321 et seq.) for the USACE.

1.2 HISTORY

The Llagas Creek Watershed Project Plan (LCWPP) was originally proposed by the SCVWD in 1968, and was approved by three local sponsoring agencies: Santa Clara County, the City of Gilroy, and the City of Morgan Hill. The State of California and Congress both approved the Project in 1969 and directed the Natural Resources Conservation Service (NRCS), formerly the U.S. Department of Agriculture (USDA) Soils Conservation Service (SCS) to construct the project under the Watershed Protection and

Flood Prevention Act of 1954[1]. The first construction work began in 1973 but stopped in 1974 to re-evaluate environmental impacts of the LCWPP under the newly authorized NEPA of 1969 and the California Environmental Quality Act (CEQA of 1970). The original LCWPP was revised by the NRCS, local sponsors, and citizen groups several times over for a period of nearly a decade before a joint EIS/EIR was completed in 1982 on the revised LCWPP.

The revised LCWPP subdivided the entire project into 14 different reaches for the 1982 EIS/EIR analysis (Figure 1.2-1). The NRCS completed about half of the authorized lower Project reaches, from Buena Vista Avenue to the confluence with the Pajaro River (consisting of Reaches 1, 2, 3, 9, 10, 11, 12 and 13) between 1973 and 1994. The upper reaches, Reaches 4, 5, 6, 7A, 7B, 8, and 14, were not constructed by NRCS due to funding constraints. The SCVWD and the project sponsors made a Congressional request to transfer the remaining unconstructed, upper Project reaches to the USACE. Through the Water Resources Development Act (WRDA) of 1999[2], Congress authorized the USACE San Francisco District to complete the remaining project elements. In 2007, USACE begin preparation of an EIS/EIR for the proposed federal project but due to shortfalls of federal funding and because a Limited Reevaluation Report had not been completed as called for in WRDA 2007, the USACE was unable to finalize the EIS/EIR or provide continued support to SCVWD. In September 2013, the SCVWD decided to pursue the project on their own without federal funding. The work requires a federal permit from the USACE. However, to advance the project and meet CEQA requirements, the SCVWD completed the EIR which was certified by SCVWD Board of Directors June 10, 2014. On August 31, 2015, SCVWD submitted a DA permit application for the proposed work.

1.3 PROJECT PURPOSE, NEED, AND OBJECTIVES

Under NEPA, the Council on Environmental Quality (CEQ) requires that an EIS specify, “the underlying purpose and need to which the Lead Agency is responding in proposing the alternatives including the proposed action (PL 83-566)[3].” This statement of purpose and need is important because it explains why the federal agency and the project proponent are undertaking the proposed action and what objectives they intend to achieve.

The statement of purpose and need helps the lead agency select the range of alternatives to be evaluated in an EIS. An EIS need only include those alternatives that would achieve at least some of the federal agency’s objectives as set forth in the statement of purpose and need.

Under NEPA (33 C.F.R. Part 325, Appendix B) and under Section 404 of the CWA pursuant to the Section 404(b)(1) Guidelines (40 C.F.R. Part 230), there are three ways that the USACE is to examine the underlying goals, or purpose, of a project: (1) the Applicant’s stated purpose and need (i.e., SCVWD’s stated purpose and need), (2) a “basic” project purpose defined by the USACE specifically for addressing a project’s water dependency, and (3) an “overall” project purpose, which is defined by the USACE

[1] PL 83-566, Stat. 666 authorizes the Secretary of Agriculture to cooperate with state and local agencies in planning and carrying out works of improvement for soil conservation and for other purposes.
[2] PL 106-53
[3] NEPA C.F.R. 40 1502.13—Purpose and Need

and is used for the alternatives analysis. Pursuant to 33 C.F.R. Part 325, Appendix B, when defining the purpose and need for a project, "while generally focusing on the applicant's statement, the USACE will in all cases, exercise independent judgment in defining the purpose and need for the project from both from the applicant's and the public's perspective."

The Applicant's stated purpose and need is an expression, typically in the Applicant's own words, of the underlying goals for the Applicant's Proposed Action. The USACE takes an applicant's purpose and need into account when determining the overall purpose and the project purpose and need. The Applicant's purpose and need is described in Section 1.3.1.

The USACE uses the basic project purpose to determine water dependency [40 C.F.R. §230.10(a)(3)]. If a project is not water dependent, other alternatives that would not result in impacts to special aquatic sites are presumed to be available. The Section 404(b)(1) Guidelines state that practicable alternatives to nonwater-dependent activities are presumed to be available and to result in less environmental loss unless clearly demonstrated otherwise by the applicant [40 C.F.R. §230.10 (a)(3)]. Section 1.3.2 below defines the USACE's basic project purpose as applied to the Applicant's Proposed Action.

The Section 404(b)(1) Guidelines are one of the substantive criteria that the USACE uses to evaluate a permit. The Section 404(b)(1) Guidelines establish two rebuttable presumptions: first, for a non-water-dependant project, the Guidelines presume that practicable alternatives are available that do not involve the discharge of dredged or fill material into a special aquatic site, such as wetlands. Second, the Guidelines presume that such alternatives result in less adverse impact on the aquatic ecosystem than wetland alternatives. These presumptions apply unless the applicant clearly demonstrates otherwise. Application of these rebuttable presumptions results in the identification of the least environmentally damaging practicable alternative (LEDPA).

The USACE will use the overall project purpose to identify alternatives for evaluation in this EIS and to determine if the Applicant's Proposed Action is the LEDPA under the Section 404(b)(1) Guidelines. According to USACE guidance in its 2009 Standard Operating Procedures, "The overall project purpose should be specific enough to define the applicant's needs, but not so restrictive as to constrain the range of alternatives that must be considered under the Section 404(b)(1) Guidelines. Defining the overall project purpose is the USACE's responsibility. However, the applicant's needs and the type of project being proposed should be considered." The USACE's overall project purpose more specifically addresses the Applicant's purpose and need than does the USACE basic project purpose. The USACE's overall project purpose, as applied to the Applicant's Proposed Action, is defined in Section 1.3.2.

Floods in 1937, 1955, 1958, 1962, 1963, 1969, 1982, 1986, 1996, 1997, 1998, 2002, 2008, 2009 and 2011 damaged existing homes and businesses. The largest recorded flood, estimated to be a 33-year event, occurred in December 1955. The Applicant's Proposed Action is needed to manage flood risk within the Upper Llagas Creek Watershed.

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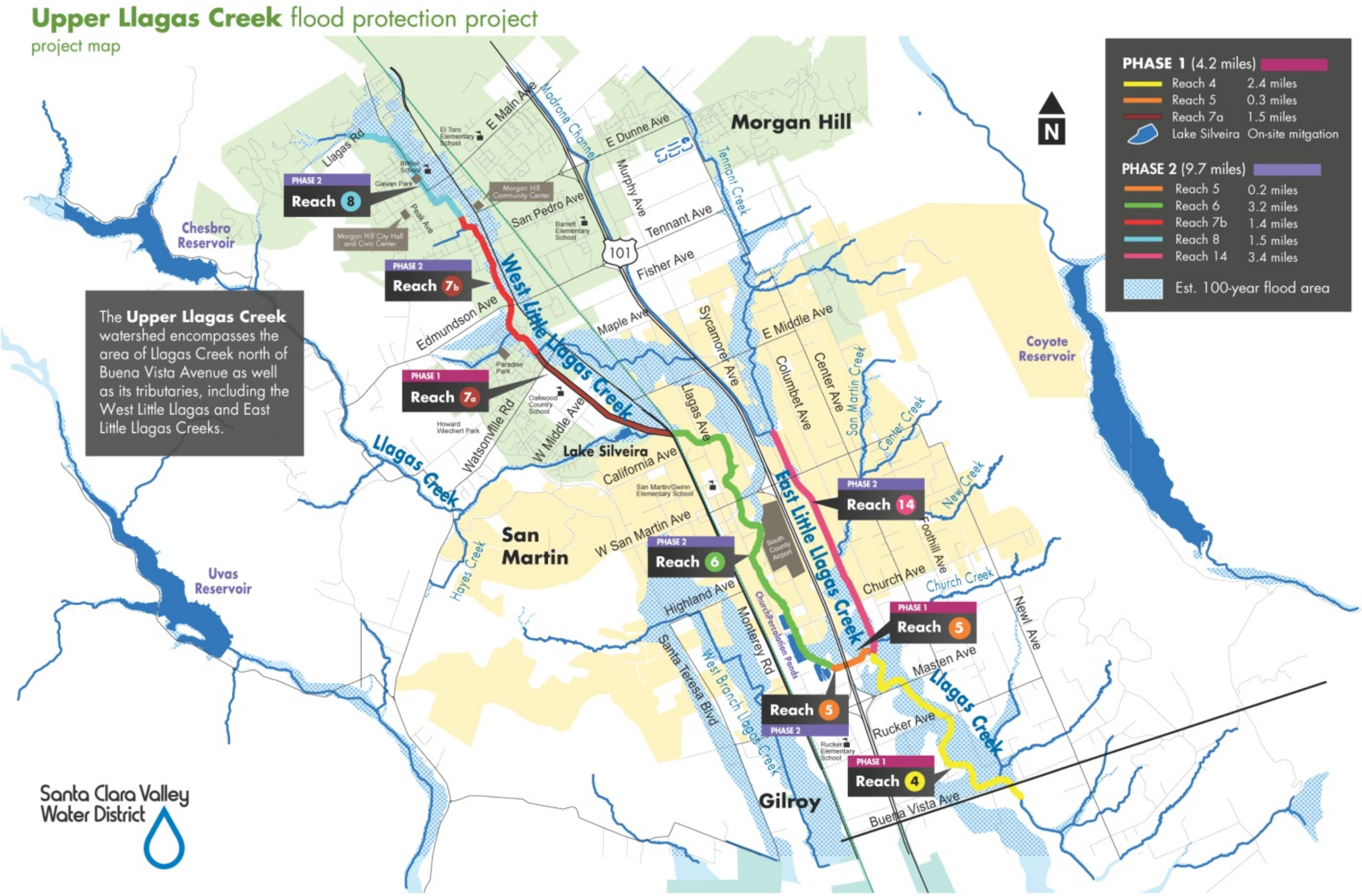

Figure 1.1-1 Regional Area Map

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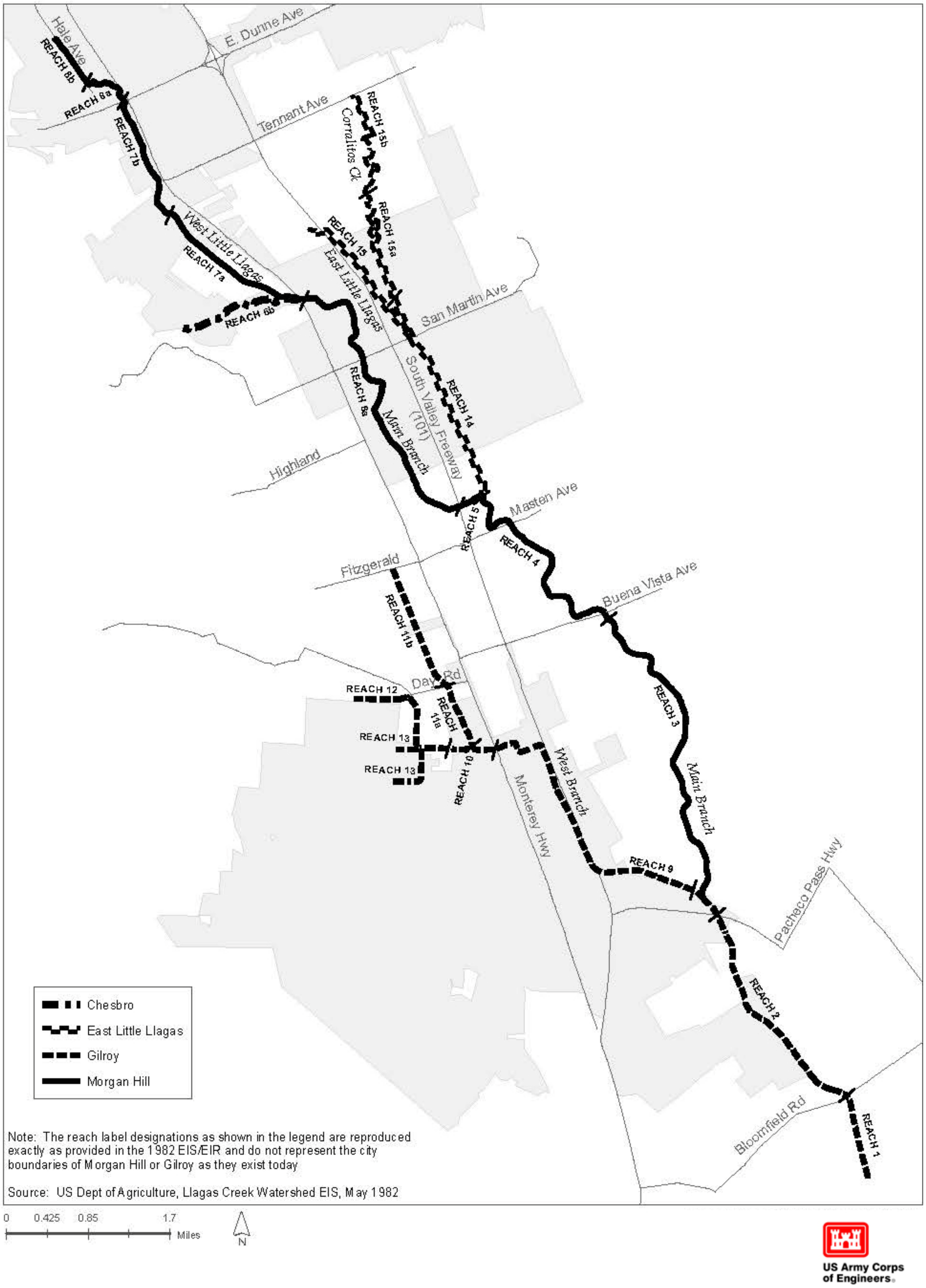

Figure 1.2-1 Llagas Creek Watershed Project From 1982 EIR/EIS

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1.3.1 Applicant's Purpose and Need

The Applicant's stated purpose and need is a statement that defines the intent and underlying goals for the Applicant's Proposed Action. The Applicant's stated purpose and project specific objectives are as follows:

The purpose of the Applicant's Proposed Action is to:

- Contain the 1-percent flood exceedance[4] (i.e., 100-year flood) on West Little Llagas Creek through the community of Morgan Hill;
- Assure that no additional flooding is induced on Llagas Creek by the upstream improvements along the reaches downstream from Morgan Hill; and
- Provide a 10-percent flood exceedance[5] capacity (10-year flood) on East Little Llagas Creek.

Project-specific objectives include:

- Improve public safety;
- Completion of the Project in accordance with the NRCS watershed plan for Llagas Creek;
- Minimize Project footprint;
- Design a horizontally and vertically stable channel that will neither widen or narrow, down-cut or aggrade, on a large scale over the long-term;
- Provide for adequate maintenance access throughout the Project, while minimizing maintenance needs of the Project, especially due to sedimentation; and,
- Preserve and enhance desirable vegetation, fish, and wildlife habitat present in Llagas Creek and connected water bodies.

1.3.2 USACE Project Purpose

As stated above the USACE defines the basic project purpose to determine water dependency while the overall project purpose is used to identify and evaluate alternatives, including the LEDPA.

[4] The 1-percent flood is a flow event that statistically has a 1 percent chance of happening in any given year. It is sometimes referred to as the "100-Year" flood. This is a flood that might occur once every one hundred years on average over the long term.
[5] The 10-percent flood is a flow event that statistically has a 10 percent chance of happening in any given year. It is sometimes referred to as the "10-Year" flood. This is a flood that might occur once every ten years on average over the long term.

The basic project purpose is to construct flood control management features to provide flood protection. Therefore, the USACE finds that the basic project purpose is water dependent.

The overall project purpose as defined by the USACE is to construct flood control management features in the Upper Llagas Creek Watershed to provide flood protection generally to the communities of Morgan Hill, San Martin, and Gilroy. Specifically, the project purpose is to provide a 1-percent flood (100-year flood) exceedance capacity on West Little Llagas Creek through the community of Morgan Hill and a 10-percent flood (10-year flood) exceedance capacity on East Little Llagas Creek.

1.4 DECISION TO BE MADE

The Proposed Action would result in the discharge of dredged or fill material into waters of the US, including wetlands, through filling, excavation, land clearing, and other activities. Under Section 404 of the CWA (33 USC §1344), the USACE is responsible for regulating the placement of fill and discharge of dredged material into the waters of the US, including wetlands. Therefore, because the SCVWD (Applicant) is seeking approval of a permit from the USACE, a federal agency, the project involves a federal action. Because any environmental consequences of SCVWD's Proposed Action are essentially products of the USACE permit action, the scope of the federal permitting action includes all of construction activities associated with this action on the project site. Concurrent with this EIS, the USACE is circulating a public notice pursuant to 33 C.F.R. Part 325 to solicit comments on the proposed activity for which a Department of Army permit is sought and to evaluate the probable impact on public interest.

The Proposed Action, through the USACE permit review requires consultation under Section 7 of the ESA andSection 106 of the National Historic Preservation Act. Other authorizations required include a Water Quality Certification issued pursuant to Section 401 of the CWA through the Central Coast Regional Water Quality Control Board. Consultation and coordination, including public involvement, are included in Chapter 7 of this EIS and the required permits, licenses and environmental laws are described both in Chapter 6and Table 1.4-1.

Additionally, the Proposed Action would involve evaluation for compliance with the Section 404 (b)(1) Guidelines of the CWA; Section 401 of the CWA, and the Clean Air Act. After all the above actions have been completed and at least 30 days following a Final EIS, the District Engineer of the San Francisco District will determine in accordance with the record and applicable regulations if a permit should be issued. Conformity with the Section 404(b)(1) Guidelines and the probable impact of the Proposed Action on public interest will be provided in a Record of Decision (ROD) that documents the DA permit decision. The ROD will document the USACE's decision to either issue, issue with conditions, or deny a permit for the Proposed Action.

Table 1.4-1 Overview of Permits, Approvals, and Consultations Required for the Upper Llagas Creek Project

Jurisdiction	Permits, Approvals & Consultations	Project Action Associated With the Permit, Approval, or Consultations
Federal Agencies		
U.S. Army Corps of Engineers (USACE)	National Environmental Policy Act (NEPA) compliance	Required for all federal actions
	Section 404 of the Clean Water Act (CWA); and, Section 404(b)(1) in particular	Discharge of fill or dredged material into waters of the United States including jurisdictional wetlands. Also known as the "404 Permit Process."
National Marine Fisheries Service (NMFS)	Section 7(a) of the Federal Endangered Species Act (ESA)	USACE must consult with NMFS regarding potential impacts to federally listed species. NMFS Issues a Letter of Concurrence or a Biological Opinion (BO).
	Section 305(b)(4) of the Magnuson-Stevens Act	USACE is required to consult with NMFS when federal action may adversely affect Essential Fish Habitat (EFH) for federally managed species. NMFS provides conservation recommendations to minimize adverse impacts.
U.S. Fish and Wildlife Service (USFWS)	Section 7(a) of the Federal Endangered Species Act (ESA)	USACE must consult with USFWS regarding potential impacts to federally listed species. USFWS issues a Letter of Concurrence or a BO.
	Migratory Bird Treaty Act (MBTA)	USFWS has responsibility for protecting nearly all species of birds, their eggs, and nests.
	Fish and Wildlife Coordination Act (FWCA)	The FWCA provides authority for USFWS involvement in evaluating impacts to fish and wildlife from proposed water resource development projects.
State Agencies		
California Department of Fish and Wildlife (CDFW)	Streambed Alteration Agreement (Fish and Game Code Sections 1600-1616)	Required for channel improvements including reconfiguration, deepening, and widening. Issues agreement with conditions to protect resources whenever a bed or bank of a stream, lake, or reservoir is altered.
	Incidental Take Permits for state-listed species (Fish and Game Code Section 2081)	CDFW may issue if specific criteria are met, the species continued existence is not jeopardized, and impacts of the authorized take are minimized and fully mitigated.
California Department of Transportation (Caltrans)	Encroachment permit is required for construction within the Caltrans Right-of-Way (ROW).	Construction of reinforced concrete boxes to pass floodwaters under a highway.
	Transportation Permit.	Delivery of materials and equipment to the Project area. Required for transport of oversized loads on state highways (This permit is usually obtained by the construction contractor or subcontractors).

Jurisdiction	Permits, Approvals & Consultations	Project Action Associated With the Permit, Approval, or Consultations
State Historic Preservation Office (SHPO)	Section 106, National Historic Preservation Act (NHPA).	USACE evaluates potential impacts to cultural resources eligible or potential eligible for listing in the National Register of Historic Places (NRHP). USACE consults with SHPO and federally recognized Tribes and prepares a Memorandum of Agreement (MOA) for adverse effects on resources listed in, or eligible for listing NRHP.
Regional Agencies		
Bay Area Air Quality Management District (BAAQMD)	As required by the California Clean Air Act (CAA) and Amendments (Health and Safety Code [HSC] Section 40910 et seq.) and the Federal CAA and Amendments (42 U.S.C. Section 7401 et seq. Responsible for air monitoring, permitting, enforcement, long-range air quality planning, regulatory development, education, and public information activities related to air pollution encompassing Santa Clara County and the Peninsula from the Santa Cruz Mountains to South San Francisco.	Possible permits for use of portable generators during Project construction that are not exempt from permit requirements (RMC 2012).
Central Coast Regional Water Quality Control Board (CCRWQCB)	Porter-Cologne Water Quality Control Act. Overseen by the State Water Resources Control Board (SWRCB), the CCRWQCB issues certification or waiver for construction-related degradation of water quality.	Triggers the National Pollutant Discharge Elimination System (NPDES) permitting for channel improvements including reconfiguration, deepening and widening.
	401 Water Quality Certification (401 Certification) required for any project that needs a Federal 404 Permit. The 401 Certification is a verification by the State that the project will not violate water quality standards	Required for channel improvements including reconfiguration, deepening and widening
	Construction General Permit for stormwater discharges associated with construction activity.	This applies to all construction projects that would disturb one or more acres of soil. Requires filing a Notice of Intent (NOI) as well as preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP).
Local Agencies		
Santa Clara Valley Water District (SCVWD)	California Environmental Quality Act (CEQA) compliance	Evaluation of potentially significant impacts is required for all projects, as defined by the California Public Resources Code, Section 21065.
	SCVWD Well Ordinance 90-I	Regulates the classification, construction, and destruction of wells and other deep excavations; requiring the destruction of abandoned or unused wells; adopting water contamination hazard standards.
Santa Clara County Department of Environmental Health Local Oversight Program (LOP)	The County of Santa Clara, in contract with the SWRCB, oversees investigation and cleanup of underground storage tanks.	The LOP is the Certified Unified Program Agency (CUPA) for hazardous materials plans and spill prevention plans if stored hazardous materials are stored onsite.
	Hazardous Materials Business Plan and Spill Prevention Control and Countermeasures Plan.	The LOP oversees petroleum spill cleanup through Spill Prevention, Control, and Countermeasure Plans (SPCC).

Jurisdiction	Permits, Approvals & Consultations	Project Action Associated With the Permit, Approval, or Consultations
County of Santa Clara	Issues encroachment and grading permits under the Santa Clara County Ordinance No. 1203.109	Triggered by the grading activities.
	Sell real estate or develop Land Use Agreement	Restoration of Llagas Creek through Lake Siveira owned by County Parks Department
City of Morgan Hill	City encroachment permits	An encroachment permit is required for activities such as construction within the public right-of-way (ROW).
	Tree Removal Permit	Required for tree trunks with a circumference of forty inches or more for nonindigenous species and eighteen inches or more for indigenous species measured at 4.5 feet vertically above the ground or immediately below the lowest branch, whichever is lower. An indigenous tree includes oaks (all types); California Bays, Madrones, Sycamore, and Alder.

1.5 RELATED AUTHORIZATIONS, PLANS, AND PROJECTS

1.5.1 Federal Reports and Authorizations

The following reports and studies pertinent to the project have been prepared by the USACE (San Francisco District). The reports are listed in chronological order.

1.5.2 Regional Studies, Reports, and Other Documents

The following reports are for projects that are relevant to the Proposed Action through location, or activity and are incorporated herein by reference.

- ***Final Subsequent Environmental Impact Report Santa Clara Valley Water District Stream Maintenance Program Update 2012–2022***. The Stream Maintenance Program (SMP) is intended to support permitting for the next 10-year planning period beginning in 2012 and ending in 2022. SMP Update prioritizes and administers maintenance activities to achieve the following objectives: (A) remove sediment to maintain the hydraulic, safety, and habitat functions of the creek systems; (B) manage vegetation to maintain the hydraulic, safety, and habitat functions of the creek systems, and to allow for levee inspections and maintenance access; (C) stabilize beds and banks of creeks and canals to protect existing infrastructure, maintain public safety, reduce sediment loading, protect water quality, and protect habitat values; and (D) avoid, minimize, or mitigate impacts on the environment by incorporating stream stewardship measures into maintenance activities. The SMP Update also seeks to obtain and maintain multi-year programmatic permits to regulate maintenance activities. Many of the Stream Maintenance Best Management Practices (BMPs) would be utilized for maintenance related activities for this Project.

- ***Pajaro River Project***. The USACE is the lead agency for this joint EIS/EIR mandated under the Rivers and Harbors Act of 1966 (Public Law 89-789). The Project area consists of the main stem of the Pajaro River, from its mouth to U.S. 101, continuing from U.S. 101 to Murphy's Crossing and includes Salsipuedes Creek. The primary project objective is to reduce the potential for flooding and associated damage along the lower Pajaro River, Salsipuedes Creek and Corallitos Creek in the vicinity of Santa Cruz and Monterey counties, as well as the city of Watsonville.

- ***Lower Llagas Creek Capacity Restoration Project***. The project area runs from Highway 152 to Pajaro River, is a partially-funded (planning phase only) project that plans, designs, and constructs improvements on approximately 3.35 miles of Lower Llagas Creek to accomplish the following objectives: restore flood capacity in Lower Llagas Creek; coordinate with South County Wastewater Authority as a principal stakeholder and water resource co-planner; and integrate flood protection with habitat protection to satisfy Endangered Species Act regulations. This project is funded by the SCVWD's watershed and stream stewardship fund. It was started in July 2008 and is scheduled to be completed in December 2016 (SCVWD 2010a, b).

- ***Butterfield Boulevard South Extension Project (City of Morgan Hill)***. This project extended Butterfield Boulevard from Tennant Avenue to Watsonville Road and include a grade separation over the Union Pacific Railroad tracks. The extension impacted a short segment of West Little Llagas Creek. The project included outlets to West Little Llagas Creek from a detention pond located southeast of the new intersection that would collect runoff from the area of the Butterfield Boulevard extension between the UPRR tracks and Monterey Road. A Final EIR for the Sutter Boulevard Extension & Flood Protection Facilities was completed for the Project in 1992. Since that time, Sutter Boulevard was renamed Butterfield Boulevard and project changes have required an addendum in 2005, an addendum in 2011, and an Initial Study/Mitigated Negative Declaration in 2010 for shifting of Butterfield Boulevard alignment to the south near Monterey Road and widening Watsonville Road further to the southeast resulting in impacts to West Little Llagas Creek (City of Morgan Hill 2011). The project is now complete.

1.6 PUBLIC SCOPING PROCESS

One of the objectives of NEPA is to encourage public involvement in project planning and government decision making. Through the scoping and document comment processes, the members of the public and responsible and interested agencies can voice their concerns, request clarification, and make recommendations that can ultimately alter the originally Applicant's Proposed Action.

1.6.1 Previous Environmental Review

- ***USDA Soil Conservation Service distributed the LCWPP Draft EIS for public review in July 1979***. A public hearing on the draft was held in September 1979. The SCS developed a Finding of No Significant Impact/Negative Declaration for impacts to geomorphology, visual resources, aquatic resources, and wildlife habitat for the project (USDA 1982). During the public review period strong citizen opposition developed along with objections from several public agencies. Therefore the project sponsors agreed to restudy the Proposed Action.

- ***Llagas Creek Watershed Draft Environmental Impact Statement/Report prepared for the USDA NRCS was distributed for public comment in September 1982***. Local sponsoring agencies for the draft report were the Loma Prieta Resource Conservation District, the Gavilan Water District, and the SCVWD. The EIR was certified, permits were obtained, and the lower reaches of Llagas Creek were constructed.

- ***Notice of Intent and Notice of Preparation to Prepare a Joint Supplemental Environmental Impact Statement (SEIS)/Supplemental Environmental Impact Report (SEIR) for the Llagas Creek Flood Control Project (Federal Register: August 7, 2001, and State Clearinghouse No. 2001082034 August 8, 2001)***. This document was started but not completed.

1.6.2 Prior Scoping Meeting

The Upper Llagas Creek Project Scoping Meeting was conducted on October 25, 2012 by the USACE and SCVWD. The meeting was held at the Morgan Hill Community and Cultural Center, Morgan Hill, California. District officials and staff provided a summary of the Project. Individuals spoke on behalf of themselves or local government agency representatives and a total of 29 unique project related questions were received related to project components, alternatives and miscellaneous concerns regarding: eminent domain, project funding, coordination with county roads and airports regarding maintenance, and how the project boundaries were determined. SCVWD received five comment letters from state and local agencies during the comment period, which are included in Appendix A. A summary of environmental concerns raised by agencies during the scoping period include:

- Impacts to wastewater treatment systems and groundwater, and surface water;

- Potential impact to County parklands, park resources, recreational facilities, public access, and county-wide trail routes;
- Impacts to vegetation differentiating between native and nonnative species;
- Reduction of future maintenance;
- Reduction of channel modifications;
- Consider Project objectives that balance flood management needs with environmental protection; and
- Impacts to bridges, trestles, and culverts from upstream modifications.

1.6.3 Scoping for the Proposed Action

A notice of intent to prepare an EIS for the proposed action was circulated in the Federal Register on September 28, 2015, for a 60-day comment period. One comment letter was received and is included in Appendix A.

CHAPTER 2 DESCRIPTION OF ALTERNATIVES

This chapter outlines the process used to determine the range of reasonable alternatives to the proposed action and presents each alternative to be considered. Several alternatives to the Applicant's Proposed Action were evaluated for their ability to meet the overall project purpose as presented in Chapter 1, including the feasibility, timeliness, and responsiveness to the issues and concerns identified during public scoping. This chapter includes discussion regarding the following sections:

Section 2.1 – Regulatory Setting for Alternatives Analysis;
Section 2.2 – Project Location;
Section 2.5 – Project Elements Common to All Action Alternatives; and
Section 2.3 – Alternatives Considered, Eliminated, and Brought Forward;Section 2.10 – Summary of Project Alternatives

In addition, the evaluation process concluded with a range of reasonable project alternatives, identified as follows:

Section 2.4 – No Action Alternative;
Section 2.6 – NRCS Alternative;
Section 2.7 – Tunnel Alternative (Applicant's Proposed Action);
Section 2.8 – Culvert/Channel Alternative; and
Section 2.9 – Reach 6 Bypass Alternative;

2.1 REGULATORY SETTING FOR ALTERNATIVES ANALYSIS

Both the Council of Environmental Quality's (CEQ) National Environmental Policy Act (NEPA) Implementation Procedures [40 Code of Federal Regulations (C.F.R.) §1502.14] and the United States Army Corps of Engineers' (USACE) NEPA Implementation Procedures (33 C.F.R. Part 325, Appendix B) require consideration of a range of reasonable alternatives for a proposed action. Defining a range of reasonable alternatives is a key element for subsequent analyses in an Environmental Impact Statement (EIS). The CEQ (1981) describes the alternatives as being the "heart of the environmental impact statement," and alternatives that are considered reasonable under NEPA include those alternatives "that are practical or feasible from a technical and economic standpoint and using common sense." The USACE's NEPA Implementation Procedures define reasonable alternatives as "those that are feasible, and such feasibility must focus on the accomplishment of the underlying purpose and need (of the applicant or the public) that would be satisfied by the proposed Federal action (permit issuance)." The USACE's regulations further provide that only reasonable alternatives need to be considered in detail and that the reason for eliminating alternatives from detailed study should briefly be discussed in the EIS [33 C.F.R. Part 325, Appendix B, sec. 9.a. (5) (a)]. NEPA regulations require that agencies consider a range of reasonable alternatives to the proposed action, including consideration of a "No Action" alternative; the regulations do not, however, require consideration of every conceivable variation of an alternative (40 C.F.R. §1502.14). In addition, these regulations provide that, while the USACE shall not prepare a cost benefit analysis of the alternatives, the EIS should indicate any cost considerations that are likely to be relevant to a decision [33 C.F.R. Part 325, Appendix B, sec. 9.a.(5)(d)].

The substantive criteria used by the USACE to evaluate a permit are the Section 404(b)(1) Guidelines (40 C.F.R. Part 230) promulgated by the United States Environmental Protection Agency (USEPA). The guidelines require the evaluation of "practicable alternatives," and are used to identify the Least Environmentally Practicable Alternative (LEDPA) to ensure that "no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences." The guidelines define an alternative as practicable "if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes" (40 C.F.R. §230.10 [a][2]). The Section 404(b)(1) Guidelines indicate that the analysis of alternatives for NEPA environmental documents will in most cases provide the information required to evaluate the alternatives under the guidelines (40 C.F.R. §230.10 [a][4]).

The USACE evaluated and screened the alternatives mindful of both the NEPA requirements and the 404(b)(1) Guideline requirements. As a result, the alternatives analysis in this EIS also satisfies the requirement under both NEPA and the Section 404(b)(1) Guidelines. As described below, the USACE examined the full scope of possible alternatives and components and systematically arrived at the range of reasonable and practicable alternatives. Through this process, the USACE believes that it has captured all of the alternatives and components necessary to determine whether the Applicant's Proposed Action is the LEDPA.

2.2 PROJECT LOCATION

The Project is located in southern Santa Clara County, approximately 25 miles southeast of San Jose, in the communities of Morgan Hill, San Martin, and Gilroy (Figure 1.1-1, Regional Area Map). The Project consists of the upper seven reaches (4, 5, 6, 7A, 7B, 8 and 14) of Llagas Creek, East Little Llagas Creek, and West Little Llagas Creek above Buena Vista Avenue (Figure 2.2-1).

The original Llagas Creek Flood Watershed Project Plan (LCWPP) was developed by the United States Department of Agriculture (USDA) Soils Conservation Service (SCS) in the late 1960s. The LCWPP addressed flooding on both the upper reaches of the watershed, and a set of lower reaches along the West Branch of Llagas Creek in Gilroy and mainstem Llagas Creek below Buena Vista Avenue. Flood control measures on the lower reaches were constructed beginning in the 1970s. This EIS considers proposed measures that address flooding in the upper reaches.

The total length of the Project area is approximately 13.9 miles; 6.2 miles of which are along the main branch of Llagas Creek, 2.9 miles along West Little Llagas Creek; and, 3.4 miles along a tributary of Llagas Creek, known as East Little Llagas Creek. An additional 1.4 miles of new channel would also be constructed along West Little Llagas Creek to Llagas Creek. On the north, the physical limits of the Project are at the creek's intersection with Llagas Road on West Little Llagas Creek in Morgan Hill; and, in the south, approximately 1,000 feet downstream of the creek's intersection with Buena Vista Avenue in Gilroy. A summary description of each of the seven Project reaches (from upstream to downstream) identified in this EIS is provided below.

Project Reach 8 (West Little Llagas Creek)

Reach 8 is approximately 1.5 miles long and is located along West Little Llagas Creek in downtown Morgan Hill between West Dunne Avenue in the south and just upstream of Llagas Road in the north (Figure 2.2-2). The existing channel conveyance capacity is less than a 10-percent flood event (<400 cubic feet per second [cfs] at Hillwood Lane). Reach 8 is highly urbanized and constrained by development with homes or other buildings built next to the channel. The existing creek consists of a trapezoidal earthen channel with top widths varying between eight and 20 feet, and an average depth of 5 feet. Some sections of the channel are open concrete, and other sections are underground passing through 10 single box culverts, eight of which are currently undersized for the 1-percent exceedance flow[1]. The 10 culverts are located at: West 5th Street; West 4th Street; West 3rd Street; the West 2nd Street/Del Monte Avenue intersection; Warren Avenue; Main Street; the Wright Avenue/Hale Avenue intersection; and Llagas Road, Llagas Creek Drive, and Hillwood Lane. The Llagas Road culvert has a constricted opening that would be removed to pass the 1-percent exceedance flow.

Project Reach 7B

Reach 7B is a trapezoidal earthen channel, approximately 1.4 miles long, located along West Little Llagas Creek in an urban, and residential suburban, area of Morgan Hill between South La Crosse Drive in the south, and West Dunne Avenue in the north (Figure 2.3-3). The existing creek passes through 18 reinforced concrete box (RCB) culverts at seven locations (Table 2.2-1), three of which (Spring Avenue, Cosmo Avenue, and Edes Street) are currently undersized for the 1-percent flow. Existing culverts include: a quadruple box culvert at South La Crosse Drive; triple box culverts at North La Crosse Drive; West Edmundson Avenue; Edes Street and Cosmo Avenue; and a culvert at Spring Avenue. A 674-foot long single box culvert conveys flows under the Morgan Hill Plaza Shopping Center from West Dunne Avenue to Ciolino Avenue. A paved pedestrian/bike path meanders alongside approximately 2,000 feet of the south side of the West Little Llagas Creek channel between Edes Court and South La Crosse Drive.

Project Reach 7A

This reach extends approximately 1.5 miles from Reach 6 just above the Monterey Road Bridge in the south, to South La Crosse Drive in the north. The majority of land adjacent to Reach 7A is currently agricultural fields (Figure 2.2-4); there is no existing channel here except for a short 0.3-mile length of trapezoidal shaped constructed channel at the north end of the reach. Each of the alternatives would excavate a proposed earthen diversion channel approximately 1.5 miles long through Reach 7A to divert flows from West Little Llagas Creek upstream of Watsonville Road to Llagas Creek downstream of Lake Silveira at Monterey Road (see Figure 2.2-4). Vegetation consists of row crops or annual, non-native grassland on fallowed lands. There are two buried (and therefore currently inoperable) bridges in this reach (Table 2.2-1) constructed by the SCVWD at

[1] The 1-percent flood is a flow event that statistically has a 1-percent chance of happening in any given year. It is sometimes referred to as the “100-Year” flood. This is a flood that might occur once every one hundred years on average over the long term. Similarly a 10-percent flood is a flow event that statistically has a 10-percent chance of happening in any given year, and is sometimes referred to as the “10-Year” flood.

Watsonville Road and West Middle Avenue that would be exhumed when the diversion channel is constructed.

Table 2.2-1 Existing Channel Crossings, Reaches 7A and 7B (West Little Llagas Creek)

Reach 7 Location	Type of Crossing	Roadway Width (ft)	Existing Culverts		Existing Bridges
			Culvert Size W (ft) x H (ft)	Number of Culverts	Number of Piers
Middle Ave.	Bridge (buried)	37	--	--	2
Watsonville Rd.	Bridge (buried)	75	--	--	2
S. La Crosse	RCB*	70	13 x 8	3	--
			12 x 11	1	--
N. La Crosse	RCB	70	16.5 x 9	2	--
			16.5 x 12	1	--
Edmundson Ave.	RCB	80	12 x 10	3	--
Edes Ct.	RCB	48	10 x 9	1	--
			10 x 7	2	--
Cosmo Ave.	RCB	48	10 x 9	1	--
			10 x 7	2	--
Spring Ave.	RCB	58	10 x 9	1	--
Ciolino/Dunne	RCB	674	15 x 8	1	--

*RCB – Reinforced concrete box culvert.

Project Reach 6

Llagas Creek Reach 6 is a natural earthen channel, approximately 3.2 miles long from 700 feet upstream of U.S. Highway 101 (U.S. 101) in the south, to Monterey Road in the north (Figure 2.2-5). Reach 6 meanders between Monterey Road and South County Airport. The southern portion of this reach is adjacent to SCVWD percolation ponds between Church Avenue and Murphy Avenue. Reach 6 is a perennially-flowing stream segment over a 6,600-foot-long segment from below Lake Silveira to about San Martin Avenue, with flow continuously supported by releases from Chesbro Reservoir, which is located outside of the project area on Llagas Creek (see Figure 1.1-1). Downstream from San Martin Avenue, Reach 6 is an intermittent channel as flow percolates through the streambed to groundwater.

Land use adjacent to the creek varies from commercial and residential in the north to agricultural in the south. There are five, existing bridge crossings: Monterey Road; the Union Pacific Railroad tracks; Llagas Avenue; San Martin Avenue; and Church Avenue. There is a mix of native and non-native vegetation along the stream banks. Patchy tree canopy is provided both by native oaks, cottonwood (Populus fremontii), sycamore (Platanus racemosa), and willows (Salix spp.), as well as by exotic eucalyptus, particularly red gum (Eucalyptus camaldulensis).

Project Reach 5

Llagas Creek Reach 5 is a natural earthen channel approximately 0.5 mile long from the Llagas Creek/ East Little Llagas Creek confluence in the east to 700 feet upstream of U.S. 101 in the west Reach 5 is ephemeral, typically dry in the summer and fall months, and, as a consequence, riparian vegetation is limited along this segment of Llagas Creek (Figure 2.2-6). Where tree canopy is present, it consists of a combination of planted exotic trees and native trees, particularly red gum and introduced Monterey pine (Pinus radiata). Additionally, the stream channel bed supports riparian species such as mule fat (Baccharis salicifolia). The banks and the undisturbed areas beyond the top of the banks support annual grassland species.

Project Reach 4

Reach 4 is the downstream-most reach of the Project. It is a natural earthen channel, extending approximately 2.4 miles along Llagas Creek from approximately 1,000 feet downstream of Buena Vista Avenue in the south to the East Little Llagas Creek/Llagas Creek confluence in the north (Figure 2.2-7). There are three existing bridge crossings at Masten Avenue, Rucker Avenue, and Buena Vista Avenue. There is an existing fish ladder and grouted concrete rock downstream of Buena Vista Avenue that would be removed so as to not induce flooding due to upstream Project improvements.

Reach 4 contains sinuous bends, particularly near Masten and Buena Vista Avenues; and, is ephemeral, typically dry in the summer and fall months and flowing only in the winter months after rainfall generates sufficient runoff. The stream channel bed supports sparse mature vegetation such as mule fat. The banks support a mixture of riparian and non-riparian species. Tree canopy is patchy but it some locales tree cover is dense, including extensive stands of red gum.

Project Reach 14

Reach 14 is a constructed channel that extends approximately 3.4 miles along East Little Llagas Creek from the Llagas Creek confluence in the south, to just downstream of the Corralitos Creek confluence in the north (Figure 2.2-8). It is an excavated earthen channel that was straightened and realigned by Caltrans in the 1970s during the construction of U.S. 101. Above the upstream boundary of Reach 14, between Sycamore Avenue to about Middle Avenue, East Little Llagas Creek is parallel to U.S. 101 for approximately 5,400 feet. U.S. 101 in this area is located atop an embankment, which also acts as the right bank of East Little Llagas Creek.

Agricultural and rural residential land uses, and commercial buildings are present in the area surrounding Reach 14. Reach 14 is ephemeral, typically dry in the summer and fall months, only flowing in the winter months after sufficient rainfall generates runoff. The channel contains box culverts where the creek crosses East San Martin Avenue and Church Avenue. The bottom of the channel banks contains a combination of annual grassland species and bare ground. Vegetation on the stream banks is primarily annual grassland with a few scattered trees (mostly native).

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Figure 2.2-1 Upper Llagas Creek Poject Area Reaches

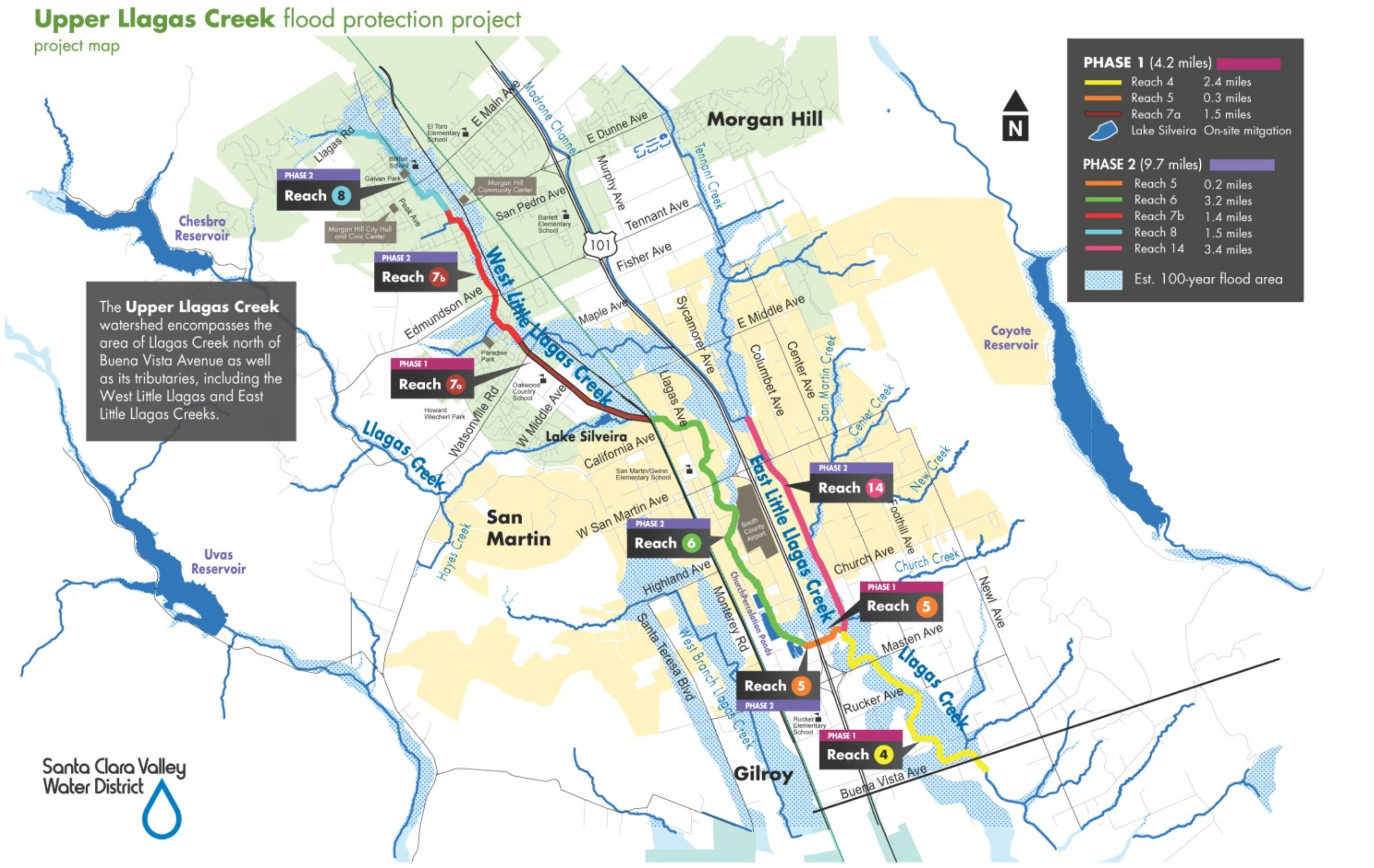

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Figure 2.2-2 Reach 8

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Figure 2.2-3 Reach 7B

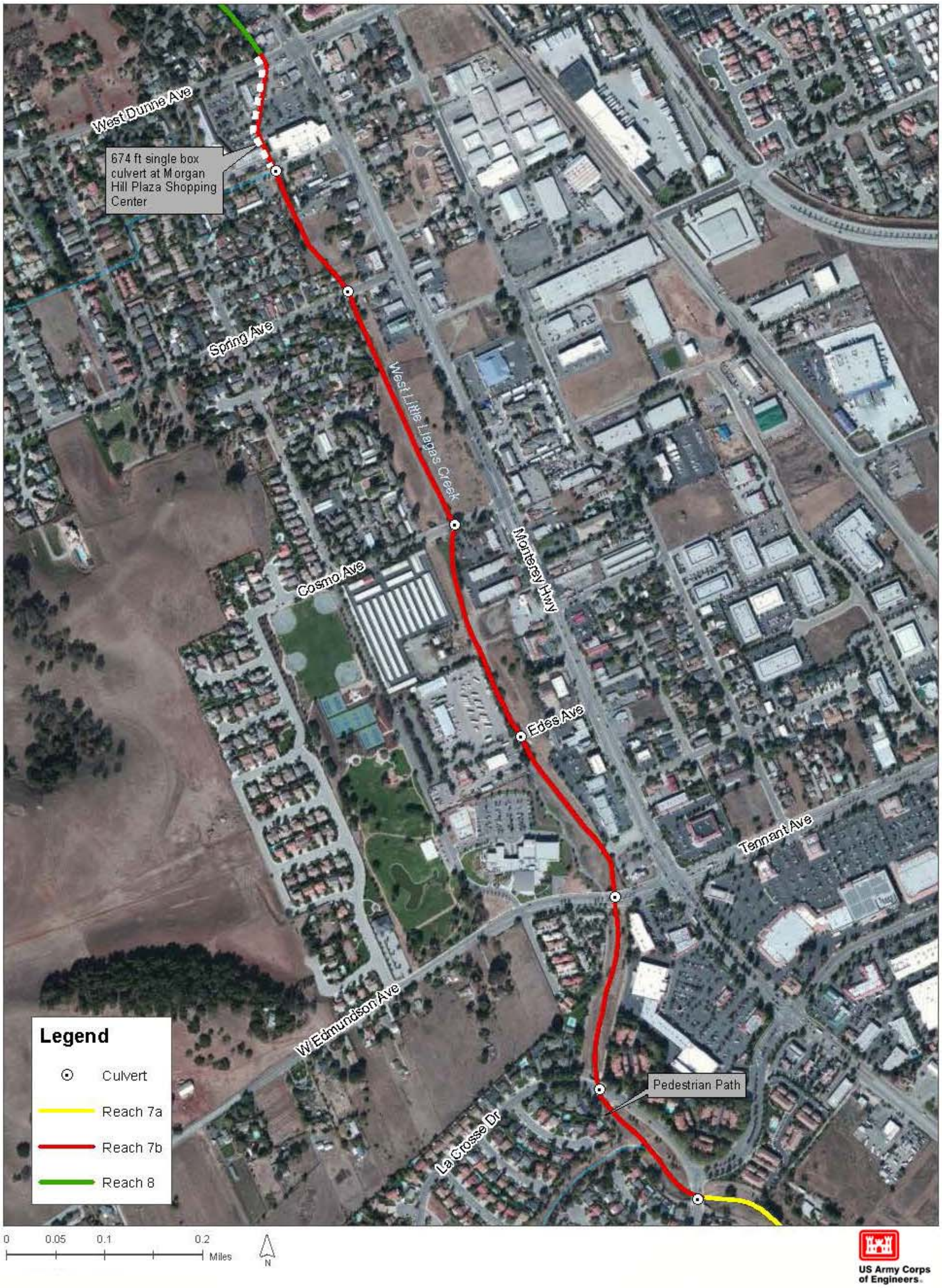

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Figure 2.2-4 Reach 7A

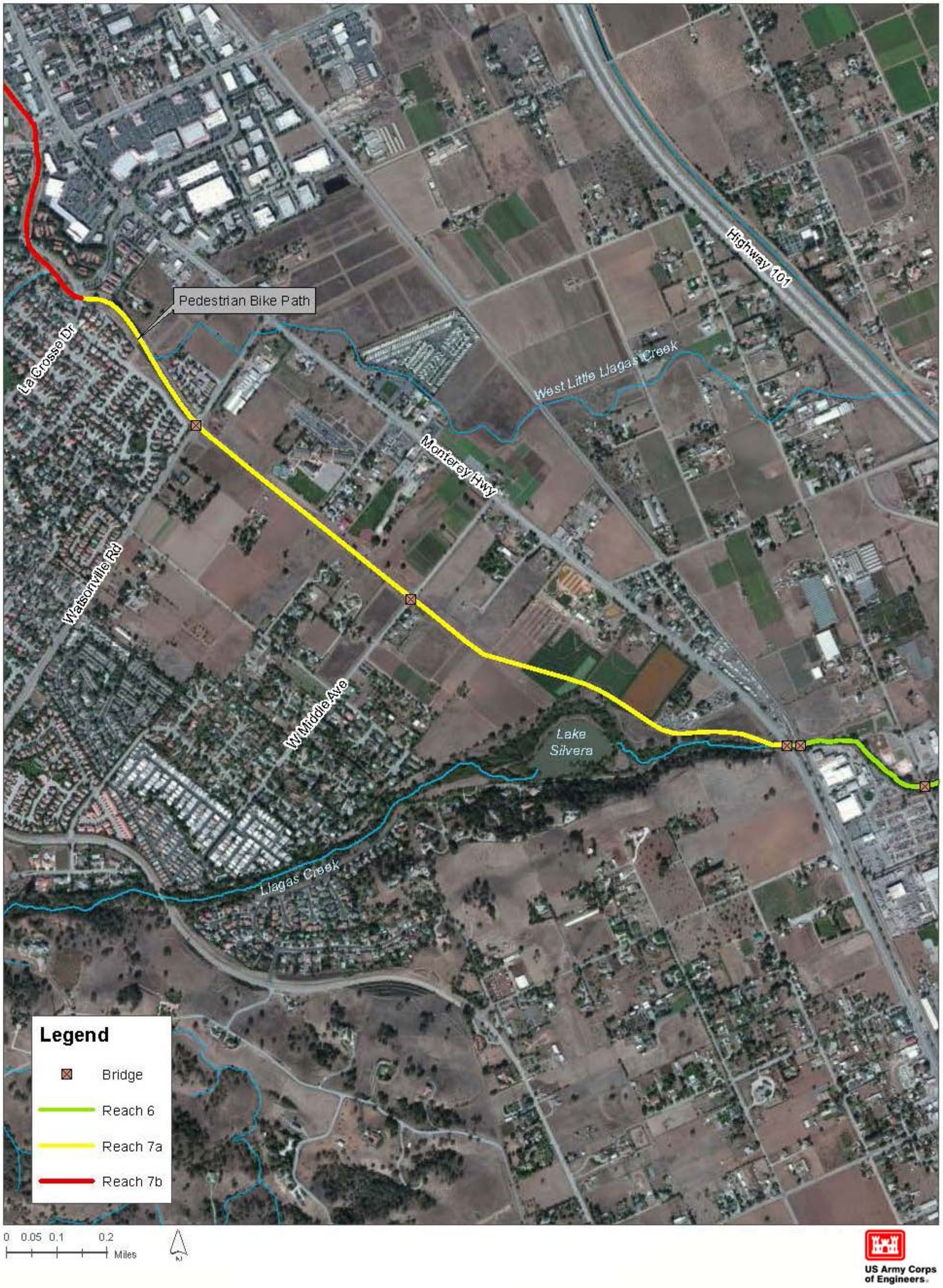

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Figure 2.2-5 Reach 6

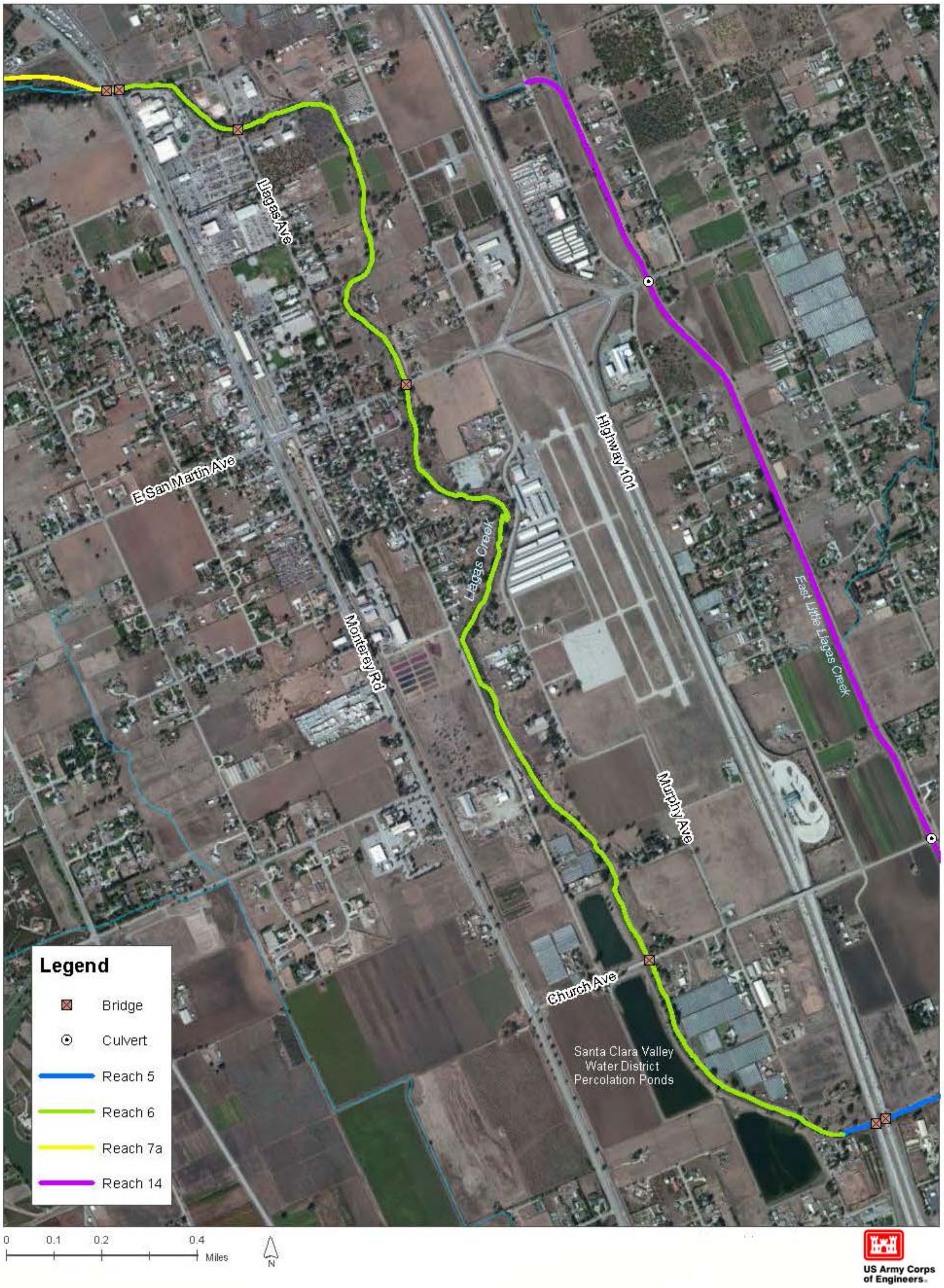

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Figure 2.2-6 Reach 5

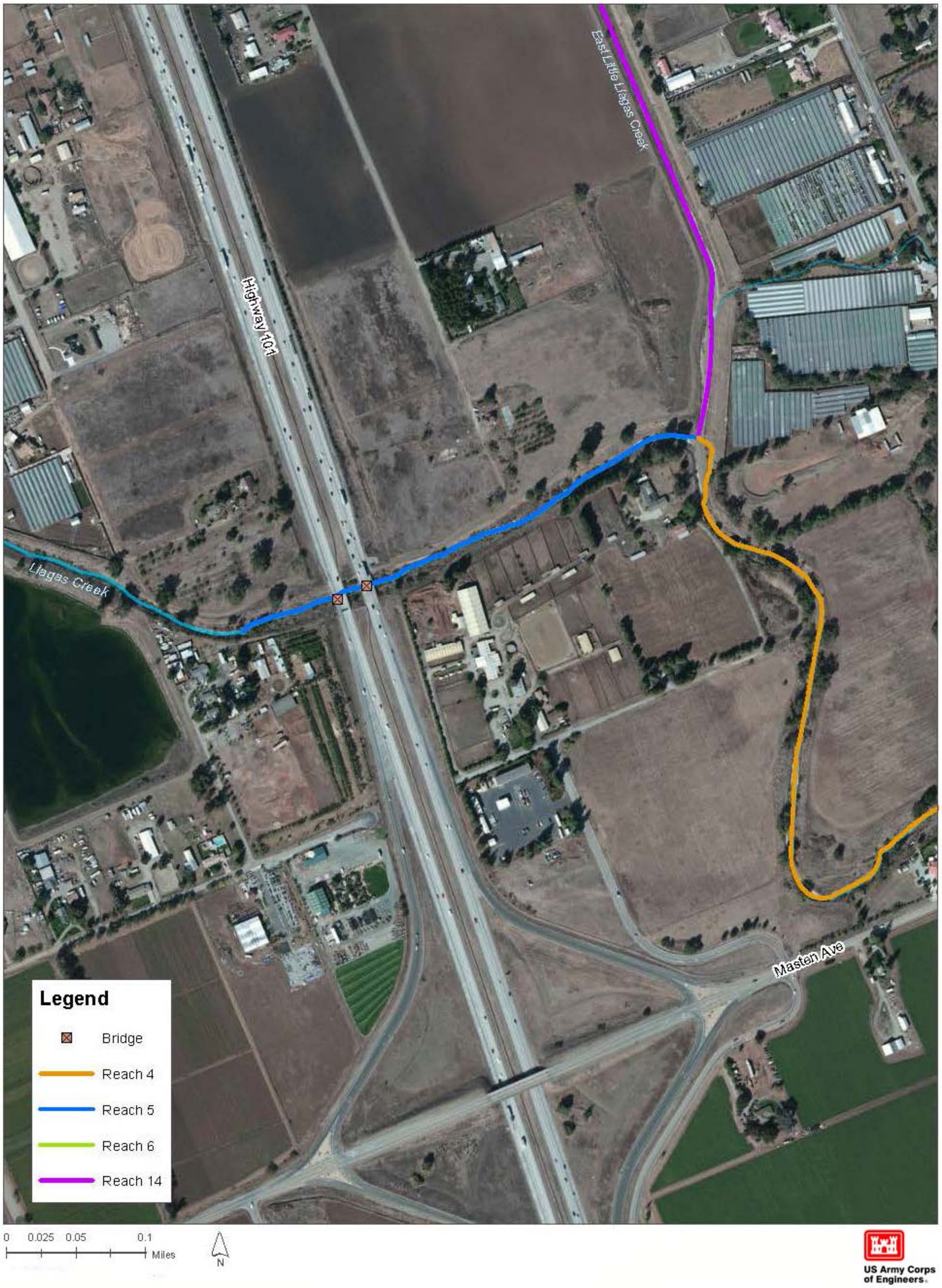

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Figure 2.2-7 Reach 4

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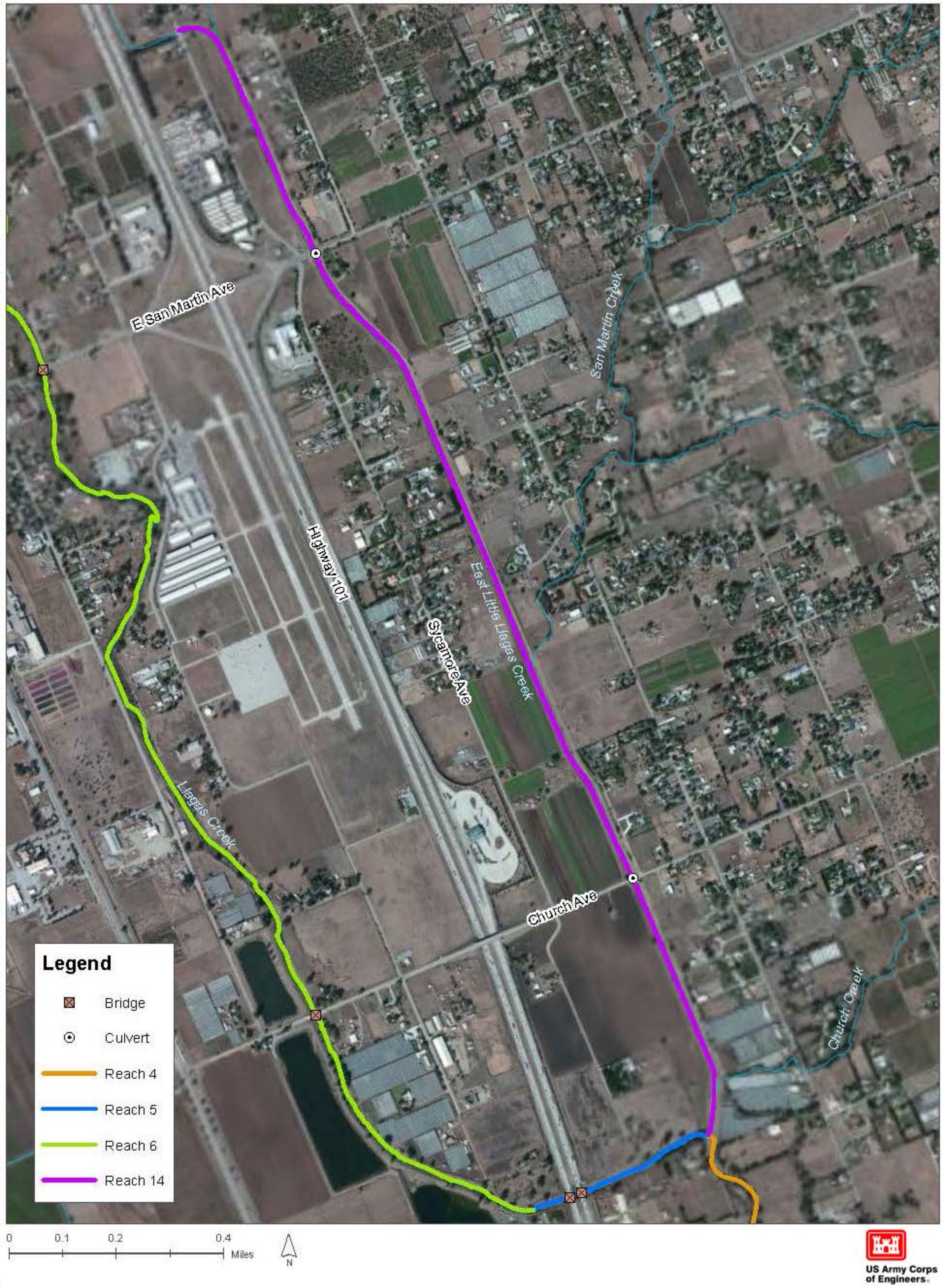
Figure 2.2-8 Reach 14



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2.3 ALTERNATIVES CONSIDERED, ELIMINATED, AND BROUGHT FORWARD

2.3.1 1982 Environment Impact Statement (EIS)/Environmental Impact Report (EIR) Alternatives Evaluation

The LCWPP was proposed by the SCVWD in 1968. In 1969, the proposed project received federal and state approval, and as part of the Watershed Protection and Flood Prevention Act of 1954. Congress authorized the NRCS, formerly the SCS, to move forward with project construction, which commenced in 1973. Project construction for the first phase was suspended in order to evaluate potential impacts as required by the National Environmental Policy Act (NEPA) of 1969 which was signed into law in 1970. The LCWPP was revised several times by the NRCS, local sponsors, and citizen groups over a period of nearly a decade before a joint EIS/EIR was completed in 1982. The scope of the 1982 EIS/EIR considered a broad range of alternatives, including an assessment of flood control measures in the entire Llagas Creek watershed. The alternatives included: the No Action Alternative; a Nonstructural Plan Alternative that included flood proofing individual buildings and elevating homes and other structures in the floodplain and six different Structural Plan Alternatives identified below as Alternatives A, B, C, D, E, and F.

The 1982 EIS/EIR determined that structural measures would be necessary to reduce flooding in agricultural and urban areas in Santa Clara County. The six alternatives evaluated in 1982 EIS/EIR considered Project reaches that were part of the larger LCWPP (Figure 1.2-1) and included lower Llagas Creek and the West Branch Llagas Creek through Gilroy (Reaches 1, 2, 9, 10, 11, 12, 13, and 15). Flood management facilities in these reaches were constructed by 1994 and, therefore, are not part of the Upper Llagas Creek Flood Protection Project addressed in this EIS.

All of the alternatives evaluated in the 1982 EIS/EIR included construction of a new channel segment to bypass East Little Llagas Creek (Reach 7A), allowing flow from West Little Llagas Creek in Morgan Hill to be redirected into the main branch of Llagas Creek near the present-day location of Lake Silveira[2]. The bypass channel would eliminate flooding along the section of West Little Llagas Creek from La Crosse Drive to East Little Llagas Creek (Reach 14). This design avoids having to excavate the existing West Little Llagas Creek channel segment to increase flow capacity, avoids construction of a bridge to accommodate an enlarged channel where it crosses U.S. 101, and reduces the amount of excavation needed to prevent induced flooding and would provide a 10-percent exceedance flow capacity through Reach 14.

Other design features that were proposed which are common to all of the 1982 alternatives include: a rectangular concrete channel in Morgan Hill (Reach 8); selective channel widening and deepening throughout the other reaches to prevent induced flooding from the improvements in Morgan Hill; and protection from the 1-percent flood event (100-year flood) on the upper urbanized reaches of West Little Llagas Creek (Reaches 7A, 7B, and 8).

[2] Lake Silveira was formed when an illegal levee breach was made separating a rock quarry pit from Llagas Creek sometime in the 1980s.

Alternative A—Raise Chesbro Dam and Channel Modifications

As a key feature of this alternative, Chesbro Dam and the spillway would be raised by at least 2 feet to add 550 acre feet of storage to the reservoir. Operational agreements would require outflow to be limited to 2,900 cfs. In combination with measures to excavate channels downstream of the dam to increase flood capacity, the dam raise under this alternative would provide 1-percent flood protection in all reaches. The flood management measures included:

- Raising Chesbro Dam and spillway;
- Excavating 26 miles of earthen channel (Reaches 2, 3, 4, 5, 7A, 7B, 8B, 9, 11A, 11B, 12, 13, 14, 15A, 15B, and 16);
- Constructing a rectangular concrete channel for 1.0 miles in Morgan Hill (Reach 8A);
- Constructing 4.1 miles of new channel (Reaches 10, 12, 13, and 7A); and
- Constructing 4.2 miles of levee on Llagas Creek (Reaches 6A and 6B).

Twenty-seven grade stabilization structures were proposed, to be designed as concrete drops and rock chutes that would provide fish passage. Thirty-eight existing bridges and 25 box culverts would be replaced. An 18-footwide maintenance road would be constructed on either side of the channel. Alternative A would have required purchase of 547 acres of right-of-way (ROW), and removal of nine residences. Thirty-four acres of riparian habitat would be removed for construction.

Out of an estimated 3,300 acres of cropland susceptible to flooding at that time, approximately 3,020 acres would be protected during the 1-percent flood. The installation cost was $61.99 million, with an estimated $913,000 in annual average damages avoided[3].

Alternative B—Channel Modifications on Corralitos Creek and West Branch Llagas Creek

This alternative would be similar to Alternative A, except that Chesbro Dam would not be raised. Additionally, two reaches of channel modification work would be added; one reach on Corralitos Creek (Reach 15C) from Tennant Avenue to East Dunne Avenue, and one reach on West Branch Llagas Creek (Reach 11C) from Fitzgerald Road to Highland Avenue, providing 1-percent flood protection. This alternative would provide 1-percent flood protection in all reaches. The flood management measures included:

- Excavating 24.8 miles of earthen channel (Reaches 2, 3, 4, 5, 7A, 7B, 8B, 9, 11A, 11B, 11C, 12, 13, 14, 15A, 15B, 15C, and 16);

[3] All costs and estimated damages avoided for alternatives A, B, C, D, E, and F are referenced from the 1982 EIS/EIR.

- Constructing a rectangular concrete channel for 1.0 miles in Morgan Hill (Reach 8A);
- Constructing 4.1 miles of new channel (Reaches 7A, 10, 12, and 13); and
- Constructing 4.2 miles of levee on Llagas Creek (Reaches 6A and 6B).

Twenty-eight grade stabilization structures were proposed, to be designed as concrete drops and rock chutes that would provide fish passage. Forty existing bridges and 25 box culverts would be replaced. An 18-footwide maintenance road would be constructed on both sides of the channel. Alternative B would have required purchase of 573 acres of ROW, and removal of nine residences. Thirty-eight acres of riparian habitat would be removed for construction.

Out of an estimated 3,300 acres of cropland susceptible to flooding at that time, approximately 3,120 acres would be protected during the 1-percent flood under this alternative. The installation cost was $63.02 million, with an estimated $916,000 in annual average damages avoided.

Alternative C—One-percent Flood Protection for Morgan Hill and Gilroy Urban Areas and Llagas Creek below Urban Areas

Flood protection under this alternative would be similar to Alternative B, except there would be no flood management improvements along East Little Llagas (Reaches 14 and 16), Corralitos creeks (Reach 15), and West Branch Llagas Creek between Highland Avenue and Fitzgerald (Reach 11C). The flood management measures included:

- Excavating 15.8 miles of earthen channel (Reaches 2, 3, 4, 5, 7A, 7B, 8B, 9, 11A, 11B, 12, and 13);
- Constructing a rectangular concrete channel for 1.0 miles in Morgan Hill (Reach 8A);
- Constructing 4.1 miles of new channel (Reaches 7A, 10, 12, and 13); and
- Constructing 4.2 miles of levee on Llagas Creek (Reaches 6A and 6B).

Twenty-one grade stabilization structures were proposed, to be designed as concrete drops and rock chutes that would provide fish passage. Thirty-six existing bridges and 13 box culverts would be replaced. An 18-footwide maintenance road would be constructed on either side of the channel. Alternative C would have required purchase of 370 acres of ROW and removal of eight residences. Thirty-two acres of riparian habitat would be removed for construction.

Out of an estimated 3,300 acres of cropland susceptible to flooding at that time, approximately 2,420 acres would be protected during the 1-percent flood. The installation cost was $51.95 million, with an estimated $889,000 in annual average damages avoided.

Alternative D—One-percent Flood Protection for Morgan Hill and Gilroy Urban Areas with 10- percent Protection in all Other Areas Described under Alternative B

This alternative would provide 1-percent flood protection in Morgan Hill (Reaches 7 and 8), Gilroy and downstream (Reaches 2, 9, 10, 11A, 11B, 12, and 13). Ten-percent protection would be provided along Corralitos (Reach 15) and East Little Llagas creeks (Reach 14), and downstream from Morgan Hill (Reaches 3, 4, 5, and 6). The flood management measures included:

- Excavating 29 miles of earthen channel (Reaches 2, 3, 4, 5, 6A, 6B, 7A, 7B, 8B, 9, 11A, 11B, 11C, 12, 13, 14, 15A, 15B, 15C, and 16);
- Constructing a rectangular concrete channel for 1.0 miles in Morgan Hill (Reach 8A); and
- Constructing 4.1 miles of new channel (Reaches 7A, 10, 12, and 13).

Twenty-eight grade stabilization structures were proposed, to be designed as concrete drops and rock chutes that would provide fish passage. Thirty-eight existing bridges and 24 box culverts would be replaced. An 18-footwide maintenance road would be constructed on both sides of the channel. Alternative D would have required purchase of 397 acres of ROW and removal of seven residences. Thirty-eight acres of riparian habitat would be removed for construction.

Out of an estimated 3,300 acres of cropland susceptible to flooding at that time, approximately 1,810 acres would be protected during the 1-percent flood. The installation cost was $50.38 million, with an estimated $887,900 in annual average damages avoided.

Alternative E—One-percent Flood protection for Morgan Hill with No Induced Flooding

Downstream and 1-percent Protection in Gilroy and Downstream Reaches

This alternative would provide 1-percent flood protection in Morgan Hill (Reaches 7 and 8), with channel modifications downstream to prevent induced flooding (Reaches 4, 5, and 6). One-percent flood protection would be provided in Gilroy and downstream (Reaches 2, 3, 9, 10, 11, 12, and 13). No work would occur on Corralitos or East Little Llagas creeks. The flood management measures included:

- Excavating 7.8 miles of earthen channel (Reaches 2, 3, 4, 7A, 7B, 8B, 9, 10, 11A, 11B, 12, and 13);
- Constructing a rectangular concrete channel for 1.0 miles in Morgan Hill (Reach 8A);
- Constructing 4.1 miles of new channel (Reaches 7A, 10, 12, and 13); and

- Selective clearing of vegetation and debris removal on 5.2 miles of stream (Reaches 4 and 6A).

Installation of 11 grade stabilization structures was proposed to be designed as concrete drops and rock chutes to provide fish passage. Nineteen existing bridges and 15 box culverts would be replaced. An 18-foot-wide maintenance road would be constructed on both sides of the channel. Alternative E would have required purchase of 335 acres of ROW and removal of four residences. Nineteen acres of riparian habitat would be removed for construction.

Out of an estimated 3,300 acres of cropland susceptible to flooding at that time, approximately 720 acres would be protected during the 1-percent flood. The installation cost was $24.1 million, with an estimated $842,400 in annual average damages avoided.

Alternative F—Same Level of Protection as Alternative E with Similar Flood Management Features in the Same Reaches, except no Work on West Branch Llagas Creek in Reach 11B, Elimination of one Maintenance Road and Levee in Reach 9 below Gilroy

This alternative would apply to the same reaches. Except there would be no work on West Branch Llagas Creek in Reach 11B and one maintenance road and levee in Reach 9 below Gilroy would be eliminated. It would provide 1-percent flood protection in Morgan Hill (Reaches 7 and 8), with minor channel modifications downstream to prevent induced flooding (Reaches 4, 5, and 6). One-percent flood protection would be provided in Gilroy and downstream (Reaches 2, 3, 9, 10, 11A, 12, and 13). No work would occur on Corralitos (Reach 15) or East Little Llagas creeks (Reach 14). The flood management measures included:

- Excavating 5.5 miles of earthen channel (Reaches 2, 4, 7A, 7B, 8B, 9, 10, 11A, 12, and 13);
- Constructing a rectangular concrete channel for 1.0 miles in Morgan Hill (Reach 8A);
- Constructing 4.1 miles of new channel (Reaches 7A, 10, 12, and 13);
- Selective clearing of vegetation and debris removal on 5.2 miles of stream (Reaches 4 and 6B); and
- Constructing levee on 0.9 mile of West Branch Llagas Creek channel (Reach 9).

Design differences from Alternative E to reduce Project costs would include eliminating the maintenance road on one side of the channel to reduce the ROW needed, and instead constructing access ramps to the channel bottom. A levee would be constructed in Reach 9 instead of excavating a channel. Fencing would also be eliminated along the concrete channel reach in Morgan Hill.

Installation of ten grade stabilization structures was proposed, to be designed as concrete drops and rock chutes that would provide fish passage. Eighteen existing bridges and 15 box culverts would be replaced. Alternative F would have required purchase of 171 acres of ROW, and removal of two residences. Nineteen acres of riparian habitat would be removed for construction.

Out of an estimated 3,300 acres of cropland susceptible to flooding at that time, approximately 480 acres would be protected during the 1-percent flood. Flooding from the 1-percent event would be eliminated on 946 acres of urban land. Five hundred and fifty-six buildings would receive protection. The installation cost was $21.97 million, with an estimated $834,300 in annual average damages avoided.

The 1982 EIS/EIR discussed the rationale for selection of Alternative F. The economic, environmental, and social factors for the six alternatives are illustrated in Table 2.3-1 (excerpted from the 1982 EIS/EIR). Only Alternatives E and F had a net positive cost-benefit (1.1:1 and 1.2:1), and, of the six alternatives studied; only Alternative F had a favorable cost-benefit specifically within the Morgan Hill area. Comparison of the alternatives found that the footprint of Alternative F was the smallest, requiring the least amount of land acquisition, fewest residential relocations, smallest loss of riparian habitat, minimized adverse effects on cultural resources, and had the least need for replacement of bridges and culverts.

Due to past California Department of Transportation (Caltrans) channel excavation for construction of U.S. 101, the Project sponsors and the NRCS recommended that mitigation to manage for induced flooding along East Little Llagas Creek (Reach 14), as well as to reduce erosion along the channel, be incorporated with Alternative F. Reach 14 is an excavated channel that was straightened and realigned by Caltrans in the 1970s while constructing U.S. 101. Public workshops later provided consensus for selection of Alternative F with mitigation along Reach 14.

Project measures on Reaches 2, 9, 10, 11A, 12, and 13 were subsequently completed by the Project sponsors and the NRCS. In 1999, the USACE was authorized to assume the Project and the objectives of protection from a 1-percent flood event for the upstream urban reaches (Reaches 7 and 8) were retained from Alternative F. As a result of the project's authorization history, Alternative F has been referred to as the "NRCS" Project design. Consequently, the designation "NRCS" Alternative, instead of Alternative F, is carried forward throughout the remainder of this EIS.

2.3.2 West Little Llagas Instream Detention

West Little Llagas instream detention was an alternative considered by the USACE following authorization by Congress to lead the Project in 1999. This alternative would involve construction of a detention facility upstream of the Project reaches on West Little Llagas Creek. Detention storage of flood water could potentially provide some flood peak reduction that would, in turn, reduce the size of the channel modification needed in Reach 8 to carry the 1-percent flood. In the 1990's the City of Morgan Hill investigated a 15-acre detention pond located on Llagas Avenue at Hale Avenue.

The City investigation (MH Engineering, 1991) determined that the U-shaped channel in Reach 8 would still have to be constructed, with only a slightly smaller cross-sectional area, regardless of the detention storage basin. While the detention pond could reduce the 1 percent flow just downstream from the pond at Hale Avenue (from 626 to 290 cfs), its benefit diminished progressing downstream as additional runoff from the watershed contributed to the discharge in the flood channel (Table 2.3-2). Although an instream detention basin would reduce the size of the flood conveyance channel needed through Reach 8, and therefore a smaller ROW would be needed along the creek, the cost-benefit ratio was determined to make the alternative infeasible. Even if this were not the case, this property is no longer available for the construction of detention facilities.

The conclusion drawn from the study remains useful because it demonstrates that more than 15 acres would be required in order to provide adequate flood reduction benefit to make an instream detention basin upstream of Morgan Hill a viable element in any of the alternatives. Even if detention storage is included in the design, it would only benefit the uppermost reaches of the project. Improvements would still be necessary further downstream in Morgan Hill. Therefore, the concept of providing detention storage upstream of Morgan Hill was subsequently dropped.

A West Little Llagas Creek Detention Pond Study (Study) and Flood Protection Measure analysis and report was prepared in May 1997 by SCVWD staff (SCVWD 1997). The Study evaluated the feasibility of a detention facility above the upstream reach of the Project, near Llagas Road, approximately 500 feet west of Hale Avenue. Two conceptual plan alternatives were developed to determine the feasibility of upstream detention.

- Case I, also known as a Shallow Pond alternative, maximized the off-creek detention storage at an elevation that could drain the floodwaters by gravity flow into an existing adjacent channel invert, thus no channel improvements. The maximum storage volume capacity for the shallow pond was determined to be 42 acre-feet (AF) at its weir and spillway elevation.
- Case II, also known as a Deep Pond alternative, the detention facility was to be excavated deeper such that it would drain by gravity, compatible with the excavated channel design per the PL 83-566 proposed Project improvements, a deeper and wider creek invert. This alternative would not avoid PL 83-566 creek improvements, thus in-creek impacts would still occur. Under Case II, the detention facility had a maximum capacity to store a volume of 84.1 AF at its weir and spillway elevation. Case II represented a detention facility that approximately doubled the Case I storage capacity.

The Study concluded that the reduction in required channel improvements for both Case I and Case II was greatest immediately downstream of the proposed detention facilities, but diminished to insignificant at the proposed confluence with Llagas Creek near Monterey Road. In summary, detention storage of the upstream flows would not prevent downstream inflows from causing flooding. The Study concluded that constructing a detention facility upstream of the

Proposed Project limits would not prevent downstream flooding. Downstream in-creek improvements would still need to be constructed to meet Project objectives. Therefore, an upstream detention facility was eliminated as an alternative because it could not avoid the need for creek improvements and associated environmental impacts.

The concept of off-stream storage was recently re-examined (SCVWD 2013a). SCVWD staff reviewed the inflow hydrograph for West Little Llagas Creek downstream of Edmundson Avenue within the City of Morgan Hill. Based on this hydrograph, the peak 1-percent exceedance flow expected for West Little Llagas Creek downstream of Edmundson Avenue (i.e., Reaches 7B and 8) is 2,093 cfs.

West Little Llagas Creek has an existing capacity of approximately 80 cfs. Therefore a detention facility would have to be designed to contain approximately 2,013 cfs to avoid flooding during a peak storm event along West Little Llagas Creek with a detention storage capacity of approximately 1,170 AF. Assuming a detention facility was designed with a depth of 8 feet, approximately 150 acres of land would be needed.

A detention facility not adequately sized to store 1,170 AF would allow flooding downstream. Constructing a smaller detention facility would therefore still require channel modifications such as widening to prevent flooding. Widening the channel a limited amount, for example 5 feet or so, would result in construction related ground disturbance and likely environmental effects that would be similar to widening the channel by a greater amount. The existing riparian vegetation and existing top of bank vegetation would be similarly impacted. Therefore, a detention facility of sufficient size to store the upstream peak flow is not considered a feasible option that reduces environmental effects.

Additionally, there are several challenges to design and construct a detention facility of this size and magnitude:

- The detention facility inlet and outlet works would need to be properly sized and designed to capture excess flows and later release this water to West Little Llagas or Llagas Creek;
- The effort and resources to maintain such a facility to efficiently function long term may be significant;
- The area is known to have a high groundwater table that could result in standing water within the detention facility, thus further reducing capacity of the detention facility;
- Potential standing water could result in public concerns for West Nile Virus and,
- A total detention facility footprint of 150+ acres in size is not practical, would face its own environmental issues, and would likely not receive favorable public support.

A supplemental analysis of instream detention storage (SCVWD 2013b) was recently performed to adjust the analysis presented above using current flow conditions (as of 2006) rather than using future build-out conditions (represented by the year 2050). The analysis using the current flow conditions found that the results differed insignificantly from the previous 2050 build-out results. Based on this additional analysis for a detention facility constructed within Reach 7A, the concept of off-stream storage is eliminated for the following reasons:

- A detention facility lesser in size than needed to prevent the 1-percent exceedance flood would result in the need for downstream channel modifications, thus resulting in similar environmental impacts to the recommended design;
- A detention facility constructed to capture upstream flows to avoid induced flooding in the downstream Reaches of 4, 5, and 6 would not address the Project's objective of providing a stable channel that will neither widen or narrow, down-cut or aggrade, on a large scale over the long-term;
- A detention facility would result in additional impacts to natural resources, such as taking agricultural lands out of production, loss of upland habitat for California tiger salamander, and potential entrainment issues for steelhead.

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Table 2.3-1 Comparison of Alternatives Presented in the 1982 EIS/EIR

Economic, Environmental, or Social Factor	A	B	C	D	E	(Selected Plan) F
Preventing Induced Flooding						
Federal Installation Cost ($)	0	0	0	0	497,4001	497,4001
Other Installation Cost ($)	0	0	0	0	1,340,0001	1,340,0001
Average Annual O&M Cost ($) 2	--	--	--	--	6,0001	6,0001
Additional Flood Prevention						
Federal Installation Cost ($)	41,857,500	42,178,500	37,147,100	33,621,200	15,168,000	13,347,000
Other Installation Cost ($)	20,134,600	20,838,900	14,807,600	16,756,500	8,930,000	9,020,400
Average Annual Installation Cost ($)	2,100,300	2,135,000	1,760,200	1,706,800	816,400	744,200
Average Annual O&M Cost ($)	83,900	88,600	66,500	88,600	47,300	43,200
Total Average Annual Cost ($)	2,184,400	2,223,700	1,826,700	1,795,400	863,700	787,400
Percent Damage Reduction						
Urban	99.9	99.9	97.8	99.2	97.5	97.1
Agricultural	94.9	99.9	97.1	20.9	33.5	24.0
Average Annual Benefits ($)	1,056,600	1,062,900	1,027,700	1,074,200	965,400	941,100
Net Benefits ($)	-1,125,500	-1,600,700	-799,000	-781,200	101,700	153,700
Benefit/Cost Ratio	0.5:1	0.5:1	0.6:1	0.6:1	1.1:1	1.2:1
Level of Protection	1 % urban and agricultural	1 % urban and agricultural	1 % urban; 1 % main branch	1 % urban; 10 % agricultural	1 % urban	1 % urban
Number of Remaining Buildings Flooded	7	7	65	93	139	152
Remaining Floodplain (1 %) (acres)	200	180	860	1,490	2,500	2,020
Additional ROW Needed (acres)	547	573	370	357	335	171
Residences Relocated	9	9	8	7	4	2
Riparian Habitat Removed (acres)	34	38	32	38	19	19
Riparian Habitat	Replace with mitigation	Replace with mitigation	Replace with mitigation	Replace with mitigation	Replace with mitigation	Replace with mitigation

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Economic, Environmental, or Social Factor	A	B	C	D	E	(Selected Plan) F
Steelhead Migration	Maintain with mitigation	Maintain with mitigation	Maintain with mitigation	Maintain with mitigation	Maintain with mitigation	Maintain with mitigation
Visual[3]	Replace with mitigation	Replace with mitigation	Replace with mitigation	Replace with mitigation	Replace with mitigation	Replace with mitigation
Cultural Resources Affected	CA-SCI-402 CA-SCI-452 Gilman Road Bridge Chesbro Reservoir sites	CA-SCI-402 CA-SCI-452 Gilman Road Bridge	CA-SCI-402 CA-SCI-452 Gilman Road Bridge	Gilman Road Bridge	Gilman Road Bridge	Gilman Road Bridge
Linear Park	Possible	Possible	Possible	Possible	Possible Morgan Hill and Gilroy	Possible Morgan Hill and Gilroy

[1] Costs are charged to benefits accruing from work already installed.
[2] No costs are provided in the USDA 1982 EIS/EIR.
[3] Visual refers to loss of mature existing trees and shrubs along an enlarged, linear channel alignment that would increase channel visibility and cause visual impact. Trees and shrubs would be replaced as mitigation for loss of visual/aesthetic resources.
Source: USDA Soil Conservation Service 1982.

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Table 2.3-2 Flow Rate and Costs for Channel Detention Storage above Reach 8

Channel Location	Length (Feet)	Flow Rate without Pond Q100[1] (cfs)	Flow Rate with Pond Q100 (cfs)	Cost without Pond	Cost with Pond	Total Cost Savings (cost without pond – cos with pond)
Llagas Rd.	437	585	585	$130,171	$130,171	$ 0
Pond	902	608	608	$282,709[2]	$1,785,827[3]	$ -1,503118
Pond at Hale	1,605	626	290	$382,808	$370,913	$11,895
Wright Ave.	2,121	688	355	$698,830	$599,025	$99,805
W. Main Ave.	2,994	823	596	$876,793	$657,275	$219,518
Dunne Ave.	4,760	1,047	856	$1,080,769	$825,397	$255,372
Edmundson Ave.	12,819		1,275			
Total	**N/A**	**N/A**	**N/A**	**$3,452,080**	**$4,368,608**	**$ -916,528**

[1] Q100 is the 100-year discharge, same as the 1-percent exceedance flow, or 100-year flood, these are just different notations describing the same flood frequency
[2] Includes 1.40 acres In right-of-way (ROW) land cost
[3] Includes 13.60 acres Land Cost
N/A = not applicable
Above costs include ROW at $2.50/sq.ft (square feet), 15-acre pond land acquisition cost at $100,000/acre, concrete box culverts and box channels and channel excavations. Concrete structures were priced using $375/cubic yard complete and in place. Not included in above cost are removal of structures, houses, temporary construction easements, and existing ROW, since these items would be a constant.
Source: adapted from MH Engineering report for City of Morgan Hill (Undated).

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2.3.3 Raise Chesbro Dam

To attenuate flows downstream of Chesbro Reservoir, Chesbro Dam could be raised. The USACE considered raising Chesbro Dam, along with other dams in the region, as a flood protection alternative (RMC 2003) in the larger Pajaro River watershed. In this alternative, Chesbro Dam would be raised 15 feet in order to store the 1-percent flood event. This would detain floodwater in the upper watershed, thereby delaying the peak flood flows downstream. By delaying the peak, this detention would attenuate flows from Llagas Creek into Reach 6. However, Reach 7A would also be diverting flow from Reaches 8 and 7B in Morgan Hill into Llagas Creek in Reach 6. The attenuation from raising Chesbro Dam could reduce the needed channel size enlargements downstream of where Llagas Creek crosses Monterey Highway (Reaches 4, 5, and 6), but some improvements will still be necessary to convey flows[4]. This alternative would not create a benefit for the Morgan Hill (Reaches 7B and 8) area, nor would it provide any flood benefit in East Little Llagas Creek (Reach 14), so the other channel improvements associated with the NRCS Alternative would still be necessary.

The existing reservoir surface area is about 236 acres. The newly expanded reservoir behind a 15-foot higher dam would cover about 296 additional acres, bringing the total lake surface to about 531 acres. The enlarged lake would flood several thousand feet of Llagas, Tilton, and Heron creeks. A rerouting and reconstruction of approximately 5.0 miles of roadways, including Oak Glen Avenue and Willow Springs Road would most likely be required, as would a new bridge over the enlarged reservoir embayment extending upstream on Llagas Creek.

The reservoir would need to be empty or nearly so before a flood to maximize protection from the 1-percent event. This could present a problem under existing operational requirements of the reservoir, which include maintaining flow releases for downstream fish habitat. The dam would be raised 15 feet in the upstream direction to preserve the existing outlet facility. The raise would require a new crest length of about 1,025 feet compared with the existing crest length of about 690 feet. The new left (east) abutment would be located on the east side of Oak Glen Avenue.

Raising the dam or constructing a new dam would require approval from the State of California Department of Water Resources (DWR), Division of Safety of Dams (DSOD). Due to the seismic activity of the area, the design and approval process would be complex. Special engineering studies would be necessary to determine the seismic vulnerability of the raised dam. In addition, removal of sediment from the upstream area of the new dam raise would be a very extensive project.

Expanding Chesbro Dam would have significant regulatory issues. Permits would be required from USACE, United States Fish and Wildlife Service (USFWS), the

[4] The Alternative A Chesbro Dam raise of 2 feet described as part of the 1982 EIS/EIR (see Section 2.2.1) also included flood conveyance features such as channel excavation and levees in Reaches 4, 5, 6 downstream from the dam. As such, that alternative was configured differently than the 15-foot-high dam raise considered later by the USACE.

National Marine Fisheries Service (NMFS), and potentially other agencies. In addition, raising the dam opens up questions of water utility management that are beyond the scope of the Project. Depending on the costs of acquisition of land for the enlarged reservoir and for the realigned roads, the cost to raise the dam was projected to approach $100 million in 2004 dollars (USACE 2010a). The estimated construction cost for Reaches 4, 5, and 6 is conservatively $15 million (USACE 2010a). Even if the attenuation of flow was able to eliminate construction in the downstream reaches, the savings is not more than the cost to enlarge the reservoir.

The environmental costs of the project construction are likely to be significant, even assuming that the dam could be raised without emptying the reservoir. There is most likely an impact and consequently a mitigation cost from conversion of creek habitat to open water habitat flooded by the dam raise. There could be loss of the small steelhead gene pool that is currently found in the upper watershed. This area is considered to have high-quality habitat for spawning and rearing. Dewatering downstream of the dam would result in significant impacts to existing steelhead populations[5].

While raising the dam could be considered costly in terms of environmental effects and dollars, it is feasible. However, the benefit in terms of flood protection is not significant. The primary benefit would be that less excavation would be required in Reaches 4, 5, and 6. Raising the dam would provide no benefit to upstream areas including the City of Morgan Hill. Because the 7A reach would deliver approximately 2,000 cfs to Reaches 4, 5, and 6 during the 1-percent flood, additional channel capacity would still be needed in the downstream reaches. Because of high cost, limited flood protection benefit, and the potential cost of mitigation for loss of riparian and aquatic habitat, the dam raising alternative was not further studied.

2.3.4 Design Refinements Considered and Brought Forward

Since 1999, refinements have been periodically incorporated into the (Alternative F) NRCS design to address and better adapt the Project to increasing urbanization, changes in runoff conditions, riparian habitat[6], and to the federal listing of steelhead and the California red-legged frog. The following design objectives have been incorporated since 1999[7]:

- Provide for appropriate flood protection;
- Provide a better balance between flood control and habitat;
- Create a stable channel form (i.e., not aggrading or degrading) requiring less maintenance;

[5] Steelhead were listed as a threatened species in 1997 by NMFS. Llagas Creek was designated Critical Habitat for the South Central California Coast steelhead trout by NMFS in 2005.
[6] The re-operation of Chesbro Reservoir (in 2009) increased flow releases to Reach 6, thereby establishing a perennial stream along the upstream portion of this reach, which also caused a change in the presence of riparian vegetation.
[7] Upper Llagas Creek Project - Alternative and Design History, Memorandum for Record (USACE 2010a)

- Allow only limited impact to mature riparian corridor trees;
- Restore natural conditions to the extent feasible; and
- Provide improved access for steelhead (federally threatened species) to upstream spawning.

After the USACE assumed the Project, a design workshop was held in 2001[8], and public meetings were held in 2001 and 2002[9], which resulted in several modifications to the NRCS design. Changes in the Project features after the workshop and public meetings include:

- Setback levee between the right bank of Reach 7A (diversion channel) and the left bank of Reach 6 where the two channels join near Lake Silveira;
- Giant Reed (Arundo donax) eradication in the upstream reaches to be replaced with native riparian vegetation10,
- Removal of six rock chute drop structures from the 1982 design to provide free passage for steelhead migration.
- Construction of two grade control structures in Reaches 7A and 14 to prevent steelhead migration into reaches that do not provide adequate habitat;
- Reach 4 designed as a trapezoidal channel form instead of conducting selective sediment and vegetation removal;
- Reach 6 designed as a two-stage flood channel instead of selective widening;
- Reach 8 designed as a trapezoidal vegetated gabion instead of a concrete channel; and
- Minimize use of riprap to protect channel from erosion.

Based on comments received at these meetings, three design alternatives for Reach 8 were considered, including using a vegetative gabion lining to simulate

[8] Workshop held between USACE, USFWS, California Department of Fish and Game (CDFG), NMFS, NRCS, and the SCVWD on May 30, 2001 to discuss restoration and enhancement features that could be part of the new project design.
[9] Following the 2002 public meeting in Morgan Hill the USACE and SCVWD prepared a study to determine: the extent of the flood control problem in Downtown Morgan Hill; the most feasible option for preventing further flooding and loss of businesses and homes; and, if the plan would be acceptable to the citizens of the surrounding areas of the creek. During this process, public, regulatory agency, and team meetings all played a part in narrowing down alternatives to satisfy the needs for all parties (Office Report [USACE 2002 and 2003]).
[10] This also was a mitigation obligation for the SCVWD's Stream Maintenance Program (SMP), authorized by the Biological Opinions from National Oceanic and Atmospheric Administration (NOAA) Fisheries (July 31, 2002, 151422-SWR-01-SR-408:ME) and USFWS (July 5, 2002, PN 22525S). In 2005, a giant reed (arundo donax) control program was started on Upper Llagas Creek. As of 2009, about 8 acres of giant reed have been removed from the Project area and treatment of regrowth was scheduled to continue through 2012 (Upper Llagas Creek Project - Alternative and Design History, Memorandum for Record [USACE 2010a]).

a natural channel, a bypass channel to divert high flows constructed under the existing roadways, and a reinforced concrete box culvert to enclose the existing creek. The USACE and SCVWD recommended a hybrid of the vegetative gabion lining and the reinforced concrete box culvert to be used in Reach 8.

The USACE and SCVWD continued to refine the Project design elements between 2002 and 2010. In 2007 the USACE considered four additional options for alignments of the Reach 7A diversion channel, and a final evaluation of these alternatives was completed in 2010[11]. The 2010 evaluation considered channel stability and sediment transport criteria in the alignment, dimensions, and design of the 7A diversion channel as well as all of the other Project reaches. A final alignment of the Reach 7A diversion channel downstream from the Lake Silveira outlet to connect with Llagas Creek immediately upstream from Monterey Road was adopted from the 2010 analysis. The NRCS diversion alignment had Reach 7A entering Llagas Creek at Lake Silveira, approximately 2,250 feet upstream of Monterey Road.

Since 2010, additional sediment transport and hydraulic studies have been conducted by the SCVWD to assist with determining stable channel dimensions and form that would not result in channel aggradation (i.e., sediment deposition), or degradation (i.e., scour and incision), and that would reduce potential long-term maintenance and would continue to meet flood capacity objectives. Other refinements to the channel design included: eliminating the setback levee along the right bank of Reaches 7A and 6; eliminating the two grade control structures to prevent steelhead migration; and replacing the vegetated gabion channel with three other channel forms. These channel forms were a vegetated trapezoidal channel; a vertical- walled concrete channel, or a hybrid trapezoidal channel with vegetation on one bank; and concrete vertical wall on the other bank in Reach 8.

In late 2012, the SCVWD held a Public Scoping Meeting in Morgan Hill to discuss the latest progress in the Proposed Project design and environmental studies and to receive public input related to the Project. During this meeting, several comments were made by attendees that upstream from the Project there has been a persistent, long-term flooding problem at Llagas Road. The public requested SCVWD to consider whether the flooding could be addressed under the Proposed Project design. As a result of the meeting and the stated public concerns, the SCVWD incorporated measures into the Project design to address flooding at Llagas Road. The measures include removing a cinder block/plate wall constriction at the existing Llagas Road culvert to allow maximum flow capacity through the culvert and thereby eliminate backwater induced flooding. Downstream from the Llagas Road culvert, the channel would be widened and deepened to accommodate the new flow capacity through the bridge so as not to induce flooding along the approximately 2,500-foot channel length between Llagas Road and Hillwood Lane.

In 2003, the USFWS issued a Draft Coordination Act Report[12] (CAR), which USFWS is in the process of providing a letter of concurrence for the CAR and

[11] Upper Llagas Creek Flood Control Project, Santa Clara County, California with Project Hydraulic Analysis (USACE 2010a).

[12] Fish and Wildlife Coordination Act Report, Fish and Wildlife Service, U.S. Department of Interior, and Llagas Creek Flood Control Project, May 2003.

Project based on the updated Project design and technical studies. The CAR provides federal input on potential mitigation measures to protect or conserve fish and wildlife resources. The 2003 CAR recommended inclusion of 40 conservation and mitigation measures. Many of these measures are related to providing instream aquatic habitat features and they have been incorporated by the SCVWD into the current Project.

Section 2.6 summarizes the NRCS Alternative Project description and a set of new alternatives developed by the SCVWD, which are analyzed in this EIS.

2.4 NO ACTION ALTERNATIVE

NEPA regulations require consideration of the No Action Alternative, which can be used as a benchmark for comparison of the environmental effects of the various alternatives. The No Action Alternative would result from the USACE not issuing a DA permit for discharge of dredged or fill material into in waters of the US regulated pursuant to Section 404 of the Clean Water Act. Under the No Action Alternative, the Project would not be built, and no new land purchases or construction activities would occur. Flooding in the residential areas of Morgan Hill and San Martin would continue. Figure 2.4-1 shows the extent of the 1-percent exceedance flood (100-year flood) under the No Action Alternative. Currently, the West Little Llagas Creek channel through the City of Morgan Hill has less than a 10-percent flood capacity (<400 cfs at Hillwood Lane and <720 cfs at Spring Avenue).

There has been extensive historic engineering of the West Little Llagas Creek, East Little Llagas Creek, and Llagas Creek channels, including construction of bridges, culverts, and channelization in response to agricultural and urbanized land use changes in past decades. Storm runoff would continue through these channelized reaches. The proposed channel in Reach 7A would not be constructed under the No Action Alternative. Historic rates of channel streambed incision[13] of 0.4 to 0.8 feet per decade, (Balance Hydrologics 2012a) and resultant channel bank erosion and widening would likely continue. Under the No Action Alternative there would be no fish habitat improvement features installed.

The SCVWD implemented the first SMP (stream management plan) in 2002. The SMP established procedures for routine maintenance of stream channels involving ongoing sediment removal, vegetation management, bank protection, and associated minor activities. The SMP incorporated a wetland and riparian mitigation program, a series of resource protection policies, and Best Management Practices (BMPs) to reduce environmental impacts from the aforementioned maintenance activities. In April 2011, the SCVWD published a Draft EIR evaluating an update to the SMP (SCVWD 2011a) and the Final EIR was certified in January 2012. The SMP Update addresses bank stabilization, sediment removal, vegetation management, management of animal conflicts, and minor maintenance. Under the No Action Alternative, maintenance of the Upper Llagas Creek facilities would be conducted in accordance with the guidelines established in the SMP Update. Implementation of the SMP renewal project began in

[13] Causes of historic and ongoing channel incision are identified as the cumulative effects of decades of changes in land use, the increase in impervious surfaces from urbanization, sediment supply loss associated with Chesbro Reservoir, water diversions, hydrograph modifications, and past channelization (Balance Hydrologics 2012a; Schaaf & Wheeler 2012).

late 2012 and is reauthorized for the next 10 years (2012–2022). The SMP includes various BMPs (Appendix B) that guide how maintenance work is performed to protect biotic and other resources.

Work within the SMP can be divided into two general categories: regularly-scheduled work (most vegetation management, trash pick-up) that occurs in the same place and the same manner with a predictable frequency; and other routine work that is not undertaken on a regular annual schedule, but is done as the need arises. This latter type of work (e.g., sediment removal and bank protection) has a less predictable frequency and location. Therefore, selection of BMPs are managed differently for these two types of work. In the Project area, SCVWD maintenance staff conducts annual inspections of fee-owned and easement areas. Once the inspection process is complete, SCVWD staff evaluates what work should be conducted. Maintenance activities are performed in accordance with the SCVWD established Maintenance Guidelines (1992) for Llagas Creek as updated in 2012, which includes West and East Little Llagas Creeks.

Instream sediment removal and bank protection work is carried out from June 15 to October 30, or the first significant rainfall (≥ 0.5 inch of rain in a 24-hour period) after October 15, whichever occurs first. Typical maintenance activities include the following:

- Channels—Remove trash and obstructions to flow that collect in the channels, and removal of instream blockages (routine). Removal of large woody debris (that meets minimum size criteria of 1-foot diameter and 6-feet length) in anadromous streams requires mitigation.
- Stream bank protection—Repair slopes damaged by scour and erosion (as needed). Geomorphic studies have shown that historically the Llagas Creek channels have been incising at the rate of 0.4-0.8 feet per decade and is ongoing (see discussion Section 3.2, Hydrology and Water Quality). This channel incision is likely to result in over-steepening of streambanks leading to instability and erosion that will require bank protection and repair.
- Sediment management—Routine sediment maintenance that is currently being performed within the Project reaches under the SMP would continue. Sediment removal has historically been conducted in a couple of areas on regular intervals. Removal of sediment on Reach 14 to the confluence with Llagas Creek occurs approximately every 5 years while sediment in front of the Church Ponds inlet structure (Reach 6) occurs approximately every 4 years. Since Reaches 4 and 5 tend to go dry at the end of the summer season, sediment management would be restricted in these two reaches to periods when there is no in-channel flow. Reaches 7 and 8 have intermittent flow, tend to go dry in the summer, and steelhead do not access these upstream reaches. As such, sediment maintenance in Reaches 7 and 8 can be performed any time during low flows. Reach 6 is supported by year-round flows due to releases at Chesbro Dam. Reach 6 provides steelhead habitat during the entire year and, therefore, would require a sediment maintenance approach that would continue to protect steelhead habitat. Sediment maintenance in Reach 6 is limited to occur only between June 15 and October 30 or the first significant rainfall after October 15, whichever occurs first. No sediment removal has been performed in Reach 6 in the past 10 years under the previous SMP. However if sediment removal is

needed, the appropriate BMPs to dewater the channel, protect anadromous fish, and restore channel habitat features, would be implemented (Appendix B).

- Vegetation management—Ongoing management of vegetation in and adjacent to creeks is necessary to maintain the channel flood conveyance capacity. Most channels require some type of periodic vegetation control. The SCVWD also manages vegetation for other purposes including the protection of concrete linings from plant roots; meeting local fire codes requiring the control of combustible weeds and grasses; providing visual clearance to inspect the condition of a facility; and providing access along maintenance roads. Removal of vegetation occurs by the use of herbicide, hand pruning, hand removal, mowing, or by discing. Removal of vegetation by hand can be undertaken between July 1 and March 1. Vegetation control and removal in channels, on stream banks, as well as maintenance roads is limited to that necessary for facility inspection purposes, to meet regulatory requirements, required to comply with fire codes, and that is required to meet capacity requirements per SMP guidelines.

Removal of trees larger than 6-inch diameter at breast height (dbh) is not considered a routine vegetation activity and is not included in the SMP. As such, no trees greater than 6-inch dbh would be removed from the flood conveyance channels except, if substantially leaning, diseased, or dead, and their removal is needed to meet the hydraulic characteristics of the channel with separate environmental review.

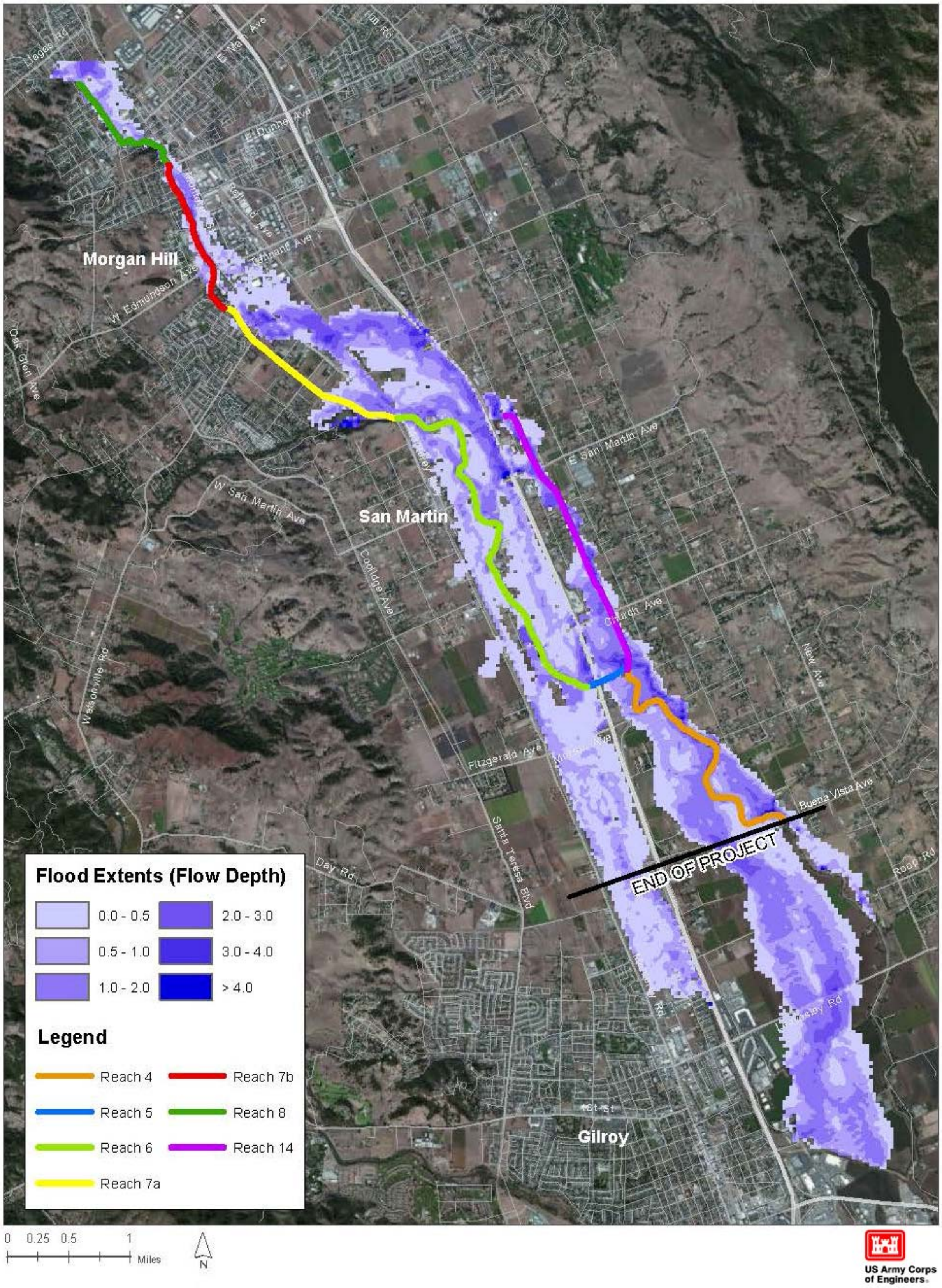
Specific vegetation activities performed within the Project reaches where the SCVWD has fee or easement on the mainstem of Llagas Creek from Buena Vista to upstream of Church Avenue (Reaches 4, 5, and a portion of 6) include pre- and post-emergent herbicide application on roadways/firebreaks; mowing of slopes; and removal of instream woody vegetation. The SCVWD has limited ROW on the rest of the Llagas Creek mainstem; therefore, no work is conducted there.

For West Little Llagas (Reach 7) on the SCVWD ROW, vegetation management activities include: pruning of overhanging growth for access into roadways and bridges, removal of instream woody and aquatic vegetation, mowing of slopes and pre/post emergent herbicide application on roadways/firebreaks. For East Little Llagas (Reach 14) the SCVWD maintains the ROW and conducts the following activities: removal of stream woody vegetation, mowing of slopes, and pre/post emergent herbicide application on roadways/firebreaks.

- Minor maintenance activities are small in size that results in removing less than 0.05 acre (2,178 square feet) of wetland or riparian vegetation. The minimum size for any minor vegetation work to be notified in SCVWD's Nationwide Permit (NWP) is 0.01 acre (436 square feet) per project, which includes any vegetation work necessary for access or staging. These activities include cleaning debris and minor sediment removal from culverts; removal of trash or debris that could impede flows; trash rack cleaning; clearing debris from bridge pilings/piers; repair and installation of gates and fences; repair of maintenance roads, and graffiti removal. These activities are (and would be) done in a manner that is sensitive to protection of aquatic resources.

- Giant Reed Control—The SCVWD also conducts a Giant Reed (Arundo donax) Control Program as mitigation for impacts associated with SMP vegetation management activities. Control of Arundo in the Llagas Creek watershed began in 2005 and continues today. Under that program, the SCVWD has completed 8.2 acres of Arundo control on Llagas Creek with the majority of that work (~5 acres) occurring in the reaches between the Church Avenue Percolation Ponds to upstream of Llagas Avenue. Arundo has been persistent within the watershed and has required numerous re-treatments to control new growth. However, the density of Arundo stands has been reduced overall by approximately 80 percent. All previously treated areas were re-treated, or were scheduled for re- treatment, during the 2011–2012 SMP season.

Figure 2.4-1 Existing 1-Percent Flooding Extents--No Action Alternative



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2.5 PROJECT ELEMENTS COMMON TO ALL ACTION ALTERNATIVES

There are four action alternatives identified and analyzed in this EIS:

- Tunnel Alternative (Applicant's Proposed Action)
- NRCS Alternative
- Culvert/Channel Alternative
- Reach 6 Bypass Alternative

Project features that are common to each of the alternatives are described in this Section 2.5. Subsequent sections discuss in greater detail each of the alternatives and the project features that are pertinent to each alternative. The Tunnel Alternative is identified as the Applicant's Proposed Action by the SCVWD. From hereon the Tunnel Alternative is referred to as the Applicant's Proposed Action.

A 65-percent engineering design prepared for the SCVWD in March 2013 is the basis for the flood risk management elements that comprise the action alternatives evaluated in this EIS (RMC 2013). All of the action alternatives provide flood management for a 1-percent flood in Morgan Hill (Reaches 8, 7A, and 7B); 10-percent flood management for the semi-urban area around East Little Llagas Creek (Reach 14); and avoid induced flooding elsewhere on Llagas Creek (Reaches 6, 5, and 4) due to upstream modifications. The post-Project flood extents for all alternatives is shown in Figure 2.5-1. The existing 1-percent exceedance flood inundates approximately 3,074 acres. The action alternatives reduce flood extents to approximately 1,365 acres.

Most of the differences between all of the action alternatives are focused on the project alignment for flood routing and the type of flood management features used in areas in Reach 8. All of the action alternatives depend on a newly constructed 1.25-mile-long channel segment in Reach 7A that will direct flow from West Little Llagas Creek at Watsonville Road to Llagas Creek just downstream from Lake Silveira. Most of the flood management features that would be implemented in Reaches 7A, 7B, 4, 5, 6, parts of Reach 8, and 14 are the same in each of the alternatives, except the Reach 6 Bypass Alternative would not require channel widening, deepening or other flow capacity improvements in Reach 5 and most of Reach 6. The common flood management features and activities for all of the action alternatives include:

- Widening (generally by constructing against one bank) and deepening the channel in all reaches (except a portion of Reach 8 under the Tunnel and Reach 6 Bypass alternatives);
- Construct sinuous low-flow channel, with benches at bankfull elevation (except for some areas in Reach 8);
- Permanent access roads at top of both banks in all reaches, (except for some areas in Reach 8);

- Aquatic habitat enhancements Reaches 4, 5, 6, and 7A (except for Bypass Alternative in Reach 5 and most of Reach 6, which have no planned enhancements);
- Grade control structures constructed of natural boulders, in all reaches;
- Culverts at two tributary drainages where they confluence with Reach 6 and three drainages in Reach 14 to provide for maintenance access;
- 1.25-mile-long channel on West Little Llagas Creek Reach 7A;
- Exhume buried bridge crossings in Reach 7A at Watsonville Road and West Middle Avenue;
- Replacing and/or modifying culverts at four road crossing locations in Reach 7B;
- Replacing culverts in Reach 8 (culvert replacement locations vary by alternative);
- Removal of a cinder block/brick wall that constricts flows at the Llagas Road culvert; cleaning of rocks, dirt and debris for all culverts and under the Hillwood Lane bridge in Reach 8;
- Relocation/replacement of some homes and other structures within the Project ROW;
- Replacement of the existing pedestrian footbridge on the private property at the corner of Llagas Creek Drive and Marianna Court;
- Installation of a stream gage upstream of the Church Avenue percolation ponds in Reach 6;
- Relocation/replacement of utilities within the Project construction footprint; and
- Acquisition of fee title and easements of adjacent land needed for Project construction and maintenance.

In addition to the common flood conveyance features listed above, all of the action alternatives would require the same type and extent of vegetation and sediment maintenance activities to provide the design flood capacity, as well as maintenance of other features such as roads, culverts, and grade-control structures. The following sections provide information on the Project design elements.

2.5.1 Channel Design Features Common to All Action Alternatives

Channel modifications in Reaches 4, 5, 6, 7B, and 14 would consist of widening and deepening, and would result in a cross section with a low-flow channel, bankfull channel, benches, and engineered banks that are 3H:1V slope. Figure 2.5-2 is a typical cross-section. The channel would be properly sized for sediment transport, geomorphic stability[14] and to allow for unimpeded fish passage. A low flow channel conveying approximately 2 cfs, would meander along the channel bottom within the bankfull channel.

Channel benches would typically be on at least one side and sometimes both sides of the channel, ranging from 9 to 21 feet wide. The channel bench is set at approximately the 2-year flow elevation. The channel benches would provide opportunities for natural deposition of sediments during runoff events and also potentially provide a surface for revegetation by way of natural recruitment and, if appropriate, for active plantings. In some areas e.g. where large meanders, crossings, and confluences occur, the benches would be eliminated to allow for additional capacity and/or to allow natural deposition patterns to form. The total top width of the channel is on the order of 125 feet, (excluding the maintenance road itself), but actual widths at any given location are variable depending upon the existing ground topography. This is about 30 to 60 feet wider than the existing channel. Channel depths would range up to approximately 14 feet, which is typically about 4 to 5 feet deeper than they are today. Channel widening would be limited to one bank, where possible, to avoid and preserve existing stands of mature vegetation.

In Reach 7A there is no existing channel; most of this reach is agricultural farmland. A new channel would be constructed (Reach 7A) that connects to the upstream Reach 7B; diverting flows from West Little Llagas Creek (Figure 2.2-4). West Little Llagas Creek would be disconnected from the newly constructed diversion channel at a location 0.2 mile south of South La Crosse Drive. By diverting flows at this junction, the flow in West Little Llagas where the existing channel turns east toward U.S. 101 would be limited only to local runoff where its confluence with East Little Llagas Creek includes approximately five local storm drain outlets. This will reduce flooding along the 1.9-mile-long segment of West Little Llagas Creek between La Crosse Drive and U.S. 101. The Reach 7A channel would also reduce flow in the East Little Llagas Creek channel along Reach 14 since this portion of the channel would no longer be connected to West Little Llagas Creek.

The design flow for Reach 7A is to provide capacity for the 1-percent flood (2,090 cfs). Reach 7A would receive flows from the upstream Reach 7B at La Crosse Drive and collect runoff from adjacent agricultural fields. The downstream end of Reach 7A is the confluence with Llagas Creek just upstream of Monterey Road. This alignment and point of confluence with Llagas Creek was extensively evaluated (Noble Consultants and Northwest Hydraulics 2008) to optimize channel sediment transport through the reach; to ensure channel stability, and to thereby reduce maintenance.

[14] A geomorphically stable channel is over the long-term, neither aggrading or incising, and is neither widening or narrowing. However, localized sediment deposition, incision, or localized changes in channel width can occur in a stable channel form.

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Figure 2.5-1 All Alternatives Post-Project 1-Percent Flood Exceedance Extents

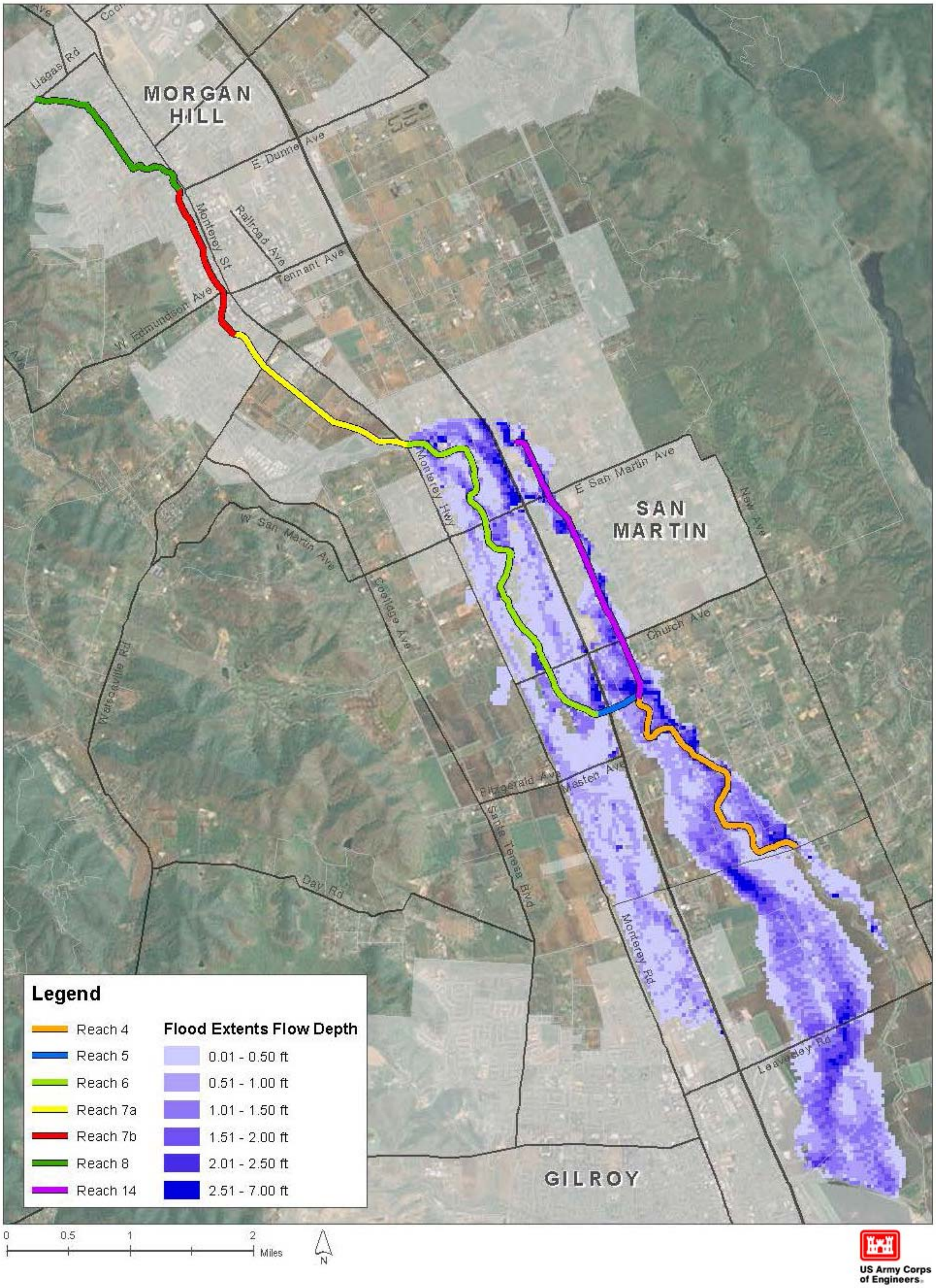

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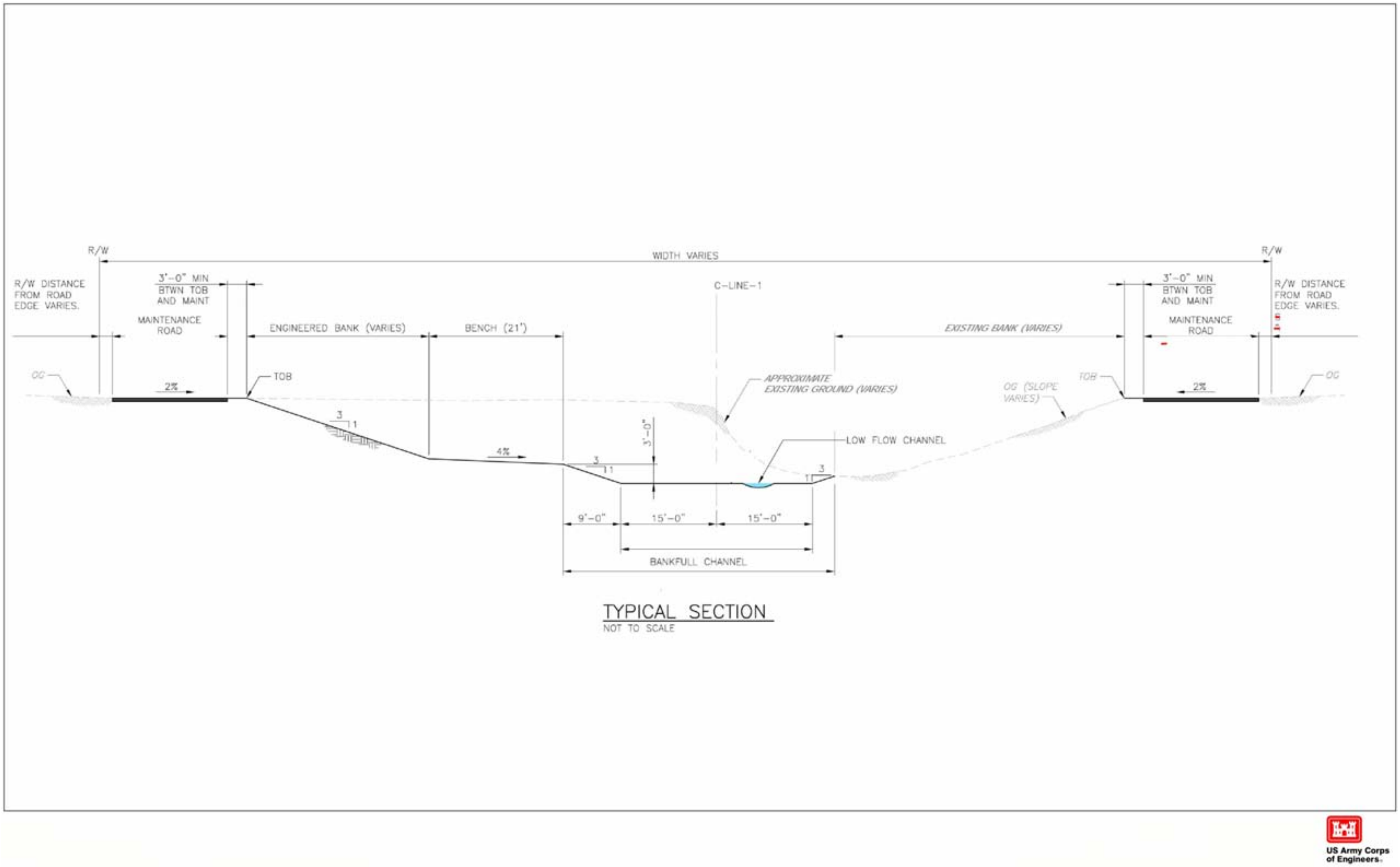
Figure 2.5-2 Typical Channel Cross-Section with Bench on One Side



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The Reach 7A channel segment would be designed similar to the channel cross section shown in Figure 2.5-2. The channel top width would range from 80 feet to 120 feet and excavated about 12 feet to 16 feet deep with 2H:1V or 3H:1V side slopes. Channel bottom width would be about 12 feet. Benches would be predominantly on one side of the channel, with a varying range of widths from 10 to 30 feet. A grade control structure constructed as a series of pools would be installed at the downstream end of Reach 7A / upstream portion of Reach 6 on Llagas Creek to transition the channel gradient where the new channel confluences with Llagas Creek below Lake Silveira.

The design flow for Reach 8 is to provide capacity for a 1-percent exceedance flood (410 cfs at Llagas Road and 640 cfs at Hillwood Lane). Channel modifications along Llagas Road to Hillwood Lane would be similar in concept to those described for the other reaches, and would involve widening and deepening the channel. The slope of the engineered banks in this upstream section of Reach 8 would be designed at a 2H:1V. The channel benches vary up to 10 feet. The channel benches, set at approximately the 2-year flow elevation, would provide opportunities for natural deposition of sediments during runoff events and also potentially provide a surface for revegetation by way of natural recruitment and, if appropriate, for active plantings. The total top width of the channel ranges from 30 to 80 feet (excluding the maintenance road), with the actual widths at any given location variable depending on the existing ground toporgraphy. Channel depths would be a maximum of 9 feet. The flow constricting plate on the culvert located at Llagas Road would be removed to reduce upstream flooding. This culvert would be cleared of rocks, dirt, and other debris. In addition, other culverts along this reach and the bridge at Hillwood Lane would also be cleared of rocks, dirts, and other debris. Another feature of this channel is replacement of an existing pedestrian bridge on private property with a 35-foot-long, 10-foot-wide pedestrian bridge constructed on concrete abutments.

The channel design for Reach 8 would be one of three types: a trapezoidal vegetated channel (Figure 2.5-3), a channel with two vertical walls (Figure 2.5-4), or a hybrid channel cross-section (Figure 2.5-5). Selection of the appropriate cross-sectional form would be based on local ROW constraints. The channel design with two vertical walls would be used where the ROW is most narrow; and the trapezoidal and hybrid channel forms would be used where there was a wider ROW that could accommodate those channel shapes. Note that these three channel forms in Reach 8 are applicable only to the NRCS and the Culvert/Channel alternatives. The Tunnel and the Reach 6 Bypass alternatives do not require modifying the existing West Little Llagas Creek channel through downtown Morgan Hill, but instead depend on a long section of underground culvert and a tunnel to divert high flows from the existing channel. For all action alternatives, the flow constricting plate at the Llagas Road culvert at the upstream boundary of the Project will be removed to reduce upstream flooding. The channel will be deepened and widened downstream from Llagas Road to Hillwood Lane to accommodate the 1-percent exceedance flow.

Maintenance/access roads would be provided along each reach, with roads at the top of the bank on one or both sides of the channel for winter flood management, maintenance, and inspection activities. The maintenance road would be 18 feet wide, designed for all-weather access, and would be aggregate-based. This 18-foot maintenance road width is needed to allow equipment to fully swing around and reach out as far as the center line of the channel bed for cleaning.

The maintenance road is to be constructed of aggregate base and involves some limited excavation. Access ramps would be constructed at various locations along the Project alignment to provide access to the channel bottom. Construction of access ramps and construction access areas within the Project site would be positioned to minimize the need for vegetation removal.

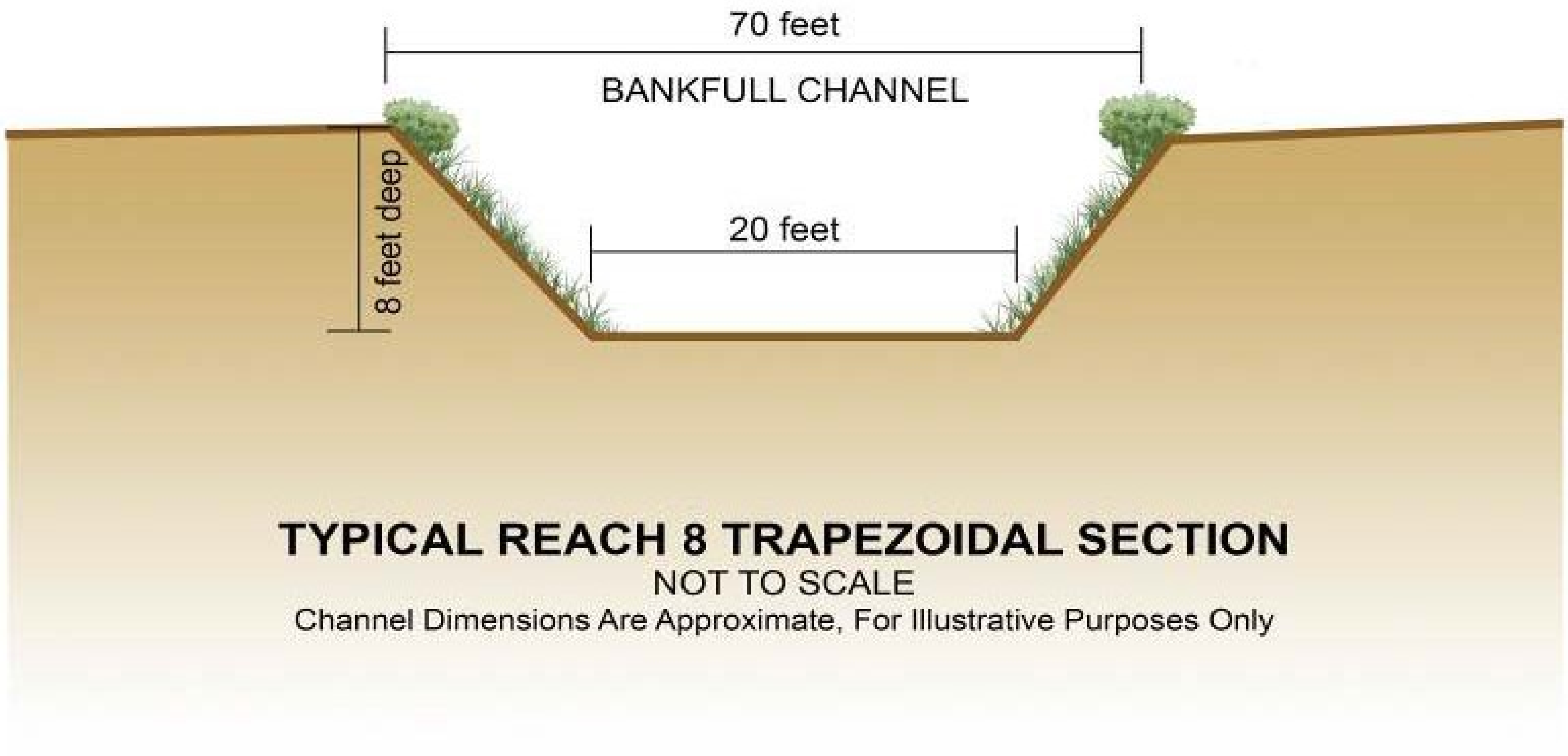

Figure 2.5-3 Reach 8 Trapezoidal Channel

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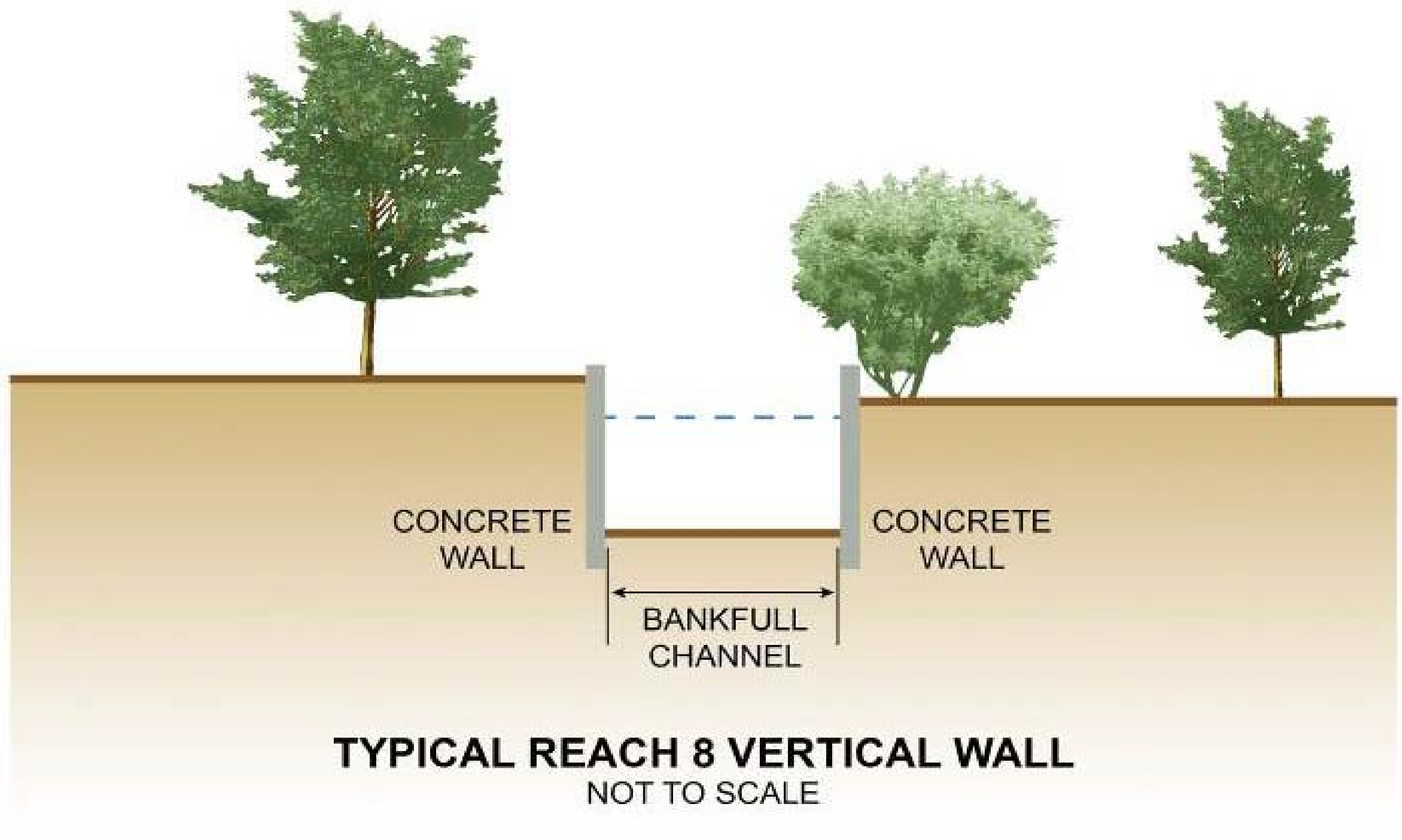

Figure 2.5-4 Reach 8 Channel with Vertical Concrete Wall

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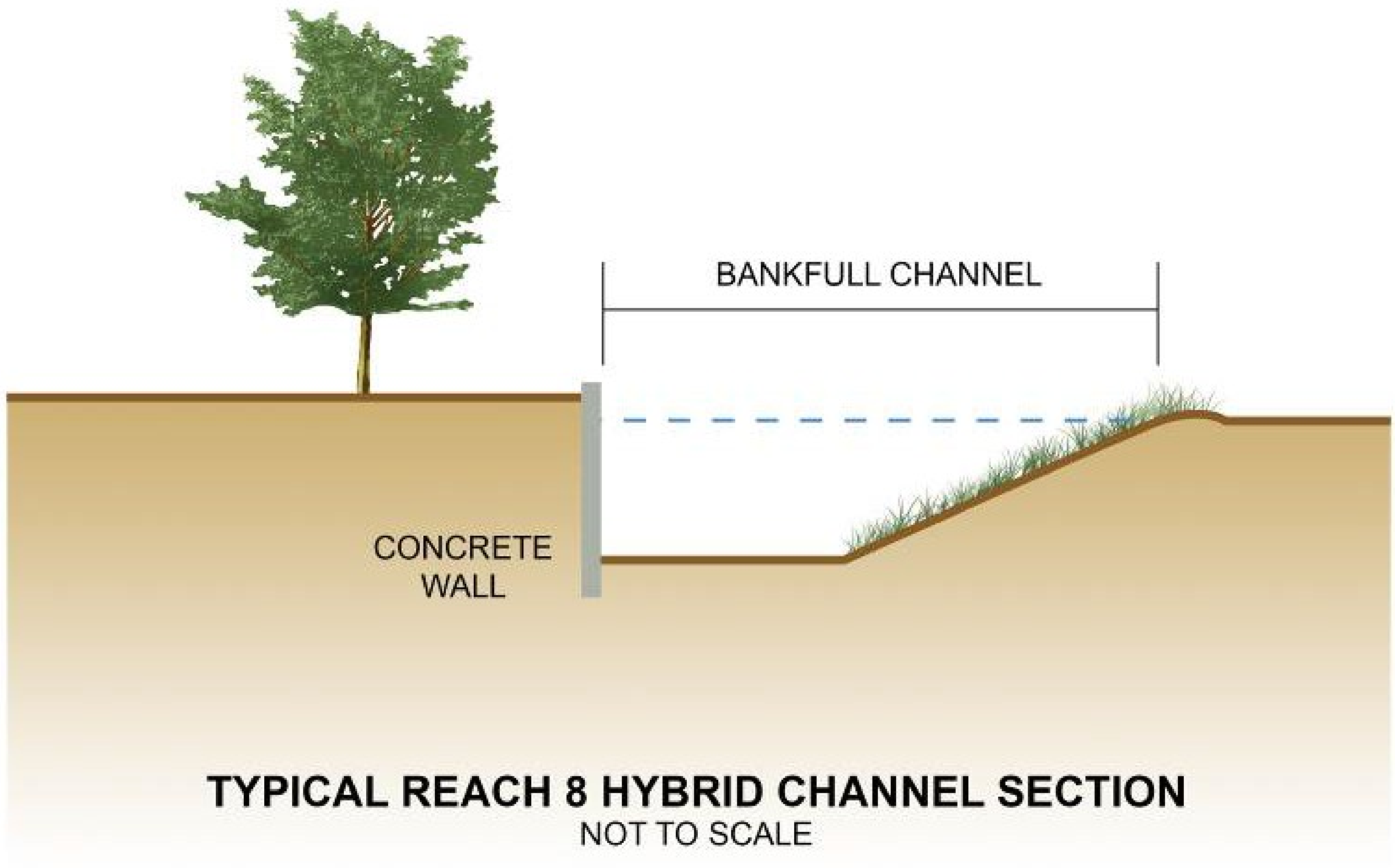

Figure 2.5-5 Reach 8 Hybrid Channel

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2.5.2 Easements and Land Requirements

Prior to construction, SCVWD would acquire ROW from landowners along the Project reaches. In general, most ROW would be acquired in undeveloped farmland or undeveloped portions of residential or commercial parcels, so existing structures would be minimally affected. However, some commercial and residential structures would be affected by temporary and permanent easements and the Project footprint. These structures would require relocation or removal.

Structures that are located within the construction footprint may have to be relocated or otherwise compensated. The structures identified within the construction footprint for each of the alternatives are listed in Table 2.5-1, which lists the Tunnel Alternative (Applicant's Proposed Action) first, organized by reach and followed by the number of each type of structure. The other alternatives list only those reaches where there is a difference from the Tunnel Alternative. For example, the NRCS Alternative has the same number of residential homes, greenhouses, outbuildings and miscellaneous structures in Reaches 4, 5, 6, 7A, 7B, and 14 as the Tunnel Alternative . Only Reach 8 is different with six residential homes under the NRCS Alternative rather than zero residential homes under the Tunnel Alternative in that reach.

Based on Table 2.5-1 for the Tunnel Alternative (Applicant's Proposed Action) there are 3 residential homes, 11 greenhouses, 21 outbuildings, and 5 miscellaneous/unknown structures that are located with the Project construction footprint. For the NRCS Alternative there are an additional 6 residential homes and for the Culvert/Channel Alternative there are an additional 4 residential homes within the construction footprint compared with the Tunnel Alternative, and these homes are all located in Reach 8. The Reach 6 Bypass Alternative has a total of three fewer residential homes inside the construction footprint than the Tunnel Alternative. The Reach 6 Bypass Alternative also has nine fewer greenhouses, 18 fewer outbuildings, and one fewer miscellaneous/unknown buildings in the construction footprint than the Tunnel Alternative.

Table 2.5-1 Structures Located within Project Construction Footprint

Alternative	Reach	Residential Homes	Greenhouses	Outbuildings (sheds, storage)	Miscellaneous/ Unknown
Tunnel Alternative)	4	0	1	3	1
	5	0	0	3	0
	6	2	9	15	3
	7A	0	0	0	0
	7B	1	0	0	1
	8	0	0	0	0
	14	0	1	0	0
	Total	**3**	**11**	**21**	**5**
NRCS[1]	8	6	0	0	0
	Total	**19**	**11**	**21**	**5**
Culvert/Channel[1]	8	4	0	0	0
	Total	**7**	**11**	**21**	**5**
Reach 6 Bypass[2]	5	0	0	0	0
	6 bypass	0	0	0	2
	Total	**3**	**2**	**3**	**4**

[1] For the NRCS and the Culvert/Channel alternatives, the only difference compared with the Tunnel Alternative (Applicant's Proposed Action) is in Reach 8.

[2] For the Reach 6 Bypass Alternative, there is no construction in Reach 5 and no construction in most of Reach 6, except for the segment 0.5 mile above the point of the Reach 6 bypass channel; all the other reaches are the same as the Tunnel Alternative.

2.5.3 Construction

Project construction would include channel modifications such as constructing and/or replacing culverts; installing maintenance roads and/or access ramps; constructing temporary (Reaches 6 and 14) and permanent (Reaches 7A and 7B) grade control structures, and upgrading bridge crossings. Revegetation work would be developed as part of a mitigation plan. An overview of a potential construction schedule listing construction activities, construction materials and disposal, equipment and crew needs, staging areas, and best management practices (BMPs) is provided in this section.

2.5.3.1 Construction Schedule

Construction would take place year-round. In-channel work would occur during the dry season, typically between May 1 and October 15. During this time flows are low or, in most reaches, the channel is dry. Revegetation and work in upland areas adjacent to the creek channel could occur outside the dry season. Construction in residential areas will take place Monday through Friday from 7:00 a.m. to 8:00 p.m. and Saturdays from 9:00 am to 6:00 p.m. Construction work outside of residential areas may go until 10:00 p.m. Night work activities may include construction on bridges, roadways, utility relocation, mobilization and demobilization, preparatory work, traffic control, clearing and grubbing, excavation, and tunneling. Emergency work, for example sewer main breaks, flooding, loss of utilities, and public safety issues, could require construction activities at later hours. All construction activities within residential areas, including work hours, would be governed by local noise ordinances (the City of Morgan Hill and Santa Clara County). City of Morgan Hill Municipal Code Chapter 18.48.040 D.1.d exempts public works projects from noise standards and indicates the public works director can set construction hours for these types of projects.

Phase 1 of the Project would be construction of the new channel in Reach 7A, the channel improvements in Reach 4, and part of Reach 5 up to U.S. 101. Temporary roads would be built for access for construction and for providing construction of channel modifications. After the completion of the Reach 7A channel there would be a temporary berm upstream of the Watsonville Avenue Bridge to direct flow through Reach 7B and thence into East little Llagas Creek so it would remain hydraulically disconnected from Reach 7A to avoid inducing flooding in Reaches 4, 5, and 6. After completion of Phase 1, it is anticipated that Phase 2 channel construction would be sequenced from downstream to upstream to avoid induced flooding. Estimates of time periods needed for construction by reach are shown in Table 2.5-2 for each of the alternatives. Table 2.5-2 shows the Tunnel Alternative (Applicant's Proposed Action) first, organized by reach and followed by timeframes. The other alternatives list only those reaches where there is a difference from the Tunnel Alternative.

Table 2.5-2 Construction Periods and Duration by Reach

Alternative	Reach	Begin Construction	End Construction	Duration (days)
Tunnel Alternative)	4	Year 1	Year 3	497
	5[1]	Year 2	Year 3	223
	6[1]	Year 2	Year 6	1,003
	7A	Year 1	Year 2	290
	7B	Year 3	Year 4	496
	8	Year 2	Year 5	735
	14	Year 2	Year 3	345
NRCS	8	Year 2	Year 5	735
Culvert/Channel	8	Year 2	Year 5	735
Reach 6 Bypass 1	Reach 6 (bypass channel) and Reach14	Year 2	Year 5	730

[1] No construction would be required in Reaches 5 and 6 of the Reach 6 Bypass Alternative, however the bypass segment itself and Reach 14 would be constructed.

2.5.3.2 Construction Activities

To the extent possible, construction would take place when the stream channel is dry, but some dewatering may be necessary in either reaches where flows persist during the summer months or where the groundwater table is above the design channel excavation depth, notably in the downstream portion of Reach 7A near Lake Silveira. Dewatering would be temporary and would be limited to the area in which active construction was occurring. Dewatering would be accomplished using a variety of methods identified in the SCVWD BMPs (see Chapter 5).

Channel modifications would entail widening, deepening and grading to increase capacity. Instream complexity features such as root wads, boulders and boulder clusters, and digger logs, would be installed in the channel as appropriate to improve instream conditions for aquatic species. Vegetation and soil would be removed (clearing and grubbing), with topsoil (where suitable) being salvaged before the start of earthwork. Large woody debris salvaged during clearing and grubbing will be re-used for fish habitat where possible within the construction footprint. Bank slopes would be graded, whenever possible, to a 3H:1V. Some areas would be graded to a 2H:1V slope (i.e., Reach 8). Stockpiled topsoil resulting from the channel modifications would be spread on Project design slopes to achieve the final grade. Storm drain outlets to the Project channel would be modified, as required, to adjust to the reconstructed channel banks. For erosion control purposes, riprap would be installed at the reconstructed storm drain outlets.

Construction would use conventional equipment such as backhoes, excavators, loaders, cranes, tractors, water tankers, paving breakers, graders, and compactors to achieve the required design criteria. Soil compaction during construction would be limited to facilitate revegetation. To facilitate revegetation infill plantings associated with vegetation/habitat mitigation, some minor grading, removal of debris and trash, will be necessary at some locations that are not proposed for channel flood capacity improvements. Construction activities and locations associated with vegetation mitigation are discussed in the Chapter 5.

All concrete box culverts would be pre-cast and delivered to the site, ready for installation with minimal preparation. The box culverts would be designed to be capable of supporting truck traffic loads. Installation of new culverts would require temporary road closures, which would be managed through a detour plan. Culverts to convey flows from tributaries under maintenance roads would be installed before construction of the maintenance road, and would be designed for loading consistent with maintenance vehicles. The prefabricated culverts would be either corrugated metal pipe or concrete cylinders.

Temporary grade control structures would be installed on Reaches 5 and 14 during Phase 1 of construction to allow for the change in grade that would be created by constructing the Phase 1 improvements. These temporary structures would be removed during Phase 2 of construction. A grade control structure designed as a series of rock pools would be constructed at the bottom of Reach 7A in Llagas Creek, located immediately upstream from the confluence with the Reach 7A channel to accommodate the change in grade where the two channels come together. Another permanent grade control structure would be constructed in Reach 7B on Edmundson Creek where the channel confluences with West Little Llagas Creek. Grade control structures, constructed primarily from rock materials would be installed at various locations along the channel. These structures would be buried into the subsurface, with the top of the structure located at the surface of the streambed.

Existing stream gages along the Project alignment will be temporarily removed and re-installed as construction is completed. A new stream gage will be installed near the Church Street percolation ponds in Reach 6.

2.5.3.3 Construction Materials and Disposal

Imported materials that might be required would be obtained from local suppliers. To the extent possible, excavated materials would be reused as fill in suitable locations. The primary disposal area would be to stockpile excavated earth material at Anderson Dam where it would eventually be used for an earthquake retrofit of the dam. A portion of the excavation material, approximately 275,000 cubic yards (CY) predominantly from Reach 7A will be used for the Lake Silveira mitigation element of the Project. Some of the excavated material may be reused on-site where fill or soil materials are needed. Suitable sites for disposal of any hazardous materials would be identified, as would specification language for handling of any hazardous materials consistent with state and local regulations. Disposal of clean material and soil would be done in accordance with SCVWD BMPs for handling and disposal of material. Preliminary estimates of earthwork quantities are shown in Table 2.5-3 for each of the alternatives by reach, beginning with the Tunnel Alternative (Applicant's Proposed Action). For each of the other alternatives, only those reaches that have different excavation and disposal quantities from the Applicant's Alternative are shown. For example, the NRCS Alternative has the same amount of excavation and disposal in Reaches 4, 5, 6, 7A, 7B, and 14 as the Applicant's Alternative, only Reach 8 differs with 66,000 bcy to be disposed under the NRCS Alternative rather than 73,000 bcy under the Applicant's Alternative.

Table 2.5-3 Estimated Excavation, Fill, and Disposal Volumes

Reach	Excavation (bcy)[1,2]	Fill (bcy)[1,2]	Disposal (bcy)[1,2]
Tunnel Alternative			
4	300,000	5,000	295,000
5 and 6	455,000	7,500	447,500
7A	400,000	50,000	350,000
7B	98,000	3,000	95,000
8	71,000	5,000	73,000
14	100,000	5,000	95,000
Total Tunnel Alternative	**1,424,000**	**75,500**	**1,348,500**
NRCS Alternative			
8	76,000	3,000	66,000
Total NRCS Project Alternative	**1,429,000**	**73,500**	**1,355,500**
Culvert/Channel Alternative			
8	79,000	3,500	75,500
Total Culvert Project Alternative	**1,432,000**	**74,000**	**1,358,000**
Reach 6 Bypass Alternative[3]			
5 and 6	0	0	0
6 Bypass Channel segment	27,730	0	27,730
14	169,520	8220	161,300
Total Reach 6 Bypass Alternative	**1,066,250**	**68,220**	**997,030**

[1] volumes are for the flood conveyance aspect of the Project only and do not include utility or roadwork
[2] bcy = bank cubic yards
[3] no excavation would be required in Reaches 5 and 6 of the Reach 6 Bypass Alternative, however the bypass segment itself and Reach 14 would be constructed.

2.5.3.4 Construction Equipment

Construction equipment would vary by reach, depending on the type of facilities to be constructed.

The number of estimated crews required for excavation and other related work would also vary by reach. There would be small differences based on the alternative and in relation to the amount of potential excavation required, the length of the reach, and access restrictions. Table 2.5-4 lists the estimated crew size by reach, along with the estimated construction duration and equipment to be used during construction.

Table 2.5-4 Construction Duration, Crew Size and Equipment

Construction Duration (months)	Crew Size (non-excavation)	Crew Size for Excavation Work[1]	Large Equipment to be Used byExcavation and Non-Excavation Crews	
Reach 4				
23	• Project manager & superintendent • 2 office staff • 1 foreman • 4 equipment operators • 12 laborers • 4 carpenters • 1 arborists • 6 landscapers • 6 roadway workers • 4 traffic control workers • 12 truck drivers	2 (for channel excavation and loading: • 1 equipment operator • 1 equipment grade checker)	• Dump Trucks (12–20 CY) • Vibratory and Static Roller (Single Drum) • Front End Loader (2.6-3.75 CY Bucket) • 2 Hydraulic Excavators (0.5–2CY) • Tractor Crawler/ Dozer • Paving Breaker • Air Hose and Compressor	• Backhoe (0.8 CY) • Grader (135 HP**) • Asphalt Compactor Roller (6 tons) • Water Tanker (5,000 Gal) • Hydraulic Crane • Hydroseeder (3,000 Gal) • Flatbed Trucks
Reaches 5 and 6				
10 (Reach 5) 46 (Reach 6)	• Project manager & superintendent • 2 office staff • 1 foreman • 4 equipment operators • 12 laborers • 3 carpenters • 1 arborists • 4 landscapers • 4 roadway workers • 4 traffic control workers • 9 truck drivers	3 (for channel excavation and loading: • 2 equipment operators • 1 equipment grade checker)	• Dump Trucks (12–20 CY) • Vibratory and Static Roller (Single Drum) • Front End Loader (2.6-3.75 CY Bucket) • 3 Hydraulic Excavators (0.5–2CY) • Tractor Crawler (Dozer) • Backhoe (0.8 CY) • Grader (135 HP) • Asphalt Compactor Roller (6 tons)	• Water Tanker (5,000 Gal) • Hydraulic Crane • Hydroseeder (3,000 Gal) • Flatbed Trucks *For Reach 6 Bypass Alternative Add:* • Pumps • Shotcrete Truck • Compressor • Vibratory and Impact Pile Drivers
Reach 7A				
13	• Project manager & superintendent • 1 office staff • 1 foreman • 4 equipment operators • 12 laborers • 3 carpenters • 1 arborists • 4 landscapers • 6 roadway workers • 4 traffic control workers • 12 truck drivers	2–3 (for channel excavation and loading: • 1–2 equipment operator(s) • 1 equipment grade checker)	• Dump Trucks (12–20 CY) • Vibratory and Static Roller (Single Drum) • Front End Loader (2.6-3.75 CY Bucket) • 2-3 Hydraulic Excavators (0.5–2CY) • Tractor Crawler (Dozer) • Backhoe (0.8 CY)	• Grader (135 HP) • Asphalt Compactor Roller (6 tons) • Water Tanker (5,000 Gal) • Hydraulic Crane • Hydroseeder (3,000 Gal) • Flatbed Trucks

Construction Duration (months)	Crew Size (non-excavation)	Crew Size for Excavation Work[1]	Large Equipment to be Used byExcavation and Non-Excavation Crews	
Reach 7B				
22	• Project manager & superintendent • 2 office staff • foreman • 4 equipment operators • 12 laborers • 3 carpenters • 1 arborists • 4 landscapers • 4 roadway workers • 4 traffic control workers • 9 truck drivers	2 (for channel excavation and loading: • 1 equipment operator • 1 equipment grade checker)	• Dump Trucks (12–20CY) • Vibratory and Static Roller (Single Drum) • Front End (2.6–3.75 CY Bucket) • 2 Hydraulic Excavators (0.5–2CY) • Tractor Crawler (Dozer) • Backhoe (0.8 CY)	• Grader (135 HP) • Asphalt Compactor Roller (6 tons) • Water Tanker (5,000 Gal) • Hydraulic Crane • Hydroseeder (3,000 Gal) • Flatbed Trucks
Reach 8				
36	• Project manager & superintendent • 2 office staff • 1 foreman • 8 equipment operators[2] • 24 laborers[2] • 3 carpenters • 1 arborists • 4 landscapers • 4 roadway workers • 4 traffic control workers • 9 truck drivers	2–3 (for channel excavation and loading: • 1–2 equipment operator(s) • 1 equipment grade checker)	• Dump Trucks (12–20CY) • Vibratory and Static Roller (Single Drum) • Front End (2.6–3.75 CY Bucket) • 2 Hydraulic Excavators (0.5–2CY) • Tractor Crawler (Dozer) • Backhoe (0.8 CY) • Grader (135 HP) • Asphalt Compactor Roller (6 tons) • Water Tanker (5,000 Gal) • Hydraulic Crane (90 Ton) • Hydroseeder (3,000 Gal) • Flatbed Trucks	For Tunnel and Reach 6 Bypass Alternatives, add: • Vibratory Sheet Pile Drive • Impact Pile Driver • Dril Jumbo • Roadheader • LHD Unit • Wheel Loader (4.88 CY) • Spader • Compressor • Shotcrete Truck • Pumps • Ventilation Fan

Construction Duration (months)	Crew Size (non-excavation)	Crew Size for Excavation Work[1]	Large Equipment to be Used byExcavation and Non-Excavation Crews	
Reach 14				
16	• Project manager & superintendent • 2 office staff • 1 foreman • 2-3 equipment operators • 12 laborers • 3 carpenters • 1 arborists • 4 landscapers • 4 roadway workers • 4 traffic control workers • 9 truck drivers	2 (for channel excavation and loading: • 1 equipment operator • 1 equipment grade checker)	• Dump Trucks (12–20CY) • Vibratory and Static Roller (Single Drum) • Front End (2.6–3.75 CY Bucket) • 2 Hydraulic Excavators (0.5–2CY) • Tractor Crawler (Dozer) • Backhoe (0.8 CY)	• Grader (135 HP) • Asphalt Compactor Roller (6 tons) • Water Tanker (5,000 Gal) • Hydraulic Crane (90 Ton – for culvert) • Hydroseeder (3,000 Gal) • Flatbed Trucks

*CY=cubic yards

** HP = horse power

[1] crew size shown is to run excavation equipment only, therefore, does not include all construction laborers, foremen, and supervisors, etc.

[2] For the NRCS and Culvert/Channel Alternatives, 4 equipment operators and 12 laborers is the Reach 8 construction crew size.

2.5.3.5 Staging Areas

Approximately 25 acres would be used in each of the actions alternatives for staging during Project construction. The proposed staging areas are shown in Figure 2.5-6. Parking for construction workers would be provided within SCVWD ROW and approved staging areas only. Staging areas, that are not already paved or covered with compacted aggregate base, would be graded, as required, and surfaced with compacted aggregate base rock over a geo-textile fabric that would maintain separation between native and construction materials. Staging areas would be used for parking vehicles, trailers, workshops, maintenance areas, or equipment, formwork, rebar, and metal product storage. Areas storing soils and sand would not be required to be surfaced with coarse aggregate base. Staging and equipment storage would take place in the following areas:

Reach 4

- *Site I*. 2.3 acres of vacant land along Masten Avenue and No Name Uno near the U.S. 101 interchange on the south side of the channel; and

- *Site J*. 4.6 acres in an agricultural field at the end of Denio Avenue, just north of Buena Vista Avenue, on the south side of the channel.

Reach 5 and Reach 6

- *Site G*. 0.13 acre of SCVWD-owned lands at the Church Avenue percolation ponds on the west side of the channel;
- *Site F*. 1.4 acres in an agricultural field at the southeast corner of San Martin Avenue and Kimble Court on the east side of the channel; and
- *Site D*. 7 acres in an agricultural field between Llagas Avenue and the Union Pacific railroad tracks at Monterey Road, on the north side of the channel, opposite the Nature Quality Inc., food-processing facility with 0.38 acre for an access road from an adjoining parcel.

Reach 7A

- *Site C*. 7 acres along Middle Ave south of Monterey Road.

Reach 7B

- *Site B*. 1 acre of vacant land along La Jolla Drive at Via Navoana upstream from Watsonville Road, on the south side of the channel.

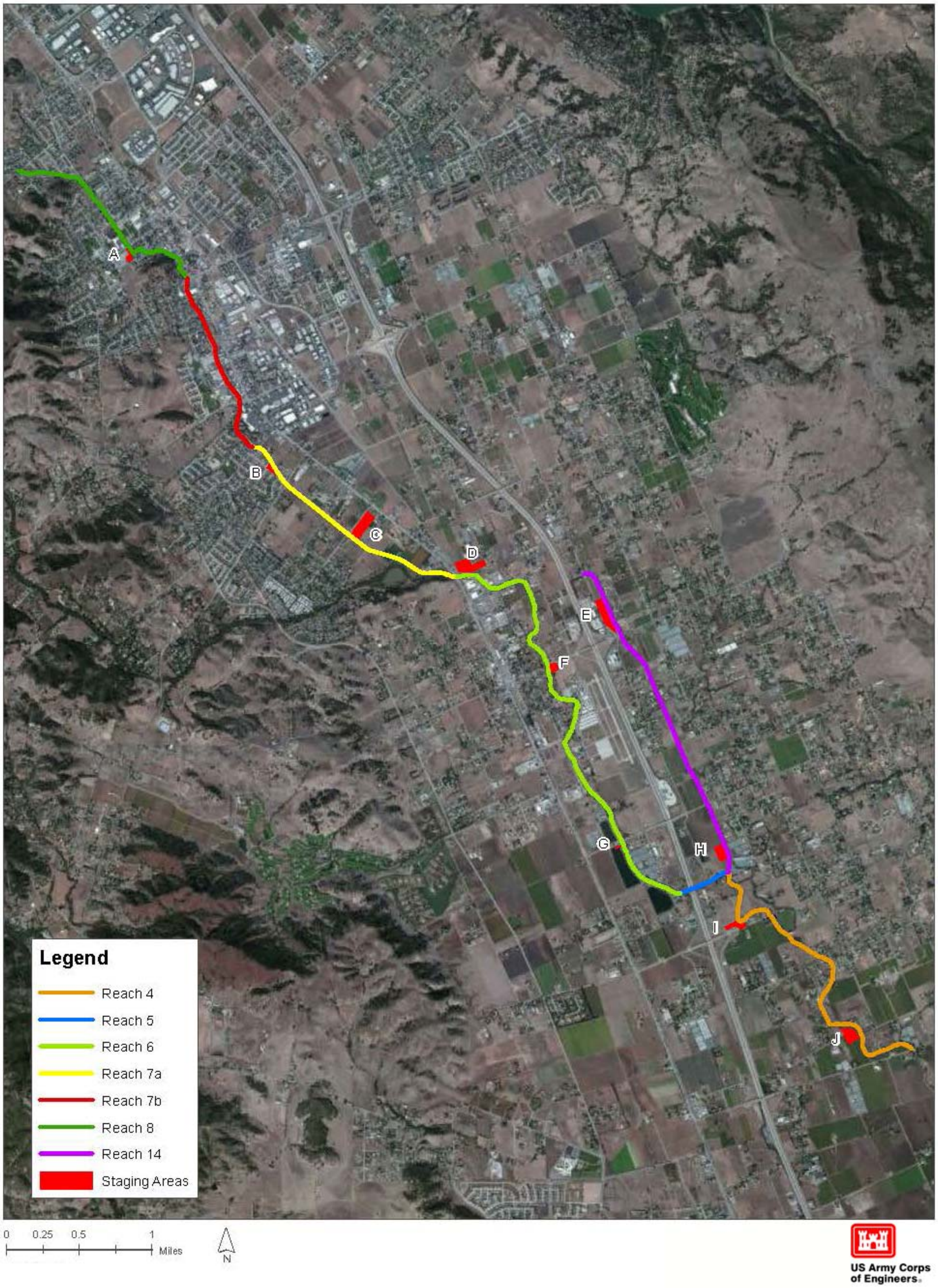
Reach 8

- *Site A*. 1.4 acres of vacant land at the site of the Pacific Gas and Electric Company (PG&E) substation on the southwest of the intersection of Hale Avenue and East Main Avenue on the west side of the channel (APN# 767-05-001). This staging site would be the main location for equipment and materials needed to construct the portal inlet and tunnel for the Tunnel Alternative (Applicant's Proposed Action).

Reach 14

- *Site H*. 3.3 acres of vacant SCVWD-owned land east of the southern end of Kannely Lane on the west side of the channel; and Site E. 5.9 acres of vacant land at the northern intersection of Sycamore Avenue and San Martin Avenue.

Figure 2.5-6 Staging Areas



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2.5.3.6 Construction BMPs

For compliance with anticipated requirements of federal and state permits, such as, but not limited to, a permit from the USACE pursuant to Clean Water Act (CWA) Section 404 and Water Quality Certification/Waste Discharge Report from the Regional Water Quality Control Board (RWQCB) pursuant to CWA Section 401, the SCVWD would require the contractor(s) to develop and implement a site-specific erosion control plan(s). The erosion control plans should consider, at a minimum, scheduling or limiting activities to certain times of the year; installing sediment barriers such as silt fencing and fiber rolls along the perimeter of the construction area; maintaining equipment and vehicles used for construction; tracking controls, such as stabilizing entrances to the construction site; and developing and implementing a spill prevention and cleanup plan.

Because soil surface disturbance for the Project would be greater than one acre, the Project would be required to comply with National Pollutant Discharge Elimination System (NPDES) requirements for control of stormwater discharges from construction sites. Pursuant to the Statewide General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Order No. 2009-0009-DWQ NPDES No. CAS000002), the SCVWD would require all contractor(s) to file a Notice of Intent (NOI) to comply with the General Permit, and to develop and implement site-specific storm water pollution prevention plans (SWPPPs). In developing a SWPPP, the contractor must identify potential sources of pollution and implement BMPs to reduce pollutants in storm water dischargers. The SWPPPs must also incorporate measures for BMP inspection, maintenance, and recordkeeping.

Dust control plans are required by the Bay Area Air Quality Management District (BAAQMD). Therefore, the SCVWD would require the contractor(s) to develop a dust control plan, which identifies the fugitive dust sources at the construction site and describes all of the dust control measures to be implemented before, during, and after any construction-related activities. Dust control would be managed with spraying from water trucks.

Exclusionary fencing would be installed around facilities and adjacent areas that are to be protected from construction-related disturbance. Construction access ramps and construction access areas within the Project site would be positioned to minimize the need for vegetation removal.

Drinking water for construction workers would be provided in accordance with the Occupational Safety and Health Administration (OSHA) regulations. Portable toilets would also be provided at the worksite by the Contractor.

In addition to state and federal permit requirements, the Best Management Practices Handbook (SCVWD 2013b) provides a list of the

SCVWD's BMPs intended to be incorporated into projects or activities to minimize potential environmental effects, including for construction and maintenance.

Applicable construction and maintenance BMPs are fully described in Appendix C, and include the following resource protection measures:

Air Quality	
AQ-1	Use Dust Control Measures for Soil Disturbing Activities
AQ-4	Avoid Stockpiling Potentially Odorous Materials
Biological Resources	
BI-3	Minimize Impacts to Steelhead
BI-4	Minimize Access Impacts
BI-5	Remove Temporary Fills as Appropriate
BI-6	Minimize Adverse Effects of Pesticides on Non-Target Species
BI-8	Avoid Impacts to Nesting Migratory Birds
BI-9	Avoid Impacts to Nesting Migratory Birds from Pending Construction
BI-10	Minimize Impacts to Vegetation From Clearing and Trimming
BI-11	Minimize Root Impacts to Woody Vegetation
BI-13	Choose Local Ecotypes of Native Plants and Appropriate Erosion Control Seed Mixes
BI-15	Restore Riffle/Pool Configuration of Channel Bottom
BI-16	Avoid Animal Entry and Entrapment
BI-17	Minimize Predator Attraction Effects on Wildlife
Cultural Resources	
CU-2	Stop Work and Report if Archaeological Artifacts are Found
CU-3	Stop Work and Report if Burial Remains are Found
Hazards and Hazardous Materials	
HM-1	Comply with All Pesticide Application Restrictions and Policies
HM-3	Minimize Use of Pesticides
HM-4	Post Areas Where Pesticides Will Be Used
HM-5	Comply with All Pesticide Usage Requirements
HM-7	Comply with Restrictions on Herbicide Use in Upland Areas
HM-8	Comply with Restrictions on Herbicide Use in Aquatic Areas
HM-9	Limit Vehicle and Equipment Fueling and Maintenance
HM-12	Ensure Proper Hazardous Materials Management
HM-13	Utilize Spill Prevention Measures
HM-14	Incorporate Fire Prevention Measures
HM-17	Comply with BAAQMD Regulations for Naturally Occurring Asbestos

Hydrology/Water Quality	
WQ-1	Conduct Work From Top of Bank
WQ-2	Evaluate Use of Wheel and Track Mounted Vehicles in Stream Bottoms
WQ-3	Limit Impact of Pump and Generator Operation and Maintenance
WQ-4	Limit Impacts of Sediments on Water Quality
WQ-5	Limit Impacts From Staging and Stockpiling Materials
WQ-6	Stabilize Construction Entrances and Exits
WQ-9	Minimize Erosion From Removal of In-Channel Vegetation
WQ-10	Limit Impact of Concrete Near Waterways
WQ-12	Isolate Work in Non-Tidal Sites With Use of Diversion of Bypass
WQ-14	Use Seeding for Erosion Control, Weed Suppression, and Site Improvement
WQ-15	Manage Exposed Groundwater at Work Sites
WQ-18	Maintain Clean Conditions at Work Sites
WQ-40	Prevent Water Pollution
WQ-41	Prevent Stormwater Pollution
WQ-42	Manage Sanitary/Septic Waste Noise
NO-1	Minimize Noise Pollution
NO-2	Minimize Noise Disturbances to Residential Neighborhoods
Transportation/Traffic	
TR-1	Incorporate Public Safety Measures
TR-2	Minimize Impacts on Traffic, Bicycles and Pedestrians

2.5.4 Utilities

A network of underground and overhead utility lines provides water, gas, electricity, sewer, storm drains, cable, phone, fiber optics, and other utility services throughout the Project area. In most cases these utilities are buried underground. Some utilities located within the footprint of the Project easements would be either protected in place, rebuilt in place, abandoned, or demolished and relocated prior to construction. Sewer lines and storm drains may be relocated at the beginning of construction. Although there are utilities in all Project reaches, most of the utilities that would need to be relocated are in the urbanized Reaches 7B and 8. Utilities would be protected in place during construction if they are not to be abandoned or replaced. There are also miscellaneous features such as fences that would need to be removed and potentially relocated. All utilities that are within the Project easements will be identified and their disposition will be determined during preparation of the final engineering design plans.

2.5.5 Operations and Maintenance

SCVWD would be responsible for maintaining all Project features, such as the channel, culverts, and grade control structures consistent with SCVWD and USACE guidelines. Flood conveyance channels would be managed to provide adequate capacity for the design flow. The channels would be regularly inspected for the build-up and removal of trash (non-living material) or other obstruction to flow. Sediment removal and vegetation maintenance are the two main activities that are periodically needed to maintain design flow capacity. Sediment removal and vegetation management generally would be conducted between June 15 and October 15. However, if the fall season remained dry, work could continue until the first significant rainfall event occurred. A significant rainfall event is defined as local rainfall of 0.5 inch or greater within the watershed over a 24-hour period (SCVWD 2011a).The expected maintenance activities that are common to all the Project alternatives are described below. Analysis of potential impacts and associated mitigations that may be needed due to proposed maintenance activities under each of the action alternatives is addressed within each of the resource sections in Chapter 4, Environmental Consequences and Chapter 5, Mitigation. Maintenance activities that occur under existing conditions were previously summarized and described under the No Action Alternative in Section 2.4.

2.5.5.1 Vegetation Management

Vegetation maintenance in the flood conveyance channels shall be performed to maintain the composite design roughness requirements (hydraulic roughness, or Manning's n-value[15]). The design roughness requirements[16] are shown in Table 2.5-5 and are applicable to all the action alternatives where there will be widening and deepening of the channel to improve flood conveyance.

[15] The flow conveyance capacity of a channel is controlled by the channel slope (gradient), cross-sectional area, and roughness of the bed and banks. Of these three factors, operation and maintenance practices primarily affect roughness, which is created by the shape of the streambank, meandering characteristics of the river, size of the bed sediment materials, presence of debris obstructions, and by vegetation. Channel roughness is represented in flow conveyance equations or hydraulic models by a unit- less factor called Manning's n-values. Manning's n-values can be identified for specific areas of a channel cross-section, or averaged to a composite value that represents their aggregate impact on flow rate. For example, a small area of very dense brush with trees could have a high n-value of 0.10 and adjacent areas of the channel with no vegetation around it having a low n-value of .035, with a composited n-value of .045 for the entire channel.

[16] A narrative description of vegetative conditions associated with a range of Manning's n-values assuming a base condition of n =.03 for a coarse sandy bed with a uniform, straight channel without vegetation or obstructions, is provided by the USGS (Arcement and Schneider 1989) as follows: N = .032-.040 dense growth of flexible turf grass or weeds where depth of flow is at least 2 times height of vegetation; supple tree seedlings such as willow, cottonwood where average depth of flow is three times height of vegetation. N = .040-.055 moderately dense stemmy grass, weeds, or tree seedlings; brushy moderately dense vegetation similar to 1-2 year old willows in dormant season. N = .055-.080 for 8–10 year old willow or cottonwood trees intergrown with weeds and brush. N = .080-0.130 bushy willow trees 1 year old intergrown with weeds on all side slopes with vegetation in full foliage, trees intergrown with weeds and brush with vegetation in full foliage. Note that n-value narrative descriptions for vegetation can be variable, depending upon other factors present in the channel that also contribute to roughness.

Table 2.5-5 Target Composite Hydraulic Roughness Coefficients (Manning's n-value) for Maintenance

Reach	Existing Composite Hydraulic Roughness[1,2]	Design Composite Hydraulic Roughness[2]
8	0.046	0.035
7B	0.045–0.065	0.038–0.069
7A	(no existing channel)	0.038–0.084
6	0.064–0.070	0.064–0.075[3]
5	0.064	0.065–0.094[3]
4	0.055	0.064–0.076
14	0.050	0.04

[1] Based on roughness values from USACE.
[2] Ranges reflect different roughness requirements in different portions of a given reach.
[3] For the Reach 6 Bypass Alternative, design composite roughness in Reaches 5 and 6 do not apply since there will be no construction.

Except where specifically allowed, woody vegetation should be removed before the trunk is greater than 3 inches dbh. Over time, vegetation density may increase and flexibility of woody riparian species may decrease as the vegetation matures and becomes well established. This could cause the hydraulic roughness of the channel to increase beyond that originally designed, necessitating thinning or removal of vegetation. Vegetation management is also conducted to maintain access roads clear of vegetation, maintain the ability to visually inspect the channel, and as needed to reduce fire loads as may be required by local fire districts. Vegetation control methods include the following:

- **Herbicide—**The application of herbicide would occur instream and on bank bench areas as well as on maintenance roads, along fence lines, and similar non-instream areas. Herbicide describes a work activity and not the chemical formulation used. This activity consists of using herbicide as the primary abatement tool to kill vegetation and provide subsequent follow up for hand removal activities. On maintenance roads the weed management strategy calls for two herbicide applications, a pre- emergent application and post emergent application.

- **Hand Pruning—**Pruning is the partial removal of any individual plant and includes cutting of tree branches, woody and herbaceous vegetation, and is conducted with mechanized and non- mechanized hand tools. Pruning may occur instream and along banks and bench areas. Pruning of trees and shrubs is a routine activity necessary to provide access to SCVWD facilities, improve visibility to inspect SCVWD facilities, protect SCVWD infrastructure, and maintain the designed hydraulic capacity. Typical woody vegetation pruning takes place along maintenance roads and fences. Tree pruning may include thinning the canopy of an individual tree or shrub. For simplicity, the term "tree" or "trees" will refer to both trees and woody shrubs.

- **Hand Removal**—Complete removal of above ground portions of any individual plant using mechanized or non-mechanized hand tools. This category includes herbicide stump treatment, called 'cut stump' which is follow-up work from the removal of vegetation. Cut stump treatment is a paired activity to Hand Removal. Live, standing trees and shrubs may be removed from SCVWD facilities to meet one of the following program objectives: maintain design flow conveyance capacity, provide facility inspection and access, or maintain the structural integrity of SCVWD facilities. For simplicity, the term “tree” or “trees” will refer to both trees and woody shrubs. Stump treatment of removed trees is included under “Hand Removal” and is not defined as “Herbicide” work.

- **Mowing**—Area-wide cutting of above ground plant material using a tractor mounted flail mower or hand-held equipment (weed-eaters). Work primarily occurs in the bank bench/outboard areas, conducted annually. Mowing provides visual access for facility inspections and may be required for flow conveyance capacity and to meet local fire codes. Local fire codes call for all weeds and grasses to be maintained below 6 inches in height for 10 feet horizontally on both sides of access routes. Vegetation must be cut back 30 feet around any structures and a 30-foot firebreak must be maintained. Parcels up to 1 acre in size must be completely mowed. All work is performed to conform to local fire code requirements.

2.5.5.2 Sediment Management

Sediment management could be required in the flood conveyance channels within the Project area. Sediment removal is the act of mechanically removing sediment deposited within a creek and may be necessary when an accumulation of sediment reduces flow conveyance capacity or prevents facilities or appurtenant structures from functioning as intended. These activities would be done in a manner that is sensitive to protection of aquatic resources. Overall, it is anticipated, based on hydraulic modeling that the Project design would provide for a balanced net transport of sediments and would not result in reach- scale aggradation (USACE 2010a). However, as vegetation develops, and woody debris and other fish habitat enhancements are installed, there remains a potential for sediments to locally deposit reducing flood conveyance capacity. At the confluence of Reaches 14, 4, and 5 the design includes a widened channel area with a mid-channel bar that bifurcates the flow. This site is designed for sediment accumulation to help reduce the need for sediment removal in downstream locations. A similar sediment depositional site is designed for an over-widened channel area near the top of Reach 6 at the first large meander bend downstream of Llagas Avenue. It is anticipated that sediment removal at both of these sites will be less frequent than once every 10 years. Sediment management would be performed in an adaptive manner, identifying depositional patterns and tendencies and updating management techniques accordingly. This is particularly true for the mid-channel bar at the confluence between Reaches 4, 5, and 14, and widened channel area of Reach 6 near Llagas Road which are designed to be sediment depositional sites.

A sediment detention basin will also be installed in Reach 8 for the Tunnel and Reach 6 Bypass alternatives, only. The detention basin will periodically require sediment removal. Heavier sedimentation may occur after episodic events such as wild fires and large flows. After such an event the Project should be inspected to identify and address large deposits that may impact channel capacity.

2.5.5.3 Bank Erosion

The channel cross-sectional form was designed to be in a stable, dynamic equilibrium with the flow and sediment regime of the Llagas Creek watershed. This does not mean there would be absolutely no erosion, but it does mean that the channel dimensions and planform should, in general, remain about the same over time. It is assumed that any maintenance for bank erosion that might arise would be related to localized erosion that might threaten infrastructure, and that this would be addressed through the SMP. Consequently, the Project does not envision a need for a bank erosion maintenance regime.

2.5.5.4 Culverts

All of the proposed culvert replacements would be reinforced concrete box structures. Any spalling (i.e., splitting or flaking) in concrete culverts would be patched with an appropriate concrete material. Repairs would be made to the bottom of the concrete culvert if they show more than 1 inch of loss due to wear and abrasion. If significant settlement is detected in a culvert or pipe, it should be excavated, the foundation raised, the pipe replaced, the fill material added in 4-inch layers and compacted around the pipe to a density equal to or greater to that of the surrounding undisturbed material, and the area reseeded. Sediment and debris must be removed from culverts to maintain their flow capacity; this is defined as a minor maintenance activity in the SMP.

2.5.5.5 Concrete Grade Control Structures

Grade control structures would be annually inspected for erosion. Erosion of the streambed both upstream and downstream of the structures would be repaired and any debris removed that accumulates on the structures. The integrity of the concrete would be inspected, and if there is any substantial cracking or erosion, the structure would be repaired.

2.5.5.6 Habitat Enhancement Features

Habitat enhancement features including a sinuous low-flow channel, pools, large woody debris placements, boulder placements, root wad structures, and wing log deflectors, are to be installed in Reaches 4, 5, 6, and 7A. Divide logs[17] would also be used, but only in the perennially flowing section of Reach 6. These types of habitat enhancements generally improve fish rearing and migration habitat by providing cover and velocity refuge. The habitat enhancement features would be maintained by the SCVWD to insure they continue to provide their designed environmental benefits.

2.5.5.7 Minor Maintenance

Minor maintenance activities would be performed to repair and maintain SCVWD facility functions. Minor maintenance activities may occur anywhere within the Project area. For all of the action alternatives, minor activities are small in size that results in removing less than 0.08 acre of wetland or riparian vegetation at a site. The minimum size for any minor vegetation work to be notified in SCVWD's Regional General Permit for Stream Maintenance is 0.01 acre per project, which includes any vegetation work necessary for access or staging. Yearly minor maintenance activities are limited to less than 0.4 acre of wetland or riparian vegetation impact per year for the combined Countywide maintenance activities under the SMP. Cumulative minor maintenance activities would be limited to 2 acres total wetland or riparian vegetation impact over a 5-year planning period and 4.0 acres over a 10-year planning period for all countywide projects combined. The methodology is consistent with the Countywide Stream Maintenance Program minor maintenance procedures. Cleaning and minor sediment removal at culverts, grade control structures, and other facilities is limited to keep them functioning to as built standards, with a 25 CY total removal per year. The following minor maintenance activities relating specifically to the Project which could occur are described as;

- Removal of wetland/riparian vegetation (less than .08 acre per site);
- Minor in-channel sediment removal (less than 10 CY);
- Trash and debris removal;
- Repair and installation of fences and gates;
- Grading and other repairs to restore the original contour of existing maintenance roads;
- Grading small areas without vegetation above stream banks to improve drainage and reduce erosion;
- Repair of structures with substantially similar materials within approximately the same footprint (i.e., replacement of concrete linings, culverts);

[17] Divide logs are used to provide cover and are a visual barrier between pairs of spawning fish.

- Graffiti removal;
- Installation and on-going maintenance of mitigation and landscape sites (including irrigation, weed control, and replanting of dead or declining individual plants until success criteria were met);
- Removal of obstructions at structures to maintain function (i.e., bridges, stream flow measuring stations, box culverts, storm drain outfalls, and grade control structures).

2.5.5.8 Application of Maintenance Activities

Each portion of the channel (in cross-section view) will have an applied set of maintenance activities. Figure 2.5-2 shows the relevant sections of the channel for purposes of describing maintenance activities, including:

- Maintenance roads;
- Top of bank (TOB);
- Engineered bank;
- Natural bank;
- Bench;
- Bankfull bank (slope between bench and channel bottom); and
- Channel bottom.

In some cases there may be a second engineered bank instead of a natural bank. Benches may be engineered or naturally formed, but in either case where there are no benches the engineered and natural banks are assumed to be extended to the channel bottom. On any channel side where a portion of the bank is natural and a portion is engineered, it is assumed that maintenance would be performed as if the entire bank is natural. The tables below (Table 2.5-6, 2.5-7, 2.5-8, and 2.5-9) show the type of maintenance activity and frequency of activity as well as the targeted roughness for each portion of the channels in the identified reaches. These roughness values are applicable to all of the action alternatives. Vegetation maintenance, such as grass and weed mowing, would occur once or twice annually. Other vegetation maintenance, such as pruning and removal, is anticipated on about a 5-year frequency, except in Reach 6 where perennial water conditions may require more frequent maintenance of willows on a 3-year maintenance cycle. Sediment maintenance is anticipated on about a 10-year frequency over the long term.

Table 2.5-6 Typical Maintenance Activities, Frequency, and Target Roughness Reaches 4 and 5

Location	Surface/ Vegetation	n-value	Maintenance Method	Frequency (years)	Notes
Maintenance Road	Aggregate base and ballast rock	N/A	Herbicide	1	Clear of vegetation for access and reduce fire hazard
Top of Bank	Grasses, Riparian Forest	N/A	Mowing Hand Pruning Hand Removal	1	Facilitate access and observation, reduce fire hazard
Engineered Bank	Planted Riparian Forest	0.10	Hand Pruning Hand Removal	5	Limited understory development is acceptable
Natural Bank	Riparian Forest	0.15	None	N/A	No maintenance
Bench	Grass	0.04	Hand Removal Sediment Removal	5 (veg) 10 (sediment)	Clear woody vegetation, remove excess sediments
Bankfull Bank	Reach 4 – Grass Reach 5 – Willow	0.04 0.08	Herbicide[1] Hand Removal Sediment Removal	5 (veg) 10 (sediment)	Clear woody vegetation (Reach 5), remove excess sediments
Channel Bottom	Gravel, cobble, sand	0.03	Hand Removal Sediment Removal	5 (veg) 10 (sediment)	Clear woody vegetation, remove excess sediments, some grass acceptable

[1] No herbicide in Reach 4
N/A = not applicable

Table 2.5-7 Typical Maintenance Activities, Frequency, and Target Roughness Reach 6

Location	Surface/ Vegetation	n-value	Maintenance Method	Frequency (years)	Notes
Maintenance Road	Aggregate base and ballast rock	N/A	Herbicide	1	Clear of vegetation for access and reduce fire hazard
Top of Bank	Grasses, Riparian Forest	N/A	Mowing Hand Pruning Hand Removal	1	Facilitate access and observation, reduce fire hazard
Engineered Bank	Planted Riparian Forest	0.10	Herbicide Hand PruninG Hand Removal	5	Limited understory development is acceptable
Natural Bank	Riparian Forest	0.15	None	N/A	No maintenance
Bench	Grass	0.04	Herbicide Hand Removal Sediment Removal	5 (veg) 10 (sediment)	Clear woody vegetation, remove excess sediments
Bankfull Bank	Willow	0.08	Hand Pruning Hand Removal Sediment Removal	3 (veg) 10 (sediment)	Prevent spread of willows, remove excess sediments
Channel Bottom	Gravel, cobble, sand	0.03	Herbicide Hand Removal Sediment Removal	5 (veg) 10 (sediment)	Clear woody vegetation, remove excess sediments, some grass acceptable

N/A = not applicable

Table 2.5-8 Typical Maintenance Activities, Frequency, and Target Roughness Reaches 7A, 7B, and 14

Location	Surface/ Vegetation	n-value	Maintenance Method	Frequency (years)	Notes
Maintenance Road	Aggregate base and ballast rock	N/A	Herbicide Hand Removal	1	Clear of vegetation for access and reduce fire hazard
Top of Bank	Grass	N/A	Mowing Herbicide 2 Hand Pruning 1 Hand Removal 1	1	Facilitate access and observation, reduce fire hazard
Engineered Bank	Reach 7A - Scrub/shrub Reaches 7B & 14 – Grass	0.06 0.04	Herbicide 2 Hand Pruning Hand Removal	5	Clear of woody vegetation
Natural Bank	N/A	N/A	N/A	N/A	N/A
Bench	Grass	0.04	Herbicide 2 Hand Removal Sediment Removal	5 (veg) 10 (sediment)	Clear woody vegetation, remove excess sediments
Bankfull Bank	Grass	0.04	Herbicide 2 Hand Removal Sediment Removal	5 (veg) 10 (sediment)	Prevent spread of willows, remove excess sediments
Channel Bottom	Gravel, cobble, sand	0.03	Herbicide 2 Hand Removal Sediment Removal	5 (veg) 10 (sediment)	Clear woody vegetation, remove excess sediments, some grass acceptable

[1] No Hand Pruning or Hand Removal in Reach 7A
[2] No herbicide use in Reach 14 except for the maintenance road
N/A = not applicable

Table 2.5-9 Typical Maintenance Activities, Frequency, and Target Roughness Reach 8

Location	Surface/ Vegetation	n-value	Maintenance Method	Frequency (years)	Notes
Maintenance Road	Aggregate base and ballast rock	N/A	Herbicide	1	Clear of vegetation for access and reduce fire hazard
Top of Bank	Grasses	N/A	Mowing Hand Pruning Hand Removal	1	Facilitate access and observation, reduce fire hazard
Engineered Bank	Grasses	0.04	Hand Removal Sediment Removal	1	Limited understory development is acceptable
Natural Bank	N/A	N/A	N/A	N/A	
Bench	N/A	N/A	N/A	N/A	
Bankfull Bank	N/A	N/A	N/A	N/A	
Channel Bottom	Gravel, cobble, sand	0.03	Herbicide Hand Removal Sediment Removal	1	Clear woody vegetation, remove excess sediments, some grass acceptable

N/A = not applicable

2.5.6 Lake Silveira Mitigation Element

The Lake Silveira parcel is a 52-acre wetland and riparian mitigation element designed by the SCVWD to reduce and compensate for environmental impacts associated with other flood protection activities. The Lake Silveira element is not a part of the Project design for flood management in any of the action alternatives. However, it is intended to reduce or compensate for flood reduction actions of the proposed Project. A brief description of the Lake Silveira mitigation element is included in this EIS, because it entails a substantial amount of construction activity over a relatively large area; and, because, it is equally pertinent to all the action alternatives. For a more detailed descrption of the compensatory mitigation measure for all action alternatives refer to Chapter 5, section 5.3.

2.6 NRCS ALTERNATIVE

The NRCS Alternative was initially conceived and evaluated as Alternative F in the 1982 EIS/EIR (Section 2.3.1). Subsequent modifications to the NRCS Alternative have been considered and incorporated since the 1982 EIS/EIR, in response to the changing physical environment, and to changes in environmental regulations (Section 2.3.4). The NRCS Alternative evaluated in this EIS is based on all subsequent modifications to Alternative F, as presented in the SCVWDs' Map and Construction Plan 65 percent Design Submittal (RMC 2013). The current NRCS Alternative consists of the following main components:

- Acquisition of fee title and easements of adjacent land needed for Project construction and maintenance;
- Channel improvements including deepening and widening, some limited planform re-alignment;
- Excavation and construction of a diversion channel for flows from West Little Llagas Creek to Llagas
- Creek which would bypass flows from entering East Little Llagas Creek;
- Construction of permanent access roads on both banks within permanent easements for construction and maintenance access;
- Construction of reinforced concrete boxes (RCB) of rectangular cross sections, which are sized to pass the design flood flow under roadways and at tributary junctions;
- Installation of a stream gage near the Church Avenue Ponds
- Relocation of homes, farm structures, and all wells where they are within the ROW;
- Relocation of utility and other public service facilities within the ROW;

- Instream aquatic habitat enhancements to provide cover and rearing for fish in Reaches 4, 5, 6, and 7A; and,

- Stream operation and maintenance activities.

- This alternative would provide an increased level of flood management for urban areas, specifically: a 1-percent flood in Morgan Hill (Reaches 8, 7A, and 7B); 10-percent flood management for the semi-urban area around East Little Llagas Creek (Reach 14); and, avoid induced flooding elsewhere on Llagas Creek (Reaches 6, 5, and 4) due to upstream improvements. The extent of floodplain inundation associated with a 1-percent flood event is shown on Figure 2.5-1.

- Descriptions of the various components of the NRCS Alternative are provided in the following subsections on a reach-by-reach basis, starting with the most downstream Reach 4 and going upstream to Reach 8, and last, Reach 14.

2.6.1 NRCS Alternative Features

Reach 4 (East Little Llagas Creek to Buena Vista Avenue)

Reach 4 (Figure 2.2-7) is typically dry in the summer and fall months, and has the smallest existing conveyance capacity in the Project watershed. The design flow objective for Reach 4 is to increase capacity to avoid any additional flooding that, potentially, could be caused by upstream improvements. Design capacity would be 7,120 cfs at Buena Vista Avenue.

Modifications to Llagas Creek in Reach 4, would consist of widening and deepening the channel (Figure 2.5-2). Channel bottom width is 30 feet, with a bankfull channel width approximately 40 to 50 feet and 3 feet deep. The existing channel alignment would generally be preserved, except in the most downstream portion of the reach where the alignment would be shifted slightly to the south to avoid loss of structures on the north bank of the creek. Some native shrubs and hardwood trees would be removed to allow for channel widening. These areas would be revegetated using site specific native species consistent with a mitigation plan discussed under Section 3.4, Botanical Resources.

Two maintenance roads would be provided along Reach 4, one on each side of the creek. Access to the maintenance roads would be at Masten Avenue, Rucker Avenue, Buena Vista Avenue, and Denio Avenue. Three drainages (Rucker Creek, an unnamed local drainage south of Masten Avenue, and an unnamed local drainage channel upstream of Buena Vista Avenue) would be culverted at their confluence with Reach 4 to allow continuous maintenance access. To allow excavation to deepen the channel, underpinning or some other structural modification to shore up the stability of the footings of the existing bridge at Masten Avenue and Llagas Avenue would be needed.

Three grade control structures, constructed of natural boulder materials and in a manner that contributes to habitat where feasible, would be installed in the channel. The grade control structures are mostly buried, except where exposed at the surface of the channel bed. Rock slope and toe armoring would be needed at only two key locations along the outside of meander bends to protect against erosion. The grade control structures ensure that there would be no channel down-cutting.

The channel downstream of Buena Vista Avenue, approximately 800 feet, will be widened and deepened through the location of an existing fish ladder. The antiquated denil style fish ladder does not properly function (Martin, Pers. Comm., 2013) and would be removed along with the grouted concrete rock just downstream of Buena Vista Avenue so as to not induce flooding associated with upstream improvements. The channel will be evaluated at the fish ladder so that a new design which will meet NMFS depth and velocity criteria for steelhead fish passage can be implemented. The new design will take into account the hydrologic and hydraulic conditions with the Project in-place.

Instream complexity features are included in this reach to assist with migration of anadromous fish during moderate to high flows: approximately 12 clusters of log-root wad structures, 19 stream boulders, and 20 triangular boulder clusters. All of these habitat features provide steelhead and other fish species with cover and velocity breaks to improve rearing and passage. Examples of these instream habitat features are provided in Appendix J. Gravel and cobble excavated to deepen the channel would be returned to the channel bed.

Reach 5

The design flow objective for Reach 5 (Figure 2.2-6) is to increase capacity to avoid any additional flooding caused by upstream flow conveyance modifications. Design capacity would be 3,280 cfs. Reach 5 is typically dry in the summer and fall months.

Channel modifications would be similar to Reach 4, with a cross-section that includes a sinuous low-flow channel, a bankfull channel with benches approximately 30 feet in total width and engineered banks that are 3H:1V slope on either side of the channel (Figure 2.5-2). Channel widening for hydraulic improvement would be limited to one bank, where possible, to preserve existing stands of mature vegetation. Channel dimensions would be similar to those in Reach 4.

Reach 5 would be realigned to split flow around a new mid-channel bar, about 60 feet wide, immediately upstream of the confluence with East Little Llagas Creek. The majority of the flow would travel to the north of the bar, increasing overall channel length. The remaining flow would travel in the existing Reach 5 alignment, south of the bar. The expanded bankfull channel width and bar configuration would be a focal point for sediment deposition and thereby reduce downstream maintenance. The accumulated sediment could be naturally removed during high flows to reduce downstream erosion and incision, or would be removed by the SCVWD as part of its maintenance activities, should it be necessary to do so. This area would also collect various types of debris (e.g. woody or trash) and thus reduce maintenance and potential hazards in the downstream channel.

Maintenance roads 18 feet in width, would be constructed on both sides of the creek in the same manner as for Reach 4. As maintenance access from U.S. 101

would not be feasible due to traffic and permitting issues, connecting roads would be constructed to Kannely Lane and Lena Avenue.

Two grade control structures constructed of natural boulder materials (and in a manner that contributes to habitat where feasible), would be installed in the channel. Instream complexity features (Appendix J) would be installed for aquatic habitat including approximately two clusters of log-root wad structures, 23 stream boulders, two wing deflectors, and three groupings of large woody debris, most of which would be placed around the upstream and downstream end of the mid-channel bar near the confluence with East Little Llagas Creek. Gravel and cobble would be left in the channel bed.

The improved slopes of the channel would be revegetated, consistent with requirements for maintaining hydraulic capacity. Revegetation is discussed as part of a mitigation plan in Chapter 5 of this EIS.

Reach 6

The flow objective for Reach 6 (Figure 2.2-5) is to increase capacity to avoid any additional flooding caused by upstream flow conveyance improvements. The existing channel alignment would generally be followed throughout the reach, except for shifts to avoid structure loss, high quality vegetation, and imposition on local industry. Design capacity would be 3,280 cfs at the Church Percolation Ponds. A 6,600-foot segment of Reach 6, from Lake Silveira to about San Martin Avenue is a perennially flowing stream, continuously supported by releases from Chesbro Reservoir. Downstream from approximately San Martin Avenue, Reach 6 returns to an intermittently flowing channel as water percolates through the streambed to groundwater.

Channel improvements would be similar to Reaches 4 and 5, with a cross-section that includes a sinuous low-flow channel, a bankfull channel with benches approximately 30 feet in total width where they occur on both sides of the channel and engineered banks that are 3H:1V slope on one side of the channel (Figure 2.5-2). Channel widening for hydraulic improvement would be limited to one bank, where possible, to preserve existing stands of higher quality mature vegetation.

Reach 6 would include a widened section at the first bend downstream of Llagas Avenue. The expanded bankfull channel width and benches (40 feet to 80 feet wide on both sides of the bankfull channel) would be designed to induce sediment deposition during high flows. This creates a focused area for sediment and debris accumulation where it can readily be removed by the SCVWD during maintenance activities, thereby reducing maintenance in the downstream channel.

Similar to Reaches 4 and 5, 18-foot-wide all-weather maintenance/access roads typically would be constructed on both sides of the channel. Some portions of the reach provide the opportunity to use existing roads and driveways for maintenance access. Access to top of bank maintenance roads would be constructed at Llagas Avenue, Kimble Court, East San Martin Avenue, Church Avenue, and Murphy Avenue.

There are five existing bridge crossings within Reach 6: Monterey Highway, Union Pacific Railroad (UPRR), Llagas Avenue, San Martin Avenue, and Church Avenue. The existing bridges would not be altered. Two local drainages south of Llagas Avenue would be diverted into culverts at their confluence with Reach 6 to allow continuous maintenance access. Underpinning, or some other structural modification to allow a lower flowline, would be performed at Masten Avenue and Llagas Avenue. Twenty-six grade control structures, constructed primarily of natural materials and in a manner that contributes to habitat where feasible, would be installed at various locations along the channel. There are 11 locations requiring some rock slope protection. There are three residential homes within the Project construction footprint in Reach 6. The inlet pipe to the SCVWD most upstream percolation pond would be reconstructed at a new location to accommodate the channel deepening and widening. This will allow flow in Llagas Creek to continue to be diverted into the pond at the same discharges as under existing operations. A new stream gage would be installed near the new diversion.

The greatest concentration of instream habitat features would be constructed in Reach 6, primarily to improve rearing and passage for steelhead since a portion of this stream reach is perennial. Instream complexity features include approximately 11 clusters of multiple log-root wad structures, 37 stream boulders, 28 wing deflectors, and 61 groupings of large woody debris. Additionally divide logs would be installed in the perennial section of Reach 6.

The improved slopes of the channel would be revegetated, consistent with requirements for maintaining hydraulic capacity. Revegetation is discussed as part of a mitigation plan in Chapter 5 of this EIS.

Reach 7A

The design flow for Reach 7A is to provide capacity for 2,090 cfs. The alignment, shape, and dimensions of the channel are described previous in Section 2.5.1.

Upstream of Watsonville Road, the existing diversion channel would need to be widened and deepened. There are three existing fixed points that control channel alignment: the confluence with West Little Llagas Creek; the existing, but buried/inoperable bridge crossing at Watsonville Road; and the existing, but buried bridge crossing at West Middle Avenue. Both bridges are buried to the bottom of their respective superstructures. The new channel would be aligned through both bridges, which would be exhumed during construction. The bridges were constructed by the SCVWD and are sized to carry the 1-percent flood.

In Reach 7A there are no structures within the project footprint requiring relocation.

Similar to other reaches, an 18-foot-wide maintenance/access road would be constructed on both sides of the channel where feasible. Access points would be provided at Middle Avenue, Watsonville Road, La Via Azul Court, and La Crosse Drive. Existing roads would provide shared access for maintenance where possible. Currently, a bike path straddles the top of the channel bank in the most upstream portion of Reach 7A. This bike path would be removed by the Project.

A maintenance road will be constructed on the improved bank which would be available for a future trail and/or bike path subject to an agreement between the SCVWD and the City of Morgan Hill. Such a future improvement would require separate environmental review before approval. Additionally, the existing pedestrian bridge over West Little Llagas Creek just upstream from Watsonville Road would be removed.

Some limited instream complexity features would be included at the lower end of Reach 7A including approximately three log-root wad structures, two large woody debris elements, and one triangular boulder cluster. Revegetation is considered and discussed as part of a mitigation plan in Chapter 5 of this EIS. Several pools would also be constructed at the lower end of Reach 7A to improve aquatic habitat.

Seven grade control structures, constructed primarily of natural materials and in a manner that contributes to habitat where feasible, would be installed at various locations along the channel. Armored rock bank slope protection would be needed at one location for erosion control and bank stability. A grade control structure would be constructed below Lake Silveira on Llagas Creek where the Reach 7A channel connects to Llagas Creek. This structure would be comprised of boulder materials, and would be configured as a step-pool sequence. The purpose of this structure is to smoothly transition the channel invert and energy grade on Llagas Creek to the new (lower) channel elevation at the confluence with the Reach 7A channel.

Reach 7B

Reach 7B modifications would provide conveyance for 1,130 cfs at upstream end of Reach 7B and 1,580 cfs at downstream end. Channel design improvements to Reach 7B are similar to Reaches 4, 5, and 6 as described in Section 2.5.1, and would include widening and deepening the existing channel and replacing existing or installing new box culverts. Benches would occur on both sides of the channel along most of the reach. Channel widening would occur on both banks, depending on ROW limitations, with bank slopes between 2H:1V to 3H:1V. Top width would be about 90 to 100 feet, channel bottom would be about 12 feet wide, and channel depth would be approximately 10 to 12 feet.

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Figure 2.6-1 NRCS Alternative Reach 8

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The general existing channel alignment would be maintained, except near Cosmo Avenue. The channel section near Cosmo Avenue would be realigned approximately 100 feet to the west to stay within SCVWD ROW and to utilize larger culverts that appear to have been included in a previous Cosmo Avenue retrofit or expansion.

A 1,100-foot section of the existing channel, approximately 200 feet downstream and 900 feet upstream of Cosmo Avenue, would be abandoned and a new channel would be constructed.

The creek channel crosses seven roads in culverts between West Dunne Avenue and La Crosse Drive: Ciolino Avenue, Spring Avenue, Cosmo Avenue, Edes Court, West Edmundson Avenue, North La Crosse Drive and South La Crosse Drive. Some of the existing culverts are undersized and are not capable of conveying the 1 percent flood, thereby resulting in the need for modifications as follows:

- The existing triple culverts at Cosmo Avenue and Edes Court would be expanded by adding a fourth RCB (10 feet by 7 feet) to the existing configuration;
- The existing culvert at Spring Avenue would be replaced with a new triple RCB culvert (three boxes, each 10 feet by 9 feet in size); and
- The existing culvert from Ciolino Avenue to West Dunne Avenue would be replaced with a 674-foot long box culvert that is 8 feet wide and 8 feet deep.

Associated with the West Little Llagas Creek channel deepening, a grade control structure would be constructed at the downstream end of Edmundson Creek at the confluence to transition the Edmundson Creek channel to the new, lower elevation of the West Little Llagas Creek channel. Three other grade control structures would be installed in the reach. There is one residential structure in Reach 7B located within the project footprint (Table 2.5-1).

There is a paved pedestrian pathway between Edes Court and La Crosse Drive on the south side of the channel where the planned maintenance road and pathway would overlap at a couple of locations. Where this occurs the path would be removed and the SCVWD maintenance road would be constructed in its place. As discussed above for the trail section in Reach 7A, maintenance road would be available for improvement as a future pedestrian pathway subject to an agreement between the SCVWD and the City of Morgan Hill. Such a future improvement would require separate environmental review before approval.

There would be no instream complexity features installed in Reach 7B. Shallow pools would be constructed to help generate appropriate instream habitat.

The improved slopes of the channel would be revegetated, consistent with requirements for maintaining hydraulic capacity. Revegetation is discussed as part of a mitigation plan discussed in Chapter 5 of this EIS.

Reach 8

Channel improvements through the urbanized City of Morgan Hill in Reach 8 begin at Llagas Road and extend downstream to West Dunne Avenue. The improvements would provide flood conveyance capacity for the 1-percent storm flow of 640 cfs at Wright Avenue and 1,130 cfs at West Dunne Avenue. The design for Reach 8 would include the following improvements (Figure 2.6-1):

- Remove the flow constricting plate at the Llagas Road culvert at the upstream boundary of the Project to reduce upstream flooding. The channel will be deepened and widened along a 2,500-foot section of channel downstream from Llagas Road to Hillwood Lane.

- Widen and deepen approximately 600 feet of channel between Wright Avenue and Hillwood Lane with an 8-foot deep trapezoidal channel, with a 20-foot bottom width and 70-foot top width. This channel would be designed to pass the 1-percent flow.

- Widen and deepen approximately 3,000 feet of channel between West Dunne Avenue and Main Avenue to form a trapezoidal vegetated channel, a channel with two vertical walls, or a hybrid section (Figures 2.5-3, 2.5-4, and 2.5-5, respectively), as appropriate depending upon the ROW available.

- Replace approximately 2,200 feet of the existing creek between Main Avenue and Wright Avenue with two 10-foot wide by 7- to 8-foot deep reinforced concrete box culverts following the existing stream alignment, but under Hale Avenue. Replace culverts at West Main Avenue and Wright Avenue (Table 2.6-1). There would be no changes to the culverts at Llagas Creek Drive or at Hillwood Lane.

- Replace five additional existing undersized culverts with new culverts, 10 feet wide by 9 feet deep, at the following locations: 5th Street, 4th Street/Monterey Highway, 3rd Street, 2nd Street/Del Monte Avenue, and Warren Avenue.

Maintenance roads would be constructed downstream from Llagas Road to Hillwood Road. There would be no maintenance roads in the downtown area of Morgan Hill. Equipment and materials would be inserted and removed from the channel at road crossings as necessary. Maintenance would be performed from the channel bottom to reduce the overall footprint.

Grade control is provided by the frequent culvert crossings. One grade control structure would be located just upstream from Llagas Road. The improved slopes of the channel would be revegetated, consistent with requirements for maintaining hydraulic capacity. There are no instream aquatic habitat improvements. There are six residential structures within the Reach 8 Project footprint (Table 2.5-1).

Table 2.6-1 Proposed and Existing Culverts for Reach 8

Reach 8 Location	Proposed Design			Existing		
	Roadway Width (ft)	Culvert Size # – w(ft) x h(ft)	Type of Crossing	Roadway Width (ft)	Culvert Size w(ft) x h(ft)	Type of Crossing
5th Street	60	2 – 10 x 9	RCB	60	5 x 5	RCB
4th Street/ Monerety Hwy	270	2 – 10 x 9	RCB	270	9 x 6	RCB
3rd Street	14	2 – 10 x 9	RCB	14	14 x 7	RCB
2nd Street/Del Monte Avenue	250	2 – 10 x 9	RCB	250	10 x 5	RCB
Warren Avenue	40	2 – 10 x 9	RCB	40	10 x 5	RCB
Main to Wright along Hale Ave (Future Santa Teresa Expwy)	2200	2 – 10 x 7-8	RCB	N/A	--	--
Main Street	N/A	--	--	70	9 x 5	RCB
Wright/Hale Avenue	N/A	--	--	110	60”	RCP

RCB = reinforced concrete box culverts
RCP = reinforced concrete pipe
N/A = not applicable

Reach 14

Channel improvements in Reach 14 provide conveyance capacity for the 10-percent flood (1,560 cfs at Corralitos Creek confluence to 3,450 cfs at the Llagas Creek confluence). The proposed design consists of channel widening using a trapezoidal cross-section with a sinuous low-flow channel, a bankfull channel, with narrow-width benches and engineered banks at 3H:1V slope (Figure 2.5-2). Channel widening for hydraulic improvement would predominantly occur on both banks, but where possible would be limited to one bank to preserve existing stands of riparian habitat. Benches would be mostly narrow width, about 5 feet on one or both sides of the channel. In some areas (e.g., at crossings and confluences), the benches are eliminated to allow for additional capacity and/or to allow natural deposition patterns to form. Channel bottom width is 30 to 40 feet. Excavation depths to the new channel bed would be about 2 feet or less in the upstream half of the reach, up to about 4 feet deep in the downstream half of the reach.

Two tributary streams, Church Creek and San Martin Creek, and an unnamed drainage would be culverted at their confluence with Reach 14 to allow continuous maintenance access. Similar to other reaches, an 18-foot-wide maintenance road would be constructed on both sides of the channel. The maintenance road on the east side of Reach 14 already exists but would be replaced. The existing maintenance road on the west side of Reach 14 would need to be relocated due to channel expansion. Access to the top of bank maintenance roads would be provided at Sycamore Avenue, East San Martin Avenue, and Church Avenue.

Twenty-one grade control structures, constructed primarily of natural materials would be installed along the channel. There are four existing culverts within Reach 14, Church Avenue, San Martin Avenue, Sycamore Avenue, and Middle

Avenue. The existing culverts are capable of conveying the 10-percent flood, so no modifications to these culverts are needed.

There are no instream aquatic habitat improvements planned for Reach 14. The improved slopes of the channel would be revegetated as appropriate for soil conditions, and consistent with requirements for maintaining hydraulic capacity. Revegetation is discussed as part of a mitigation plan in Chapter 5 of this EIS.

2.6.2 NRCS Alternative Construction

Table 2.5-2 shows the construction schedule by reach for the NRCS Alternative. Construction is estimated to last for a total duration of 5.5 years. The construction activities are described under Section 2.5.3.2.

Preliminary estimates of earthwork quantities for the NRCS Alternative are shown in Table 2.5-3. About 1,355,500 bank cubic yards[18] (bcy) of spoil would require disposal, which would require approximately 223,800 round truck trips[19] primarily to Anderson Dam (111,900 trips to the Dam and 111,900 trips returning from the Dam) over 5.5 year construction period (with 12 CY truck capacity). Some of the excavated material will also go to filling Lake Silveira to create wetland habitat, and some material may be reused on-site where fill or soil materials are needed. The number of truck trips will be roughly equal between Phase 1 and Phase 2 of construction. Construction materials and disposal are described in Section 2.5.3.3. Table 2.5-4 shows the types of equipment and construction crew size needed. Staging areas for construction work are described in Section 2.5.3.5 and shown on Figure 2.5-6. Construction BMPs are discussed in Section 2.5.3.6.

2.6.3 Easements and Land Requirements

The NRCS Alternative encompasses 263 acres of easements needed in order to construct the Project. The Project ROW would require the SCVWD to acquire private residential properties, agricultural lands, and some lands used for commercial/industrial businesses. Details on the types of land-uses and associated acreages within the project footprint are addressed in Section 3.8, Land Use and Planning.

There are a total of 9 residential homes, 11 greenhouses, 21 outbuildings (e.g., sheds, storage buildings), and 5 miscellaneous/unknown structures with the construction footprint (see Table 2.5-1) all of which may need to be relocated. One of the residential properties is owned by the SCVWD. One property at the upstream end of Reach 6 is a food processing company where Llagas Creek would be widened, requiring infrastructure to be relocated including a pipe bridge and some facility parking spaces to accommodate the additional cross-sectional area. There are no structures within the construction footprint of Reach 7A.

[18] One Bank Cubic Yard (BCY) equals 27 cubic feet (3'x3'x3') of earth in situ. When excavated and loaded loosely into a truck, the original one BCY of material is less compacted, expanding to approximately 1.2 Cubic Yards (CY).
[19] See section 3.10 Traffic and Circulation for definition of a “truck trip”.

2.6.4 Utilities

Utilities include underground and overhead utility lines that provide water, gas, electricity, sewer, storm drains, cable, phone, fiber optics, and other utility services throughout the Project area. There are also miscellaneous features, such as fences, that would need to be removed and potentially relocated. Utilities located within the Project easement footprint would be either protected in place, rebuilt in place, abandoned, or demolished and relocated prior to construction. Sewer lines and storm drains may be relocated at the beginning of construction. Utilities are located in all reaches of the NRCS Alternative; however, most of the utilities that would need to be relocated are in the urbanized Reaches 7B and 8. All utilities that are within the Project easements will be identified and their disposition will be determined during preparation of the final engineering design plans.

2.6.5 Operations and Maintenance

SCVWD would be responsible for maintaining all Project features, such as the channel, culverts, roads, fences, and grade control structures consistent with SCVWD and USACE guidelines. Adequate vegetation and sediment maintenance are key factors to maintaining the flow capacity of the channel and culverts. Additionally, maintenance is required for the access roads, for the structural integrity and functioning of the culverts and grade control structures, and for installed aquatic habitat enhancements. The maintenance methods and activities are described in Section 2.5.5. Tables 2.5-6, 2.5-7, 2.5-8, and 2.5-9. Each table provides a reach-by-reach description of the expected frequency, method, and target hydraulic roughness characteristics for different portions of the channel under maintained conditions.

2.7 TUNNEL ALTERNATIVE (APPLICANT'S PROPOSED ACTION)

The SCVWD considered and developed the Tunnel Alternative because there was an opportunity to reduce the Project footprint associated with the NRCS Alternative in Reach 8. The Tunnel Alternative would require a smaller ROW, reduce the amount of vegetation to be removed and excavation needed along the existing West Little Llagas channel, reduce the extent of utilities to be relocated, and reduce the culvert replacements required, which would result in less construction related interference with commercial and residential areas. The Tunnel Alternative is designated the Applicant's Proposed Action in this EIS in accordance with NEPA designation (Preferred Alternative is the CEQA designation).

2.7.1 Tunnel Alternative (Applicants Proposed Action) Features

The Tunnel Alternative would provide the same 1-percent flood management as the NRCS Alternative in Reach 8 protecting downtown Morgan Hill. All other Project reaches would have the same level of protection, and the same Project features would be constructed as described for the NRCS Alternative. The key feature of the Tunnel Alternative is to use an underground concrete tunnel instead of channel widening and deepening proposed through downtown Morgan

Hill under the NRCS design. The main components of the Tunnel Alternative (Figure 2.7-1) would include:

- A 250-foot-long sediment trap and an inlet weir (diversion) structure would be constructed in the 600 feet of channel between Wright Avenue and Hillwood Lane. A new 18-foot-wide maintenance/access road would be installed along the sediment detention basin at the top of the south bank of the channel between Hillwood Lane and Wright Avenue.

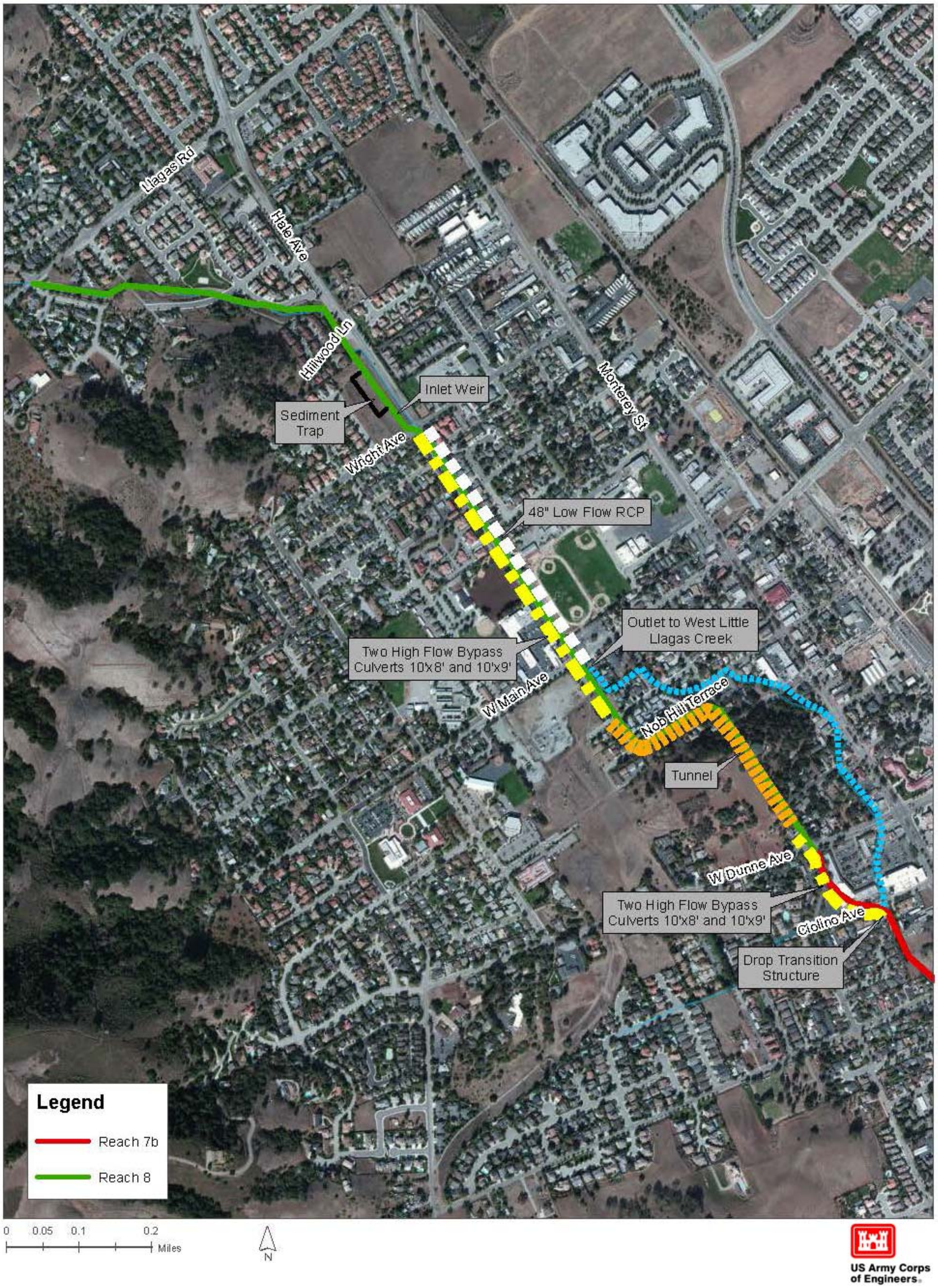
- A 36-inch-diameter reinforced concrete pipe (RCP) culvert would be constructed paralleling Hale Avenue, stretching from the weir structure 2,400 feet downstream and discharging into the existing West Little Llagas Creek channel south of West Main Avenue. The 2,400-foot-long earthen channel section of West Little Llagas Creek between Wright Ave and West Main Ave would be replaced with the RCP culvert. The RCP culvert would maintain low flows up to 50 cfs in the existing creek through the downtown area without exceeding the channel capacity.

- Two high flow bypass culverts would be constructed. One would be 10 feet by 8 feet in size, while the other would be 10 feet by 9 feet in size. Both culverts would extend from the weir structure parallel to Hale Avenue and stretch 2,750 feet to Warren Avenue where they would convey high flows to the tunnel.

- A 2,100-foot-long tunnel would be constructed, extending under Nob Hill between Warren Avenue and Del Monte Avenue, continuing under Nob Hill Terrace. This modification also includes using open cut box culverts for transition to and from the tunnel, and construction of a tunnel portal at the upstream end.

There would be no change to the existing culverts at 5th Street, 4th Street/Monterey Highway, 3rd Street, 2nd Street / Del Monte Avenue, and Warren Avenue, nor would the channel be widened and deepened in this section of Reach 8 as proposed under the NRCS Alternative. The flow constricting plate at the Llagas Road culvert at the upstream boundary of the Project would be removed to reduce upstream flooding. The channel would be deepened and widened downstream from the bridge to the inlet of the sediment detention basin near Hillwood Lane.

Figure 2.7-1 Tunnel Alternative Reach 8



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Also as part of this alternative, Reach 7B would be modified as follows:

- Double box culverts would be constructed; one 10 feet by 8 feet in size, and the other 10 feet by 9 feet in size, from the tunnel outlet at West Dunne Avenue to downstream of Ciolino Avenue. The Tunnel Alternative differs from the proposed NRCS design, which would replace the existing culvert along the current alignment of West Little Llagas Creek.

Aquatic habitat enhancement features identified in Section 2.6.1 under the NRCS Alternative would be the same for the Tunnel Alternative. Examples of the habitat enhancement features are provided in Appendix J.

2.7.2 Tunnel Alternative Construction

The construction approach for the Tunnel Alternative would be the same throughout the entire Project reaches as previously described in Section 2.5.3 and as described for the NRCS Alternative. The key difference would be that a tunnel and a sediment detention basin would be constructed, and much of the channel widening, deepening, and culvert replacement construction in Reach 8 through downtown Morgan Hill (Section 2.6.1) would be avoided.

2.7.2.1 Construction Schedule

Construction duration for the Tunnel Alternative would be 5.5 years, with the construction lasting for about 36 months in Reach 8, which is the same duration to construct Reach 8 and total Project duration under the NRCS Alternative (Tables 2.5-2 and 2.5-4).

2.7.2.2 Construction Activities, Equipment, and Crews

Construction activities would be the same as those described under Section 2.5.3.2 and for the NRCS Alternative, except that in Reach 8 several thousand feet of RCP and RCB culverts would be buried adjacent to Hale Avenue, the tunnel would be constructed under the Nob Hill Terrace neighborhood, and a sediment detention basin would be constructed near Hale Avenue and Wright Avenue.

The tunnel would be excavated toward the south from the Hale Avenue Portal work area toward Del Monte Avenue near Dunne Avenue. The Project would use conventional mining equipment and methods to excavate the tunnel, namely roadheaders, excavators, and controlled detonations. A roadheader is a boom-mounted cutting head, mounted on a crawler that cuts through the rock face (Figures 2.7-2 and 2.7-3). As the roadheader tunnels forward, the excavated material would be transported from the tunnel face back to the tunnel entrance or shaft using electric-powered muck trains on a temporary railway in the tunnel and/or diesel-powered load-haul-dumps (LHD), also called muck trucks (Figure 2.7-4). The LHD scoops up muck from the tunnel bottom and transports it to the tunnel portal where it is loaded onto dump trucks for disposal. In very soft zones, a bucket excavator may be used.

Figure 2.7-2 Typical Roadheader Used for Tunnel Excavation in Soft to Medium Strength Rock

Figure 2.7-3 Roadheader Excavation with Steel Sets at the Face of a Tunnel

Figure 2.7-4 Load, Haul, Dump (LHD) Unit

In sections of harder rock, controlled detonations would be used to fracture the rock in advance of the roadheader or bucket excavator. Controlled detonation is performed by drilling small holes in a specified pattern in the rock face (Figure 2.7-5), packing them with small amounts of explosive and primer (Figure 2.7-6 a, b, and c), and detonating the explosives using a specified time delay between successive detonations. The detonations would sound like a short succession of thunder generally lasting a few seconds. Controlled detonation methods would adhere to stringent state and federal safety requirements and would also be conducted in accordance with local noise ordinances. Typically, less than 20 pounds of explosives per delay would be used. If explosives are stored at any of the work areas, they would be kept in specially designed and secured containers or magazines in accordance with state regulations (California Code of Regulations, Title 8, Division 1, Chapter 4).

Figure 2.7-5 Drill Jumbo for Drilling Holes

Figure 2.7-6 a, b, and c—Photographs of Controlled Detonation Preparation

Tunneling is anticipated to advance at a rate of approximately 15 to 25 feet per day; however, the advancement rate would vary depending on geological conditions encountered and other factors. In addition, the Project would implement a two-stage lining system. The first stage or initial tunnel support may be provided by steel sets and lagging, rock bolts or dowels, wire mesh, shotcrete, lattice girders, or some combination of these methods (Figure 2.7-7). The purpose of the initial support is to provide a stable and safe work environment and help control groundwater inflow.

Figure 2.7-7 Tunnel with Steel Rib and Wood Lagging Initial Support

The second stage involves installing a final liner of concrete throughout the tunnel intended to provide long-term structural support, to provide a relative smooth surface to enhance flow capacity, and to reduce maintenance and enhance safety. For the project tunnel, the final lining would likely consist of eight to twelve inches of shotcrete.

Portions of the tunnel would have a small amount of cover between the top of the tunnel and the street. At these locations, it would be necessary to inject grout into the loose soil to bind the soil together, which would allow the tunnel to be excavated without causing surface settlement. The three areas to be pre- grouted are Hale Avenue southeast of Warren Avenue (250 feet), the intersection of Nob Hill Terrace and Del Monte Avenue (180 feet on Nob Hill Terrace and 70 feet on Warren Avenue), and Del Monte Avenue (approximately 150 feet north of Dunne Avenue for a length of 70 feet). The equipment used for pre- grouting is a drill rig truck and a grouting truck.

Before the tunnel can be constructed, a tunnel portal would need to be constructed. In general, a tunnel portal is a vertical shaft from which the tunnel is constructed. The size of the portal would be approximately 40 feet long by 30 feet wide. It would be approximately 30 feet deep. It would be located in a vacant parcel just north of the intersection of Warren Avenue and Hale Avenue. The portal excavation would be supported by steel sheet piles. It would take approximately three weeks to construct the portal. The steel sheet piles would be installed using vibratory pile drivers and/or impact pile drivers. Soil within the portal would be removed using a large excavator. The material would probably be temporarily stockpiled on site then loaded into dump trucks using a wheeled loader for disposal. Power (electricity) is needed in the tunnel and around the portal site. Power may be brought to the site from existing power lines. Power may also be generated on-site using a temporary diesel generator.

Due to the intensity, duration, and proximity of construction activities to the nearby residences, two temporary sound barriers (e.g., walls, sound-absorbing blankets) would be installed along some of the work area boundaries. These sound barriers would be designed to provide a minimum 10 A-weighted decibel (dBA) reduction in noise. The final design of the sound barrier would be determined by the contractor to achieve the Project's noise performance standards. For the purposes of this Project description, the barrier is assumed approximately 20 feet high.

2.7.2.3 Construction Materials and Disposal

The construction fill and disposal material volumes for the Tunnel Alternative are provided in Table 2.5-3. The material excavated from the tunnel would vary from highly weathered rock at either end to unweathered rock in the middle of the hill. When it is removed, the rock would be in small pieces ranging from gravel-sized pieces to approximately four inches in diameter. Some of the rock may be taken to a SCVWD maintenance yard and temporarily stored and then used later as construction material in maintenance projects. The remaining material would be disposed of in the same manner as the material from the non-tunnel segments, which is expected to be end-hauled predominantly to Anderson Dam for stockpiling and later use, with some material also going to the Lake Silveira element.

2.7.2.4 Staging Areas and Access Routes

The staging areas and access routes would be the same as described under Section 2.5.3.5 and shown in Figure 2.5-6.

2.7.2.5 Construction BMPs

The construction BMPs will be the same as that described in Section 2.5.3.6. Additional BMPs are prescribed specific to the construction of the tunnel (Tunnel Alternative and Reach 6 Bypass Alternative) primarily to address potential noise effects. Those BMPs include specific limits on construction hours for spoils hauling, delivery trucks, and use of air supply fans, in addition to other types of BMPs to address potential noise issues. The type of construction with the greatest noise contributions proposed for the Tunnel Alternative is the tunnel, which would be constructed using conventional mining equipment and methods to excavate, specifically roadheaders, excavators, and controlled detonations. Controlled detonations would be used in sections of harder rock, to fracture the rock for the roadheader or excavator. Controlled detonation would be performed by drilling small holes in a specified pattern in the rock face, packing them with small amounts of explosive and primer and detonating the explosives using a specified time delay between successive detonations. The detonations would sound like a short succession of thunder generally lasting a few seconds. Controlled detonation methods would adhere to stringent state and federal safety requirements and would also be conducted in accordance with local noise ordinances. Typically, less than 20 pounds of explosives per delay would be used. A Blasting Plan would be prepared for the Project to provide guidelines for the safe use and storage of blasting materials that may be used during construction and would also provide measures to reduce noise, including the following:

- Drill multiple, small charge holes rather than fewer larger holes;
- Retain soil 3 to 4 feet above blasting material before detonation;
- Use blast mats and timing delays;
- Blast small horizontal and vertical areas rather than large areas;
- Stem blast holes with dense sand;
- Direct charges away from the direction of sensitive receptors; and
- Place physical barriers between the detonation site and the nearest receptors.

BMPs have been prescribed specific to the tunnel construction in order to reduce noise associated with the tunneling activity. Some BMPs designed to reduce noise also reduce vibrations. The BMPs specific to tunnel construction are listed below:

- **Fan Noise**: Tunneling will not be allowed at night. The air supply fans will be shut off between 7:30 p.m. and 7:00 a.m.
- **Generator Noise**: Power will be supplied to the site using PG&E facilities. Power will not be generated using portable power generators.
- **Tunnel Access**: The tunnel will have a gate and this gate will be closed and locked when the air fans are not supplying air to the tunnel.
- **Controlled Detonations**: Controlled detonations would be limited to daytime hours between 7:00 a.m. and 8:00 p.m. Monday through Friday and 9:00 a.m. to 6:00 p.m. on Saturdays unless it can be demonstrated by the qualified vibration consultant that nighttime controlled detonations would not exceed the applicable threshold of 0.130 in/sec PPV for transient sources.

  Controlled detonation methods would adhere to stringent state and federal requirements.
- **Storage of Explosives**: Explosives would not be stored at the tunnel portal work area.
- **Neighborhood Notice**: The SCVWD will provide reasonable advance notification to the businesses, owners, and residents of adjacent areas potentially affected by the tunneling about the nature, extent, and duration of the tunnel construction activities.

Interim updates should be provided to such neighbors to inform them of the status of the construction.

- **Noise and Vibration Control Plan**: The contractor shall submit a Noise and Vibration Control Plan prepared by a qualified noise consultant. A qualified noise and vibration consultant is defined as a Board Certified Institute of Noise Control Engineering member or other qualified consultant or engineer approved by SCVWD.

- **Noise Monitoring Plan**: The contractor shall submit a Noise Monitoring Plan, which shall at a minimum, include the following:
  - Schedule for tests to confirm the construction noise levels and effectiveness of noise control measures prior to commencement of substantial noise-generating activities, such as grading, earthmoving, demolition.
  - The number and location of monitoring locations and relation to stationary noise controls.
  - Schedule for ongoing monitoring and reporting of construction noise levels to meet performance standards. Monitoring shall occur at least weekly, or more often if needed in response to complaints.
  - Neighborhood notification procedure for controlled detonation activities.

- **Best Available Noise Control Techniques**: Best available noise control techniques (including mufflers, intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds) shall be used for all equipment and trucks in order to minimize construction noise impacts, as necessary, to maintain noise levels below the applicable thresholds.

- **Impact Equipment**: If impact equipment (e.g., jack hammers, pavement breakers, and rock drills) is used during project construction, hydraulically or electric-powered equipment shall be used wherever possible to avoid the noise associated with compressed-air exhaust from pneumatically powered tools. However, where use of pneumatically powered tools is unavoidable, an exhaust muffler on the compressed-air exhaust shall be used. The contractor shall use external jackets on the tools themselves and quieter procedures, such as drilling rather than using impact equipment as needed to comply with the established Noise Performance Standards.

- **Stationary Noise Sources**: Stationary noise sources shall be located as far from sensitive receptors as possible. If they must be located near receptors, adequate muffling and/or enclosures shall be used, as needed, to comply with the established Noise

Performance Standards. Enclosure opening or venting shall face away from sensitive receptors. If any stationary equipment (e.g., ventilation fans, generators, dewatering pumps) is operated beyond the time limits specified by the pertinent noise ordinance, this equipment shall conform to the affected jurisdictions pertinent day and night noise limits.

- **Material Stockpiles and Maintenance/Equipment Staging and Parking Areas**: Material stockpiles, as well as maintenance/equipment staging and parking areas, shall be located as far as practicable from residential and school receptors. If such areas cannot be feasibly located 200 feet or more from residential receptors, then a temporary sound barrier shall be constructed to block the line of sight between construction equipment and nearby homes.

- **Sound Barriers**: Sound barrier material shall have a minimum surface density of 1 pound per square foot and a minimum sound transmission class rating of 25. Any noise-generating activities associated with initial site preparation and/or building the sound barriers that exceed applicable thresholds shall be restricted to daytime hours and the duration of the activities that exceed applicable thresholds shall not exceed 2 weeks at any one location.

- **Equipment Maintenance and Repair Work**: All construction equipment maintenance and repair work shall be performed during the daytime hours, when feasible. If nighttime repair is necessary to maintain operations during the nighttime hours, hammering, and other high level noise activities shall be performed in such a way that a sound barrier shields the repair activity from the line of sight to the nearby residence.

- **Backup Alarms**: Subject to site safety priorities and consistent with state and federal worker safety laws, the contractor may use administrative controls instead of audible backup alarms to meet the Lmax Noise Performance Standards. Such administrative control shall provide backup warning on all vehicles that operate in areas where their backward movement would constitute a hazard to employees working in the area on foot, and where the operator’s vision is obstructed to the rear of the vehicle (earth moving equipment) (Title 8 CCR, §1592). Administrative controls may include procedures that require a spotter or flagger in clear view of the operator to direct the backing operation, that require the operator to dismount and circle the vehicle immediately prior to starting a back-up operation, and the design of traffic patterns to minimize the need for backward movement. California Occupational Safety and Health Administration (Cal/OSHA) will be consulted to determine whether additional noise reductions may be achieved through Cal/OSHA-approved alternatives to backup alarms without compromising site safety. If Cal/OSHA indicates that such alternatives are a viable option and SCVWD, in consultation with the contractor, determines that site safety would not be compromised, then the contractor shall apply for a variance from Cal/OSHA and use such alternatives consistent with Cal/OSHA requirements. Such alternatives could include, but not limited to:

- o “Smart” alarms with an audible range of 77 to 97 dBA, which limit the warning signal to 5 dBA over ambient noise levels.
- o Radar presence-sensing alarms, which identify objects in the reversing path of a truck; or the “bbs-tek” broadband backup alarm system, which uses a broadband sound instead of a more noticeable single-frequency sound.
- o Strobe lights instead of audible alarms (which are particularly effective at night).

If any of the alternatives described above can be implemented, the use of backup alarms would be avoided (e.g., by routing trucks and equipment to eliminate the need to back up, or by eliminating truck and heavy equipment use at night).

- **Trucks**: The contract specifications shall contain the following requirements to mitigate noise from trucks:
  - o Offsite truck operations (haul trucks and concrete delivery trucks) shall not occur during nighttime hours and be restricted during evening and daytime hours, as needed, to comply with the established Noise Performance Standards.
  - o Haul and delivery truck routes shall avoid local residential streets and shall follow local designated truck routes. Total project-related haul and delivery truck volumes on any particular haul truck route shall be limited to 80 trucks per hour.
  - o Spoils hauling shall occur only between 7:00 a.m. and 8:00 p.m., Monday through Friday and 9:00 a.m. to 6:00 p.m. Saturday, at the tunnel portal work area.
  - o Delivery trucks shall be prohibited from operating within 200 feet of any residential uses during the nighttime hours (10:00 p.m. to 7:00 a.m.). If there are receptors, but they are beyond 200 feet from the truck route, limited truck operations shall be allowed during the more sensitive nighttime hours, but noise generated by these operations cannot exceed the 50-dBA sleep interference criterion at the closest receptors. If trucks must operate during these hours and residential uses are located within 200 feet of

the truck route, deliveries shall be made to staging areas outside residential areas, then transferred to the construction site during daytime hours (7:00 a.m. to 8:00 p.m.).

- o A truck route plan for muck truck movements that minimizes backward movement of trucks.

- o In the event that the Noise Performance Standards are exceeded, the contractor shall immediately inform SCVWD and provide information to SCVWD within 24 hours of the exceedance, identifying the source of the exceedance (e.g., unusually noisy method, broken muffler, emergency repair) and identifying the corrective actions that are being taken to reduce the noise.

- o In the event that complaints are received regarding noise, the contractor shall immediately inform SCVWD and evaluate whether the noise-generating activity that is the subject of the complaint exceeds applicable thresholds. If determined to exceed the applicable thresholds, the noise-generating activity shall be immediately stopped and/or corrective measures implemented so that the thresholds are no longer exceeded. Subsequently, the contractor shall provide information to SCVWD within 24 hours regarding the noise levels measured and activities that correspond to the complaints. The effectiveness of implemented noise control measures shall be verified and/or corrective actions shall be taken by the contractor to ensure that future exceedances are minimized.

- **Preconstruction Crack Survey**: Prior to construction, SCVWD shall conduct a preconstruction crack survey at homes (where permission is granted) within 225 feet (slant distance) of planned controlled detonations to document existing cosmetic and structural cracks. If complaints of new cracking are made to SCVWD by nearby property owners, SCVWD shall evaluate the claim(s) relative to the baseline crack survey and vibration monitoring data collected during construction. If the claim is verified, then SCVWD shall repair the project-related damage at no cost to the property owner.

- **Blast Overpressure**: Blast overpressure shall be limited to 0.0145 psi or 134 decibels (dB) at nearby residences. The contract specifications shall require the contractor to notify neighbors at the portals within 500 feet of near-surface detonation activity of the construction activity schedule and to advise residents to remove precious and fragile items from walls and shelves. The contract specifications shall require the contractor to notify neighbors within 500 feet slant distance of underground detonation activity (away from the portals) of construction activity schedules.

2.7.3 Easements and Land Requirements

The easement acreage of the Tunnel Alternative encompasses 262 acres. This includes permanent easements for operations and maintenance and a temporary construction easement, which is needed in order to construct the Project.

The number of structures located within the project footprint that may need to be relocated in each reach are the same as that described for the NRCS Alternative (Table 2.5-1), with the exception of 6 residential structures in Reach 8 that will not be within the Tunnel Alternative ROW. As such, there are a total of 3 residential structures, 11 greenhouses, 21 outbuildings, and 5 miscellaneous structures within the construction footprint under the Tunnel Alternative. Details on the types of land-uses and associated acreages within the Project footprint are addressed in the Land Use and Planning section in Chapter 3.

2.7.4 Utilities

Utilities include underground and overhead utility lines that provide water, gas, electricity, sewer, storm drains, cable, phone, fiber optics, and other utility services throughout the Project area. There are also miscellaneous features, such as fences, that would need to be removed and potentially relocated. Utilities located within the Project easement footprint would be either protected in place, rebuilt in place, abandoned, or demolished and relocated prior to construction. Sewer lines and storm drains may be relocated at the beginning of construction. Utilities are located in all reaches of the Tunnel Alternative; however, most of the utilities that would need to be relocated are in the urbanized Reaches 7B and 8. Utilities would be protected in place during construction if they were not to be abandoned or replaced. All utilities that are within the Project easements will be identified and their disposition will be determined during preparation of the final engineering design plans.

2.7.5 Operations and Maintenance

Operations and maintenance would be the same as described in Section 2.5.5, and is the same as that expected for the NRCS Alternative in all Project reaches, with a few differences in Reach 8. The Tunnel Alternative would include a sediment detention basin near the upstream boundary of the Project in Reach 8. The detention basin would function to capture sediments transported from the West Little Llagas Creek drainage upstream of the Project, thereby reducing the need to conduct sediment maintenance in downstream reaches, including the culverts and tunnel sections in Reach 8. To maintain the detention basin function it would periodically need to be excavated with the removed sediments end-hauled off-site. The detention basin would have a maintenance road along its south side. The section of West Little Llagas Creek, past the portal intake just downstream from W. Main Avenue through downtown Morgan Hill, would not be within the construction footprint; and there are no SCVWD maintenance easements in this section of channel. Therefore, there would be no maintenance activities by SCVWD in association with this channel segment under the Tunnel Alternative.

There would be three types of access to the box culverts and tunnel in Reach 8. First, there would be major access points where panels can be removed to lower equipment into the culverts and tunnel such as bobcats to remove debris and sediment. Second, smaller hatches would be constructed for personnel and small equipment access. Third, manways would be included along the culvert length for inspections.

2.8 CULVERT/CHANNEL ALTERNATIVE

The SCVWD developed the Culvert/Channel Alternative to reduce the Project footprint associated with the NRCS Alternative in Reach 8. This alternative would require a smaller ROW, reduce the amount of vegetation to be removed along the existing West Little Llagas channel, and would allow easier maintenance access, relative to the NRCS Alternative.

2.8.1 Culvert/Channel Alternative Features

The Culvert/Channel Alternative would provide management for a 1-percent flood exceedance in Reach 8, protecting downtown Morgan Hill. All reaches would have the same level of protection, and the same features would be constructed as described for the NRCS Alternative, with a few differences in Reach 8. The key feature of the Culvert/Channel Alternative is elimination of the need for channel deepening and widening through residential properties, as proposed for the NRCS Alternative between West Main Avenue and West 2nd Street in Reach 8. The main components of the Culvert/Channel Alternative that are different from those previously described for the NRCS Alternative include the following (all focused in Reach 8 (Figure 2.8-1).

- Realign an 800-foot segment of the double 10-foot-wide box culverts that, in the NRCS design, would be parallel to Hale Avenue through the Britton School athletic fields up to Del Monte Avenue;
- Continue the double box culvert under Del Monte Avenue approximately 900 feet to West 2nd Street; and
- From West 2nd Street to West Dunne Avenue perform the same channel widening and deepening, along with culvert replacements at 2nd, 3rd, 4th, and 5th Streets as described for the NRCS Alternative for Reach 8. The upstream most portion of the Culvert/Channel Alternative from Llagas Road to Hillwood Lane, thence along Hale Avenue up to the Britton School athletic field would remain the same as the NRCS Alternative. All other reaches would have the same design as previously described for the NRCS Alternative.

Aquatic habitat enhancement features identified in Section 2.6.1 under the NRCS Alternative would be the same for the Culvert/Channel Alternative. Examples of the habitat enhancement features to be installed are provided in Appendix J.

2.8.2 Culvert/Channel Alternative Construction

The construction approach for the Culvert/Channel Alternative would be the same throughout all of the Project reaches as previously described for the NRCS Alternative.

2.8.2.1 Construction Schedule

Construction duration for the Culvert/Channel Alternative would be 5.5 years, with the construction lasting for about 36 months in Reach 8, same as the NRCS Alternative (Tables 2.5-2 and 2.5-4).

2.8.2.2 Construction Activities, Equipment and Crews

Construction activities, equipment, and crew size would be the same as that described for the NRCS Alternative (Table 2.5-4), except that in a segment of Reach 8 construction would occur through athletic fields, and along Del Monte Road to West 2nd Street, rather than through a section of residential homes between West Main Avenue and West 2nd Street.

2.8.2.3 Construction Materials and Disposal

The construction fill and disposal material volumes for the Culvert/Channel Alternative are nearly the same as for the NRCS Alternative, as shown in Table 2.5-3.

2.8.2.4 Staging Areas and Access Routes

The staging areas and access routes would be the same as for all of the other action alternatives (Figure 2.5-6).

2.8.2.5 Construction BMPs

The construction BMPs will be the same as that described for all alternatives (Section 2.5.3.5).

Figure 2.8-1 Culvert/Channel Alternative Reach 8

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2.8.3 Easements and Land Requirements

The Culvert/Channel Alternative would require 261 acres of easement, which includes permanent easements for operations and maintenance and temporary construction easements needed in order to construct the Project.

There are a total of 7 residential homes, 11 greenhouses, 21 outbuildings, and 5 miscellaneous structures within the construction footprint that may need to be relocated (see Table 2.5-1). Details on the types of land-uses and associated acreages within the Project footprint are addressed in Land Use section in Chapter 3.

2.8.4 Utilities

Utilities include underground and overhead utility lines that provide water, gas, electricity, sewer, storm drains, cable, phone, fiber optics, and other utility services throughout the Project area. There are also miscellaneous features, such as fences, that would need to be removed and potentially relocated. Utilities located within the Project easement footprint would be either protected in place, rebuilt in place, abandoned, or demolished and relocated prior to construction. Sewer lines and storm drains may be relocated at the beginning of construction. Utilities are located in all reaches of the Culvert/Channel Alternative; however, most of the utilities that would need to be relocated are in the urbanized Reaches 7B and 8. The Culvert/Channel Alternative would have the same amount of utilities in the ROW as the NRCS Alternative in all Project reaches, except for Reach 8 where the flood management features and Project alignments differ. Utilities would be protected in place during construction if they were not to be abandoned or replaced. All utilities that are within the Project easements will be identified and their disposition will be determined during preparation of the final engineering design plans.

2.8.5 Operations and Maintenance

Operations and maintenance required for this alternative would be the same as those as described for the NRCS Alternative.

2.9 REACH 6 BYPASS ALTERNATIVE

The Reach 6 Bypass Alternative would construct a high flow bypass channel between Reach 6 of Llagas Creek and Reach 14 of East Little Llagas Creek. The bypass would be designed so that no flood capacity improvements would be needed along the remaining section of Reach 6 or Reach 5 of Llagas Creek downstream of the proposed bypass. Flood conveyance improvements for the upstream Project Reaches 8, 7A, and 7B and for the downstream Reach 4 would remain the same as described for the Tunnel Alternative. Reach 14 would be designed similar to the Tunnel Alternative, except that the channel dimensions will be larger to accommodate the additional high flow routed from the upstream reaches (8, 7B, 7A) through the Reach 6 bypass, so as not to cause induced flooding.

Under existing conditions, Reach 6 of Llagas Creek has capacity to carry up to approximately the 10-year flow. Flows larger than the 10 percent exceedance flow overtop the channel banks and flood the surrounding areas. The bypass would convey the future extra flow (i.e., new capacity) from Reach 8, 7A, and 7B directly to Reach 14. East Little Llagas Creek downstream of the bypass (Reach 14) would be designed to carry the extra flow from the upstream channel capacity. The design flow for the Reach 6 high flow bypass segment would be 1,200 cfs. The existing flow capacity in Reach 6 downstream from the bypass channel (2,090 cfs which is approximately a 10-percent exceedance flow), would continue to be maintained. The existing flow capacity in Reach 5 would also continue to be maintained. In Reach 14 the design flow would be 2,900 cfs at the confluence with the high flow bypass, which would maintain a 10-percent flow exceedance capacity in this reach.

2.9.1 Reach 6 Bypass Alternative Features

The proposed high flow bypass would start near the top of Reach 6, about 0.5 mile downstream of Monterey Highway. The 0.5-mile section of Reach 6 between Monterey Highway and the bypass would be widened and deepened as proposed for all of the action alternatives; however, no construction would occur downstream from the bypass channel, over a distance of approximately 2.7 miles in Reach 6 and the entire 0.5 mile length of Reach 5. Consequently, there would be no instream aquatic habitat enhancements in Reach 6 downstream from the bypass channel or in Reach 5; however, aquatic habitat enhancements identified under the NRCS Alternative for all other reaches would be the same. Construction in Reach 4 would be the same as previously described for all the action alternatives. The bypass channel would run east through open fields, continue under Murphy Avenue and U.S. 101, and connect to Reach 14. Figure 2.9-1 shows the alignment of the bypass channel situated near the upstream portion of Reach 6. The proposed high flow bypass would be approximately 1,660 feet long and would provide a 1-percent exceedance flood protection through the bypass segment. There are five main flood management features included in this alternative:

- Hydraulic control structure at Reach 6;
- Bypass channel from Reach 6 to Reach 14;
- Three bridge replacements;
- Reach 14 creek improvements; and
- Culverts modifications in Reach 14 at Sycamore Avenue Bridge and East San Martin Avenue Bridge.

2.9.1.1 Hydraulic Control Structure

The hydraulic control structure would include a trapezoidal-shaped weir and five 6-foot by 6-foot individual working sluice gates at the entrance of the high flow bypass channel. The invert elevations of the sluice gates would be set at 290 feet NAVD88. The proposed weir would be 60 feet wide, would have 3H:1V side slopes, and the bottom elevation would be set at elevation of 293 feet (NAVD88).

For the 10-percent exceedance flood event, the five sluice gates would be fully opened. The weir and five gates would be designed to divert 1,200 cfs from Reach 6 of Llagas Creek to Reach 14 of East Little Llagas Creek. Automatic control devices would be installed to operate gates to control the flow into the bypass channel and maintain existing flow condition in Reach 6.

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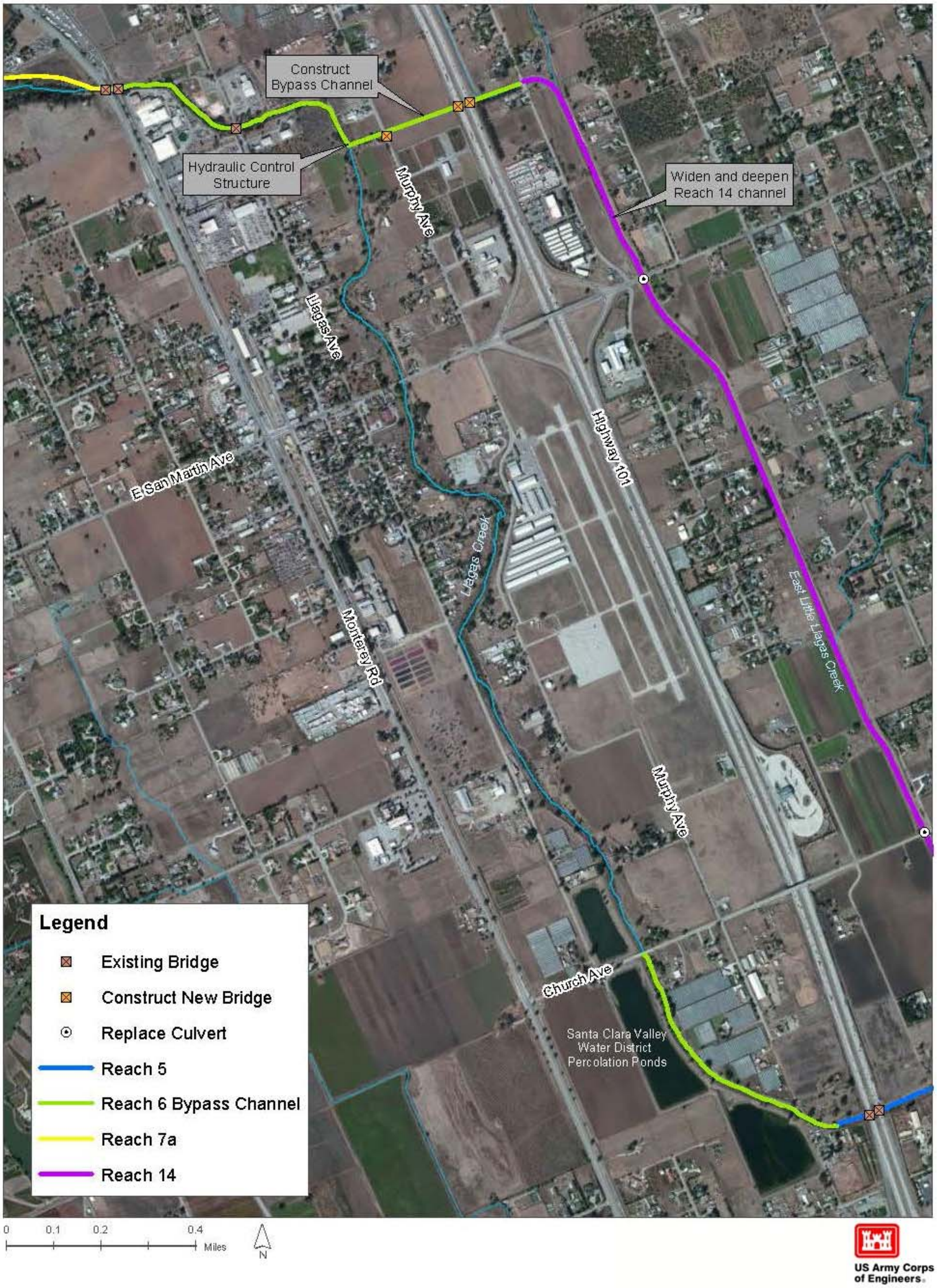
Figure 2.9-1 Reach 6 Bypass Alternative



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2.9.1.2 Reach 6 Bypass Channel

The proposed high flow bypass is 1,660 feet long and connects Llagas Creek to East Little Llagas Creek. The bypass channel has a 60-foot bottom width, is roughly 6 feet deep, and has 3H:1V side slopes. The longitudinal channel slope is 0.2 percent. Maintenance roads would be constructed at the top of bank on both sides of the channel. Figure 2.9-2 provides a typical cross-section for the high flow bypass channel.

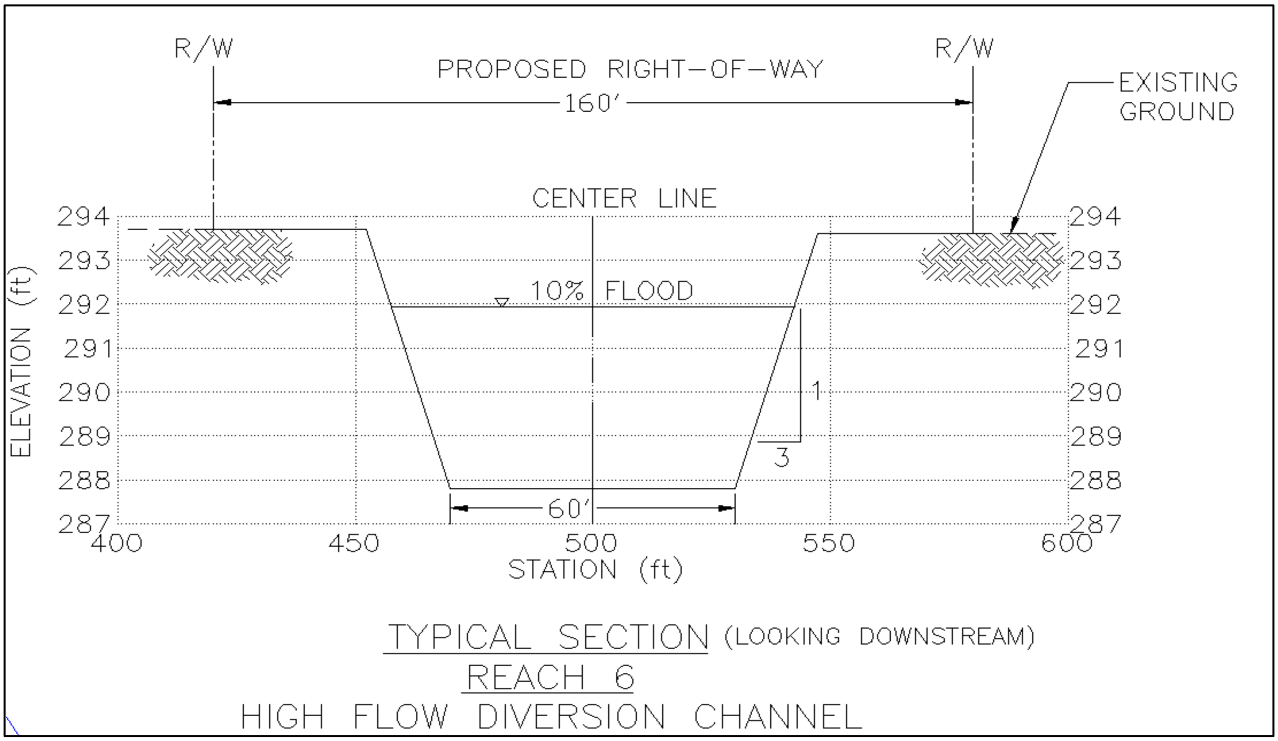

Figure 2.9-2 Bypass Channel Typical Cross-Section Reach 6

2.9.1.3 Bridges

Three bridges are proposed to be constructed at the following locations: Murphy Avenue, U.S. 101 southbound, and U.S. 101 northbound. The bridge dimensions are listed in Table 2.9-1 below.

Table 2.9-1 New Bridges Proposed for Reach 6 Bypass Alternative

Murphy Avenue	Bridge	42	104	6
U.S. 101-northbound	Bridge	52	140	10
U.S. 101-southbound	Bridge	52	140	10

In order to construct the bypass channel temporary traffic control routes would need to be constructed to accommodate local traffic on Murphy Avenue (Figure 2.9-3). In addition, two construction phases would be needed to divert traffic through temporary traffic routes (Figures 2.9-4 and 2.9-5) on U.S. 101 northbound and southbound.

Phase 1 would include the diversion of traffic in both directions. In this phase construction of the north bound bridge and culvert would take place. The approximate construction time to build the temporary road detours in Phase 1 would be 60 days. After the traffic is diverted through the new temporary roads, the construction of the new bridge and culvert in the northbound direction would be approximately 90 days. In Phase 2, the new north bound bridge would be used to route traffic flow while the temporary road in the south bound direction would still be used. During Phase 2 the south bound bridge and culvert would be constructed, requiring approximately 90 days. The total number of days for the Phase 1 and Phase 2 work along U.S. 101 would be 250 days. Upon completion of the Murphy Road and U.S. 101 bridges, the temporary traffic control routes would be removed.

2.9.1.4 Reach 14 Improvements

The proposed high flow bypass connects directly to the existing Reach 14 (East Little Llagas Creek). To pass the extra flow from the bypass and have 10 percent exceedance flow capacity, the following channel widening work is proposed for Reach 14, starting 500 feet upstream of the confluence with the bypass to 0.5 mile downstream of East San Martin Avenue. The improvements for the rest of Reach 14 (0.5 mile downstream of East San Martin Avenue to the confluence with Llagas Creek Reach 4) are the same as for the NRCS Alternative. No additional improvements beyond those proposed for the NRCS Alternative are needed in this downstream section of Reach 14 because there will be sufficient capacity to carry the 10-percent exceedance flow.

Figure 2.9-3 Temporary Traffic Road at Murphy Avenue

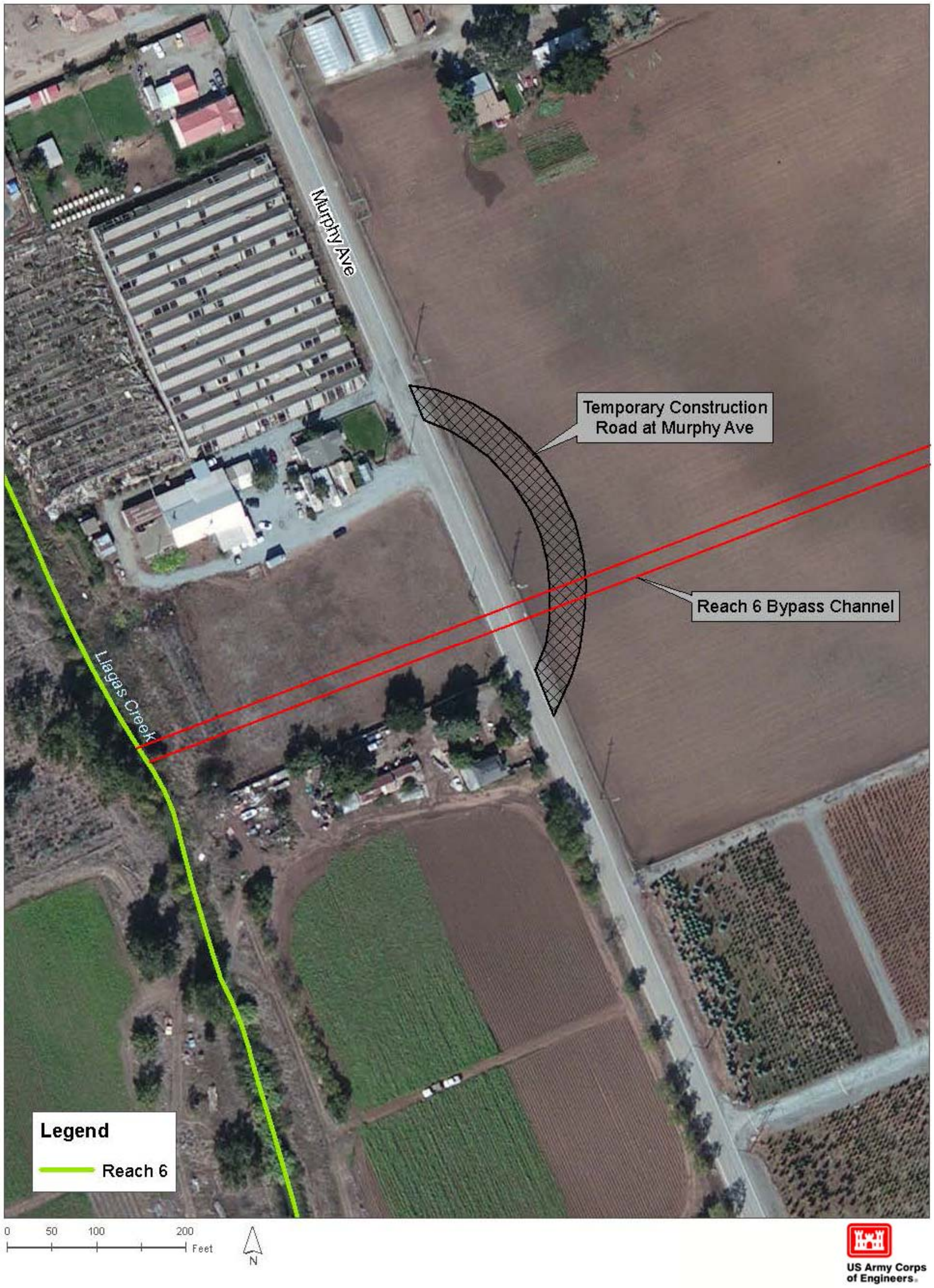

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Figure 2.9-4 Phase 1 – Hwy 101 North Bound Bridge and Culvert Construction and Temporary Traffic Control

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Figure 2.9-5 Phase 2 – Hwy 101 South Bound Bridge and Culvert Construction and Tempoaray Traffic Control

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The proposed trapezoidal cross section has an 80-foot bottom width, 130 foot top-width, 3H:1V side slopes, and an approximately 7- to 10-foot depth (Figure 2.9-6). The longitudinal channel slope is 0.4 percent. The channel widening would not be limited to a single bank. To avoid extra land acquisition, the creek realignment would be designed to stay within the SCVWD's ROW. The creek widening to Sycamore Avenue would be proposed to begin on the north side of the creek and then shift toward the south side.

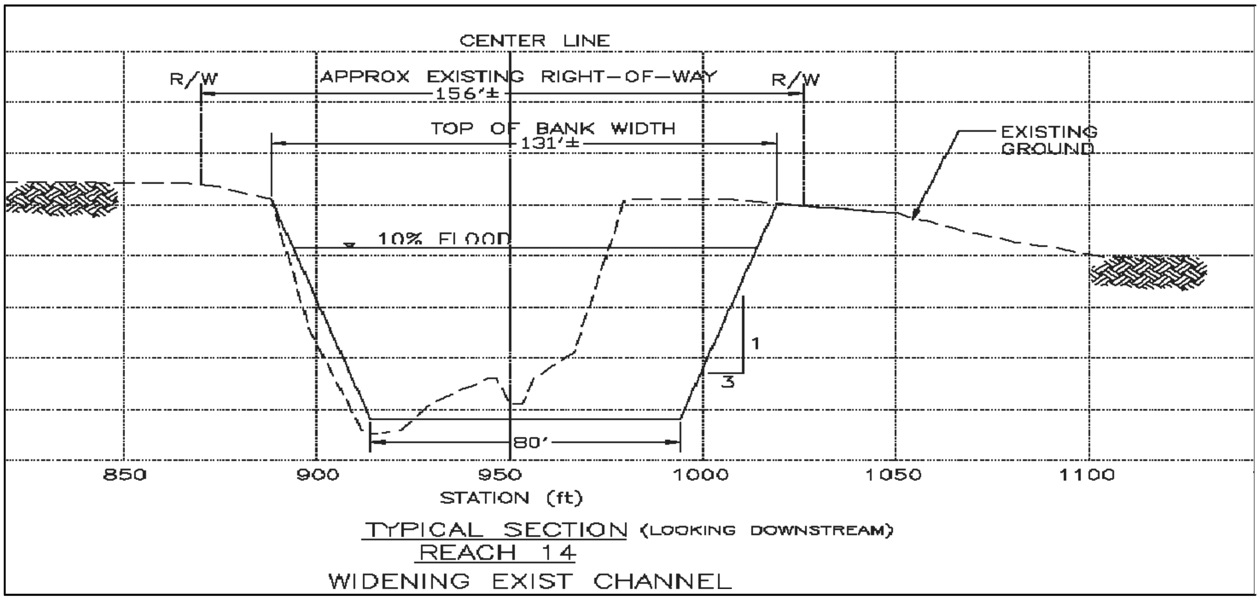

Figure 2.9-6 Reach 14 Typical Cross Section for the Reach 6 Bypass Alternative

2.9.1.5 Culvert Modification

Preliminary hydraulic analyses have indicated that the existing culverts at Sycamore Avenue and East San Martin Avenue are not adequate to convey the 10-year flood event under this alternative. Additional culvert cells are proposed in these two crossings to increase the capacity and are listed in Table 2.9-2.

Table 2.9-2 Proposed Culvert Improvements

Location	Type of Crossing	Existing Roadway Width (feet)	Existing No. of Culvert Cells	Additional No. of Cells Are Added	Culvert Size per Cell (i.e., span x depth)
Sycamore Avenue	RCB	60	3	3	11.5'x7'
East San Martin Avenue	RCB	41.5	4	2	12'x7'

2.9.2 Reach 6 Bypass Alternative Construction

The construction approach for the Reach 6 Bypass Alternative would be the same for all of the upstream Project Reaches 8, 7A, and 7B as previously described for the Tunnel Alternative (Applicant's Proposed Action). Reach 14 construction would be similar to that in the other alternatives but with a greater amount of channel widening. There would be no construction needed to widen or deepen the channel below the bypass segment in Reach 6 or in Reach 5. Reach 4 flood conveyance improvements would be the same as described for the Tunnel Alternative (Applicant's Proposed Action). Three new bridges and additional culverts would require construction (Section 2.8.1).

2.9.2.1 Construction Schedule

Construction duration for the Reach 6 bypass channel segment along with the Reach 14 segment would be 24 months (Tables 2.5-2 and 2.5-4). The entire Reach 6 Bypass Alternative (all reaches) would require 5.5 years to complete the Project construction.

2.9.2.2 Construction Activities, Equipment and Crews

Construction activities, equipment, and crew size is shown in Table 2.5-4, and is nearly the same as described for the Tunnel Alternative (Applicant's Proposed Action), except that the new bypass channel segment would require construction between Reach 6 to Reach 14. This would require temporary roads and traffic detour routing on Murphy Avenue and on both north and southbound lanes of U.S. 101. Construction crews would need to build bridges to accommodate the new bypass channel segment under these roadway sections. An estimated construction time of 250 days would be needed to build the bridges at these three crossings.

2.9.2.3 Construction Materials and Disposal

The construction fill and disposal material volumes are shown in Table 2.5-3. Total disposal volume is less than the other alternatives, approximately 997,000 bcy.

2.9.2.4 Staging Areas and Access Routes

Construction access and staging areas would be the same as previously described for all of the other alternatives except for the two staging areas (F and G) in lower half of Reach 6 (Section 2.5.3.5, Figure 2.5-6.) but with an additional two staging areas to cover construction of the bypass channel in Reach 6 to the upstream portion of Reach 14. The two additional staging and storage areas are described in Table 2.9-3. Staging Area 3 at the corner of East San Martin Avenue and Sycamore Avenue was previously listed and described as staging area E (see Figure 2.5-6).

Table 2.9-3 Summary of Additional Staging Areas for Reach 6 Bypass Alternative

Staging Area (acres)	Location	Total Area	Construction Activity
1	East Side of Murphy Ave. between Reach 6 and Reach 14	0.34	Bypass channel inlet at Reach 6, and channel between Reaches 6 and 14. Also, to construct culverts and bridges at Murphy Ave. and U.S. 101.
2	East side of Sycamore Ave in Reach 14	0.25	To construct the outlet of the bypass channel, culverts and bridges at U.S. 101 and culverts at Sycamore Ave.

Minor vegetation removal and grading could occur at staging areas to provide room for equipment, materials, and construction personnel parking. Work area access would be provided via the existing county roads and maintenance roads. Construction material and equipment haul routes could include Murphy Avenue, U.S. 101 northbound and southbound, Sycamore Avenue, and East San Martin Avenue.

2.9.2.5 Construction BMPs

The construction BMPs will be the same as described for all alternatives (Section 2.5.3.5)

2.9.3 Easements and Land Requirements

Easements for the Reach 6 Bypass Alternative encompasses 183 acres, which includes the new bypass channel construction in Reach 6 and permanent easement in Reach 14 for the widening of the channel and maintenance road.

Homes adjacent to the location of proposed channel widening would require relocation, and in some cases residential property and farmland are located within the construction footprint and easement boundaries. There are a total of 3 residential homes, 2 greenhouses, 3 outbuildings, and 4 miscellaneous structures within the construction footprint. (see Table 2.5-1).

2.9.4 Utilities

Utilities include underground and overhead utility lines that provide water, gas, electricity, sewer, storm drains, cable, phone, fiber optics, and other utility services throughout the Project area. There are also miscellaneous features, such as fences, that would need to be removed and potentially relocated. Utilities located within the Project easement footprint would be either protected in place, rebuilt in place, abandoned, or demolished and relocated prior to construction. Sewer lines and storm drains may be relocated at the beginning of construction. Utilities are located in all reaches of the Reach 6 Bypass Alternative, however most of the utilities that would need to be relocated are in the urbanized Reaches 7B and 8. The Reach 6 Bypass Alternative would have the same amount of utilities in the ROW as the Tunnel Alternative in all reaches, except there would be no construction in Reach 6 below the bypass and in Reach 5, so no utilities removal and relocation would be needed at those locations.

2.9.5 Operations and Maintenance

Operations and maintenance would be nearly the same as described for the NRCS Alternative, with the exception of maintenance for the bypass channel and hydraulic control structure in Reach 6. Reaches 5 and 6 downstream from the hydraulic control structure would be maintained according to 2012–2022 SMP wherever SCVWD has maintenance easement responsibilities since these reaches are not part of the Reach 6 Bypass Alternative.

2.10 SUMMARY OF PROJECT ALTERNATIVES

Table 2.10-1 Summary of Project Alternatives

Project Feature	No Action Alternative	NRCS Alternative	Tunnel Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
Flood Capacity					
	Provides 20- to 10-percent flood exceedance event capacity in Morgan Hill and 10-percent flood event capacity in downstream reaches.	Morgan Hill, Reaches 7A, 7B & 8: 1-percent flood exceedance event 10-percent flood exceedance capacity in semi-rural areas around East Little Llagas Creek (Reach 14). No induced flooding in Reaches 4, 5, and 6 due to upstream channel improvements.	Same flood capacity as the NRCS Alternative	Same flood capacity as the NRCS Alternative	Same flood capacity as NRCS Alternative. Includes a 1-percent flood exceedance capacity in the proposed Reach 6 bypass channel segment.
Land Acquisition/Floodplain Easements and Structures in Project Footprint					
	No new land would be acquired. No structures would be relocated or removed.	263 acres of land for permanent and temporary easements. 49 structures within Project footprint.	262 acres for permanent and temporary easements. 43 structures within Project footprint.	261 acres of land for permanent and temporary easements. 47 structures in Project footprint.	183 acres of land for permanent and temporary easements. 12 structures within Project footprint.
Construction					
	No construction would occur. No excavation or disposal needed	Construction over the entire Project area would last an estimated 5.5-year period. Construction related BMPs would guide resource protection activities. Approximately 1.3 million bcy excavated for disposal	Construction duration same as NRCS Alternative. Same BMPs as NRCS, with additional BMPs specific to tunnel construction. Approximately same disposal volume as NRCS. Requires blasting and other tunnel construction methods in Reach 8	Construction duration same as NRCS Alt. Same BMPs as NRCS Alternative. Approximately same disposal volume as NRCS.	Construction duration is same as NRCS Alternative. Same BMPs as NRCS Alternative. Approximately 0.99 million bcy for disposal.
Recreational Facilities					
	No new recreation facilities. No loss of existing trails.	No new recreation facilities. Existing paved trails along Reach 7B would be converted to maintenance road.	Same as NRCS Alternative	Same as NRCS Alternative	Same as NRCS Alternative

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Project Feature	No Action Alternative	NRCS Alternative	Tunnel Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
Bridge/Culvert Replacement					
	None. Bridge crossings in Reach 7A at Middle Ave and Watsonville Rd have been constructed but are buried in place.	No bridges or culverts to be added or replaced in Reaches 4 or 5. Reach 6 culverts to be installed at two locations on tributaries to provide continuous maintenance access along Llagas Ck. Five existing bridges will not be modified. Reach 7A two existing bridges that are buried and inoperable at Middle Ave and Watsonville Rd to be exhumed. Reach 7B multiple culverts to be replaced at 7 road crossings (S. and N. La Crosse, Edmundson, Edes Ct, Cosmo Ave, Spring Ave, Ciolino/Dunne Ave). Reach 8 replace culverts at 5 road crossings (5th, 4th/Monterey Hwy, 3rd, 2nd/Del Monte, Warren Ave). Replace 2 culverts at Main St and at Wright/Hale Ave with 2,200 ft long double 10 x 8 ft RCB along Hale Ave. Existing channel to be buried. Remove plate constriction at Llagas Road culvert to expand opening. Reach 14, two tributary streams, Church Ck, San Martin Ck, and unnamed drainage to be culverted at confluence with EastLittle Llagas.	Same as NRCS Alternative except in Reach 8, as follows: Instead of 2200 ft long double 10 x 8 ft RCB along Hale Ave, install a 36-inch RCP culvert for low flows from the weir structure 2,400 ft downstream discharging to West Little Llagas Creek; and two high flow bypass culverts 10 x 8 ft and 10 x 9 ft along Hale Ave to Warren Ave to tunnel portal Construct 2,100-foot long tunnel under Nob Hill between Warren Ave. and up to Del Monte Ave, under Nob Hill Terrace. No change to existing culverts at 5th, 4th St/Monterey Hwy, 3rd St, 2nd St/Del Monte Ave, and Warren Ave. No channel widening or deepening in Reach 8 near downtown Morgan Hill (downstream of tunnel portal). And Reach 7B, as follows: Double box culverts, 10 ft x 8 ft and 10 ft x 9 ft, from tunnel outlet at West Dunne Avenue to downstream of Ciolino Ave, instead of replacing existing culvert along West Little Llagas Ck as proposed for the NRCS.	Same as NRCS Alternative except Reach 8, eliminate channel deepening and widening through residential properties between West Main Avenue and West 2nd Street. Realign an 800-foot segment of double 10 ft wide box culverts that, in the NRCS design, would be parallel to Hale Avenue through the Britton School athletic fields up to Del Monte Ave; and, continue the double box culvert under Del Monte Ave 900 ft to West 2nd St. From West 2nd St to West Dunne Ave the same channel widening and deepening, along with culvert replacements at 2nd, 3rd, 4th, and 5th Streets as described for the NRCS Alternative.	Same as Tunnel Alternative in Reaches 8, 7B, 7A, 5 and 4. Bridge/culvert improvements in Reaches 6 to accommodate a new bypass channel. Three bridges to be constructed; U.S. 101 northbound, U.S. 101 southbound, and Reach 6 bypass channel at Murphy Ave. Culverts modifications in Reach 14 at Sycamore Ave bridge and East San Martin Ave bridge. Greater channel widening in Reach 14 than Tunnel Alternative.

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Project Feature	No Action Alternative	NRCS Alternative	Tunnel Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
Utility Relocation					
	No utilities are to be relocated.	Water, sanitation, sewer, and gas, pipelines to be either protected in-place, abandoned or replaced. Existing storm drains to be adjusted to outfall into wider channel. Other utilities such as fiber optic, phone, fences to be either abandoned or replaced. Most utilities in Reach 8.	Similar to NRCS Alternative, minor differences in Reach 8.	Similar to NRCS Alternative, minor differences in Reach 8.	Same as Tunnel Alternative (Applicant's Proposed Action) in all reaches, but no utilities would be replaced in Reaches 5 and 6 downstream from the bypass channel. May have additional utilities in the new bypass channel section of Reach 6.
Operations and Maintenance					
	Vegetation, channel sediment, bank erosion to be managed according to the SCVWD SMP. This would include Arundo removal in Reach 6. Same BMPs for maintenance as NRCS Alternative	Vegetation, and sediment, would be managed. According to Project hydraulic capacity requirements. Channel banks designed for stability, so no erosion or bank stability measures are assumed to be needed. Vegetation maintenance such as grass and weed mowing on benches conducted annually, other vegetation maintenance such as pruning about once every 5 years on all reaches. No maintenance on natural banks with riparian forest. Sediment maintenance at locations where hydraulic capacity is impaired, estimated to occur once every 10 years on average. Minor maintenance to include less than .08 acre wetland/riparian removal per site, sediment removal less than 10 CY per site. Vegetation and sediment maintenance at Lake Silveira as needed to ensure flow split at inlet to wetlands and to historic channel is functioning. Removal of giant reed (Arundo donax) in Reach 6 under the SMP. BMPs for resource protection activities related to maintenance	Similar to NRCS Alternative in all reaches, with addition of sediment detention basin and tunnel maintenance in Reach 8. Same BMPs for maintenance as NRCS Alternative	Nearly identical to NRCS Alternative Same BMPs for maintenance as NRCS Alternative	Similar to Tunnel Alternative (Applicant's Proposed Action), except for hydraulic gates to be maintained for diversion to bypass channel in Reach 6. Reaches 5 and 6 vegetation, sediment, and bank erosion to be maintained according to 2012-2022 SMP since these reaches are not part of the Alternative. Same BMPs for maintenance as NRCS Alternative

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Project Feature	No Action Alternative	NRCS Alternative	Tunnel Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
Channel Modification					
	No modifications or habitat enhancement features would be made to the channel.	Channel modifications would entail widening and deepening, from just upstream of Llagas Road to just downstream of Buena Vista Ave. Instream complexity features for fish habitat would be installed in Reaches 4, 5, 6, and 7A.	Same as NRCS in Reaches 4, 5, 6, 7A, 7B, and 14. Tunnel replaces channel widening and deepening along a portion of Reach 8, fewer culvert replacements in Reach 8. Sediment detention basin 600- foot long in Reach 8 just downstream of Hillwood Lane.	Same as NRCS except Reach 8 eliminate channel deepening and widening through residential properties between West Main Avenue and West 2nd Street.	Same as Tunnel Alternative (Applicant's Proposed Action) in Reach 8 and in all other reaches, except no modifications to Reaches 5 or 6 below bypass channel, and for a portion of Reach 14 channel widening is about twice the NRCS Alternative. Construct high flow bypass channel 1660-foot length connecting Reach 6 to Reach 14; to carry 1-percent exceedance flow
Maintenance Roads					
	Maintenance road at the bottom of the channel would be retained. No new maintenance roads would be constructed.	18 ft wide maintenance roads at top-of bank on both sides of the channel; all reaches.	Maintenance roads same as NRCS Alternative, except includes roads to access sediment detention basin.	Maintenance roads same as NRCS Alternative	Maintenance roads same as Tunnel Alternative (Applicant's Proposed Action), except no new roads installed in Reaches 5 or Reach 6.
Grade Control Structures					
	No new grade control structures would be installed.	Grade control structures: Reach 4 – 3 Reach 5 – 2 Reach 6 – 26 Reach 7A – 7 Reach 7B – 4 Reach 8 – 1 Reach 14 – 21 One temporary structure each in Reaches 5 and 14.	Same as NRCS	Same as NRCS	Same as Tunnel Alternative (Applicant's Proposed Action), except no grade control structures in Reach 5 or Reach 6.

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Project Feature	No Action Alternative	NRCS Alternative	Tunnel Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
Fish Enhancement					
	No fish habitat enhancements planned.	Habitat enhancement features including a sinuous low-flow channel, pools, large woody debris placements, boulder placements, root wad structures, and wing log deflectors, to be installed in Reaches 4, 5, 6, and 7A. Divide logs to be used only in perennially flowing section of Reach 6. Remove and replace dysfunctional fish ladder downstream of Buena Vista Ave. Lake Silveira to include re-water of 1,980 feet of historic abandoned Llagas Creek channel and creation of wetland habitat, Sycamore forest and other forested habitat.	Same as NRCS	Same as NRCS	Same as NRCS, except no habitat enhancement features in Reaches 5 or 6 downstream from bypass channel. Full extent of Lake Silveira mitigation element may not be required.

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CHAPTER 3 AFFECTED ENVIRONMENT

This chapter provides a description of the physical, biological, and human environments that could be affected by the Upper Llagas Creek Project (Project) and project alternatives. The existing conditions are presented in either a regional- or area-specific context depending on the nature of the resource or the anticipated effect to that resource. This chapter describes in-depth environmental impacts in 19 resource and issue areas referred to as the “project area” throughout this section.

- Geology and Soils (Section 3.1)
- Hydrology and Water Quality (Section 3.2)
- Mineral Resources (Section 3.3)
- Botanical Resources (Section 3.4)
- Wildlife Resources (Section 3.5)
- Aquatic Resources (Section 3.6)
- Agriculture and Forestry Resources (Section 3.7)
- Land Use and Planning (Section 3.8)
- Cultural Resources (Section 3.9)
- Traffic and Circulation (Section 3.10)
- Air Quality and Greenhouse Gases (Section 3.11)
- Noise (Section 3.12)
- Aesthetics Resources (Section 3.13)
- Utilities and Public Services (Section 3.14)
- Recreation Resources (Section 3.15)
- Population and Housing (Section 3.16)
- Socioeconomics Resources (Section 3.17)
- Hazards and Hazardous Materials (Section 3.18)
- Environmental Justice (Section 3.19)

Project Location

The Project is located in southern Santa Clara County, approximately 25 miles southeast of San Jose, in the communities of Morgan Hill, San Martin, and Gilroy. The Project consists of the upper seven reaches (4, 5, 6, 7A, 7B, 8 and 14) of Llagas Creek, East Little Llagas Creek, and West Little Llagas Creek above Buena Vista Avenue (Figure 3-1).

The original Llagas Creek Flood Watershed Project Plan (LCWPP) that was developed by the United States Department of Agriculture (USDA) Soils Conservation Service (SCS) in the late 1960s included both the upper reaches of the watershed, which are the subject of this EIS, and a set of lower reaches along the West Branch of Llagas Creek in Gilroy and mainstem Llagas

Creek below Buena Vista Avenue. The lower reaches were constructed beginning in the 1970s, and are not part of the analysis presented in this EIS.

The total length of the Project area is approximately 13.9 miles; 6.1 miles of which are along the main branch of Llagas Creek, 2.8 miles along West Little Llagas Creek; and, 3.4 miles along a tributary of Llagas Creek, known as East Little Llagas Creek. An additional 1.6 miles of new bypass would also be constructed along West Little Llagas Creek to Llagas Creek. On the north, the physical limits of the Project are at the creek's intersection with Llagas Road on West Little Llagas Creek in Morgan Hill; and, in the south,1000 feet downstream of the creek's intersection with Buena Vista Avenue in Gilroy. A summary description of each of the seven Project reaches (from upstream to downstream) identified in this EIS is provided below.

Project Reach 8 (West Little Llagas Creek)

Reach 8 is approximately 1.6 miles long and is located along West Little Llagas Creek in downtown Morgan Hill between West Dunne Avenue in the south and Llagas Road in the north. The existing channel conveyance capacity is less than a 10-percent flood event (<400 cfs at Hillwood Lane). Reach 8 is highly urbanized and constrained by development with homes or other buildings built next to the channel. The existing creek consists of a trapezoidal earthen channel with top widths varying between eight and 20 feet, and an average depth of 5 feet. Some sections of the channel are open concrete, and other sections are underground passing through eight single box culverts, all of which are currently undersized for the 1-percent flow. The culverts are located at: West 5th Street; West 4th Street; West 3rd Street; the West 2nd Street/Del Monte Avenue intersection; Warren Avenue; Main Street; the Wright Avenue/Hale Avenue intersection; and Llagas Road, Llagas Creek Drive, and Hillwood Lane.

The open stream channel bed varies in character from sections with no vegetation, to areas with broad-leaved cattails (*Typha latifolia*) and hardstem bulrush (*Schoenoplectus acutus*). The banks are generally vegetated with annual grassland species, although a large section of this reach has a tree canopy comprised of exotic trees, with occasional patches of remnant coast live oaks (*Quercus agrifolia*), and valley oaks (*Q. lobata*).

Project Reach 7B

Reach 7B is a trapezoidal earthen channel, approximately 1.4 miles long, located along West Little Llagas Creek in an urban, and residential suburban, area of Morgan Hill between South La Crosse Drive in the south, and West Dunne Avenue in the north. The existing creek passes through eighteen reinforced concrete box (RCB) culverts at seven locations (Table 2.2-1), three of which (Spring Avenue, Cosmo Avenue, and Edes Street) are currently undersized for the 1 percent flow. Existing culverts include: a quadruple box culvert at South La Crosse Drive; triple box culverts at North La Crosse Drive; West Edmundson Avenue; Edes Street and Cosmo Avenue; and a culvert at Spring Avenue. A 674-foot long single box culvert conveys flows under the Morgan Hill Plaza Shopping Center from West Dunne Avenue to Ciolino Avenue. A paved pedestrian/bike path meanders alongside approximately 2,000 feet of the south side of the West Little Llagas Creek channel between Edes Court and South La Crosse Drive.

The stream channel bed contains riparian herbaceous species (e.g., nutsedges, [*Cyperus spp*.]). The banks and the non-disturbed areas beyond the top of bank support annual grassland species. Extensive portions of this reach have no tree canopy. Where tree canopy is present, it consists of a combination of planted exotic trees and native trees.

Project Reach 7A

This reach extends approximately 1.55 miles from Reach 6 just above the Monterey Road Bridge in the south, to South LaCrosse Drive in the north. The majority of Reach 7A is currently agricultural fields; there is no existing channel here except for a short 0.3-mile length of trapezoidal shaped constructed channel at the north end of the reach. Each of the alternatives would excavate a proposed earthen diversion channel approximately 1.25 miles long through Reach 7A to divert flows from West Little Llagas Creek upstream of Watsonville Road to Llagas Creek downstream of Lake Silveira at Monterey Road. Vegetation consists of row crops or annual, nonnative grassland on fallowed lands. There are two inoperable bridges in this reach (Table 2.2-1) constructed by the SCVWD at Watsonville Road and West Middle Avenue that were previously constructed in anticipation of this project and would be exhumed if the diversion channel were constructed.

Project Reach 6

Llagas Creek Reach 6 is a natural earthen channel, approximately 3.2 miles long from 700 feet upstream of U.S. Highway 101 (U.S. 101) in the south, to Monterey Road in the north. Reach 6 meanders between Monterey Road and South County Airport. The southern portion of this reach is adjacent to SCVWD percolation ponds between Church Avenue and Murphy Avenue. Reach 6 is a perennially-flowing stream segment over a 6,600-foot-long segment from below Lake Silveira to about San Martin Avenue, with flow continuously supported by releases from Chesbro Reservoir. Downstream from San Martin Avenue, Reach 6 is an intermittent channel as flow percolates through the streambed to groundwater.

Land use adjacent to the creek varies from commercial and residential in the north to agricultural in the south. There are five, existing bridge crossings: Monterey Road; the Union Pacific Railroad tracks; Llagas Avenue; San Martin Avenue; and Church Avenue. There is a mix of native and non-native vegetation along the stream banks. Patchy tree canopy is provided both by native oaks, cottonwood (*Populus fremontii*), sycamore (*Platanus racemosa*), and willows (*Salix spp*.), as well as by exotic eucalyptus, particularly red gum (*Eucalyptus camaldulensis*).

Project Reach 5

Llagas Creek Reach 5 is a natural earthen channel approximately 0.5 mile long from the Llagas Creek / East Little Llagas Creek confluence in the east to 700 feet upstream of U.S. 101 in the west. Two bridges cross Llagas Creek along the north and south lanes of U.S. 101.

Reach 5 is ephemeral, typically dry in the summer and fall months, and, as a consequence, riparian vegetation is limited along this segment of Llagas Creek. Where tree canopy is present, it consists of a combination of planted exotic trees and native trees, particularly red gum and introduced Monterey pine (*Pinus radiata*). Additionally, the stream channel bed supports riparian species such as mule fat (*Baccharis salicifolia*). The banks and the undisturbed areas beyond the top of the banks support annual grassland species.

Project Reach 4

Reach 4 is the downstream-most reach of the Project. It is a natural earthen channel, extending approximately 2.4 miles along Llagas Creek from 1000 feet downstream of Buena Vista Avenue in the south to the East Little Llagas Creek/Llagas Creek confluence in the north. There are three existing bridge crossings at Masten Avenue, Rucker Avenue, and Buena Vista Avenue.

Reach 4 contains sinuous bends, particularly near Masten and Buena Vista Avenues; and, is ephemeral, typically dry in the summer and fall months. The stream channel bed supports sparse mature vegetation such as mule fat. The banks support a mixture of riparian and non-riparian species. Although tree canopy is patchy, it is more extensive than on any of the other Project reaches, including extensive stands of red gum.

Project Reach 14

Reach 14 is a constructed channel that extends approximately 2.4 miles along East Little Llagas Creek from the Llagas Creek confluence in the south, to just downstream of the Corralitos Creek confluence in the north. It is an excavated earthen channel that was straightened and realigned by Caltrans in the 1970s during the construction of U.S. 101. Above the upstream boundary of Reach 14, between Sycamore Avenue to about Middle Avenue, East Little Llagas Creek is parallel to U.S. 101 for approximately 5,400 feet. U.S. 101 in this area is located atop an embankment, which also acts as the right bank of East Little Llagas Creek.

Agricultural and rural residential land uses, and commercial buildings are present in the area surrounding Reach 14. Reach 14 is ephemeral, typically dry in the summer and fall months. The channel contains box culverts where the creek crosses East San Martin Avenue and Church Avenue. The bottom of the channel banks contains a combination of annual grassland species and bare ground. Vegetation on the stream banks is primarily annual grassland with a few scattered trees (mostly native).

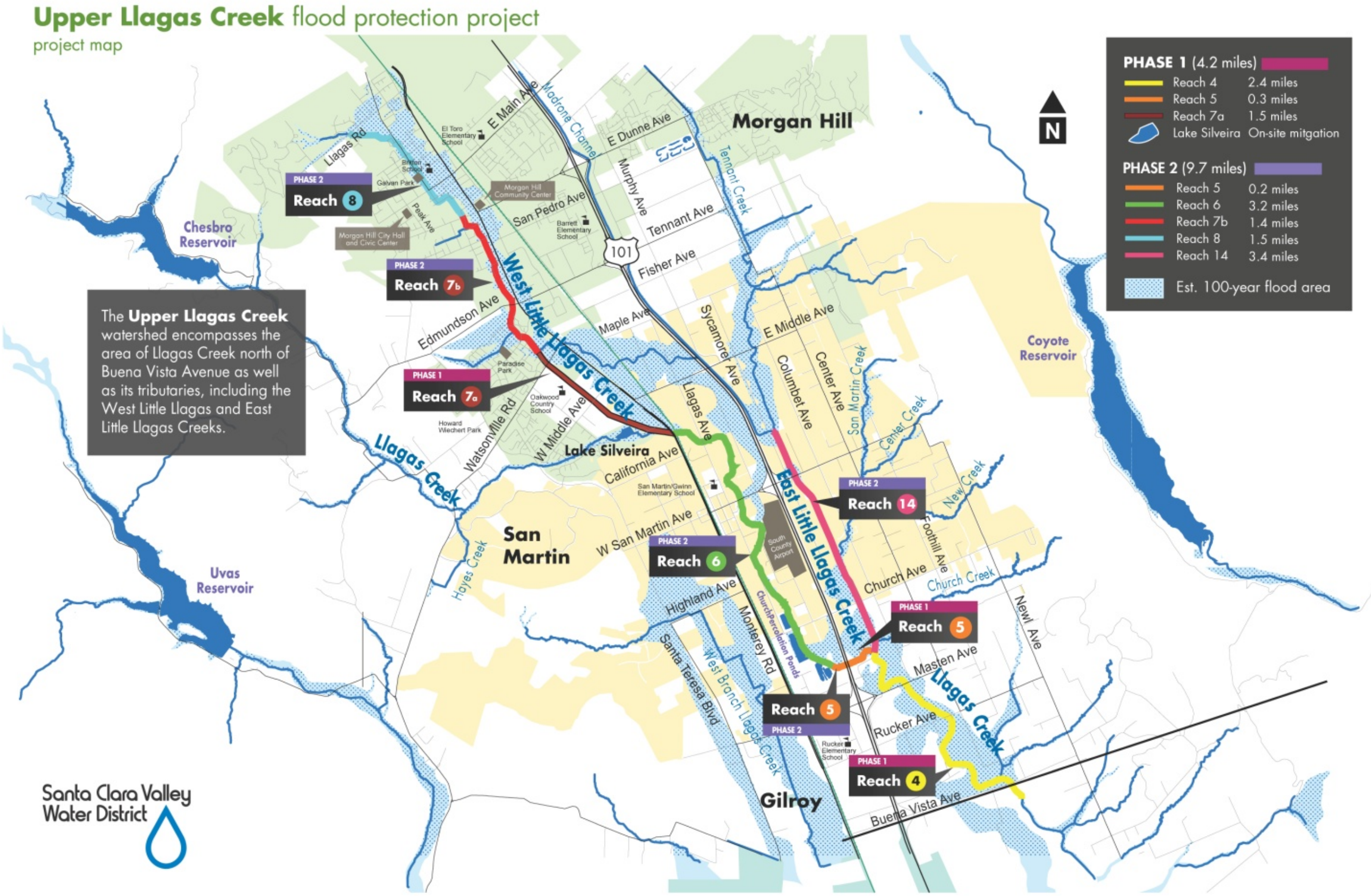

Figure 3-1 Upper Llagas Creek Project Reaches

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3.1 GEOLOGY AND SOILS

3.1.1 Introduction

The Upper Llagas Creek Project (Project) area is located within an actively forming geologic environment of earthquakes and faulting as well as associated uplift of mountain ranges and lowering of basins. These geological processes, ongoing for millions of years, have created the landforms upon which the Project streams flow; and, as a result, must be accounted for in Project design and potential impacts. In addition, the Project involves excavation of soils and exposure of underlying geologic layers in order to construct Project features, such as new or expanded channels, culverts, maintenance, and access roads. The ongoing risks of major earthquakes and potential hazards resulting from ground shaking and failures, such as ruptures and liquefaction are important factors to consider in design of key Project elements. In general, the geologic and soils setting described below applies to the Project area and surrounding region. Baseline information on geologic and soil resources in the Project area was compiled from existing published literature. Primary data sources include the following:

- California Geological Survey (CGS). 2010a. 2010 Geologic Map of California, Geologic Data Map No. 2. Available online at: http://www.quake.ca.gov/gmaps/GMC/stategeologicmap.html. Accessed on February 15, 2013.
- California Geological Survey (CGS). 2010b: Historical California Earthquakes. Available online at: http://redirect.conservation.ca.gov/cgs/rghm/quakes/historical/degreemap.asp?Map=12237#Map. Accessed February 15, 2013.
- Santa Clara County. 2006. Chapter IV Geologic Provisions. Available online at: http://www.sccgov.org/sites/planning/PermitsDevelopment/GeoHazards/Documents/Geologic_Ord_0 31902.pdf. Accessed on February 15, 2013.
- Santa Clara County. 2012a. County Geologic Hazard Zones. Available online at: http://www.sccgov.org/sites/planning/GIS/GeoHazardZones/Pages/SCCGeoHazardZoneMaps.aspx. Accessed on February 15, 2013.

3.1.2 Project Area

The Project is located in southern Santa Clara County, approximately 25 miles southeast of San Jose, passing through rural, residential, and a commercial district in the communities of Morgan Hill, San Martin, and Gilroy (Figure 1.1-1, Regional Area Map). The northern portion of the Project (Reaches 8, 7B, and portions of 7A) is within the City of Morgan Hill; a portion of 7A is within unincorporated Santa Clara County. Reaches 6, 5, and 14 are within the San Martin planning area, and a portion (north of Masten Avenue) of Reach 4 is also in the San Martin planning area. The southern portion of Reach 4 is within unincorporated Santa Clara County. The southern extent of the project area is less than 1 mile from the City of Gilroy.

The following section describes the environmental setting for the Project area and regional setting for geology and soils.

3.1.3 Environmental Setting

Geologic Setting

The Project area and its 84-square-mile watershed are located within the Coast Range Geologic Province of Central California. The Upper Main Llagas Creek drainage basin originates at the crest of the Santa Cruz Mountains. The creek flows southeastward through foothill terrain, then onto the floor of the Southern Santa Clara Valley, before joining the Pajaro River. The Pajaro River flows into Monterey Bay near Watsonville in Santa Cruz County. West Little Llagas Creek flows along the western edge of the valley, turns eastward north of San Martin, and joins East Little Llagas near the center of the valley. East Little Llagas Creek drains small creeks gathering flow from tributaries from the east side of the valley before joining the main stem just north of Masten Avenue. The Project area includes segments of all three creeks to the Project terminus near Buena Vista Avenue.

Southern Santa Clara Valley is geologically a fault-bounded, down-dropping basin structurally oriented northwest to southeast. It is bounded by the Santa Cruz Mountains to the west and the Diablo Range to the east. The region and the Project area are structurally dominated by San Andreas and Calaveras Fault systems: to the west the San Andreas Fault is a right lateral movement with thrust zones that have raised the Santa Cruz Mountains and shortened the earth's crust by several kilometers (Page, et al. 1998); to the east is the parallel Calaveras Fault, which trends through the lower foothills forming linear valleys and basins such as that holding Coyote and Anderson reservoirs and dams. The fault zones are within several miles of the Project area and are historically active, most notably the 1906 San Francisco Quake (M=7.8)[1] and the 1989 Loma Preita Quake (M=6.9).

Movement and earthquakes along the San Andreas Fault system, and associated faults to the east and west, occur along a major tectonic plate boundary between the Pacific Plate and the North American Plate. The headwaters of the Llagas Creek drainage area are east of the San Andreas Fault, which has lifted older Mesozoic Rocks of marine origin (such as the Franciscan Complex) to the surface, including meta-sedimentary rocks, deep ocean shales, cherts, and serpentine and ultramafic rocks (Figure 3.1-1; CGS 2010a).

[1] "M=" refers to earthquake magnitude for the specific event as measured by the Richter Scale (see http://en.wikipedia.org/wiki/Richter_magnitude_scale for more information).

The terrain of the Llagas Creek headwaters in Santa Cruz Mountains is comprised of steep vegetated slopes, with heavily sheared and deeply weathered rocks and soils. These slopes are prone to large landslides during earthquakes and rainstorms as well as debris flows during intense rainstorms. Below the steep headwater terrain; Llagas Creek flows through Chesbro Reservoir and Chesbro Dam into the foothills, where younger (Quaternary) continental deposits are encountered. These formations include the Pleistocene Santa Clara Formation, older alluvial fan deposits (terraces) and Holocene Alluvium, and the most recently moved sediments within the modern Llagas Creek corridor and floodplain. Further downstream, Llagas Creek flows on the valley floor where lower gradients and historical tectonic movements have created layers of alluvium (sand and gravel) and thick muds associated with past lake (lacustrine) environments categorized as “Basin Fill”.

The Diablo Range to the east is predominately Mesozoic sedimentary and metasedimentary rocks, sandstones and siltstones of the Great Valley Sequence, as well as Tertiary volcanic rock and exposures of Franciscan Complex—like Mesozoic metamorphic and meta sedimentary rocks along fault lines (e.g., at Coyote Reservoir Dam). The Diablo Range has drier conditions than the forested Santa Cruz Mountains to the west; and, as a result, is predominately grasslands or oak/grasslands. Only small, short drainages from the Diablo Range enter the valley floor east of East Little Llagas Creek. The structural trend of linear fault valleys dip northward resulting in much of the Diablo Range watershed draining into San Francisco Bay.

The Santa Clara Valley is underlain with up to 1,000 feet of Plio-Pleistocene alluvial and basin sediments lying over older bedrock units. Within the Project area, recent basin deposits range up to 450 feet in thickness and consist of a mix of alluvial stream deposits interbedded with dense clay lacustrine sediments that act as confining layers for groundwater (aquicludes). This stratigraphy reflects the environmental history of stream systems and intervening periods of lake environments within the past 2 million years, likely formed by the ongoing warping and down dropping of the valley floor caused by regional tectonic movements.

Seismicity

The geologic region is subject to intense earthquakes generated on both the San Andreas Fault, 9 miles to the west; and the Calaveras Fault, 4 miles to the east (Figure 3.1-2). Historical quakes and shaking have caused building damage and ground failures by many mechanisms nearby (i.e. ground offsets, heaving, and landsliding). However, mapping of the 1906 quake ground failures did not indicate any major damage in the Project area. The three most significant recent events include the Great 1906 San Francisco Quake (M7.8); the 1989 Loma Prieta Quake (M=6.9) on the San Andreas Fault system; and the Morgan Hill Quake of 1986 (M6.2), closer to the Calaveras Fault (CGS 2010b).

Historical records indicate that the Project area has been subject to major earthquakes greater than M5.0 more than six times since 1800. Landslides, stream bank failures, and liquefaction have occurred in the region; and due to the presence of saturated, unconsolidated sand layers and shallow groundwater, areas of the Llagas Creek corridor have been designated as potential, severe earthquake shaking and liquefaction failure zones (Figure 3.1-3; Santa Clara County 2012a).

Soils

The soils underlying the Project area's valley floor location reflect the recent geologic history of periods of alluvial sediment deposits and gravels and sands in old channels, which are interlayered with fine layers of floodplain deposits. The intervening periods of lake environments, Ancient Lake San Juan and Lake San Benito, resulted in thick layers of dense lacustrine clays. Soil mapping and a site investigation for the Project was performed to address revegetation planning (Cardno ENTRIX 2012a). In general, the soils present in the Project area are deep, well drained, medium to fine textured loams (gravels, sands, and silts), and clay loams and include Yolo, Zamora, Pleasanton, San Ysidro, Cropley, and Arbuckle Series. According to the Farmland Mapping and Monitoring Program (Section 3.7) as of 2010, there were 17,270 acres of Prime Farmland, 3,630 acres of Farmland of Statewide Importance, and 2,523 acres of Unique Farmland in Santa Clara County. Within the Project footprint, there are 57 acres of Prime Farmland as well as 3 acres of Farmland of Statewide Importance. Agricultural Resources are discussed further in Section 3.7.

Ultramafic rocks, such as serpentine, are a source for naturally-occurring asbestos (NOA). While serpentine soils and NOA are not known to occur in the Project area, some deposits of ultramific source rocks have been identified upstream of Reach 8 (Figure 3.1-1; Formation um). Potential impacts related to encountering NOA soils are discussed in Section 3.18, Hazards and Hazardous Materials, HAZ-2 determinations.

One key characteristic of Project area soils involves varying degrees of silica cementation of some underlying conglomerate layers. Such cementation results in a hardening of sediment materials causing consolidation that limits root penetration (Cardno ENTRIX 2012a).

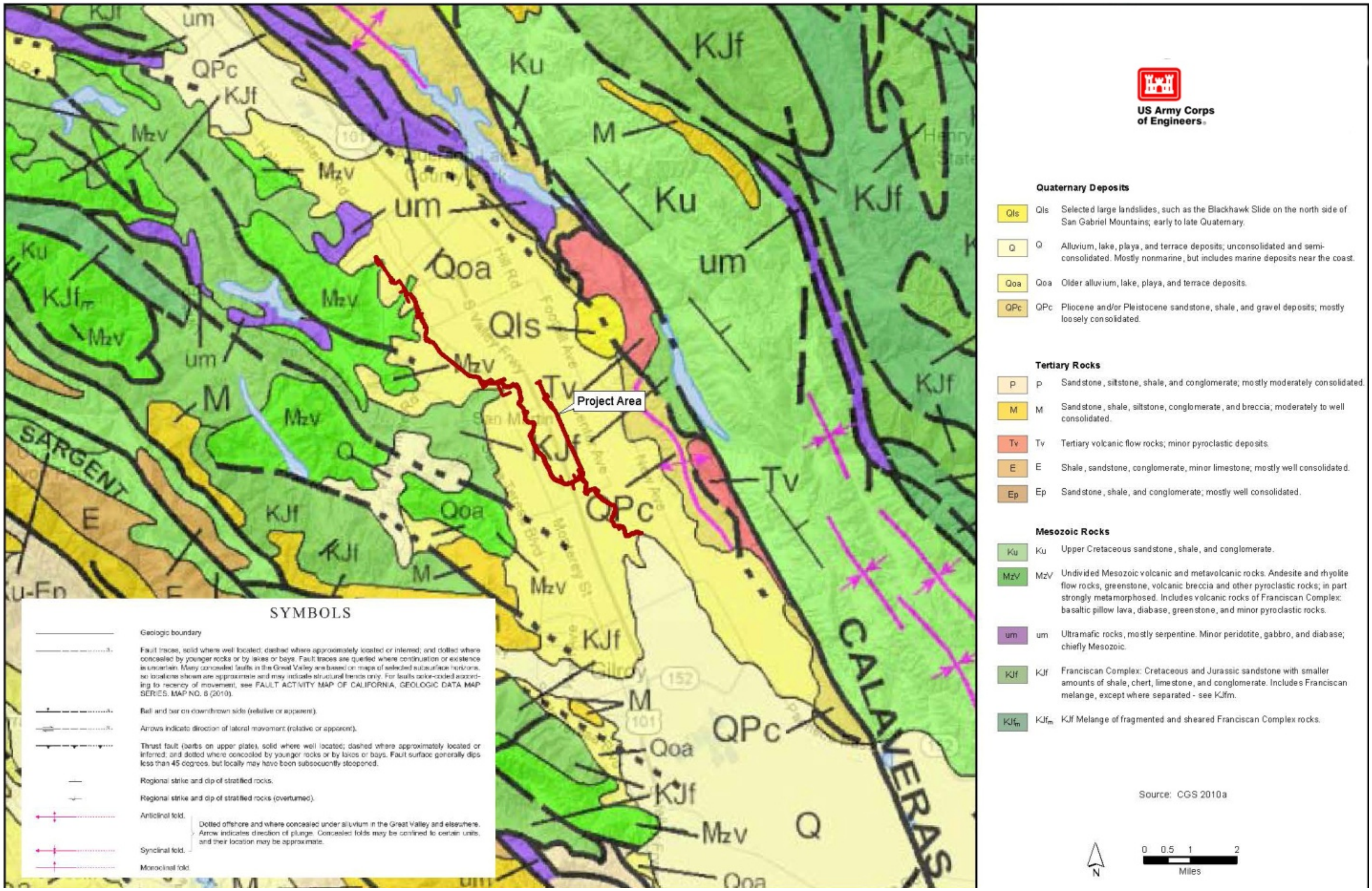

Figure 3.1-1 Geology in the Project Vicinity

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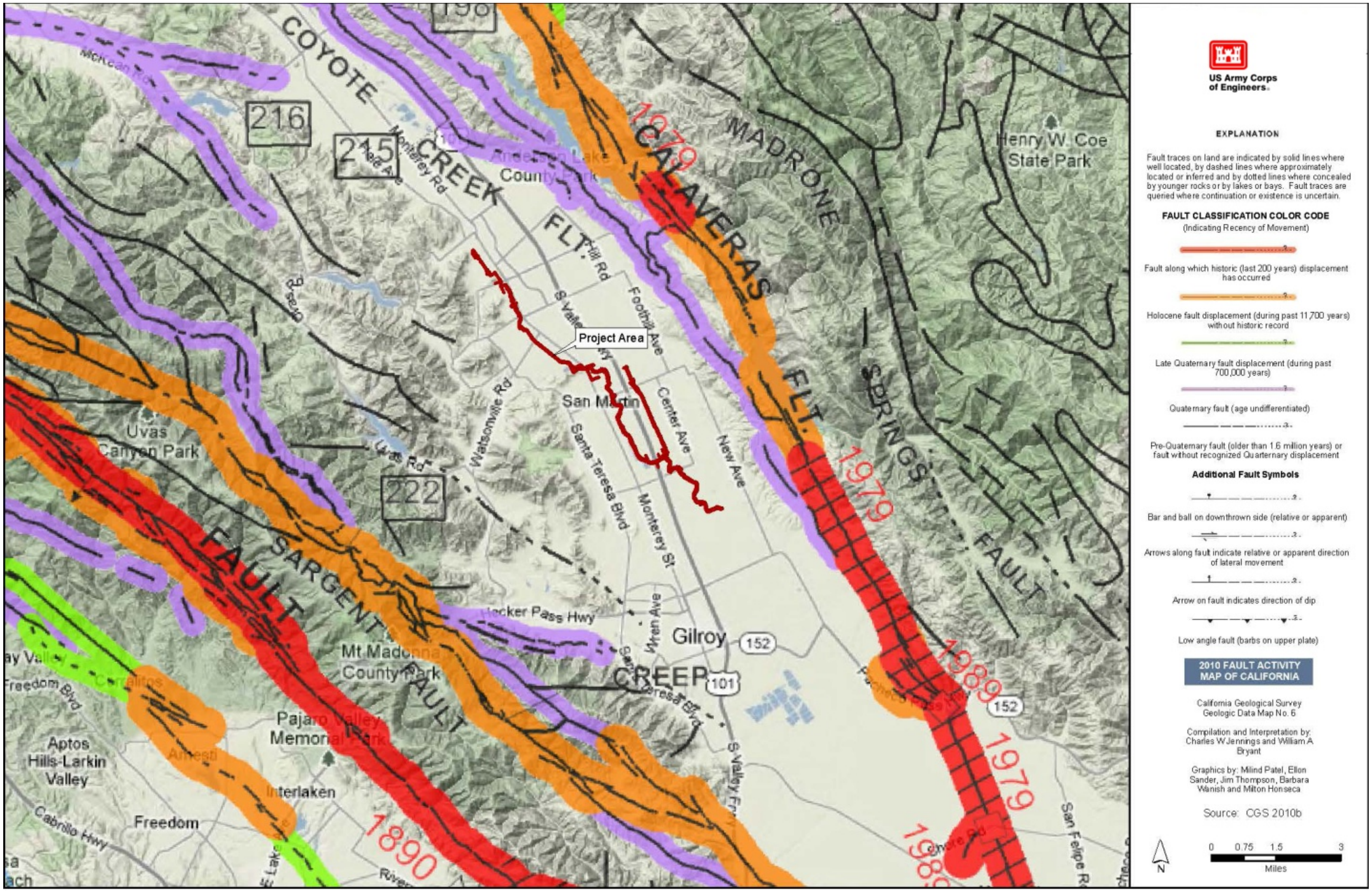

Figure 3.1-2 Faults in the Project Vicinity

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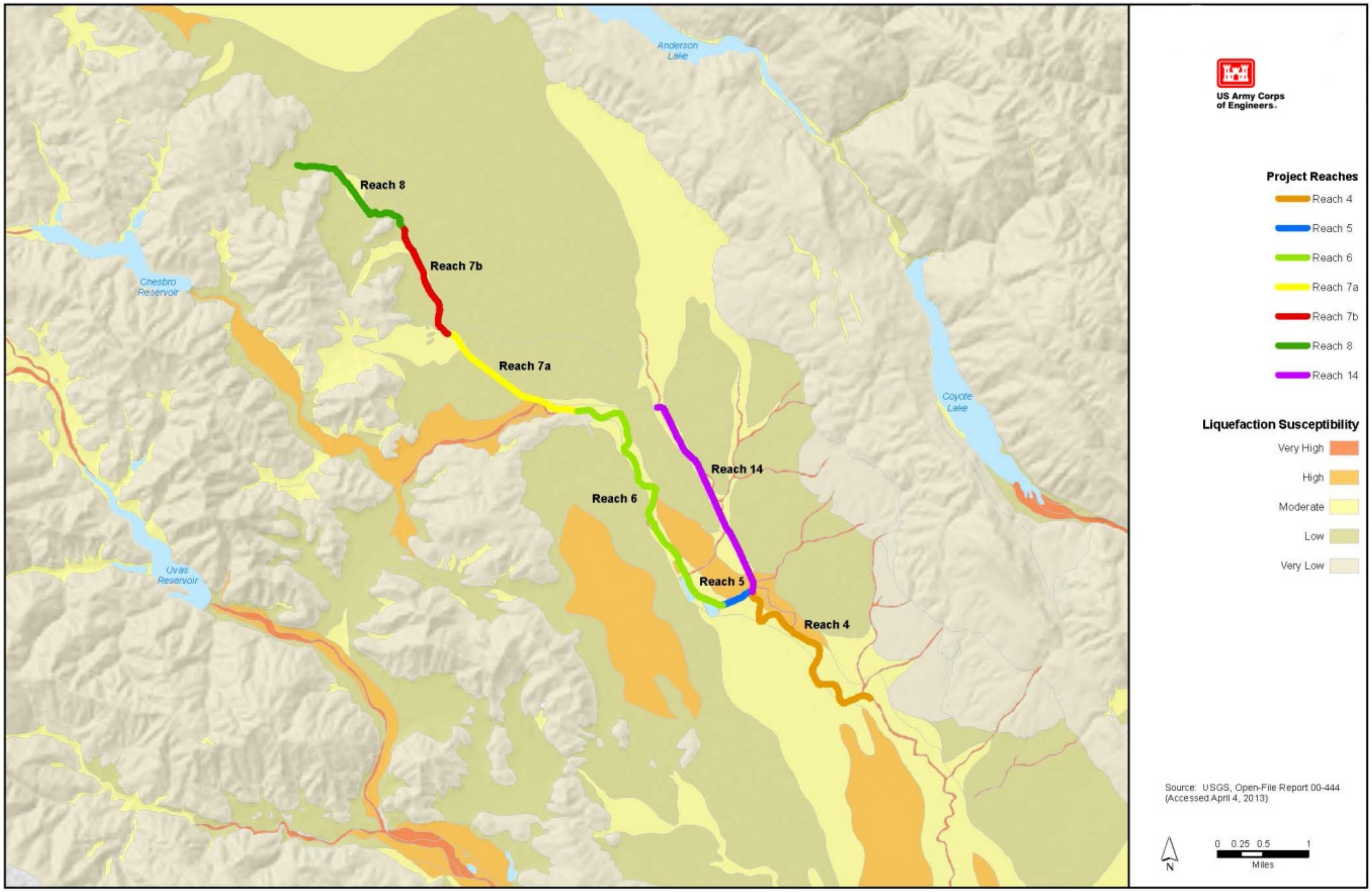

Figure 3.1-3 Liquefaction Susceptibility in the Project Vicinity

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3.2 HYDROLOGY AND WATER QUALITY

3.2.1 Introduction

This section addresses surface water, groundwater, and water quality conditions in the Upper Llagas Creek watershed. The hydrologic setting of the project area and the regional vicinity is described. This section also includes discussion of variables that affect hydrology, and water quality within the project area.

3.2.2 Project Area

For the purpose of describing the surface and subsurface water resources and evaluating associated impacts, the project area includes the watershed and groundwater basin of upper Llagas Creek within the communities of Morgan Hill, San Martin, and Gilroy in southern Santa Clara County. The project area includes West Little Llagas Creek from Llagas Road to its transition to East Little Llagas Creek, and from there to the confluence with Llagas Creek and Llagas Creek downstream of Lake Silveira to 1,000 feet downstream of Buena Vista Avenue. The project area for impacts related to surface water includes the channels and floodplains of upper Llagas Creek and lower reaches of West Little Llagas and East Little Llagas creeks. The groundwater resources project area is defined as the Llagas subbasin of the larger Gilroy-Hollister Groundwater Basin.

3.2.3 Environmental Setting

Climate

Llagas Creek is located on the eastern slope of the Santa Cruz Mountains with moderating influence from the Pacific Ocean and is subject to a Mediterranean-type climate. The watershed experiences mild, wet winters and dry summers. Average annual precipitation ranges from about 40 inches near the headwaters of Llagas Creek to 28 inches at Chesbro Reservoir and to 20 to 24 inches on the valley floor. About

92 percent of the average annual rainfall falls between November 1 and April 30 (Soil Conservation Service 1982). Mean annual temperature is 58°F, with a mean monthly variation from 66°F in July to 48°F in January. Extreme temperatures in Gilroy are recorded as 20°F and 116°F. The average frost-free period is 273 days. The growing season varies between 209 and 365 days in Gilroy.

Surface Hydrology

Llagas Creek originates in the Santa Cruz Mountains from Mount Loma Prieta and flows southeasterly towards the lower agricultural plains of Santa Clara County. The Llagas Creek watershed covers an area of approximately 104 square miles and is contained within the larger Pajaro River watershed, which drains to Monterey Bay. The Project covers a drainage of 61.7 square miles within Santa Clara Valley, including the Santa Cruz Mountains and a portion of the Diablo Range on the eastern side of the Santa Clara Valley, that give rise to the major tributaries of West Little Llagas and East Little Llagas Creeks.

Historically, channels in the Llagas Creek watershed were more diffuse and discontinuous prior to 19th and 20th century modifications. The streams were shallow, braided, and branched into smaller distributary channels within broad riparian corridors supporting seasonal and perennial ponds and wetlands (SFEI 2008). Small creeks descending from the hills in some cases dissipated across alluvial fans and divided into multiple channels before eventually soaking into the ground (SFEI 2008). In the dry season sections of Llagas Creek would go completely dry, with the exception of a few standing, isolated pools. Large flows during the rainy season were supported by Llagas Creek, but stream banks would overflow regularly during flood events (SFEI 2008).

Today Llagas Creek is a mixture of natural and engineered stream features. Increased runoff with impervious surfaces associated with urban development and stormwater drains routed in to West Little Llagas Creek, East Little Llagas Creek, and Llagas Creek. The stream channels have historically been altered by realignment and channelization and the constructions of culverts and bridges to accommodate development in the urban areas of Morgan Hill, San Martin, and Gilroy as well as for farmland reclamation and road and freeway construction. Chesbro Reservoir was constructed in 1955 to provide an increased water supply for the growing population in Santa Clara Valley (Santa Clara County 1997) and regulates the upper 19 square miles of the watershed. Historic and ongoing channel incision are identified as the cumulative effects of decades of changes in land use, the increase in impervious surfaces from urbanization, sediment supply loss associated with Chesbro Reservoir, water diversions, hydrograph modifications, and past channelization (Balance Hydrologics 2012; Schaaf & Wheeler 2012). Streambed incision of the Llagas Creek watershed ranges from 0.4 to 0.8 feet per decade (Balance Hydrologics 2012).

The Upper Llagas Creek watershed is a flashy system. Stream channels are typically dry or nearly dry even through the winter. Runoff occurs during larger storm events. The duration of flow varies but after rains have subsided, stream channels typically return back to their dry state. As such, the Project stream reaches have ephemeral flow, except for a 6,600-foot portion of Llagas Creek in Reach 6 from below Lake Silveira to about San Martin Avenue, which is usually perennial and continuously supported by releases from Chesbro Reservoir. Downstream from San Martin Avenue, Reach 6 returns to an ephemeral channel as flow percolates through the streambed to groundwater. Urban return flows from lawns, irrigation, etc. may provide a small discharge in the upper urbanized Reaches 8 and 7B along West Little Llagas Creek.

The section of West Little Llagas Creek to be cut-off from flows by diversion in Reach 7A extends nearly 9,600 feet from near La Crosse Drive flowing east toward U.S. Highway 101 (U.S. 101). By naming convention, West Little Llagas Creek becomes East Little Llagas near the Union Pacific Railroad crossing about 3,500 feet downstream from Monterey Road. East Little Llagas Creek confluences with a straightened channel known as the Madrone Ditch on the east side of U.S. 101, and thence the East Little Llagas Creek channel parallels U.S. 101 for about 5,500 feet before it reaches the beginning of Reach 14. The channel to be cut-off passes through mostly open fields with a few scattered homes and a trailer court, and flows through culverts at six road crossings. This entire section of West Little Llagas Creek to East Little Llagas Creek is intermittent, flowing only when there is sufficient rain to generate runoff. Flooding occurs all along the channel length during a 1-percent exceedance flow (see Figure 2.4-1).

Under all the action alternatives, there would be no flows from the upstream segment of West Little Llagas Creek entering the cut-off channel segment reducing, but not eliminating the flooding extent occurring during a 1 percent exceedance flow event for a 6,500-foot distance downstream from the cut-off point (see Figure 2.5-1). Only local runoff, which includes several storm drains, would continue to discharge through the West and East Little Llagas Creek channel starting at the cut-off to a point 6,500 feet downstream where the Butterfield Channel extension confluences with West Little Llagas Creek. The recently completed Butterfield Detention facility and City of Morgan Hill's Butterfield Channel extension has a drainage area of 2.78 square miles (Schaaf and Wheeler 2013). The Butterfield Channel extension confluences with West Little Llagas Creek about 6,500 feet downstream from the Reach 7A cut-off point. The Butterfield extension will introduce flows at this confluence point to West Little Llagas Creek that are similar to the discharges that would have naturally occurred prior to the 7A diversion. The West Little Llagas Creek channel is expected to continue to flow only intermittently under post-Project conditions, and high flows of the magnitude occurring under existing conditions would no longer occur between the cut-off point and the Butterfield Channel extension confluence. However, some flooding although reduced compared with existing conditions, would continue to occur both upstream and downstream from the Butterfield Channel extension, high flow events will still persist, and the channel will continue to flood under a 1 percent exceedance flow event (see Figure 2.5-1,The post-Project 1 percent exceedance flow (i.e., 100-year flow) would be 110 cubic feet per second (cfs) near the Union Pacific Railroad (UPRR) (which is 5,200 feet downstream from the cut-off point for the bypass channel) and 870 cfs near the confluence with the Madrone Channel at U.S. 101 (Table 3.2-1).

There is currently no channel in Reach 7A. All of the action alternatives would include the construction of a bypass channel in Reach 7A, which would carry all of the flow formerly in West Little Llagas Creek to East Little Llagas Creek and route it through the bypass channel to the Llagas Creek channel just downstream from Lake Silveira near Monterey Highway. This will decrease flow in East Little Llagas Creek and increase the discharge magnitude routed to Llagas Creek through Reaches 6, 5, and 4. These reaches would be widened and deepened to accommodate the additional flow magnitude, so that there is no new flooding induced by the channel capacity improvements in the upstream reaches. The SCVWD diverts a portion of the flow from Reach 6 to the Church Street percolation ponds for groundwater recharge. Reaches 5 and 4 are an intermittently flowing channel as the perennial flow in Reach 6 recharges to groundwater. East Little Llagas Creek (i.e., Reach 14), which was deepened and channelized several decades ago for construction of U.S. 101, is also an intermittently flowing channel. A reach-by-reach summary description of the stream channels and the Project features common to all of the action alternatives is provided in Sections 2.2 and 2.5, respectively.

Historically, flooding was a natural process of the southern Santa Clara Valley's drainage. Sloughs and wetlands were common features that would swell and stream bank overtopping was not uncommon during large storm events. Modern urbanization has further compounded the effect of large storm events on the drainage by reducing permeable surfaces within the valley and directing stormwater runoff into the local streams. Additionally, Chesbro Reservoir, attenuates the flows by affecting the timing, magnitude, and duration of flood flows within the Project reaches. Flows through the Project reaches during various flood events under existing conditions and the proposed design conditions for the Project are provided in Table 3.2-1. At the upstream boundary of the Project at Llagas Road the 1-percent exceedance flow is 410 cfs. All of the action alternatives would remove a constricting plate in the Llagas Road culvert and widen and deepen the channel downstream to accommodate the 1-percent exceedance flow.

Llagas Creek is a primary source of flood risk in the City of Morgan Hill and the unincorporated community of San Martin. A number of floods have occurred in the southern Santa Clara Valley during major storm events. The floods in 1937, 1955, 1962, 1963, 1969, 1982, 1986, 1996, 1997, 1998, and 2006 damaged existing homes, businesses, and agricultural property within these communities (USACE 2010b). The largest recorded flood, estimated to be a 33-year event, occurred in December 1955 (SCVWD 2010a).

3.2.4 Groundwater

The Llagas Creek and Llagas subbasin of the Gilroy-Hollister Groundwater Basin comprise a linked surface water-groundwater hydrologic setting. Llagas Creek surface water discharge (streamflow) is partially dependent upon groundwater conditions, and groundwater conditions are equally dependent on recharge by precipitation (infiltration) and streamflow contributions.

Llagas Creek is within the Llagas subbasin of the Gilroy-Hollister Groundwater Basin. The groundwater bearing formations of Llagas subbasin include Pliocene to Holocene age continental deposits of unconsolidated to semi-consolidated gravel, silt, and clay (DWR 1981). The principal water producing deposits include the Santa Clara Formation and valley fill materials of old and young alluvium and alluvial fans (California DWR 1981). Water quality from these deposits varies with depth and deposit type. The Santa Clara Formation is the deepest water-bearing unit with water quality suitable for irrigation and municipal purposes. The young alluvium deposits are the uppermost water-bearing unit and water quality is generally acceptable for domestic purposes (DWR 1981). Operational groundwater storage capacity of the Llagas subbasin is estimated to be between 150,000 and 165,000-acre feet (SCVWD 2011a).

Table 3.2-1 Existing and Proposed Project Design Flow Capacities

Location			Existing Channel Capacity in Reach				With Project Peak Discharge (cfs)		Design Capacity (cfs)	Design Return Period
	From	To	Min	Max	Min	Max	10-yr	100-yr		
Reach 4 (Llagas Creek)	E. Little Llagas Ck	Masten Ave.	2,200	3,400	<2-yr	5-yr	6,790	11,830	6,790	10-yr
Reach 5 (Llagas Creek)	Masten Ave	Rucker Ave	2,200	7,000	<2-yr	25-yr	6,790	11,830	6,790	10-yr
	Rucker Ave	Buena Vista Ave	2,200	9,500	<2-yr	25-yr	6,790	11,830	6,790	10-yr
	U.S. 101	E. Little Llagas Ck.	2,700	>2,800	<5-yr	>5-yr	3,280	5,780	3,280	10-yr
Reach 6 (Llagas Creek)	Silveira Lake	U.S. 101	1,300	>2,800	2-yr	>5-yr	2,990	5,540	2,990	10-yr
	U/S Silveira Lake	Silveira Lake	3,000	6,200	25-yr	>100-yr	1,930	4,860	—	—
Reach 7A N/A	La Crosse Dr.	Llagas Ck.	n/a	n/a	n/a	n/a	1,360	2,100	2,100	100-yr
Reach 7B (West Little Llagas Creek)	W. Dunne Ave	Ciolino Ave	—	300	—	<2-yr	720	1,130	1,130	100-yr
	Ciolino Ave.	Spring Ave.	200	650	<2-yr	4-yr.	950	1,490	1,490	100-yr
	Spring Ave.	La Crosse Dr	<410	1,700	<2-yr	>100-yr	1,050	1,580	1,580	100-yr
	W. Little Llagas near La Crosse Dr. (diverted channel section)	West Little Llagas Ck at UPRR						110	[4]	[4]
	West Little Llagas Ck at UPRR	West Little Llagas at U.S. 101, before Madrone Channel						870	[4]	[4]
Reach 8 (West Little Llagas Creek)	W. Main Ave	W. 5th St	<260	260	<2-yr	<2-yr	630	990	990	100-yr
	W. 5th St	W. Dunne Ave	<320	320	<2-yr	<2-yr	720	1,130	1,130	100-yr

Location			Existing Channel Capacity in Reach				With Project Peak Discharge (cfs)		Design Capacity (cfs)	Design Return Period
	From	To	Min	Max	Min	Max	10-yr	100-yr		
Reach 14	Madrone Channel	Corralitos Ck	1,200	21,000	5-yr	>100-yr	1,570	2,160	1,570	10-yr
(East Little Llagas Creek)	Corralitos Ck	San Martin Ck	1,700	3,000	5-yr	25-yr	2,540	4,060	2,540	10-yr
	San Martin Ck	Church Ck.	2,300	3,000	5-yr	< 10-yr	3,150	5,140	3,150	10-yr
	Church Ck	Llagas Ck	2,300	2,300	5-yr	5-yr	3,450	5,780	3,450	10-yr

[1] 10-yr and 100-yr Peak Discharges from USACE Llagas Creek Flood Control Project Hydrologic Investigation, rounded.

[2] Based on Hydrologic Engineering Center - River Analysis System (HEC-RAS) models for Existing Llagas Creek (i.e. discharge not in overbank areas. Actual channel capacity will vary.) USACE estimates existing Reach 8 capacity = 300 cfs.

[3] Relative to estimated Project peak discharge.

[4] The cut-off West to East Little Llagas Creek channel segment would not have a design capacity since there would be no improvement work in this channel segment. The flow capacity would remain the same as existing conditions.

Recharge of the Llagas subbasin occurs naturally from streams, through percolation of precipitation and surplus irrigation waters, from seepage along canals, and subsurface inflow. Average natural groundwater recharge in the Llagas subbasin is estimated to be 23,000 acre feet per year (SCVWD 2010c). In southern Santa Clara County, ground water pumping provides 95 percent of supply for all beneficial uses and 100 percent of the drinking water supply (SCVWD 2010c). Natural ground water recharge is insufficient to replenish the amount of ground water withdrawn and SCVWD conducts a managed recharge program to maintain groundwater supply.

Groundwater elevation in the Llagas subbasin Index Well (10S03E13d003) has remained stable over the period of record (1969 to 2001) with the exception of water level drops and subsequent recovery associated with drought periods (DWR 2004). A groundwater condition report from SCVWD in August of 2012 (SCVWD 2012b) states that Llagas subbasin groundwater levels from 2010 to July of 2012 in the City of Morgan Hill were above the normal year represented by 2004 and above or slightly below the 5-year average (SCC 2012). In July 2012, groundwater elevations were roughly 50 feet below ground surface (bgs) near Morgan Hill and approximately 40 feet bgs near San Martin (SCVWD 2012b). The SCVWD groundwater report for February 2012 (SCVWD 2012a) shows that January groundwater levels in the Llagas subbasin increased in elevation since July and remained the same with respect to the normal and the 5-year average (Table 3.2-2). Current well monitoring (2014-2015) at Lake Silveria does indicate that the groundwater levels dropped in response to the recent drought but have recovered as has been seen in the historic records (Balance Hydraulics, 2015 unpublished). These monitoring wells are not indicative of elevations in all wells, but suggest seasonal changes in the groundwater basin.

Table 3.2-2 Selected Monitoring Well Water Levels for January 2012

Monitoring Well	State Well Number	Water Level Below Ground Surface (ft)					
		Jan 1987	Jan 2004	5-Year Average 2007 to 2011	Jan 2012	Change from 2004 to 2012	Change from 5-Year Average to 2012
Morgan Hill	09S03E22P005	50.4	47.7	50.3	40	7.7	10.3
San Martin	10S03E13D003	34.6	33.4	36.4	30.4	3.0	6.0
Gilroy	11S04E10D004	13.4	16.7	14.5	13.3	3.4	1.2

Source: SCVWD 2012a

Review of groundwater elevations from streamside observation wells[2] installed and used for geotechnical observations related to the Proposed Project indicates that maximum annual groundwater elevations are near or above the existing stream channel bottom (Table 3.2-3). Average well water elevations were typically 2-5 feet bgs. However, soil sampling conducted for the SCVWD in 2012 did not find evidence of groundwater near or above the channel invert; and there were no redoximorphic soil features encountered which would have indicated sustained groundwater levels close to the channel bottom (Cardno ENTRIX 2012a). Liquefaction maps discussed in the Section 3.1, Geology and Soils, reflect shallow groundwater within 15 feet bgs.

Soil borings obtained during Phases II Environmental Site Assessments (ESAs) conducted in 1997 and 2004 showed that in Reaches 7A and 7B groundwater was encountered in many borings at depths of 14 to 26 feet bgs (Weiss 2011). A geotechnical investigation near Lake Silveira area, within Reach 7A, encountered groundwater at depths as shallow as 3 feet bgs. However this data does not represent static water levels, but rather the depth at which saturated soils were first encountered, which ranged between 3 feet bgs to 13 feet bgs (Pacific Geotechnical Engineering 2013 unpublished).

Recent well, piezometer, and pump test data was collected near Lake Silveira along the Reach 7A channel alignment, just east of the lake (Balance Hydrologic 2013). The well data found that groundwater was approximately 8 feet bgs in August 2013. The proposed channel will be excavated to depths of approximately 12 feet in this part of the reach; as such, it is likely that groundwater will be encountered during construction and dewatering will be necessary. About 0.5 mile further upstream from the lake near West Middle Avenue, groundwater elevations are deeper, approximately 14–15 feet bgs (based on data collected by Kleinfelder, June 1997, and Pacific Geotechnical Engineering, August 2010, as reported in Balance Hydrologics 2013). Proposed construction depths will be nearly 15 feet deep, so that groundwater is also likely to be intercepted, although, to a lesser extent than closer to the lake.

[2] Observation wells listed in Table 3.2-3 were installed for geotechnical study purposes and do not supply water.These wells will be sealed and operationally closed as part of the Project construction.

Table 3.2-3 SCVWD Observational Well Elevations In Proximity to Llagas Creek, West Little Llagas Creek, and East Little Llagas Creek

		Well Elevations (ft) [1]			Months Dry
		Mean	Min	Max	
Reach 4	OW4-11	214.6	213.1	219.8	0
	OW4-18	209.5	207.7	211.0	6
Reach 6	OW6-7	288.6	287.8	289.7	0
	OW6-17	264.6	262.3	268.1	0
	OW6-25	249.4	247.7	251.2	2
	OW6-27	244.9	244.4	245.4	7
Reach 7	OW7A-2	312.1	310.2	314.3	6
Reach 8	OW8A-2C	329.4	324.2	334.5	4
	OW8A-3B	327.4	324.5	334.6	0
	OW8A-4	328.5	324.7	336.5	0
	OW8A-5	333.1	329.2	338.2	0
Reach 14	OW14-10	277.0	272.2	282.6	4
	OW14-16	259.7	252.8	265.2	2
	OW14-22	249.6	247.9	252.8	2
	OW14-26	236.1	234.4	237.8	7

[1] Values calculated from nine measurements. Well elevation data was generally collected monthly from June 1, 2012 to January 4, 2013. Two measurements were taken in December 2012.

Source: Pacific Geotechnical Engineering 2013

3.2.5 Water Quality

Water quality in a given area of a flowing stream is controlled by multiple factors, which include the chemical and physical nature of streambed material (erodibility, grain size, and rock type) as well as influences outside the stream corridor, such as quality of groundwater and upstream runoff acting to recharge the system. Minerals with differing rock types greatly affect types and levels of dissolved metals within a stream. More easily erodible or finer-grained material presents a greater surface area on which chemical reactions can occur; and, therefore, also influence water quality. Very fine-grained sediments contribute to elevated turbidity and temperature, which in turn affects oxygen levels. All of these variables occur within a natural stream system. In streams within urban or agricultural corridors, water quality is typically influenced from increases in peak runoff, dissolved hydrocarbons, dissolved fertilizers, and increases in sediment loads. Water quality impacts associated with agricultural runoff are linked to residual level concentrations of fertilizers and pesticides, as well as increased sediment loads in receiving waters. In streams with urban corridors other pollutants can be directly introduced into the stream through storm drains and can be further concentrated with the increased proportion of impermeable surfaces within urban areas. The more densely populated and developed areas draining to Project Reaches 8 and 7B are potential sources of urban pollutants, while most of Reaches 7A, 6, 5, and 14 drain areas that are more likely to be subject to water quality constituents carried by agricultural runoff.

The Central Coast Regional Water Control Board (CCRWQCB) monitors Llagas Creek for known pollutants and other parameters that can impair water quality. Impaired water bodies are listed on the Clean Water Act 303 (d) list by pollutant and then submitted to the Environmental Protection Agency (EPA) for determination of total maximum daily loads (TMDL). From the 2010 integrated report (SWRCB 2010), there are two specific areas within Llagas Creek where water quality has been identified as impaired: Reach 14 and downstream of Reach 4. East Little Llagas Creek downstream of Church Avenue in Reach 14, elevated levels of fecal coliform, nitrates (nutrients), sedimentation/siltation, and total dissolved solids have been detected (SWRCB 2010). Sources for these pollutants range from natural to agricultural and due to channel hydromodifications. Sources of sediment include nonpoint and point source discharge activities including agricultural and grazing land uses, urbanization and rural development, roads, and modifications to the channel (i.e., hydromodification).

Four pollutants (fecal coliform, nitrates [nutrients], sedimentation/siltation, and total dissolved solids) are currently listed on the Clean Water Act (CWA) Section 303 (d) list; and TMDLs have been established by the EPA for nitrates (nutrients) and sedimentation. The TMDL for nitrates in the Pajaro River and Llagas Creek is set at a maximum of 10 milligrams per Liter (mg/L) in receiving waters (Final Regional SWMP 2010). The TMDL for sedimentation in Llagas Creek is provided in Table 3.2-4. High levels of chloride and sodium have been detected on Llagas Creek downstream of the confluence with Miller Slough on an approximately 1-mile-long section of stream near Southside Drive. However, Southside Drive is roughly 7 miles downstream of Reach 4 and outside of the Project footprint. Llagas Creek is listed on the CWA Section 303 (d) list for chloride and sodium, but TMDLs for each pollutant have yet to be established. Other pollutants and impairment parameters without specified locations on Llagas Creek are also listed on the Section 303 (d) list. These include chlorpyrifos, electrical conductivity, E. coli, low dissolved oxygen (DO), and turbidity. Sources of these more general area impairments range from unknown to agricultural and municipal, as well as habitat modification and TMDLs have yet to be established.

Table 3.2-4 Suspended Sediment Total Maximum Daily Load Numeric Targets for Llagas Creek (CRWQCB)

Exposure Category		Exceedance Event Criteria		Numeric targets [1]	
Duration (Consecutive Days)	Suspended Sediment Concentration (mg/L)	Duration (Consecutive Days)	Suspended Sediment Concentration (mg/L)	Maximum Number of Exceedance Events	Maximum Duration of Exceedance Event (Consecutive Days)
1	666 – 1808	2	>1808	0	0
2	245 – 665	3	>665	0	1
6	91 – 244	7	>244	9	15
14	91 – 244	15	>244	1	15
49	33 – 90	50	>90	0	28

1 Numeric targets are comprised of two components: a maximum number of exceedance events that may occur and the maximum duration (consecutive days) in which the maximum suspended sediment concentration (SSC) value for each range can be exceeded. Exceedance events are specific to each exposure category.

Lake Silveira (an artificially created instream pond) influences water quality conditions, notably turbidity, temperature, and DO in both the lake itself and downstream in Reach 6. The SCVWD measured turbidity, temperature and DO during the spring, summer and winter periods in 2011 (Balance Hydrologics et al. 2012) in order to obtain information on lake water quality and its influence on water quality in receiving waters immediately downstream. Water quality data for turbidity, temperature, and DO were collected just upstream, downstream, and within the lake itself.

Temperature and DO are two water quality parameters that strongly influence steelhead growth and survival. As discussed in the Aquatics Resources, Section 3.6.3, DO levels within Lake Silveira do not meet water quality objectives established by the Regional Water Quality Control Board (RWQCB) Central Coast Region criteria. In the Water Quality Control Plan for the Central Coast Region (Basin Plan) for the Llagas Creek watershed (RWQCB 2011) it states “for waters not mentioned by a specific beneficial use, DO concentration shall not be reduced below 5.0 mg/L at any time. Median values should not fall below 85 percent saturation as a result of controllable water quality conditions”. DO never fell below 7 mg/L when measured upstream and downstream of the lake and percent saturation did not fall below 85 percent above or below the lake in any season. As such, DO is not likely adversely influenced by the lake in the downstream Reach 6. However, the average daily percent saturation did fall to as low as 40 percent saturation in the lake itself during the summer season measurements. It should be noted that the percent saturation measurements were taken near the bottom of the lake in the hypolimnion, indicating a natural process of lake stratification, which is not an unusual condition and is in fact an expected process.

Outflow from Lake Silveira causes higher water temperatures downstream in Reach 6, varying from 9-14°F greater than upstream of the lake in summer, in some cases exceeding water quality objectives established in the Basin Plan (RWQCB 2011), which states “at no time or place shall the temperature of any water be increased by more than 5°F above natural receiving temperature”. Warming within Lake Silveira raises downstream temperatures above optimal temperature range for juvenile steelhead (59-65°F). Daily average temperatures in late August exceeded 75°F, which are stressful and potentially lethal to rearing juvenile steelhead. Temperature and DO conditions are not further addressed in Section 3.2, Hydrology and Water Quality; but are addressed in Section 3.6, Aquatics Resources, because of the important connection of these water quality parameters to steelhead growth and survival. Additionally, turbidity in the lake was consistently higher than upstream reaches and exceeded Basin Plan objectives by increasing turbidity downstream from the lake in the summer and winter seasons.

Groundwater quality in South County is good for most beneficial uses except for nitrate levels, which remains the primary ground water protection challenge (SCVWD 2013c). The Llagas subbasin of the Gillroy-Hollister groundwater basin is distant from the coast and seawater intrusion has not been documented. Seawater intrusion has been documented in other aquifers of the region, but the encroachment has been arrested by changes in management practices resulting in the decrease in groundwater withdrawals and increasing groundwater recharge.

A Nitrate Management Program was created in 1991 to investigate and remediate increasing nitrate concentrations. Nitrate concentrations in excess of federal standards were found only in private wells, while all public wells meet federal drinking water standards. A hazardous material investigation was performed in Reach 7A. Groundwater analytical results indicate the presence of nitrate at hazardous waste concentrations (Kleinfelder 1997). In 2012, nitrate was detected above the drinking water standard in 30 percent of South County water supply wells, primarily domestic wells (SCVWD 2013c). For a full discussion of the investigation, please see Section 3.18 Hazardous Materials.

3.3 MINERAL RESOURCES

3.3.1 Introduction

This section describes the mineral resources of the Project area, including the designation of mineral resource zones (MRZ) in the Project area as delineated on statewide MRZ maps. Section 3.3.2, Project Area, presents the existing environmental setting conditions with respect to mineral resources in the Project area.

Baseline information on mineral resources in the Project area was compiled from existing published literature. Primary data sources include the following:

- City of Gilroy. 2002. *Gilroy General Plan 2002 to 2020*. Adopted June 2002. Gilroy, California.
- City of Morgan Hill. 2010a. *Morgan Hill General Plan*. February 2010. Morgan Hill, California.
- Santa Clara County. 1994. *Santa Clara County General Plan, 1995–2010*. Adopted December 1994. County of Santa Clara, California.
- U.S. Geological Survey (USGS). 1957. *Gemstones of the United States; Geological Survey Bulletin 1042-G.*

3.3.2 Project Area

The Project is located in southern Santa Clara County, approximately 25 miles southeast of San Jose, passing through rural, residential, and a commercial district in the communities of Morgan Hill, San Martin, and Gilroy (Figure 1.1-1, Regional Area Map). The northern portion of the Project (Reaches 8, 7B, and portions of 7A) is within the City of Morgan Hill; a portion of 7A is within unincorporated Santa Clara County. Reaches 6, 5, and 14 are within the San Martin planning area, and a portion (north of Masten Avenue) of Reach 4 is also in the San Martin planning area. The southern portion of Reach 4 is within unincorporated Santa Clara County. The southern extent of the project area is less than 1 mile from the City of Gilroy.

The project area for assessing impacts to mineral resources is defined as work conducted directly on or within an identified resource area that has the potential to cause a “loss of availability”. This would specifically apply to channel earthwork or construction of maintenance roads, which could result in a loss of aggregate resources through consumption (road construction) or removal (channel earthwork).

3.3.3 Environmental Setting

According to the Santa Clara County General Plan, 1995–2010 (1994), mineral resources of significance found and extracted in Santa Clara County include construction aggregate deposits and, to a lesser extent, salts derived from evaporation ponds at the edge of San Francisco Bay. Crushed rock is also a commercially important material in the region. It may be derived from greenstone, serpentine, diabase, and chert-limestone (Jensen 1988; Kohler-Antablin 1996; Kohler 1999). Eight mines are currently operating within the county. The Sargent Oil Field (7 miles south of the City of Gilroy) is also active. Cinnabar (mercury ore) deposits are present within in the county.

In the Project area, Reaches 4, 5, and 6, and the southernmost portion of Reach 14 have been classified by the California Division of Mines and Geology (CDMG) as MRZ-2 (significant deposits present), because they contain sand and gravel resources. There are no active quarries or other mineral extraction sites within the Project area.

3.3.3.1 Poppy Jasper

Poppy jasper, a semi-precious gemstone used in art and jewelry, is a type of orbicular jasper with characteristic orange and red “poppy flowers” within a microcrystalline quartz matrix found in rhyolitic deposits along the eastern wall of the valley. A famous locality for poppy jasper is Morgan Hill, California (USGS 1957). Historically strip mining has been conducted to extract this gemstone. Due to this former practice, the resource has become rare and is now protected by the City of Morgan Hill General Plan (Maxey Pers. Com. 2013a). However, the major deposits of poppy jasper have been previously identified outside of the Project boundary.

Lake Silveira (located just east of where Reach 7A and 6 come together) is an element of the Project that would be constructed primarily for mitigation to be implemented for all proposed alternatives as described in Section 2.4.6. This feature was a former shallow open pit quarry likely a source of sand and gravel material for local construction prior to 1980. This quarry was not described in any searches of the historic U.S. Geological survey bulletins pertaining to the region. It is located within recent (Quaternary) alluvium, lake, playa, and terrace deposits (Figure 3.1-1; Formation Qoa). It is unlikely that the former quarry site contains any poppy jasper due to its location relative to the poppy jasper parent rock outcrops (Figure 3.1-1; Formation Tv).

3.4 BOTANICAL RESOURCES

3.4.1 Introduction

This section describes the botanical resources in the project area, including vegetation types and habitats, rare or important plant communities, special-status plant species, and waters of the United States and state.

The following reports were reviewed for relevant information on botanical resources and jurisdictional waters in the project area:

- Upper Llagas Creek Project Baseline Biological Resources Report (Cardno ENTRIX 2012b).

- Baseline Biological Resources/Habitat Mapping, Upper Llagas Creek Flood Protection Project (Condor Country Consulting, Inc. 2012a).
- Wetland Delineation and Preliminary Jurisdictional Determination Santa Clara Valley Water District Upper Llagas Creek Flood Protection Project Santa Clara County, California. Prepared for Cardno ENTRIX, August 1, 2012 (Condor Country Consulting, Inc. 2012b).
- Upper Llagas Creek Stormwater Improvements Project Preliminary Delineation of Wetlands and Other Waters. 5 July (H. T. Harvey & Associates 2013b).
- Upper Llagas Creek Flood Protection Project 65% Design Habitat Impact Analysis Technical Memorandum. June 17. (H. T. Harvey & Associates 2013c).
- Final Santa Clara Valley Habitat Conservation Plan, Appendix D Species Accounts. August 2012. (ICF International 2012a).
- Upper Llagas Creek Flood Protection Project, Soil Characterization Report, June 2012 (Cardno ENTRIX 2012a).
- Revised Draft Fish and Wildlife Coordination Act Report (CAR) for the Llagas Creek Flood Protection Project, Santa Clara County, California (USFWS 2003).

3.4.2 Project Area

The Project area for the evaluation of vegetation and habitats includes any areas that would be directly, permanently, or temporarily affected by the construction activities associated with all the Project alternatives (Figure 3.4-1). The Project area includes access roads, temporary staging areas, and some areas that were included at various stages of the Project design to ensure all potentially impacted areas were included in biological studies. Specific locations relating to the project area include Upper Llagas Creek channel north of the City of Gilroy to Silveira Lake in the City of Morgan Hill, Reaches 4, 5, and 6; West Little Llagas Creek in the City of Morgan Hill (Reaches 7A, 7B, and 8); the stream channel of West Little Llagas Creek proposed to be cut off by Reach 7A in the City of Morgan Hill, and the southern portion of the East Little Llagas Creek within the City of San Martin (Reach 14). The project area is approximately 320 acres. The footprint of the Tunnel Alternative (Applicant's Proposed Action) is approximately 305 acres and is referred to as the Tunnel Alternative Project area (Appendix E).

The wetland delineation conducted for the Project has a unique project area boundary (delineation project area) that includes areas outside of the current Project area, such as the Lake Silveira proposed mitigation area (Appendix F). Tree surveys and California sycamore woodland mapping were also conducted in some areas adjacent to the Project area (Appendix F).

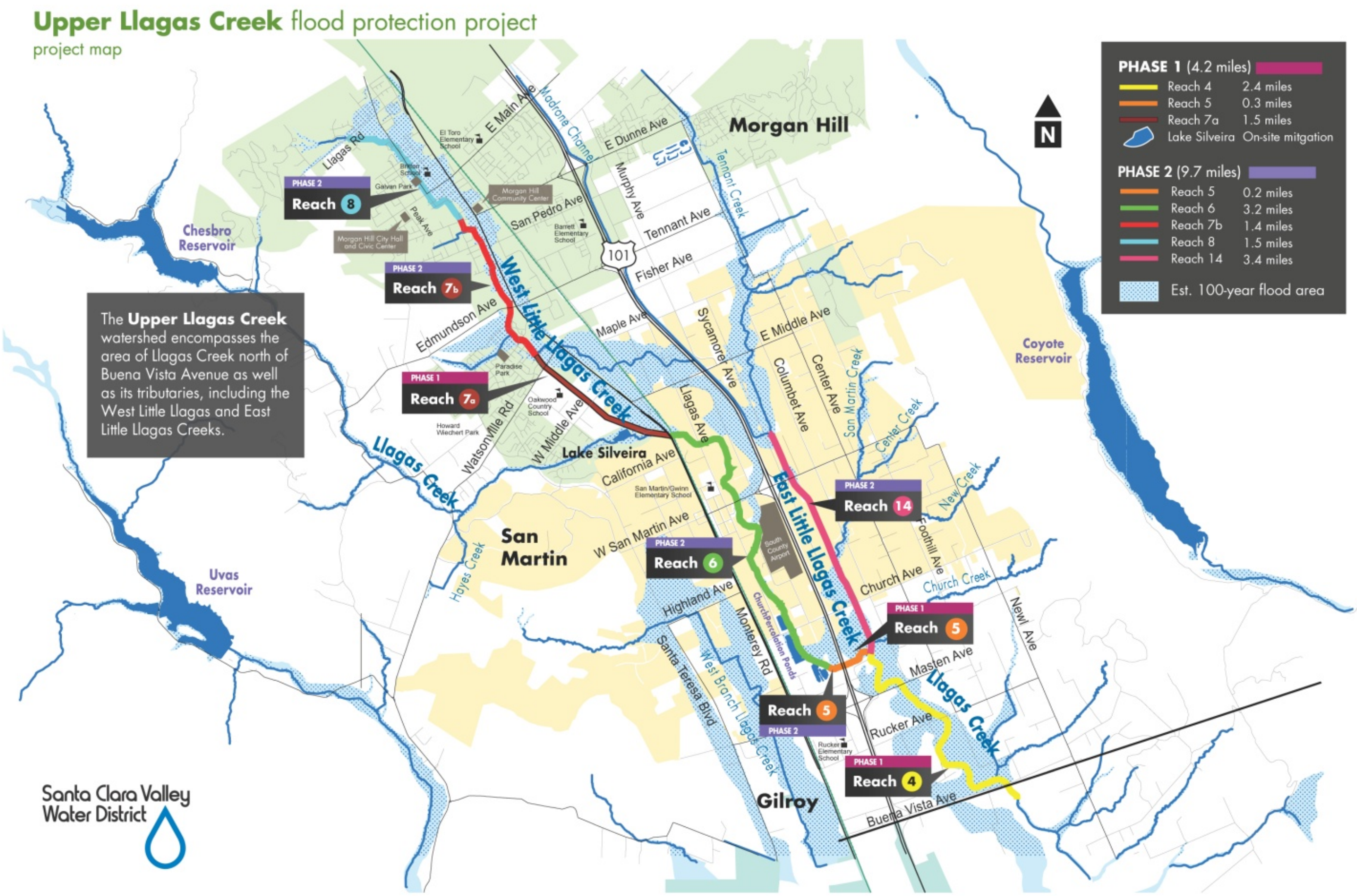

Figure 3.4-1 Upper Llagas Creek Project Reaches

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3.4.3 Environmental Setting

The project area is located in southern Santa Clara County, approximately 25 miles southeast of San Jose, in the communities of Morgan Hill, San Martin, and Gilroy (Figure 3.4-1). The project area is in the southern Santa Clara Valley, in relatively flat terrain, with elevations ranging from 220 to 350 feet (67 to 106 meters) above sea level. Existing land use in the project area is agricultural, residential, open space, and commercial.

The project area and its 84-square-mile watershed are located within the Central California Coast Ranges. The Upper Main Llagas Creek drainage basin originates at the crest of the Santa Cruz Mountains and extends southeastward through foothill terrain then onto the floor of the Southern Santa Clara Valley before joining the Pajaro River, which then flows into Monterey Bay near Watsonville in Santa Cruz County. West Little Llagas Creek flows along the western edge of the valley then turns eastward north of San Martin where it joins East Little Llagas near the center of the valley. East Little Llagas Creek gathers flow from tributaries from the east side of the valley before joining the main stem just north of Masten Avenue. The project area includes segments of all three creeks and southward to just beyond Buena Vista Avenue.

The soils underlying the project area’s valley floor location reflect the geologic history and periods of flowing stream sediment deposits, gravels, and sands in old channels with overlapping fine layers of floodplain deposits. In general, the soils present in the project area are deep; well drained; medium to fine textured loams (gravels, sands, and silts) and clay loams; formed on gradients less than 9 percent; and include Yolo, Zamora, Pleasanton, San Ysidro, Cropley, and Arbuckle Series (Cardno ENTRIX 2012a). Serpentine, alkaline, or volcanic soils that potentially support special-status plant species endemic to these soil types are not present in the project area. The soils investigation conducted for the Project identified several soil conditions in the project area that could influence the success of proposed plantings (Cardno ENTRIX 2012a). These conditions include cemented soil layers that would limit root growth and soil moisture and low fertility, which could limit plant growth.

The following discussion describes vegetation and general characteristics of the creek channel that are present in the project area for each reach. These descriptions are based on field surveys conducted in portions of the project area during September 20 through 23, 2011 vegetation sampling; October 18, 19, and 21, 2011 vegetation mapping; October 17 and 18, 2011 and January 16 and 17, 2012 wetland delineation investigations; and vegetation mapping and sampling on West Little Llagas on April 17 through 20, 2012 (Condor Country Consulting, Inc. 2012b). The following floristic descriptions are limited to surveys that were conducted primarily during the fall and winter when identification of herbaceous species would be limited. Specific vegetation types and habitats are described in more detail in Section 3.4.3.1. Vegetation types and habitats in the project area are shown in Appendix E.

Reach 4

Reach 4 is an intermittent stream channel that winds through agricultural and suburbanized areas. The stream channel averages about 30 feet wide at the OHWM along its 2.4-mile stretch. The stream channel bed is cobbles, pebbles, and sand, which support sparse riparian vegetation, such as mule fat (*Baccharis salicifolia*). The stream banks are typically steep, well defined, and support a mix of riparian and non-riparian species. Annual non-native grass species, such as wild oats (*Avena spp*.) and ripgut brome (*Bromus diandrus*), are common along with invasive non-native species, such as Italian thistle (*Carduus pycnocephalus*) and yellow star thistle (*Centaurea solstitialis*). Top of bank areas support non-native trees, such as red gum (*Eucalyptus camaldulensis*) and native trees, such as Fremont cottonwood (*Populus fremontii ssp. fremontii*), western sycamore (*Platanus racemosa*), and coast live oak (*Quercus agrifolia*). Black walnut (*Juglans sp*.), which are escapes from orchard rootstock, are also present in Reach 4.

Reach 5

Reach 5 is a short approximately 0.4-mile segment connecting Reaches 6 and 14 that averages 15 feet wide at the OHWM. The channel is composed of gravel and sand and contains riparian species, such as mule fat in the stream channel, red gum at the top of bank, and annual grassland dominating the understory throughout. There is a large grove of Monterey pine (*Pinus radiata*) on the bank above the southeast portion of the reach, but this commonly-planted species, while native to California, is not native to the project area. Land use to the north is agriculture and to the south is urban.

Reach 6

Reach 6 flows southward for 3.7 miles. The channel is composed of gravel, sand, and silt and varies between 15 to 30 feet wide. The southern portion of Reach 6 is adjacent to several SCVWD percolation ponds to the west and greenhouses and agricultural fields to east. The southern portion supports riparian species, such as mule fat and willow (Salix spp.) in the stream channel and coast live oak, red gum, and western sycamore on top of the banks. The middle portion of Reach 6 traverses agricultural fields, small corporation yards, and suburban areas. Portions of this central reach are adjacent to paved roads and invasive non-native species, such as giant reed (*Arundo donax*) and Himalayan blackberry (*Rubus armeniacus*), are abundant amid the annual grassland and scattered native and non-native tree species, such as western sycamore, red gum, and willows. The northern portion of Reach 6 passes through an industrial area and waste treatment facilities, but still supports considerable riparian forest and scrub habitat.

Reaches 7A and 7B

Reach 7 is divided into two sections, Reaches 7A and 7B. The southern end of Reach 7A ends at Llagas Creek and Silveira Lake, and this small portion of Reach 7A is biologically diverse with valley oak (Quercus lobata) and coast live oak, walnut, willow, and broad-leaved cattail (*Typha latifolia*). The majority of the southern half of Reach 7A is a non-channelized topographically flat section of land with a combination of heavy agricultural use (plowed fields) or fallow land that has converted to annual non- native grassland. The northern half of Reach 7A supports non-native grassland and patches of perennial marsh and highly fragmented riparian forest and runs through a residential neighborhood.

Reach 7B contains West Little Llagas Creek and the channel is composed of gravel, sand, silt, and clay, which transects an urban area. The stream channel supports riparian scrub species and the banks and the undisturbed areas above the top of bank support non-native grasslands dominated by wild oats along with Bermuda grass (*Cynodon dactylon*) and annual canary grass (*Phalaris canariensis*). Over half the project area in Reach 7B is grassland (Table 3.4-1). The tree canopy consists of a combination of planted exotic trees and native trees, such as coast live and valley oaks, and Fremont cottonwood. The southern half of the Reach 7B channel averages 75 feet in width and the northern half of Reach 7B (north of Tennant Avenue) averages 15 feet in width. In the northern portion, the stream channel is adjacent to small businesses and is in an underground culvert for the northernmost 650 feet of the reach.

Table 3.4-1 Vegetation Types and Habitats in the Project Area

Vegetation Type	Project Area Total (Acres)
Reach 4	
Riparian Forest (PFO) (native and non-native)	17.5
Riparian Scrub-shrub (PSS) (native and non-native)	2.9
Perennial Marsh (PEM)	--
Upland Herbaceous (U/H)	41.1
Aquatic	7.9
Developed	1.2
Reach 5	
Riparian Forest (PFO) (native and non-native)	1.8
Riparian Scrub-shrub (PSS) (native and non-native)	2.1
Perennial Marsh (PEM)	--
Upland Herbaceous (U/H)	13.7
Aquatic	1.9
Developed	0.9
Reach 6	
Riparian Forest (PFO) (native and non-native)	12.9
Riparian Scrub-shrub (PSS) (native and non-native)	11.1
Perennial Marsh (PEM)	1.0

Vegetation Type	Project Area Total (Acres)
Upland Herbaceous (U/H)	49.7
Aquatic	8.5
Developed	9.3
Reach 7A	
Riparian Forest (PFO) (native and non-native)	3.9
Riparian Scrub-shrub (PSS) (native and non-native)	3.3
Perennial Marsh (PEM)	1.7
Upland Herbaceous (U/H)	43.2
Aquatic	0.1
Developed	1.3
Reach 7B	
Riparian Forest (PFO) (native and non-native)	1.4
Riparian Scrub-shrub (PSS) (native and non-native)	0.1
Perennial Marsh (PEM)	1.6
Upland Herbaceous (U/H)	13.7
Aquatic	0.3
Developed	3.1
Reach 8	
Riparian Forest (PFO) (native and non-native)	3.4
Riparian Scrub-shrub (PSS) (native and non-native)	0.9
Perennial Marsh (PEM)	1.3
Upland Herbaceous (U/H)	10.2
Aquatic	0.4
Developed	4.1
Reach 14	
Riparian Forest (PFO) (native and non-native)	1.4
Riparian Scrub-shrub (PSS) (native and non-native)	2.7
Perennial Marsh (PEM)	0.3
Upland Herbaceous (U/H)	28.6
Aquatic	13.4
Developed	11.0

Reach 8

Reach 8 is an intermittent stream (West Little Llagas Creek) and the channel is composed of gravel, sand, silt, and clay, which averages 12 feet in width. The channel transects an urban area with businesses, residential areas, and roads abutting many portions of the top of the channel bank. The channel runs underground for 250 feet in two locations. The bottom of the channel varies from sections with no vegetation to areas with broad-leaved cattails and hardstem bulrush (Schoenoplectus acutus). The banks are predominately vegetated with non-native annual grassland. A large portion of this reach has a canopy of exotic trees with occasional patches of remnant coast live oak and valley oak. The northernmost section runs along Hale Avenue and supports mostly ruderal vegetation, with some cattail and scattered oaks throughout. Most of the project area in Reach 8 is bordered by developed urban and landscape habitats (Table 3.4-1).

Reach 14

Reach 14 is an engineered wide channel with several portions that were recently re-excavated in 2011. The channel width at the OHWM averages 25 feet and the top of bank width averages 70 feet. The stream channel substrate is composed of cobbles, gravel, sand, and silt. A few sections contain riprap. The bottom of the channel is mostly bare ground with scattered patches of riparian herbs, such as curly dock (Rumex crispus) and cocklebur (*Xanthium strumarium*). The vegetation on the banks of the channel is predominately non-native grasslands. The top of the channel on both sides is lined with roads or ruderal habitat with scattered scrub, exotic trees, and willows. Agricultural fields or suburban areas are present beyond the roads on each side of the channel.

3.4.3.1 Vegetation Types and Habitats

Vegetation types and habitats in the project area were mapped using a SCVWD vegetation classification, which was based on the *Manual of California Vegetation* (Sawyer et al 2009), the industry standard for California vegetation mapping. The SCVWD categories were applied to the project area (Condor Country Consulting, Inc. 2012a; Cardno ENTRIX 2012b). Additional adjustments and data gaps for vegetation mapping were addressed to maximize mapping precision with aerial photograph interpretation and ground surveys (H.T. Harvey & Associates 2013c). This analysis resulted in 43 vegetation types or habitats in the project area, which were grouped into 15 corresponding vegetation types and habitats for this EIR. Thirteen of the 15 types were further grouped into six CAR types for the purpose of conducting an impact analysis and proposing compensatory mitigation that is consistent with the requirements of the CAR (USFWS 2003). The CAR habitat types are riparian habitats that were described in the USFWS (2003) report prepared for this Project for the purpose of identifying appropriate mitigation measures and compensatory mitigation ratios for impacts to habitats. A map series showing CAR habitat types in the project area is provided in Appendix E. Subsequent to completion of the analysis described above, an additional section was added to Reach 8, between Hillwood Lane and Llagas Road; and CAR vegetation types were determined for this area using aerial photography, ground based photos and other data.

The following section provides a general description of each of the six CAR habitat types and each of the corresponding SCVWD vegetation types or habitats associated with that CAR type. Table 3.4-1 provides a summary of the acreages by reach of four main CAR habitats in which Riparian Forest (native) and Riparian Forest (non-native) are combined, and Riparian Scrub-shrub (native) and Riparian Scrub-shrub (non-native) are combined. In addition, Aquatic and Developed habitats, which do not correspond to a CAR habitat, are also described.

Riparian Forest (PFO) (native)

The Riparian Forest (PFO) (native) CAR habitat type consists of five SCVWD vegetation types in the project area that are dominated by native riparian trees (Appendix E). These types include: (1) broad- leaved woodland, (2) California sycamore woodland[1], (3) horticultural and landscape plantings (native), (4) native riparian scrub, and (5) riparian woodland. The Riparian Forest (native) category refers to habitat dominated by woody plant species over 20 feet in height in the riparian corridor (USFWS 2003). This habitat is generally found within the bed and banks of the creek, but includes the canopy of trees that extend beyond the bed and banks. The structure of this habitat varies throughout the project area, ranging from single isolated trees with sparse to no herbaceous understory to dense, multiple-layered canopy forest. Isolated trees, such as those found in much of Reaches 7 and 8, represent degraded habitat with limited biological function whereas multi-layered canopy forest, such as those found in Reach 4 and parts of Reach 6, provides high biological functions and values.

Broad-leaved Woodland

Broad-leaved woodland consists of upland woodland with a tree layer composed of varying proportions of coast live oak, valley oak, and California buckeye (*Aesculus californica*). Dominant shrub species include poison oak (*Toxicodendron diversilobum)*. In some portions of the project area the broad-leaved woodland type is dominated by coast live oak or valley oak with over 50 percent of the relative tree canopy cover provided by one of these two oak species. The broad-leaved woodland type also includes mixed oak woodland; where neither the coast live oak nor valley oak comprises over 50 percent of the tree canopy cover. Broad-leaved woodland is generally represented as individual trees or small clusters along most reaches, except in Reach 4, where more extensive patches exist.

[1] The California sycamore woodland type is dominated by western sycamore trees.

California Sycamore Woodland

California sycamore woodland in the project area is based on the SCVWD *Platanus racemosa* type. This woodland alliance generally occurs within the riparian corridor and is composed of mature, widely spaced western sycamore comprising at least 5 percent of the absolute cover of the tree canopy layer. Other species associated native trees include coast live oak, valley oak, sandbar willow, red willow, arroyo willow, and black walnut. California sycamore woodland is considered a rare and sensitive vegetation community by the California Department of Fish and Game (CDFG [2010]). Regulatory agencies are concerned with the decline in this habitat type in Santa Clara County (CBI 2006). It is considered a declining habitat type and relict trees are considered particularly valuable, because seed produced by native sycamores in the Santa Clara Valley includes genetic material from widely-planted non-native sycamores (*Platanus* sp.). For that reason, the limited young trees that have recruited from seed are often hybrids with non-native trees. In addition, the extent of hydrologic alteration in the region has made natural recruitment of native sycamores infeasible in most areas, including most reaches of the Project and, therefore, new native sycamore trees are not replacing the old trees that reach the end of their lifespan.

California sycamore woodland was mapped in the field during the 2013 site investigations to encompass all California sycamore woodlands, including small mapping units. During these field surveys, existing California sycamore woodland mapping units that were defined as western sycamore occupying 50 percent of the relative tree canopy were expanded to encompass some adjacent woodland areas and western sycamore occupying at least 5 percent absolute cover. This method resulted in larger mapping units in some areas and a higher acreage of California sycamore woodland than for the trees alone in the project area.

Horticultural and Landscape Plantings (native)

Horticultural and landscape plantings (native) consist of planted native trees such as Monterey pine.

Native Riparian Scrub

The native riparian scrub vegetation type in the project area is dominated by one or more riparian shrub species and the absolute vegetative cover in the shrub layer ranges from 20 to 50 percent. Herbaceous plants may occur in the understory. Dominant species in this vegetation type that occurs in PFO (native) include arroyo willow (*Salix lasiolepis*) and other willow species with a shrubby understory of Himalayan blackberry.

Riparian Woodland

Riparian woodland in the PFO CAR habitat is dominated by red willow (*Salix laevigata*) and/or Fremont cottonwood. The subcanopy may include arroyo willow. In the project area, this habitat type generally consists of individual trees or small clusters of trees except on Reach 7A just south of La Crosse Drive and Reach 4 south of the convergence of Reaches 5 and 14. This habitat provides important biological functions and values.

Riparian Forest (PFO) (non-native and planted non-local natives)

The Riparian Forest (PFO) (native) CAR habitat type consists of two vegetation types in the project area (Appendix E). This habitat is similar to Riparian Forest (PFO) (native) except that this habitat is dominated by non-native or planted non-local native riparian trees. This habitat is generally found within the bed and banks of the creek, but includes trees where canopy extends beyond the bed and banks. The structure of this habitat varies throughout the project area, ranging from single isolated trees with sparse to no herbaceous understory to dense, multiple-layered canopy forest.

Eucalyptus

The eucalyptus type contains a eucalyptus tree canopy with a relative tree cover greater than 80 percent. The predominant eucalyptus species in the project area is red gum. Other scattered eucalyptus species in the project area include blue gum (*E. globulus*) and forest red gum (*E. tereticornis*). Red gum has a California Invasive Plant Council (Cal-IPC) rating of limited and is considered to have a low to moderate rate of invasiveness (Cal-IPC 2006).

Horticultural and Landscape Plantings

Horticultural an landscape plantings consist of ornamental non-native trees and stands of black walnut, which are escapes from orchard rootstock.

Riparian Scrub-shrub (PSS) (native)

The Riparian Scrub-shrub (PSS) (native) CAR habitat type consists of two vegetation types in the project area that are dominated by native riparian shrubs (Appendix E). Riparian Scrubshrub (native) is habitat composed of woody plant species less than 20 feet tall within the riparian corridor (USFWS 2003). This includes species that are in an early developmental stage of PFO, shorter stature native trees and native shrub species. The structure of this habitat ranges from single isolated shrubs to dense, multi-species canopy scrub habitat.

Native Riparian Scrub

The native riparian scrub vegetation type in the project area is dominated by one or more riparian shrub species and the absolute vegetative cover in the shrub layer ranges from 20 to 50 percent. Dominant species in this vegetation type include mule fat, sandbar willow (Salix exigua), and arroyo willow. This vegetation type often has an herbaceous understory, but may also have a shrubby understory of Himalayan blackberry.

Upland Scrub

The Upland vegetation type in the project area is vegetation complex that consists of a shrubby layer of coyote brush (*Baccharis pilularis*) that occupies over 50 percent of the absolute cover.

Riparian Scrub-shrub (PSS) (non-native)

The Riparian Scrub-shrub (PSS) (native) CAR habitat type consists of one vegetation type in the project area that is dominated by non-native riparian shrubs and giant reed (Appendix E). Riparian Scrub-shrub (non-native) refers to habitat composed of vegetation that is less than 20 feet tall within the riparian corridor (USFWS 2003). This includes species that are in an early developmental stage of PFO and shorter stature vegetation. The structure of this habitat ranges from single isolated shrubs to dense, multi- layered canopy scrub habitat.

Riparian Exotic Scrub

Riparian exotic scrub is dominated by giant reed or Himalayan blackberry, with 60 percent or greater relative cover of one of these species. Giant reed has a Cal-IPC rating of high and considered a highly invasive plant that can have a severe impact on animal communities and vegetation structure with a high likelihood of invading and dominating adjacent riparian plant communities (Cal-IPC 2006). Himalayan blackberry has a Cal-IPC rating of high and considered a highly invasive plant that can have a severe impact on animal communities and vegetation structure with a high likelihood of invading and dominating adjacent wetland plant communities (Cal-IPC 2006).

Upland Herbaceous (U/H)

The Upland Herbaceous (U/H) CAR habitat type consists of four vegetation types or habitats in the project area that are dominated by non-native grasses and forbs and include sparsely vegetated disturbed areas with invasive species (Appendix E). This type includes: (1) agriculture, (2) barren, (3) grassland, and (4) ruderal. It is located on the Creek channel banks and levee slopes. Areas where the Creek banks occur under bridges were characterized as Upland Herbaceous but vegetation cover tends to be sparse in these areas.

Agriculture

Agriculture habitat in the project area supports agricultural activity or recently fallowed fields and includes orchards and land planted with crops.

Barren

Barren habitats are sparsely vegetated to unvegetated areas. These areas have less than 10 percent absolute cover of vegetation. Recently plowed agricultural areas are included in agriculture.

Grassland

Grassland habitat is the dominant vegetation type in the project area (Table 3.4-1). This vegetation type is dominated by naturalized (non-native) annual plants, such as wild oat (*Avena fatua*), slender wild oat (*Avena barbata*), ripgut brome, Italian ryegrass (*Festuca perennis*), or by naturalized perennial grasses such as Harding grass (*Phalaris aquatica*), Dallis grass (*Paspalum dilatatum*) and Bermuda grass.

Ruderal

Ruderal vegetation consists of weedy species growing on highly disturbed land that is frequently subject to disturbance from people and vehicles. Ruderal plant species in the project area include non-native wild radish (*Raphanus sativus*), narrow-leaved plantain (*Plantago lanceolata*), filaree (*Erodium spp*.), and annual grasses, such as wild oat. Ruderal habitat is commonly found adjacent to highways.

Perennial Marsh (PEM)

The Perennial Marsh (PEM) CAR habitat type consists of any perennial marsh and seasonal wetlands habitat that were delineated as USACE jurisdictional features (H. T. Harvey & Associates 2013b; Appendices E and F). These habitats are generally found on the edges of the active channel; however, some span the entire channel bed (H. T. Harvey & Associates 2013b). Perennial marsh habitat occurs in the perennially and intermittently flowing reaches of the creek and is composed of species, such as cattail (*Typha sp*.), California bulrush (*Schoenoplectus californicus*), tall flatsedge (*Cyperus eragrostis*), and fringed willowherb (*Epilobium ciliatum*). Seasonal wetlands are generally located in the ephemerally flowing reaches of the creek and are composed of species such as curly dock, cocklebur, and Dallis grass.

Other Habitats

Two habitats in the project area do not correspond to a CAR habitat: Aquatic and Developed (Appendix E).

Aquatic

Aquatic habitat includes concrete lined channels, perennial stream channels, and seasonal intermittent streambeds. Concrete lined channels are characterized by an impermeable layer of concrete that may have an overlying layer of sediment that contains herbaceous plant species. Perennial stream channels have moving water year round. Seasonal streambeds are over 80 percent bare ground composed primarily of sand, gravel, and cobbles. These gravelly stream beds do not contain surface water for at least 3 months of the year. Facultative, facultative wet, and facultative upland plant species, such as curly dock, cockle bur, and crab grass (*Digitaria sanguinalis*), and other species, such as black mustard (Brassica nigra) and teasel (*Dipsacus fullonum*), may occur in scattered stands.

Developed

Areas in the project area that are mapped as developed include urban and suburban, roads, and riprap. Water channels in urbanized areas may be underground inside large diameter pipes with built up urban areas above. Roads are regularly maintained and traveled gravel or asphalt surfaced roads. Riprap consists of channel areas with a fill composed of large boulders greater than 10 inches (25 centimeters).

3.4.3.2 Rare or Important Plant Communities

The CDFW regulates impacts to rare or important plant communities (CDFG 2010). Locations of some these communities occurrences are recorded in the California Natural Diversity Database (CNDDB) (CDFW 2012), but many are not. There are two sensitive natural communities in the CNDDB within 10 miles of the project area: Serpentine Bunchgrass and Sycamore Alluvial Woodland (Figure 3.4-2). Serpentine Bunchgrass does not occur in the project area, because serpentine soils are not present. The CNDDB Sycamore Alluvial Woodland community corresponds to California sycamore woodland in the project area, and to the *Platanus racemosa* Woodland Alliance in *A Manual of California Vegetation*, second edition (Sawyer et. al 2009). There are 24.02 acres of this habitat in the vicinity of the project area, primarily in Reaches 4 and 6 (Appendix E). The updated *List of Vegetation Alliances and Associations* (CDFG 2010) ranks *Platanus racemosa* Woodland Alliance as G3, S3, which means there are 21 to 100 occurrences of it worldwide/statewide and/or more than 2,590 to 12,950 hectares of the alliance.

Other riparian habitats in the project area are also considered sensitive vegetation communities by CDFW, because of their ranking (CDFG 2010) and their location adjacent to *Aquatic* habitat that consists of bare channels (perennial and intermittent stream channels). The CDFW's jurisdiction along channels with a defined bed and bank extends to adjacent riparian habitats. Most of the Riparian Forest (42.09 acres) in the project area is located adjacent to Aquatic habitat and is comprised of vegetation subtypes that are ranked as sensitive, including *Populus fremontii, Salix laevigata*, and *Quercus lobata*.

The project area also has the potential to support native grassland alliances that could be considered rare, such as purple needle grass grassland (*Nassella pulchra* alliance). The CDFW ranks this alliance as G3? S3?, which means a tentative ranking is that *there* are 21 to 100 occurrences of it worldwide/statewide, or more than 2,590 to 12,950 hectares (CDFG 2010). Another sensitive native grassland community that is potentially present in the project area is blue wild rye meadows (*Elymus glaucus alliance*), which has a ranking of G3?, S3?, meaning that tentatively there are only 21 to 100 occurrences of it worldwide/statewide, and/or 2,590 to 12,950 hectares of the alliance. Most of the grasslands in the project area are disturbed, especially in Reach 14, so these sensitive grassland habitats are not likely to be present in the upper reaches of the Project, but are potentially present in less disturbed areas, such as Reach 4.

3.4.3.3 Waters of the United States and Waters of the State

Two recent wetland delineations have been conducted for different parts of this Project. The first delineation was on October 17 and 18, 2011, January 16 and 17, 2012, and April 17 through 20, 2012 and covered Reaches 6 and 7A bypasses, Reach 7A at Watsonville Road, north tunnel portal terminus construction area, and the West Little Llagas Creek channel and adjoining banks, as well as several *areas* outside the project area (Appendix F) (Condor Country Consulting, Inc. 2012b). The second was conducted on November 8 through December 7, 2012 and May 2, 6, and 14, 2013 and covered the remaining portions of the Project project area, as well as the northern section of Reach 8 and some of the proposed mitigation areas, such as Lake Silveira (H.T. Harvey & Associates 2013b). Both delineations were routine onsite investigations that followed the USACE standard methods (Environmental Laboratory 1987; USACE 2008). The results of the delineations were combined and are included as Appendix F. The delineation project area corresponds to the botanical project area except for one part of Reach 7A, where no delineation has been conducted. However, this area is primarily agricultural fields and wetlands, if present, are anticipated to be very limited in extent.

Table 3.4-2 provides a summary of the 52.70 acres of potential jurisdictional waters (Section 404) that were identified in the 181.93-acre delineation project area (H.T. Harvey & Associates 2013b). A total of 9.75 acres of perennial marsh and seasonal wetlands were delineated as potential jurisdictional wetlands.

A total of 42.95 acres and 53,473 linear feet of intermittent and perennial streams, culverts, or ponds situated below the OHWM were delineated as potential jurisdictional other waters (non-wetland waters) of the United States. These jurisdictional wetlands and other waters are shown in Appendix E where perennial marsh and seasonal wetlands correspond to the CAR Perennial Marsh (PEM) habitat, and intermittent and perennial streams, culverts, and ponds are grouped as Aquatic habitats. All reaches within the delineation project area are relatively permanent waters (RPWs) and Lake Silveira is a palustrine feature (P) (H.T. Harvey & Associates 2013b). None of the non-wetland waters in the project areas are traditionally navigable waters (TNWs).

Table 3.4-2 Jurisdictional Waters in the Delineation Project Area

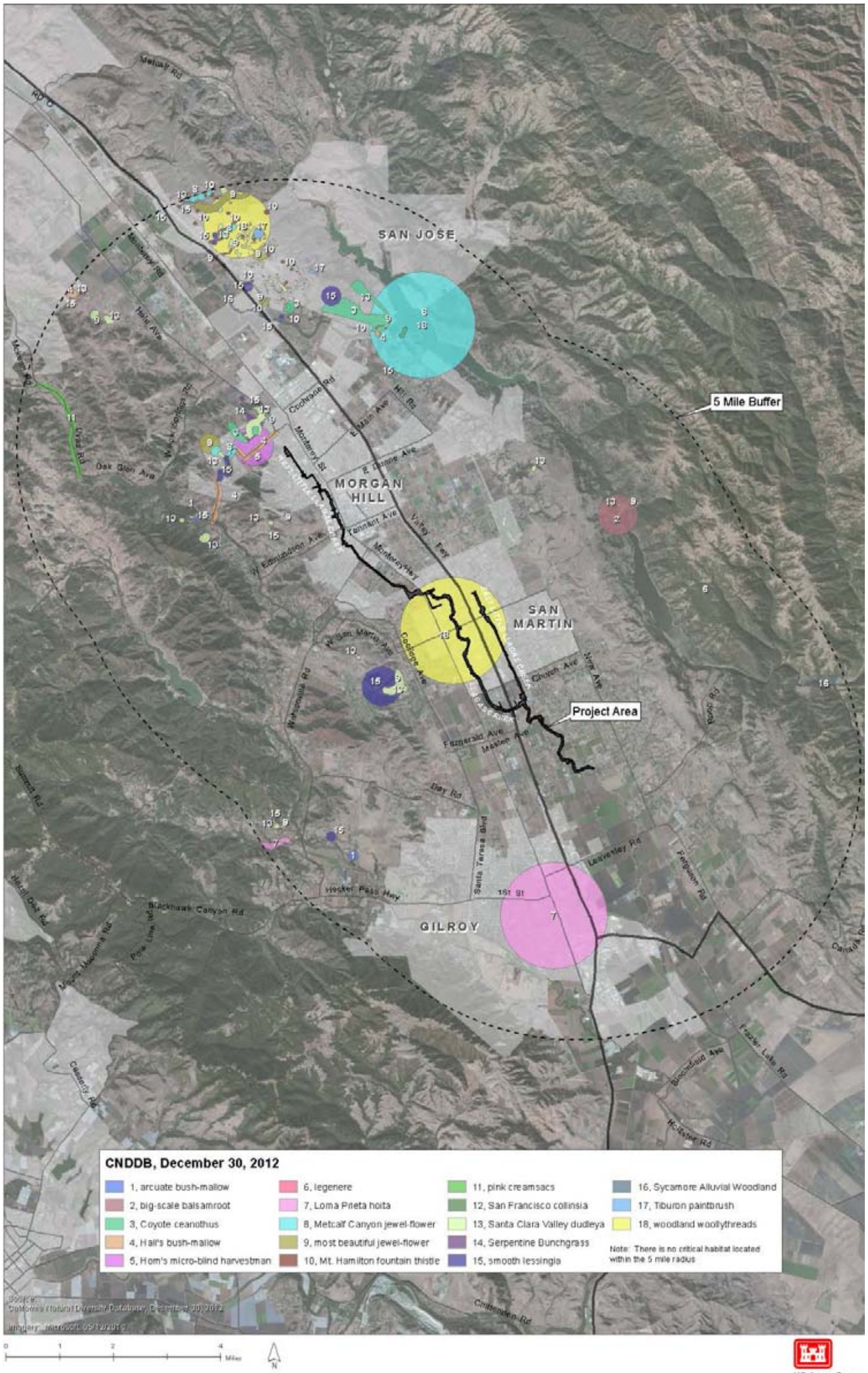
Potential Jurisdictional Waters	Acres
Section 404 Wetlands	**9.75**
Perennial Marsh	1.42
Seasonal Wetlands	8.33
Section 404 Other Waters	**42.95**
Intermittent Streams	24.21
Perennial Streams	9.90
Culverts	0.94
Pond	7.90
Total Jurisdictional Waters	**52.70**

Source: H.T. Harvey & Associates 2013b

Two hundred twelve (212) potential jurisdictional perennial marsh features (totaling 1.42 acres) were mapped in the project area (Appendix F). Perennial marsh is restricted to areas that retain water throughout the year, such as areas within the OHWM in the perennial stream corridors and along the banks of Lake Silveira. There are 6,329 total linear feet of perennial marsh in streambeds throughout the project area. Vegetation below the OHWM, supported wetland species, such as spotted ladysthumb (*Persicaria maculosa*), and obligate wetland species, such as California bulrush and cattail. Hydrophytic vegetation along the edge of the low-flow channel included facultative species, such as curly dock, cocklebur and Dallis grass, tall flatsedge, fringed willowherb, and wild mint (*Mentha arvensis*).

Seventy-seven (77) potential jurisdictional seasonal wetlands (totaling 8.33 acres) were mapped in the project area (Appendix F). Seasonal wetlands are present, adjacent to the intermittent stream channels in all reaches and at Llagas Creek at Lake Silveira. Most seasonal wetlands in the delineation project area are in channels at or below the OHWM, and some are outside of the main Llagas Creek channel. There are 15,465 linear feet of the seasonal wetlands. Cattail and California bulrush were observed in wetlands located at or below the OHWM and tall flatsedge, curly dock, cocklebur, and Dallis grass were often observed in wetlands that occurred at or just above the OHWM.

Figure 3.4-2 CNDDB Records of Special Status Plants and Sensitive Communities in the Vicinity of the Tunnel Alternative Project Area



US Army Corps of Engineers

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A total of 42.95 acres of non-wetland waters (other waters) were identified in the project area, corresponding to 53,473 linear feet (Table 3.4-2; Appendix F). These features are located in the low-flow channels and active floodplains within OHWM of the Llagas Creek watershed. Most of the non-wetland waters identified in the delineation project area are intermittent streams within a single channel. The intermittent streams did not often have surface water at the beginning of the delineation period in November 2012, but seasonal flows were observed later during the survey period after precipitation events in December 2012. Perennial features were only observed in Reach 6 and the portion of Llagas Creek near Lake Silveira and were the most complex stream channels in the delineation project area. Twenty culverts were also identified as other waters of the United States.

3.4.3.4 Special-status Plant Species

For the purpose of this section, special-status species are plant species that meet one or more of the definitions listed below.

- Species listed or proposed for listing as threatened or endangered under the federal ESA.
- Species that are Candidates for possible future listing as threatened or endangered under the federal ESA.
- Species listed or proposed for listing by the State of California as threatened, endangered, or rare under California Endangered Species Act (CESA).
- Species that meet the definitions of rare or endangered under CEQA Guidelines Section 15380. This includes plant species that have a California Rare Plant Rank (RPR) of 1A, 1B, or 2 (CNPS 2012).

A list of 55 special-status plant species that are known to occur or potentially occur in the vicinity of the project area were compiled and evaluated for their potential to occur within the project area. This list is provided in Appendix G and describes the species' scientific and common names, status, habitat, and potential to occur in the project area. The list was compiled based on a review of special-status species lists and records from the CNDDB (CDFW 2012), USFWS online species list (USFWS 2012), California Native Plant Society online *Inventory of Rare, Threatened, and Endangered Plants of California* (CNPS 2012) databases, and literature resources. The CNDDB and the USFWS databases were reviewed for special-status species that are known to occur or potentially occur in the three USGS, 7.5-minute topographic quadrangles that the project area is located within (Morgan Hill, Mount Madonna, and Gilroy), and the nine neighboring quadrangles: Chittenden, Gilroy Hot Springs, Loma Prieta, Mississippi Creek, Mount Sizer, San Felipe, Santa Teresa Hills, Watsonville East, Watsonville West, Lick Observatory, Isabel Valley, and San Jose East (Appendices H and I). The CNDDB records of special- status plant species and sensitive vegetation communities within 5 miles of the Project area were also reviewed and are shown in Figure 3.4-2. There is no Critical Habitat for special-status plant species within 10 miles of the project area.

The 55 special-status plant species in the Appendix G list were evaluated for their potential to occur in the project area. Based on an analysis of distribution, known occurrences, and habitat requirements four of the special-status plant species evaluated may occur in the project area (Table 3.4-3). Focused protocol-level surveys for special-status plant species have not been conducted in the project area, but no special-status plant species were observed during various site surveys such as the vegetation mapping on October 18, 19, and 21, 2011; and the wetland delineation on October 17 and 18, 2011, January 16 and 17, 2012, and April 17 through 20, 2012.

Table 3.4-3 Special-status Plant Species Potentially Occurring in the Project Area

Common Name	Scientific Name	Status
Big-scale balsamroot	Balsamorhiza macrolepis var. macrolepis	RPR 1B
Loma Prieta hoita	Hoita strobilina	RPR 1B
Fragrant fritillary	Fritillaria liliacea	RPR 1B
Arcuate bush-mallow	Malacothamnus arcuatus	RPR 1B

RPR 1B = Rare Plant Rank 1B: rare, threatened or endangered in California and elsewhere

None of these species are state or federally listed; and they have a California Rare Plant Rank of 1B, meaning that they are considered rare, threatened, or endangered in California and elsewhere. All four of these species are sometimes associated with serpentine soils, which is not present at the ground surface in the project area. However, these species may also occur in non-serpentine soils. Many other special- status plant species evaluated for potential to occur in the project area were eliminated from further consideration, because suitable habitat is not present in the project area. For example, many species are restricted to serpentine soils, which do not occur in the Project footprint (Appendix G). The four special- status plant species with the potential to occur in the project area are discussed below.

Big-Scale balsamroot (Balsamorhiza macrolepis)

Big-scale balsamroot (*Balsamorhiza macrolepis*) is an RPR 1B species (CDFW 2012). This species is a perennial herb that occurs in chaparral, cismontane woodland, valley, and foothill grassland, and sometimes serpentine soils, at elevations between 90 and 1,555 meters (300 to 5,100 feet). Big-scale balsamroot is in the sunflower family (*Asteraceae*) and blooms from March to June.

This species may occur in the project area in grasslands or in various woodland habitats; although, no serpentine soils are present in the project area. There is one CNDDB (CDFW 2012) occurrence of this species within 10 miles of project area. This 1990 occurrence is approximately 2.6

miles northeast of the project area, west of Coyote Dam on SCVWD property (Figure 3.4-1).

Fragrant Fritillary (Fritillaria liliacea)

Fragrant fritillary (*Fritillaria liliacea*) is an RPR 1B species (CDFW 2012). This lily occurs in grasslands, coastal scrub, and coastal prairie on various soils that are often serpentine and sometimes heavy clay, at elevations from 3 to 410 meters (10 to 1,350feet). It flowers from February to April.

Fragrant fritillary may occur in the project area in Grassland or woodland habitats. Serpentine soils are not present in the project area, but clay soils are present. There are five CNDDB (CDFW 2012) occurrences of fragrant fritillary within a 10-mile radius from the project area. These records range from 6.1 to 6.8 miles from the Project area. The closest occurrence is a 1989 record of 150 plants on private land in the East Santa Clara Valley, southeast of Metcalfe Canyon.

Loma Prieta hoita (Hoita strobilina)

Loma Prieta hoita (*Hoita strobilina*) is an RPR 1B species (CDFW 2012). This species usually occurs on serpentine, moist sites in cismontane woodland, riparian woodland, and chaparral, between 30 to 860 meters (100 to 2,825 feet) in elevation. Its primary habitat is woodland, especially in the understory of riparian woodlands or shaded slopes, and its secondary habitat is chaparral (ICF 2012). Although Loma Prieta hoita can inhabit non-serpentine soils, it is often associated with serpentine soils (Safford et al. 2005). It is a perennial herb in the legume family (*Fabaceae*) that blooms from May to July.

Loma Prieta hoita may occur in the project area in riparian woodlands and other woodland habitats; although, serpentine soils are not present in the project area. There are 12 CNDDB (CDFW 2012) records of this species within 10 miles of the project area. The closest CNDDB occurrence is approximately 1.7 miles south of the Project area that is broadly mapped in Gilroy and is a historic record from 1918 that is possibly extirpated, but other records within 10 miles are believed extant.

Arcuate bush-mallow (Malacothamnus arcuatus) [Malacothamnus fasciculatus]

Arcuate bush-mallow (*Malacothamnus arcuatus*) [*Malacothamnus fasciculatus*] is an RPR 1B species (CDFW 2012). It occurs on gravelly soils and alluvium in chaparral and cismontane woodland at elevations between 15 to 355 meters (15 to 1,165 feet). This species is an evergreen shrub in the mallow family (Malvaceae) that blooms from April to September.

This species may occur in the project area in woodland habitats. There are CNDDB occurrences within 10 miles of in the project area. The closest CNDDB occurrence is approximately 2.0 miles from the Project area at the SCVWD’s Chesbro Reservoir Spillway where two plants were observed in 2006 (Figure 3.4-1).

3.4.3.5 Protected Trees

The project area contains approximately 2,200 native and non-native trees that range in size from 2 to 90 inches in dbh. This total includes trees inventoried within the footprint of the Action Alternatives, as well as trees adjacent to the footprint. Some of the trees meet the criteria (dbh and species) to be considered protected trees under the City of Morgan Hill and the Santa Clara County tree ordinances and, therefore, would require removal permits. Common tree species include eucalyptus, western sycamore, various fruit trees (*Prunus spp*.), coast live oak, valley oak, black walnut, willow, and Fremont cottonwood.

3.5 WILDLIFE RESOURCES

3.5.1 Introduction

This section describes the wildlife resources of the Project area, including wildlife habitats, common wildlife species, and special-status wildlife species. In addition, this section discusses potential Project impacts to special-status wildlife species and their habitats that occur within the Project area. Section 3.5.3, Environmental Setting, describes the regulations and ordinances that apply to wildlife resources.

A list of special-status wildlife species was compiled for the Project area based on the following sources: the CDFW, California Natural Diversity Data Base (CNDDB; Appendix H; Figure 3.5-1), the USFWS species lists for the Project Quadrangles, and the Santa Clara County List (Appendix I).

Baseline information on wildlife resources in the Project area, including special-status species and their habitats, was compiled from existing published and unpublished literature describing biological resources in the region, environmental database searches, consultation with local wildlife professionals, and information provided by staff from the CDFW, USFWS Pacific Southwest Region, the SCVWD, and the USACE. Primary data sources include the following:

- Baseline Biological Resources/Habitat Mapping—Verification and updated habitat map of the 2006 Tetra Tech habitat map and updated California Natural Diversity Database (CNDDB) query of the Upper Llagas Creek Flood Protection Project. Condor Country Consulting, Inc. 2012. (prepared for Cardno ENTRIX).
- Biological Resources Report for Lake Silveira Master Plan – H.T. Harvey & Associates (prepared for Amphion Environmental Inc.) 1988.

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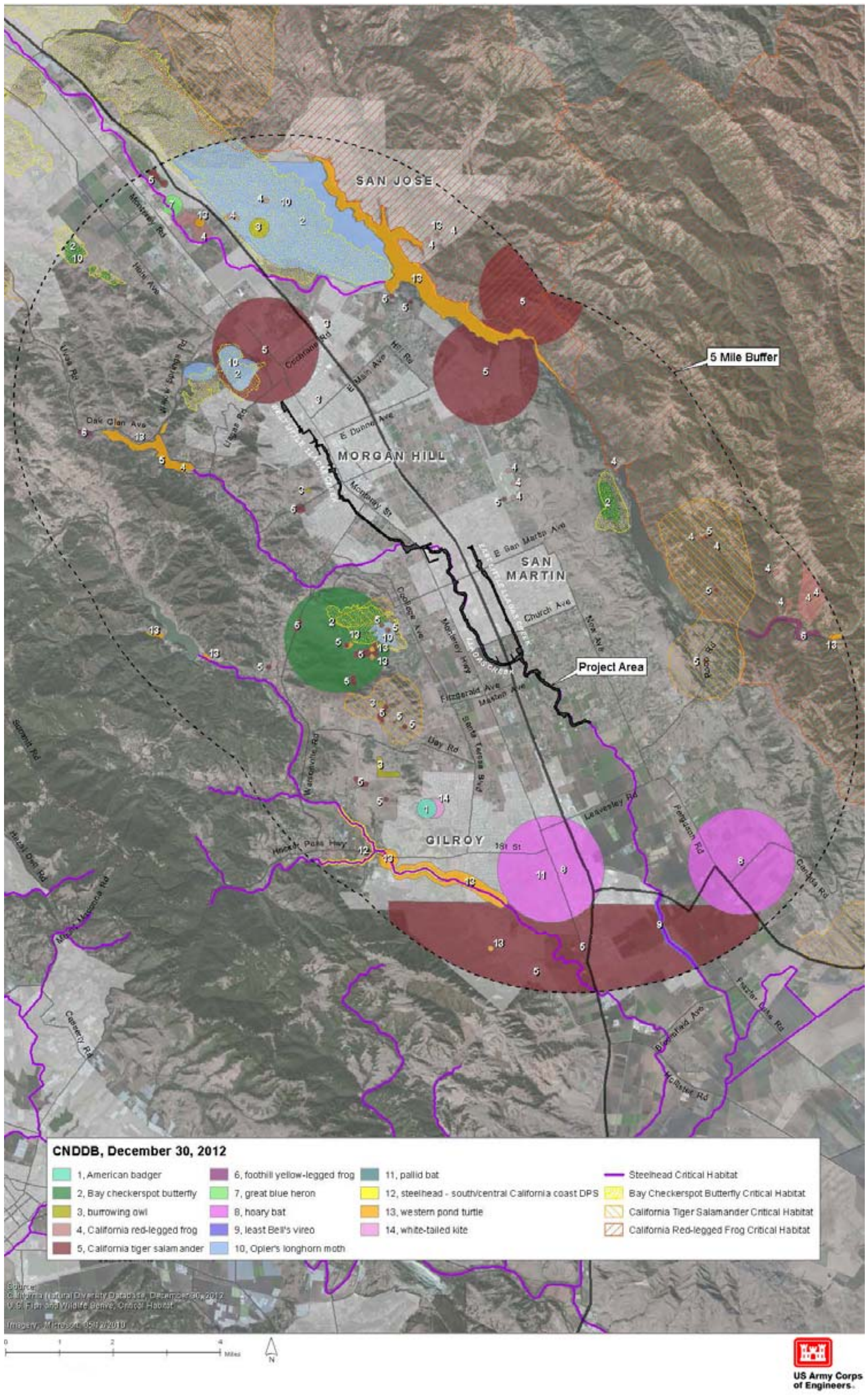
3.5.2 Project Area

The project area for wildlife resources is the area that has potential for unobstructed movement of wildlife species within a maximum of 2.5 miles from the Project area and includes all areas that may be directly and indirectly disturbed by the Project (Chapter 2.1, Figure 2.1-1). The Project area consists of the upper seven reaches (4, 5, 6, 7A, 7B, 8, and 14) of Llagas Creek, East Little Llagas Creek, and West Little Llagas Creek, starting at the downstream boundary about 1,000 feet below Buena Vista Avenue upstream to Llagas Road. The project area is approximately 13.9 miles long and includes 6.1 miles of the main branch of Llagas Creek, 2.8 miles along West Little Llagas Creek, 2.4 miles of East Little Llagas Creek (a tributary of Llagas Creek), and 1.3 miles of a new bypass that would be constructed along West Little Llagas Creek to Llagas Creek. The terrestrial portion of the project area extends 100 feet from top of bank from both sides of the aforementioned portion of Llagas Creek to include the riparian corridor.

Figure 3.5-1 CNDDB Records of Special-Status Animals and Critical Habitat in the Vicinity of the Project Area



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3.5.3 Environmental Setting

This section describes wildlife resources by Project reach as described in Chapter 2, Project Description.

Project Reach 4

Reach 4 is an intermittent stream channel that winds 2.4 miles through agricultural and suburbanized areas from just downstream of Buena Vista Avenue in the south to the East Little Llagas Creek/Llagas Creek confluence in the north (Figure 2.2-7). Typically this reach is ephemeral: dry in the summer and fall months. The stream banks are typically steep and well defined and support a mixture of riparian and non- riparian species. The stream channel bed supports sparse mature vegetation, such as mule fat (*Baccharis salicifolia*). The canopy consists of non-native trees, such as red gum (*Eucalyptus camaldulensis*) and native trees, such as Fremont cottonwood (*Populus fremontii*), western sycamore (*Platanus racemosa*), coast live oak (*Quercus agrifolia*), and Northern California black walnut (*Juglans hindsii*). The understory consists of annual non-native grasses, such as wild oats (*Avena spp*.), ripgut brome (*Bromus diandrus*), weeds (such as Italian thistle (*Carduus pycnocephalus*), and yellow star thistle (*Centaurea solstitialis*) (Cardno ENTRIX 2012b). Along the majority of this reach, the vegetation is sparse and open, with a scant understory (H.T. Harvey & Associates 2011). Tree canopy along this reach is patchy; however it is more extensive than any other Project reach. The habitat along and adjacent to Reach 4 may provide suitable habitat for a variety of nesting birds, some reptiles, and small mammals.

Project Reach 5

Reach 5 is a short riparian corridor approximately 0.5 mile long from the East Little Llagas Creek/Llagas Creek confluence in the east to 700 feet upstream of U.S. 101 in the west connecting Reaches 6 and 14 (Figure 2.2-6). The channel contains Upper Llagas Creek that runs ephemeral drying in the summer and fall months. As a result of the limited availability of water, riparian vegetation is sparse along this section of the creek, consisting of species, such as mule fat in the stream channel, red gum at the top of bank, and annual grassland dominate the understory throughout that may provide suitable habitat for nesting migratory birds. There is a large grove of Monterey pine (*Pinus radiata*) on the bank above the southeast portion of the reach, but this species is not native to the Project area (Cardno ENTRIX 2012b). The habitat along this reach is characterized by very open vegetation with extensive areas dominated by weedy herbaceous species (H.T. Harvey & Associates 2011).

Project Reach 6

Reach 6 travels south for approximately 3.2 miles from Monterey Road in the north to 700 feet upstream of U.S. 101 in the south (Figure 2.2-5). This section of Upper Llagas Creek is the most dense and well- vegetated riparian corridor of the reaches within the Project area (Cardno ENTRIX 2012b). Due to releases from Chesbro Reservoir, Reach 6 is typically a perennially flowing stream from just downstream of Lake Silveira to San Martin Avenue, a distance of approximately 1.3 miles. The southern portion of the reach is considered intermittent. The reach is characterized by a narrow band of stratified riparian forest with multiple canopy layers. The southern portion of this reach contains riparian species, such as mule fat and willow (*Salix* spp.) in the stream channel and a patchy mix of native and non-native canopy species consisting of coast live oak, red gum, and western sycamore on top of the banks. Native plants comprise the majority of vegetation in the riparian forest and scrub communities. Dominant species include willow and California blackberry (*Rubus ursinus*). Invasive weeds, such as giant reed (*Arundo donax*) and Himalayan blackberry (*Rubus armeniacus*) are abundant amid the annual grassland. The southwestern portion of Reach 6 is adjacent to several SCVWD percolation ponds and the south eastern portion of Reach 6 is adjacent to greenhouses and agricultural fields. Portions of the reach traverse through agricultural fields, corporation yards, suburbanized areas, and is adjacent to paved roads. The northern portion of Reach 6 passes through a commercial and residential area while the southern portion is adjacent to agricultural areas. The habitat along and adjacent to Reach 6 would provide suitable habitat for a variety of nesting birds, amphibians, and small mammals.

Project Reach 7A

Reach 7A is approximately 1.55 miles long extending from Reach 6 just above the Monterey Road Bridge in the south to South La Crosse Drive in the north (Figure 2.2-4). The southern half of Reach 7A is currently a non-channelized flat section of land with agricultural use (plowed fields). All Project alternatives would excavate a proposed earthen diversion channel through this section of Reach 7A approximately 1.25 miles long to divert flows from West Little Llagas Creek upstream of Watsonville Road to Llagas Creek downstream of Lake Silveira at Monterey Road. The southern portion of Reach 7A connects to mainstem Llagas Creek just downstream of Lake Silveira. Llagas Creek is a contiguous, perennial riparian corridor up to Chesbro Reserboir; therefore the connection to this higher-quality habitat increases the diversity and biological value of this portion of the reach. The northern half of Reach 7A runs through a residential neighborhood with the northern most 0.3-mile section consisting of a trapezoidal shaped constructed channel. Vegetation in this section consists of row crops and annual, non- native grassland on fallowed lands. Reach 7A would potentially provide suitable habitat for a variety of wildlife.

Project Reach 7B

Reach 7B runs for approximately 1.4 miles through a residential suburban area of Morgan Hill between South La Crosse Drive in the south and West Dunne Avenue in the north (Figure 2.2-3). West Little Llagas Creek in this section is intermittent. The riparian corridor along Reach 7B is disturbed habitat and the creek is intermittently channelized. Portions of the corridor have been developed or are adjacent to roads and residences. A paved recreational path runs along 0.4 mile of the southern portion of the channel. Annual grasslands, ruderal or developed habitat are the prevalent habitat type adjacent to the creek. The stream channel contains riparian scrub species (e.g., nutsedges, [*Cyperus spp.*]) and the non-disturbed areas contain annual grassland species. The tree canopy consists of a combination of planted exotic and native trees, such as coast live and valley oaks, and Fremont cottonwood. In the northern portion, the stream channel includes emergent wetland vegetation, some taller trees, is adjacent to small businesses, and is in an underground culvert for the last 650 feet on the north end. Sections of Reach 7B may provide suitable habitat for migratory nesting birds, some amphibians and reptiles, and mammals.

Project Reach 8

Reach 8 is approximately 1.1 miles long and is located in downtown Morgan Hill between West Dunne Avenue to the south and Llagas Road to the north (Figure 2.2-2). This portion of West Little Llagas Creek is an intermittent stream. The channel is developed and transects a heavily urbanized area with businesses, residential areas, and roads abutting many portions of the channel. The channel varies from sections with no vegetation, to areas with broad-leaved cattails (*Typha latifolia*), and hardstem bulrush (*Schoenoplectus acutus*); and the banks are predominately vegetated with annual grassland species. A large portion of this reach has a canopy of exotic trees with occasional patches of remnant coast live and valley oaks. The northern-most section runs along Hale Avenue, and hosts mostly ruderal vegetation, with some cattail and scattered oaks throughout. Although wildlife habitat suitability is low, Reach 8 may provide suitable habitat for migratory nesting birds and common reptiles, amphibians, and small mammals.

Project Reach 14

Reach 14 extends approximately 2.4 miles along East Little Llagas Creek from the Llagas Creek confluence in the south to just downstream of the Corralitos Creek confluence in the north (Figure 2.2-8). This portion of the creek is ephemeral, typically with dry summer and fall months. The riparian corridor is disturbed, dominated by agriculture with both sides of the channel lined with roads or ruderal habitat. The channel bottom consists of a mix of annual grassland species and bare ground. The stream banks are predominately annual grasslands with a few scattered trees that are mostly native. Riprap is also prevalent along portions of this reach. Beyond the roads on each side of the channel, are agricultural fields or suburbanized areas. Reach 14 is highly disturbed and may provide suitable habitat for common wildlife and migratory nesting birds.

East/West Little Llagas Creek

The section of East/West Little Llagas Creek to be cut-off from flows by diversion in Reach 7A extends nearly 9,600 feet from near La Crosse Drive flowing east toward U.S. 101 where it confluences with East Little Llagas Creek. East Little Llagas Creek at this point is in a straightened ditch paralleling U.S. 101 for about 5,500 feet before it reaches the beginning of Reach 14. The cut-off channel passes through mostly open fields with a few scattered homes and a trailer court, and flows through culverts at six road crossings. This entire existing section of West Little Llagas Creek to East Little Llagas Creek is intermittent, flowing only when there is sufficient rain to generate runoff. Under all action alternatives, there will be no flows entering the cut-off channel segment from West Little Llagas Creek. Only local runoff, including two detention basins and eight outfalls will continue to discharge to the channel. The channel is expected to continue to flow only intermittently under post-Project conditions (see Section 3.2, Hydrology and Water Quality).

3.5.3.1 Wildlife Habitat

Fifteen habitat types were identified in the Project area during botanical surveys and vegetation mapping (Section 3.4.3.1 Vegetation Types and Habitats) conducted in the Project area along the Upper Llagas Creek (Figure 3.4-1). These 15 habitat types were mapped in the Project area, according to classifications in *Preliminary Descriptions of the Terrestrial Natural Communities of California* (Holland 1986), with the exception of ruderal and urban habitat types. The 15 habitats in the Project area are agricultural, bare channel, barren, broad-leaved woodland, developed, California sycamore woodland, eucalyptus, horticultural, freshwater marsh, grassland, riparian exotic scrub, riparian native scrub, riparian woodland, ruderal, and upland scrub. Section 3.4.3.1 provides a detailed description of the floristic composition and distribution of these habitat types in the Project area. A discussion of wildlife that has been documented or that typically occurs in these habitats in the Project area or in the vicinity is presented below. Other sources of information for this section include documented field observations during field surveys, databases, regional literature, reports prepared for this Project and nearby projects as listed previously in Section 3.5.1 and *A Guide to Wildlife Habitats of California* (Mayer and Laudenslayer 1988).

The predominant wildlife habitats in the area consist of riparian (both woodland and scrub), agricultural, urban (e.g., developed, residential), annual grassland, and ruderal lands. Although the majority of these habitat types include regular human presence, many of these habitat types support a number of resident, migratory, and common and special-status wildlife species. Additional details on vegetation type and habitats are provided in Section 3.4.3.1.

Agriculture

Agricultural habitats are areas with agricultural activity or recently fallowed fields, orchards, and row crops. This habitat type provides foraging habitat for a variety of wildlife, including migratory birds and mammals. Avian species, such as European starlings (*Sturnus vulgris*), American crow (*Corvus brachyrhynchos*), American robin (*Turdus migratorius*), Great blue heron (*Area herodias*), Great Egret (*Area alba*), and cow bird (*Molothrus ater*) are commonly associated with agricultural habitat. Agricultural ditches boarding planted fields and irrigation canals may provide suitable habitat for a variety of common reptiles and amphibians, including bullfrog (*Rana catesbeiana*) and Pacific gopher snake (*Pituophis catenifer catenifer*). Many species of small mammals are adapted to agricultural croplands (CWHR 1988a). Rodents and mammals that forage in agricultural areas include California vole (*Microtus californicus*), California ground squirrel (*Otospermophilus beecheyi*), black-tailed jackrabbit (*Lepus californicus*), and raccoon (*Procyon lotor*).

This habitat type predominates Reach 7A and occurs adjacent to Reaches 4, 5, 6, and 14. Reaches 7A and 14 contain this agricultural habitat type which could possibly be affected by Project-related activities.

Bare Channel

Bare channel habitat includes: concrete lined channels, perennial stream channel (i.e., contains water year round), and seasonal streambeds (i.e., a streambed with over 50 percent bare ground composed primarily of sand and gravel and is without water for at least three months of the year). The habitat value to wildlife may be dependent upon the variety and complexity of vegetation that is growing adjacent to the channel, as well as other geomorphic characteristics (e.g., the presence of riparian vegetation).

Bare channels may provide suitable foraging and loafing habitat for common waterfowl, such as mallards (*Anas platyrhynchos*) and mergansers (*Mergus spp*.); wading birds, such as great blue heron; and great egret and other birds, such as kingfishers (*Alcedines spp*.). Common mammals, such as raccoon, skunks (*Mephitis mephitis*), and coyote (*Canis latrans*) will also forage in or around bare channels for small amphibians and invertebrate prey. If the channel contains sufficient emergent wetland vegetation and basking sites, amphibians and reptiles may also utilize this habitat type. The Western pond turtle, a California species of special concern (CDFG 2011), has been documented in Lower Llagas Creek and Lake Silveria (H.T. Harvey & Associates 2010) (H.T. Harvey & Associates 2013a). This habitat type occurs at various parts of all Project reaches, except Reach 6. The reaches with the most area of this habitat type, which could be affected by Project activities, are Reaches 4 and 14.

Barren

Barren areas are habitats that have sparse or no vegetated cover. The structure and composition of the substrate is largely determined by the region and surrounding environment; along rivers and creeks, barren habitat may include creek banks and canyon walls (CHWR 1988b). In urban settings, barren habitat may be covered in pavement or gravel. Barren habitat locations may change seasonally and are dependent upon management regimes (e.g., disked or plowed agricultural fields are barren until re-sowed or flooded, but this situation is included in the agriculture type). Barren habitat is usually found adjacent to other habitat types and the value to wildlife is dependent upon the structure of the non-vegetated substrate. For example, barren areas may support wildlife that nest on rock ledges, such as hawks and falcons; it may support wading birds that rely on open ground covered with sand or gravel for foraging and constructing small scrape nests (e.g., plovers and terns). Within this Project area, wildlife that may utilize barren habitat would include mallard, killdeer (*Charadrius vociferus*), rock pigeon (*Columba livia*), western fence lizard (*Sceloporus occidentalis*), and bank swallow (*Riparia riparia*). This habitat type occurs adjacent to various parts of all Project reaches.

The reaches with the most area of this habitat type that could be affected by Project activities are Reaches 6 and 7A.

Broad-leaved Woodland

This habitat type includes California broadleaf woodland and oak woodland (e.g., mixed *Quercus spp*.) and is present in the driest reaches of the Project area, often lining seasonal drainages of north and west-facing slopes. This habitat type is an upland habitat consisting of a tree layer composed of mixed oaks and California buckeye (*Aesculus californica*) with a dominant shrub species consisting of poison oak (*Toxicodendron diversilobum*). In all oak-dominated habitats, an understory of blackberry, poison oak, and invasive annual grasses is common. A variety of common nesting birds found within or adjacent to the Project that utilize this habitat type for foraging and nesting include acorn woodpeckers (*Melanerpes formicivorus*) and Northern flicker (*Colaptes auratus*). Raptors, including red-shoulder hawks (*Buteo lineatus*) and red-tailed hawk (*Buteo jamaicensis*), utilize this habitat type. Although unlikely, this habitat type may be used as a migratory corridor for special-status mammals, such as the American badger (*Taxidea taxus*) and San Joaquin kit fox (*Vulpes macrotis mutica*). This habitat type occurs adjacent to all Project reaches. The reaches with the most area of this habitat type that could be affected by Project activities are Reaches 4 and 7A.

Developed

Developed habitat includes urban disturbed areas, such as gravel and asphalt surface roads, riprap, and water channels that run underground inside large diameter pipes and areas within residential and commercial structures above, roads, and riprap. Urban areas provide limited wildlife habitat and generally support only generalist and sometimes non-native wildlife species that are tolerant of human presence and activities. Raccoon, opossum (*Didelphis virginiana)*, striped skunk (*Mephitis mephitis*), black-tailed jackrabbit, California slender salamander (*Batrachoseps attenuatus*), and western fence lizard (*Sceloporus occidentalis*) are common urban wildlife species that may be found utilizing developed areas in Llagas Creek. Birds adapted to urban environments and documented within or adjacent to the Project area include Western scrub-jay (*Aphelocoma californica*), white-crowned sparrow (*Zonotrichia atricapilla*), house finch (*Carpodacus mexicanus*), mourning dove (*Zenaida macroura*), and house sparrows (*Passer domesticus*) (Balance Hydrologics et al. 2012). Developed habitat is adjacent to all Project reaches. The reaches with the most area of this habitat type to be affected from Project activities are Reaches 8 and 14.

California Sycamore Woodland

This habitat type is a specific riparian community dominated by western sycamore with an understory composed of herbaceous annuals and shrubs that have adapted to fluvial depositional plains consisting of sandy loam to coarse alluvium substrate (Gillies 1998). Other vegetation species that are found in the Project area include coast live oak, valley oak, sandbar willow, red willow, arroyo willow, and black walnut (H.T. Harvey & Associates 2013c). This habitat type is distributed in lower elevations from central to southern California and serves as a critical wildlife corridor for a variety of species, such as resident and migratory birds (i.e., red-shouldered hawk, California quail, spotted towhee, white-breasted nuthatch, and chestnut-back chickadee) and mule deer (*Odocoileus hemionus*) (Keeler-Wolf 1993; Sawyer and Keeler- Wolf 1995; CWHR 2006). This habitat type is found in discontinuous patches in all reaches; except Reach 14 where it is not present. California sycamore woodland in the Project area provides habitat for many of the same species discussed in Riparian habitat (see below). The California sycamore trees in the Project area provide important habitat, however, degradation as a result of channel incision and hydrologic modifications have substantially impacted their habitat value (H.T. Harvey & Associates 2013c). California sycamore woodland habitat is found in Project Reaches 4, 5, and 6. The reaches with the most area of this habitat type to be affected by Project activities are Reaches 4 and 6.

Eucalyptus

This habitat type is a woodland community dominated by a Eucalyptus tree canopy, with a relative tree cover of greater than 80 percent. Red gum is the predominate Eucalyptus species in the Project area. Other scattered Eucalyptus species in the Project area include Blue gum (*E. globulus*) and forest red gum (*E. tereticornis*). There is little understory in this community type; however, annual grasses and small shrubs may be present. Eucalyptus is known to become established along stream courses, encroaching upon existing riparian vegetation (CWHR 1988c). This habitat type provides suitable roosting and perching habitat, as well as nesting habitat for a number of bird species, particularly raptors. The stringy bark or rapid deposition of litter creates suitable habitat for a variety of smaller wildlife including alligator lizard (*Elgaria multicarinata*), gopher snake, and wood rat species (*Neotoma spp*.). Characteristic wildlife species and those species associated with this habitat type within the Project area include barn owl (*Tyto alba*), red-tailed hawk, and red-shouldered hawk. Eucalyptus woodlands generally adjoin other wildlife habitat. This habitat type can be found along Reaches 4, 5, 6, 7B, and 14. The reaches with the most area of this habitat type that could be affected by Project activities are Reaches 4 and 6.

Horticultural and Landscape Plantings

Horticultural or landscaped habitats typically contain non-native or ornamental species, but can contain native planted trees. These areas generally support non-native vegetation, and adjacent land use includes residential, commercial, and urban areas. The Project area occurs adjacent to residential housing and commercial businesses where this habitat type dominates. Horticultural and landscaped areas can provide forage and refugia for wildlife adapted to a more suburban environment;

although, the wildlife diversity tends to be low. Wildlife species associated with this habitat type include raccoon, western fence lizard, bullfrog, and many species of nesting birds including mourning dove, black Phoebe (*Sayornis nigricans*), and house finch. This habitat type is found adjacent to all Project reaches. The reaches containing the largest amount of this habitat type potentially affected by Project activities are Reaches 7B and 8.

Freshwater Marsh

Freshwater marsh communities are dominated by emergent vegetation and found in low-lying perennially wet areas. Freshwater marsh or wetlands includes both vegetated areas and pockets of open water within the channel. It is found along the edges of Llagas Creek and can occupy most of the channel in reaches with sediment build up, resulting in reduced water flows and establishment of marsh vegetation. The location of freshwater marshes and open-water habitats can shift from year to year, depending on annual rainfall. Typical vegetation species found in this habitat include cattails, California bulrush (*Scirpus californicus*), and salt grass (*Distichlis spicata*). Agricultural ditches and man-made basins are included in this habitat type in the Project area and provide lower quality habitat than emergent marshes, but support similar wildlife species.

Freshwater marsh habitat with emergent vegetation provides a high quality seasonal resource a variety of nesting birds including the following birds observed adjacent to the Project area: pied-billed grebe (*Podilymbus podiceps*), black-crowned night-heron (*Nycticorax nycticorax*), common mallard, egrets, and herons. A number of amphibians require standing or flowing water for breeding, including western toad (*Bufo boreas*), Northern Pacific tree frog (*Pseudacris regilla*) and bull frogs. The Western pond turtle, a California species of special concern, is found in freshwater marsh that is adjacent to open water, which is present within the Project area (H.T. Harvey & Associates 2010). This habitat type may be found in all reaches with perennial flows and is found in disconnected patches throughout the main channel of Llagas Creek and its tributaries. It is predominately present along Reaches 6, 7A, 7B, and 8.The reaches containing the largest amount of this habitat type potentially affected by Project activities are Reaches 7A and 7B.

Grassland

Grassland habitat is the dominant vegetation type in the Project area and consists of a combination of naturalized annual plants, such as wild oats, ripgut brome, Italian ryegrass, or a combination of naturalized perennial grasses, such as Bermuda grass. Within the Project area, this habitat type is usually dominated by non-native grasses and can be found along banks, along the outside of levee maintenance roads, and undeveloped, open space. Non-native grasslands generally support relatively low wildlife diversity, but could be used by common and special-status species for foraging habitat and migratory corridors. Many common species, such as birds, reptiles, and mammals use annual grasslands. Typical species associated with annual grassland include western fence lizard, gopher snake, Western meadowlark (*Sturnella neglecta*), and song sparrow (*Melospiza melodia*). Additionally, grassland habitat provides foraging habitat for predatory birds that nest in the adjacent woodlands, such as red-tailed hawk and American kestrel (*Falco sparverius*). This habitat type is found in all Project reaches. The reaches containing the largest amount of this habitat type potentially affected by Project activities are Reaches 4 and 6.

Riparian

Riparian habitat includes riparian scrub (both exotic scrub and native scrub) and riparian woodland. Riparian habitat is an important habitat in California for many wildlife species. This habitat type provides food, water, cover, and migration and dispersal corridors for a diversity of amphibians, reptiles, birds, and mammals. This habitat type occurs along creek banks where trees and shrubs species prefer a moist environment. Plant species found in exotic riparian scrub include giant reed and Himalayan blackberry. Vegetation found in native riparian scrub includes poison oak, mule fat, willow, and Arroyo willow (*Salix lasiolepis*). Vegetation species associated with riparian woodland habitat include Fremont cottonwood, buckeye (*Aesculus californicus*), and walnut.

Riparian scrub and woodlands provide high habitat suitability for foraging and nesting for a variety of common and special-status wildlife species. Common wildlife species associated with riparian habitat include cavity nesting birds (e.g., acorn woodpecker) and other small passerines, raptors, small mammals (e.g., raccoon, tree squirrels, fox squirrel, wood rats, etc.), and reptiles (e.g., Western fence lizard [*Sceloporus occidentalis*]). Special-status wildlife species that typically use riparian habitat and are found in or around Llagas Creek include Western pond turtle and dusky footed woodrat (*Neotoma fuscipes*) (WRA 2010).

Riparian scrub and woodland habitat is most dense in Reach 6 and in some parts of Reach 7A. Patches of riparian scrub are also present in parts of Reaches 4, 5, 7B, and 14. Patches of riparian forest are present in parts of all Project reaches. The reaches containing the largest amount of this habitat type potentially affected by Project activities are Reaches 4 and 6.

Ruderal

Ruderal areas consist of weedy, upland vegetation that typically occurs in areas where soils and native vegetation have been significantly disturbed by grading, plowing, construction or other land-clearing activities. These areas are dominated by non-native annual grasses and forbs that are adapted to disturbances. This habitat is present in the Project area along, benches, road shoulders, and other disturbed areas. Ruderal habitats provide limited wildlife habitat and generally support only generalist, and sometimes non-native wildlife species that are tolerant of human presence and activities. Terrestrial wildlife species commonly associated with ruderal habitats in the Project area may include western fence lizard, California ground squirrel (*Spermophilus beecheyi*), Botta's pocket gopher (Thomomys bottae), white-crowned sparrow (*Zonotrichia leucophrys*), and European starlings. This habitat type is only found in Reach 8 where approximately only 1 acre could be affected by Project activities.

Upland Scrub

Upland habitat is dominated by shrubs with thick evergreen leaves (CWHR 1988d).Typical vegetation associated with upland scrub include annual grasses and upland forbs, such as wild oats (*Avena barbata*), coyote brush (*Baccharis pilularis*), yellow star thistle, ceanothus (*Ceanothus spp*.), Manzanita, and California buckeye and oaks. Upland scrub habitats support many common wildlife species including California towhee, California quail, California thrasher (*Toxostoma redivivum*), and red-tailed hawk. Common mammals occurring within this habitat include brush rabbit (*Sylvilagus bachmani*), black-tailed jackrabbit, and mule deer (CDFG 2008a). Upland scrub habitat is only present in the downstream portion of Reach 7A. This stretch of habitat is proposed for a new channel that would connect West Little Llagas Creek to the mainsteam of Llagas Creek. Less than 1 acre of this habitat type will be affected by Project activities.

3.5.3.2 Special-Status Wildlife Species

For the purpose of this section, special-status species are wildlife species that meet one or more of the definitions listed below.

- Species listed or proposed for listing as threatened or endangered under the federal ESA (50 CFR 17.11).
- Species that are Candidates for possible future listing as threatened or endangered under the federal ESA (61 FR 7591).
- Species listed or proposed for listing by the State of California as threatened or endangered under CESA (14 CCR 670.5).
- Species that meet the definitions of rare or endangered under CEQA Guidelines Section 15380.
- Animals fully protected in California (CDFW Code, Section 3511, 4700, 5050, and 5515).
- Animal species of special concern to CDFW (CDFW 2011a).

A list of special-status wildlife that are known to occur or potentially occur in the vicinity of the Project area was compiled and evaluated for their potential for occurrence within the Project area. This list is available in Appendix I and provides each species' scientific and common names, status, habitat, and potential to occur in the Project area. The list was compiled based on a review of special-status species records from CNDDB (CDFW 2012), USFWS online species list (USFWS 2012), and literature resources. The CNDDB and USFWS database was reviewed for special-status wildlife species that are known to occur or potentially occur in the following U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles: Chittenden, Gilroy, Gilroy Hot Springs, Isabel Valley, Lick Observatory, Loma Prieta, Mississippi Creek, Morgan Hill, Mt. Madonna, Mt. Sizer, San Felipe, Santa Teresa Hill, and Watsonville East. The CNDDB records of special-status wildlife within 5 miles of the Project area were also reviewed and are shown in Figure 3.5-1.

There is federally designated Critical Habitat for special-status wildlife within 2.5 miles of the Project area (USFWS 2013). Critical habitat for California red-legged frog (CRLF [*Rana aurora draytonii*]) is located over 2.5 miles east of the Project area. Critical habitat for California tiger salamander (CTS [*Ambystoma californiense*]) is located within 2.5 miles and is located south and east of the Project area and southwest of Reaches 5 and 6. Critical habitat for Bay checkerspot butterfly is located within 2.5 miles of the Project area and is found east of Reach 14, north of Reach 8, and west of Reach 6.

The 36 special-status wildlife species were evaluated for their potential to occur in the Project area. Based on an analysis of distribution, known occurrences, and habitat requirements, 17 of the 36 special-status wildlife species evaluated have potential to occur in the Project area (Table 3.5-1). Species evaluated as being unlikely to occur within the Project area are considered to be beyond their known range or to have low habitat suitability for reproduction, cover, and/or foraging. These species are not discussed further. Species without listing status are not discussed further. Habitat assessments and field surveys for special-status wildlife have been conducted in the Project area, and special-status wildlife was observed during field surveys on November 24, 2009 (WRA 2010), January 4-11, 2013 (H.T. Harvey & Associates 2013e), and May 15 and June 5 and 26, 2013 (H.T. Harvey & Associates 2013f).

Species with potential to occur within the Project area, based on the analysis presented in Table 3.5-1 are discussed in further detail below.

Based on USFWS and CNDDB information, 17 special-status wildlife species or groups are known to occur, or potentially occur, in the vicinity of the Project area including four mammals, six birds, two reptiles, three amphibians and two invertebrates. These species are discussed below.

Table 3.5-1 Special-status Wildlife Species Potentially Occurring in the Project Area

Species	Status	Species	Status
Mammals			
Pallid bat *Antrozous pallida*	CSC	San Joaquin kit fox *Vulpes macrotis mutica*	FE, CT
San Francisco dusky-footed woodrat *Neotoma fuscipes annectens*	CSC	American badger *Taxidea taxus*	CSC
Birds			
Western burrowing owl *Athene cunicularia*	CSC	Tricolored blackbird *Agelaius tricolor*	CSC
Least bell's vireo *Vireo bellii pusillus*	FE, CE	White-tailed kite *Elanus leucurus*	FP
Bank swallow *Riparia riparia*	CT	Yellow warbler *Dendroica petechial*	CSC
Reptiles			
Western pond turtle *Actinemys marmorata*	CSC	Coast horned lizard *Phrynosoma blainvillii*, formerly *P. coronatum frontale*	CSC
Amphibians			
California tiger salamander *Ambystoma californiense*	FT, ST, CSC	Foothill yellow-legged frog *Rana boylii*	CSC
California red-legged frog *Rana aurora draytonii*	FT, CSC		
Invertebrates			
Bay checkerspot butterfly *Euphydryas editha bayensis*	FT	Opler's longhorn moth *Adela oplerella*	FC

Status Codes:
FE: Federally Endangered
FT: Federally listed as Threatened
FP: Fully Protected by the California Department of Fish and Wildlife (CDFW)
FC: Federal Candidate; USFWS have enough information on biological vulnerability and threats to support a proposal to list as endangered or threatened.
CT: State listed as Threatened in California CE: State listed as Endangered in California
CSC: California species of special concern

Pallid bat *(Antrozous pallidus)*

The pallid bat (*Antrozous pallidus*) is a California species of special concern (CDFG 2011). This species ranges from western Canada to central Mexico and is widely distributed at lower elevations in California (Zeiner et al. 1990a). The pallid bat utilizes a variety of habitats, including grasslands, shrublands, woodlands, and forests; although, it is most commonly found in open habitats with rocky areas for roosting and prefers to forage in the open (Zeiner et al. 1990a). Their day and night roosts include crevices in rocky outcrops and cliffs, caves, mines, and trees (Sherwin and Rimbaldini 2005). Roosts in trees include deciduous trees in riparian areas, the bole cavities of oak (Quercus spp.) trees, and exfoliating valley oak (*Quercus lobata*) bark (Sherwin and Rimbaldini 2005). Pallid bats also roost in human structures, such as bridges, barns, bat boxes, and vacant to lightly used buildings (Sherwin and Rimbaldini 2005; Zeiner et al. 1990a). Pallid bats breed from late October through February, and young are born from April through July (Zeiner et al. 1990a).

Review of the CNDDB indicates one occurrence of Pallid bat within 5 miles of the Project area. The occurrence is approximately 2 miles south of Reach 4 near the intersection of Monterey Highway and 1st Street. Based on surveys conducted in 2013 (H.T. Harvey & Associates 2013e), most of the bridges, culverts, and other structures within the Project area do not provide potential habitat for roosting bat; however, Monterey Road and UPRR has potential for roosting bats, but no evidence of roosting on these structures was observed. Four structures in Reaches 4, 5, and 6 (Masten Avenue, U.S. 101 north and south, and Llagas Avenue) have potential habitat and evidence that bat night-roost on the structure (H.T. Harvey & Associates 2013e). Moreover, two species of bats “regularly night-roost during summer months in low numbers in” some of the structures (H.T. Harvey & Associates 2013e; SCVWD 2013d). The pallid bat could potentially roost in these structures; although, no evidence of presence has been documented (H.T. Harvey & Associates 2013e).

Near Reach 7B and 8, the proposed tunnel in the Applicant’s Proposed Action could provide potential bat roosting habitat and may be attractive to two species of bats (H.T. Harvey & Associates 2012a). Bats may roost at the three planned access points in the tunnel, because the access points would have warmer than ambient temperatures through the night and bats are known to commonly forage along the Upper Llagas Creek corridor (H.T. Harvey & Associates 2012a). Additionally, appropriate foraging and roosting habitat occurs in the immediate vicinity of the Project area (H.T. Harvey & Associates 2013e; SCVWD 2013d).

San Francisco dusky-footed woodrat *(Neotoma fuscipes annectens)*

San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*) is a California species of special concern (CDFG 2011). This subspecies is found on the Peninsula southward to Santa Cruz County and in the East Bay hills. It is a medium-sized rodent. Dusky-footed woodrats are widespread in chaparral, woodland, and forest habitats with well-developed undergrowth (Carraway and Verts 1991). Their stick houses may be as much as 6 feet tall and contain multiple chambers used for sleeping and food storage. Houses are usually occupied by single adults or females with young and can be used by successive generations of woodrats. Woodrat houses provide cover for many other animal species, including small mammals, reptiles, amphibians, and arthropods (Cranford 1982; Vestal 1938). The reproductive season typically occurs between December to September, with a peak in mid-spring (Zeiner et al. 1990b). Carraway and Verts (1991) summarized data suggesting that breeding is sometimes extended through September.

Although CNDDB records do not indicate occurrences within 5 miles of the Project area, there is potentially suitable habitat for this species along the mainstem of Llagas Creek and Lake Silveira (Balance Hydrologics et al. 2012). The species could also utilize the riparian corridor along Reach 6 and the mainstem above Monterey Road. Nests of this species were observed along West Little Llagas Creek in the live oak riparian habitat south of the Watsonville Road/Monterey Road intersection (approximately 1,100 feet east of Reach 7A) (WRA 2010).

San Joaquin kit fox *(Vulpes macrotis mutica)*

The San Joaquin kit fox (*Vulpes macrotis mutica*) is federally listed as endangered and is state-listed as threatened (USFWS 1967). No critical habitat has been designated for the species.

Kit fox occur in annual grassland or mixed shrub/grassland habitats throughout low, rolling hills and in the valleys (e.g., foothill annual grassland, oak savannah, and agricultural areas). The San Joaquin kit fox is active mostly at night. In the southern range, kit fox inhabit grassland and scrubland communities, including those that have been modified by development, such as with oil exploration, wind turbines, agricultural, and grazing (USEPA 2010a). The San Joaquin kit fox will also utilize woody croplands and remnant patches of scrubland in valley floor areas (USFWS 1998a). The fox requires underground dens for shelter and reproduction and will commonly modify and use dens constructed by other animals and human-made structures, such as culverts, abandoned pipelines, or banks in sumps or roadbeds (USFWS 1998a). Dens are most often found in relatively level areas or gently sloped terrain, such as washes and roadside berms (Morrell 1972; ICF International 2012b) on loose-textured soils; however, the San Joaquin kit fox den characteristics vary across the species geographic range (USFWS 1998a).

The San Joaquin kit fox has been cited in southern Santa Clara County (Morell 1972 as cited in SCVWD 2011b). Although there are no record occurrences within 5 miles of the Project area, there are two CNDDB records for San Joaquin kit fox occurrence within 10 miles of the Project area (north of Felipe and southeast of Coyote Reservoir). The CNDDB occurrences are located within the distributional range of the species and two individuals were documented near the town of Coyote in 1992 (WRA

2010). Kit foxes are now generally acknowledged to be rare in Santa Clara County and found only in areas adjacent to access from the Central Valley populations centers (SCVWD 2011). Kit fox is expected only to occur in the vicinity of Pacheco Creek and the uppermost portions of the Pajaro River and would only be occasional dispersants in this area while moving to breeding locations outside the county (SCVWD 2011). According to an Independent Science Advisors report, although several individual kit foxes have been observed as roadkill in the southernmost portions of the county, no breeding population has been demonstrated within Santa Clara County despite substantial survey efforts (CBI 2006). The Science Advisors assumed that the southern Santa Clara Valley is not an important area to the conservation of this species and that there is little suitable habitat (CBI 2006) The Project area is surrounded by urban and agricultural development and open habitat is fragmented and disturbed. It is unlikely the San Joaquin kit fox would utilize the Project area for breeding or hunting, although, it may occur within or adjacent to the Project area during dispersal between areas of known habitat outside of the Project area. The potential to occur within the Project Area is low or unlikely.

American badger *(Taxidea taxus)*

American badger was listed as a CDFW Species of Special Concern in 1987. A member of the weasel family, American badger (Mustelidae), has a wide distribution in North America, spanning from Alberta to Mexico and from the Pacific Coast to the Great Lakes. With the exception of the humid coastal forests of Del Norte County and the northwestern portion of Humboldt County, the species is known to occur throughout California. In California, the badger occupies a diversity of habitats, including grasslands, savannas, chaparral, and riparian habitats, with typically less than 50 percent plant cover. Badgers require friable soils for digging burrows that are used for cover and reproduction (Zeiner et al. 1990). Largely nocturnal, the American badger primarily feeds on burrowing rodents, including gophers (Thomomys sp.), California ground squirrels, and kangaroo rats (*Dipodomys sp*.) (Williams 1986).

Review of the CNDDB reported one occurrence of the species within 5 miles of the Project area and three occurrences of the species within 10 miles of the Project area. The nearest occurrence is approximately 2.8 miles southwest of Reach 4. There is low or unlikely potential for this special-status ground dwelling mammal species to occur within the Project area (SCVWD 2012c). Badgers are known to occur primarily in foothill grasslands, but only occur occasionally on the valley floor primarily during dispersal events (SCVWD 2011). The potential for occurrence is low or unlikely, because (1) American badgers typically require large expanses of open habitat which is not typically found along riparian edges (SCVWD 2011; CBI. 2006); (2) low numbers of suitable denning burrows were observed in the project area (Balance Hydrologics et al. 2012); (3) the disturbed areas adjacent to the channel do not provide suitable habitat for the species; and (4) there is habitat fragmentation between known occurrences for this species. Although it is unlikely for the species to occur, there are a few sections of Reach 5 that contain sandy, friable soils preferred by this species that could provide habitat (Condor Country Consulting, Inc. 2012a). American badger may occupy agricultural fields adjacent to the Project area, particularly if the fields are pastured or fallowed; intensively cultivated fields inhibit the permanent establishment of dens. The species may also use agricultural fields adjacent to the Project area for dispersal. However, its potential to occur within the Project area is low or unlikely.

Western burrowing owl *(Athene cunicularia)*

The western burrowing owl (BUOW) is a California species of special concern (CDFG 2011). Burrowing owls range throughout most of the interior western United States, southern Canada, the Central Valley of California, southern California, throughout Mexico into Central America, and along the western half of Florida. Burrowing owls inhabit open, dry, gently rolling to flat grasslands, scrublands, road and railway ROWs, open urban habitats (i.e., airfields, campuses, and golf courses), and agricultural lands. Essential habitat characteristics for the burrowing owl are low-growing, sparse vegetation, and the occurrence of larger burrowing rodents, such as ground squirrels and prairie dogs (CDFG 2012a). The nesting season for burrowing owls occurs from February through August, with peak breeding occurring in April and May. Burrowing owl occur year-round in Santa Clara Valley (Trulio 2007 as cited in SCVWD 2011), and is commonly present in agricultural or grassland habitat with small mammal burrows. Burrowing owls are more widespread in the county in winter than during the breeding season; therefore, some potential exists for use of the Project area as roosting and foraging habitat (H.T. Harvey & Associates 2013f). This species has been increasingly disappearing due to development along the valley floor and has practically disappeared as a breeder from areas south of San Jose (SCVWD 2011). The species exhibits high site fidelity and will attempt to use an area even after the site has been developed (SCVWD 2011). SCVWD performed surveys at 41 stream maintenance sites throughout Santa Clara County in 1998, but did not detect burrowing owls, nor its habitat (SCVWD 1998 as cited in SCVWD 2011). In 2007 and 2008, a habitat assessment, burrow mapping study, and standardized breeding-season, protocol surveys for burrowing owl were conducted along multiple sections of SCVWD managed waterways (EDAW 2008 as cited in SCVWD 2011), including waterways in Santa Clara and Gilroy. Surveys identified active burrowing owl activity at a few locations and potential habitat for the species was determined to be present along a number of creeks but not within the Llagas watershed (EDAW 2008 as cited in SCVWD 2011).

A habitat assessment has been conducted by the SCVWD (H.T. Harvey & Associates 2013f). The survey results suggest that no breeding owls are present in the Project area; however, suitable nesting and roosting habitat is located along Reaches 6, 7A, and 14. There is potential for this ground dwelling species to occur within the Project area due to small mammal burrows observed within the Project area (Balance

Hydrologics et al. 2012) and the adjacent agricultural land, particularly the drier ruderal/annual grassland habitat adjacent to the channel; although, generally disturbed, may provide suitable habitat for the species (WRA 2010). Review of the CNDDB found six occurrences of the species within 5 miles of the Project area. The closest reported occurrence is 0.5 mile northeast of Reach 8. In 2012, the CDFW provided a guideline to evaluate Project impacts (CDFW 2012). The three progressive steps of the guideline assist in evaluating whether projects will result in impacts to burrowing owls. The information, gained from the steps, inform any subsequent avoidance, minimization, and mitigation measures. The steps for project impact evaluations are: (1) habitat assessment, (2) surveys, and (3) impact assessment. Field surveys to determine if existing habitat for BUOW exists adjacent to the Project area was performed by the SCVWD between April and June of 2013. The results of the assessment suggest that it is unlikely that burrowing owls breed anywhere in the Project vicinity (H.T. Harvey & Associates 2013f).

Least Bell’s Vireo *(Vireo bellii pusillus)*

Least Bell’s vireo (Vireo bellii pusillus) is federally and state listed as endangered (Federal Register 1986; CDFG 2011). A draft recovery plan has been completed for this species (USFWS 1998b). Critical habitat has been designated for the least Bell’s vireo, but the Proposed Project is not located within critical habitat area (Federal Register 1994). Least Bell’s vireo is a neo-tropical migrant that historically nested from interior northern California (Tehama County) to northwestern Baja California, Mexico. When this subspecies was federally listed in 1986, the breeding distribution was limited to scattered locations in southern California and northwestern Baja California, Mexico. Although breeding pairs of the least Bell’s vireo had long been absent from the Central Valley, a breeding pair was observed in the San Joaquin Wildlife Refuge in Stanislaus County in the summer of 2005 (Howell et al. 2010).

Habitat requirements for the least Bell’s vireo consist of dense riparian willow thickets with well-developed understories, and low densities of aquatic and herbaceous cover, in the immediate vicinity of watercourses. The understory typically contains dense shrub thickets, consisting of willow or mule fat. Foraging habitat includes both the riparian nesting habitat and adjacent chaparral. The least Bell’s vireo arrives in its breeding habitat in mid-March to early April. Although this vireo nests primarily in willows, it also uses a variety of other shrubs, trees, and vines. The least Bell’s vireo leaves its breeding grounds in late August and September for its wintering range in Mexico (Federal Register 1986).

There is no evidence in the historical record or in any pattern of recent occurrences of the species that the least Bell’s Vireo is likely to colonize the Project area (H.T. Harvey & Associates 2011). The narrow nature of the riparian corridor, along with encroachment by adjoining industrial, commercial, and residential land uses, reduce the likelihood of use by the least Bell’s vireo in most Project areas, even where vegetation is considered potentially suitable, such as in Reach 6 (H.T. Harvey &

Associates 2011). Breeding pairs of the least Bell's vireo have long been absent from central and northern coastal California; although, the most recent sighting of a breeding pair in the Central Valley may indicate the species is expanding its existing range. Based on CNDDB records, there was only one occurrence of the least Bell's vireo within 10 miles of the Project area south of Reach 4, and a known nesting occurrence in a reach south of the Project area for this species from a 2001 sighting (H.T. Harvey & Associates 2011).

Bank Swallow *(Riparia riparia)*

The bank swallow (Riparia riparia) is state listed as threatened (CDFG 2011). The bank swallow is found primarily in riparian and other lowland habitats in California west of the desert. The bank swallow is a common migrant within the interior of the state during the spring-through-fall period, and less common along the coast. There are few records of the bank swallow during the winter months for California. This species arrives in California from South America in early March, and remains until early August when colonies are abandoned and migration begins. During the summer, the bank swallow is restricted to riparian, lacustrine, and coastal areas with vertical banks, bluffs, and cliffs with fine-textured or sandy soils. This swallow is a colonial breeder. Approximately 75 percent of the current breeding population in California nests along the banks of the Sacramento and Feather River in the northern Central Valley. The bank swallow breeds from early May through July, digging horizontal nesting tunnels and burrowing along the side of stream banks and cliffs. Most colonies contain between 100 and 200 nesting pairs. The bank swallow feeds predominantly over open riparian areas, but will also forage over brushland, grassland, wetlands, water, and irrigated crop land. The bank swallows' diet includes a wide variety of aerial and terrestrial soft-bodied insects, including flies, bees, and beetles (Zeiner et al. 1990a).

Review of CNDDB indicates no occurrences within 5 miles of the Project area. The closest reported occurrence is 9.4 miles south of Reach 4. There is potential for this species to occur in more open reaches during fall and spring migrations due to the presence of suitable foraging adjacent to the Project area (i.e., grassland, streams, and agricultural areas). However, its potential for occurrence in the Project area is low, as the species prefers to nest in areas with steep banks and this habitat structure is not found within the Project area (Condor Country Consulting, Inc. 2012a).

Tricolored Blackbird *(Agelaius tricolor)*

The tricolored blackbird (Agelaius tricolor) is a medium-sized passerine bird, which is very similar in appearance to red-winged blackbird (Agelaius phoeniceus). It is designated by the CDFW as a Species of Special Concern (SSC) and is designated as a Bird of Conservation Concern by the USFWS (USFWS 2008a; TBWG 2007). Nearly all tricolored blackbird populations occur within California. While no major changes in their overall geographic distribution have been noted, large gaps in the occupied range now exist due to loss of habitat (e.g., Kings, San Joaquin, Riverside, and San Bernardino counties) and populations have significantly declined (BDCP 2013). This species typically breeds in areas with access to open water and protected nesting sites, often including flooded, thorny, or spiny vegetation. Tricolored blackbirds will nest in freshwater marsh habitat in vegetation including tules, cattails, willows, thistles, or nettles. Nests may also be concentrated in grain fields, giant reed, and riparian scrubland and forest areas (BDCP 2013). Birds may forage as much as 8 miles from nest sites (Beedy and Hamilton 1999) in areas that support insect prey. Pasturelands, alfalfa, dairies, grassland, and shrubland habitats may be used in lieu of natural flooded habitat (CDFG 2008b).

Although no CNDDB occurrences for this species have been reported within 5 miles of the Project area, there is potential for this species to occur in the more open reaches and in adjacent agricultural fields, due to the presence of suitable foraging habitat in the Project area, particularly in reaches with perennial water that would support dense stands of emergent wetland vegetation. In Reach 4, there is low potential for tricolored blackbird to occur in the adjacent agricultural and naturalized annual grassland areas (Condor Country Consulting, Inc. 2012a).

White-tailed Kite *(Elanus leucurus)*

The white-tailed kite (Elanus leucurus) is a fully protected species in California (CDFG 2012b). Fully protected species may not be taken or possessed at any time and no licenses or permits may be issued for their take except for collecting these species for necessary scientific research and relocation of the bird species for the protection of livestock (CDFG 2012b). This kite is a year-long resident in coastal and valley lowlands, and is rarely found away from agricultural areas. This species is a permanent resident in California and western Oregon.

Suitable habitat for white-tail kite consists of tree-dotted lowlands or hillsides, ungrazed or fallowed grasslands, marshes, croplands, savannas, and emergent wetlands. These areas provide foraging habitat that is abundant with preferred food sources that include primarily voles and other small diurnal mammals, occasionally birds, large insects, reptiles, and amphibians. Nesting for the white-tailed kite takes place in trees with nest placement well above the ground and within close proximity to foraging sites. Breeding takes place from mid-March to early April through late September (Zeiner et al. 1990b).

There is low potential for this species to occur due to suitable nesting habitat and foraging habitat within and adjacent to the Project area. Preferred nest trees are extremely variable, ranging from small shrubs (less than 10 feet tall) to large trees (greater than 150 feet tall) (Dunk 1995). Fallow agricultural fields, orchards, and riparian habitat within and adjacent to the Project area provide high quality foraging and nesting habitat for this species (WRA 2010). The closest reported CNDDB occurrence of white-tailed kite is 6.5 miles southwest of Reach 4, northwest of Gilroy. There is low potential for the species to occur in the Project area.

Yellow Warbler *(Dendroica petechial)*

The yellow warbler (Dendroica petechial) is a state species of special concern (CDFG 2011). Its breeding distribution ranges from northern coastal Del Norte County, east to Modoc plateau, south to coastal Ventura County, and along the western slope of the Sierra Nevada. The species also breeds along the eastern side of California and in several southern California mountain ranges, and is known to breed locally in small numbers in Sonoma, Marin, Alameda, San Mateo, Santa Clara, Santa Cruz, Monterey, and San Luis Obispo counties (Shuford and Gardali 2008). Breeding occurrences in lowlands are in decline and it is rare to uncommon in many lowland areas where it was formerly common (CDFG 2005); however, small numbers of yellow warblers breed in remnant riparian areas within Santa Clara County (Bousman 2007 as cited in SCVWD 2011).

The yellow warbler breeds in riparian woodlands in close proximity to water along streams and wet meadows, from coastal and desert lowlands up to 8,000 feet, montane chaparral, and in open pine and mixed conifer habitats with substantial amounts of brush (CDFG 2005; Shuford and Gardali 2008). The species prefers riparian deciduous habitats consisting of cottonwoods, willows, alders, and other small trees and shrubs typical of low, open-canopy riparian woodland. In California, the species utilizes numerous other species of riparian shrubs or trees and varies by biogeographic region (Shuford and Gardali 2008). Tall trees provide suitable foraging habitat and heavy brushy understories are used for nesting; and the species shows a high degree of site fidelity. In migration, the species will utilize riparian woodland, forest, and shrub habitats.

There is potential for this species to occur, particularly along parts of Reach 6, due to suitable nesting habitat and foraging habitat within the Project area. Although there are no recorded occurrences of the yellow warbler within 10 miles of the Project area, the species may occasionally move through the project area from other suitable locations. However, its potential to occur within the Project area is low or unlikely.

Western Pond Turtle *(Actinemys marmorata)*

The western pond turtle (WPT [Actinemys marmorata]), a state species of special concern (CDFG 2011), was found historically in most Pacific slope drainages between the Oregon and Mexican borders. It is still found in suitable habitats west of the Sierra-Cascade crest. Elevation range is between sea level and approximately 4,700 feet (1,430 meters) (Jennings and Hayes 1994).

WPT require some slow-water aquatic habitat and are uncommon in high-gradient streams (Jennings and Hayes 1994). The banks of inhabited waters usually have thick vegetation, but basking sites, such as logs, rocks, or open banks, must also be present (Zeiner et al. 1988). Depending on the latitude, elevation, and habitat type, WPT may become inactive over winter or remain active year-round. Nest sites are typically on unshaded slopes with high clay or silt composition (Jennings and Hayes 1994). Eggs are laid from March to August, depending on local conditions, and incubation lasts from 73 to 80 days.

Potential habitat for the WPT is present within the Project area wherever there are suitable perennial waters along the Project reaches, such as pooled waters at Reach 6. All perennial creeks, many intermittent creeks, and most ponds that are not completely isolated by development have some potential to support the turtle; however, the loss of upland nesting habitat because of development and construction of movement barriers between the creeks and nesting areas have reduced the pond turtles potential for occurrence (SCVWD 2011). The CNDDB lists several records for WPT west of Reach 6 within 2.5 miles of the Project area (CNDDB 2013; Figure 3.5-1).WPT are known to occur in Reaches 1 and 2 of Llagas Creek and Lake Silveira (H.T. Harvey & Associates 2010). Therefore potential for the species to move in to the perennial segments of the Project area is high.

Coast Horned Lizard *(Phrynosoma blainvillii)*

The Coast horned lizard (also known as Blainville's horned lizard) is a subspecies of the Coast horned lizard and is a California species of special concern (CDFG 2011). It is uncommon to common in valley-foothill hardwood, coniferous, and riparian habitats, as well as in pine-cypress, juniper, and annual grassland habitats (Zeiner et al. 1988c). The subspecies is endemic to California and ranges include: the Central Valley from southern Tehama County south, the Sierra foothills from Butte to Tulare counties below 4,000 feet, throughout the Coast Ranges south from Sonoma County; and below 6,000 feet in the mountains of southern California in northern Santa Barbara, Ventura, and Los Angeles counties (Jennings and Hayes 1994). The Coast horned lizard inhabits a variety of open habitat, characterized by sandy loosely textured soil areas, washes, flood plains, and wind-blown deposits. The species may be found in chaparral, coastal scrub, annual grassland, and clearings in riparian woodland (Jennings and Hayes 1994). The reproductive season for the Coast horned lizard varies from year to year and geographically depending on local conditions (Zeiner et al. 1988); however, reproductive activity is conspicuous in April and May and hatchlings first appear in July and August (Jennings and Hayes 1994).

Its numbers are declining due to habitat loss, extensive collecting on wildlands near urban development, and the introduction of Argentine "grease ants", which eliminate the native ant species eaten by horned lizards, harvester ants (Pogonomyrmex barbatus).

The Coast horned lizard is strongly associated with loose soils free of plant debris, and with the presence of its primary food source. Review of the CNDDB reported no occurrences of Coast horned lizard within 5 miles of the Project area with the closest occurrences being recorded approximately 7.25 miles from the Project area in an adjacent USGS 7.5 minute quad (Gilroy Hot Springs).There is no potential for occurrence within the Project area due to unsuitable vegetation and lack of suitable soils (Balance Hydrologics et al 2012); therefore, Coast horned lizard will not be analyzed further.

California Tiger Salamander *(Ambystoma californiense)*

The CTS is federally and state listed as threatened (Federal Register 2004). Critical habitat has been designated in 19 counties in California. The Project area does not include, or is located within designated critical habitat or a recovery unit (Figure 3.5-1). Two critical habitat units, Lions Peak 10a and 10b, are encompassed within the Llagas Creek watershed and are located west of Reach 6. A third critical habitat unit, Cebata Flat Unit 9, is located southeast of the Llagas Creek watershed and is east of Reach 14.

The CTS historically ranged from Sonoma and Colusa counties to Tulare and Santa Barbara counties. It is found in grasslands and lowest foothill regions (Zeiner, at al. 1988). It migrates at night from its underground refuges to breeding ponds, covering distances of as much as 1 mile. The CTS breed and lay eggs in temporary rainwater ponds, reservoirs, and in vernal pools, and may sometimes use human-made ponds if predatory fish are absent (Zeiner et al. 1988). During non-breeding season, adult CTS will remain in subterranean refugia, especially burrows of California ground squirrels.

Although the likelihood of the species utilizing the Project area is very low, there is potential for this species to occur in the Project area, due to the presence of potentially suitable breeding habitat (i.e., ponded water, suitable upland habitat adjacent to the channel) and dispersal habitat for this species is present adjacent to the main channel of Upper Llagas Creek; however, the habitat is fragmented by development (H.T. Harvey & Associates 2012b; WRA 2010). The Project area is within the migration range of potential breeding habitat, including designated critical habitat (Balance Hydrologics et al. 2012).

The main channel of Upper Llagas Creek has low suitability for breeding as streams are rarely used for reproduction (Zeiner et al. 1988) and the presence of predators (i.e., bullfrogs and fish). However, percolation ponds adjacent to the Project area provide marginal breeding habitat for the species and the upland habitat adjacent to the main channel may be used for subterranean refugia. Although potential suitable breeding habitat exists adjacent to Upper Llagas Creek, there is very low likelihood the species would occur within the Project area due primarily to distance from potential breeding ponds and/or impediments to dispersal from breeding ponds to the Project area (H.T. Harvey & Associates 2012b). Moreover, field studies report low number of small mammal burrows necessary for CTS underground refugia (Condor County Consulting 2012b). Lake Silveira is hydrologically connected to Reach 7A and has perennial surface, thus has the hydrology to support larval development periods for CTS. Field studies, however, did not yield observations of adult, larval, or egg masses of CTS during sampling at Lake Silveira (Balance Hydrologics et al. 2012).

Nevertheless, the presence of CTS cannot be ruled out, as one CTS juvenile was observed in 2010 at the Main Avenue Percolation Ponds adjacent to the Project area (H.T. Harvey & Associates 2012b); and there is designated critical habitat for CTS approximately 1.5 miles to the west of Reach 6 and approximately 2 miles east of Reach 14. Review of the CNDDB found 79 occurrences within 10 miles and 26 occurrences of CTS within 5 miles of the Project area. The closest reported occurrence is 0.01 mile west of Reach 8 along West Edmundson Avenue. The proximity of the site to other records suggests the possibility that CTS from other breeding sites could disperse into the Project area.

California Red-Legged Frog *(Rana aurora draytonii)*

The CRLF is federally listed as threatened (Federal Register 1996) and is a California species of special concern. The USFWS made a final rule on March 17, 2010 to designate Critical habitat (75 FR 12816) for this species. The Project is located approximately 2.5 miles west of a designated critical habitat unit. The USFWS released a recovery plan in 2002 (USFWS 2002).

Historically, the CRLF occurred in coastal mountains from Marin County south to northern Baja California, and along the floor and foothills of the Central Valley from about Shasta County south to Kern County (Jennings and Hayes 1994). Currently, this subspecies generally only occurs in the coastal portions of its historic range and is apparently extirpated from the valley and foothills and in most of southern California south of Ventura County. CRLF are usually confined to aquatic habitats, such as creeks, streams, and ponds, and occur primarily in areas having pools approximately 3 feet deep, with adjacent dense emergent or riparian vegetation (Jennings and Hayes 1994). Adult frogs move seasonally between their egg-laying sites and foraging habitat; but, generally, they rarely move large distances from their aquatic habitat. CRLF breed from November to March. Egg masses are attached to emergent vegetation and eggs hatch within 6 to 14 days. Metamorphosis generally occurs between July and September.

There is little or no potential for the occurrence of CRLF due to the presence of barriers to migration into the Project area from known occurrences and to habitat degradation. The closest occurrences are in ponds at a golf course 2.2 miles east of Reach 7A, which are separated from the Project area by farmland, urban development, and many roads, including U.S. 101 (Balance Hydrologics et al. 2012). The nearest CRLF population with a connection via aquatic habitat to Lake Silveira is more than 5 miles upstream at Chesbro Reservoir, upstream of the dam and reservoir. However, the presence of predatory fish and bullfrogs reduces the potential for this species to breed successfully in Lake Silveira or the neighboring stream channels, even if they were able to reach the lake. The only suitable upland habitat is located in the immediate project area, and the banks upstream of Lake Silveira have been cleared of understory vegetation. The areas outside the project area have degraded habitat (from urbanization and agriculture) that is unsuitable for this species. The nearest designated critical habitat for the CRLF is approximately 4 miles to the east of Lake Silveira, in the foothills of the Diablo Range (75 FR 12816). This critical habitat unit is separated from Lake Silveira by farmlands, urban development, and many roads, including U.S. 101 (Balance Hydrologics et al. 2012). The next closest critical habitat unit is over 15 miles away, west of Watsonville. The reach of Llagas Creek that includes Lake Silveira historically supported savanna or was unvegetated (SFEI 2008). Where Llagas Creek emerged from the hills onto the alluvial plain, it was a non-perennial channel with a braided morphology and was much less incised (SFEI 2008). Thus it is unlikely that this reach supported CRLF historically. Review of the CNDDB found 101 occurrences of the CRLF within 10 miles and 18 occurrences within 5 miles of the Project area, the latest of which was documented in 2007 at Coyote Creek Dam. However, surveys in the Project area and vicinity indicate that CRLF no longer occurs in the lowlands of the valley (H.T. Harvey & Associates 1997) and the Project area is within a region in which the CRLF is presumed to be extinct (SCVWD 2011b). Focused surveys were conducted in the spring of 2012 of the project area at Lake Silveira and no frogs at any life stage were found (Balance Hydrologics et al. 2012).

Foothill Yellow-Legged Frog *(Rana boylii)*

The foothill yellow-legged frog (FYLF [*Rana boylii]*) is a California species of special concern. In California, this frog occurs in the Coast Range from Oregon to San Luis Obispo County and into the western foothills of the Sierra Nevada. The FYLF was historically distributed throughout the foothills of a majority of the Pacific drainages from the northern Oregon to the San Gabriel River, while populations have been greatly decreased in its southern reaches. This species has been found at elevations from sea level up to 6,500 feet in the Sierra Nevada (Zeiner et. al. 1988).

The FYLF can be found in partly shaded or near clear, cool rocky streams in a variety of habitats (Jennings and Hayes 1994). They occur in a range of stream habitats from small intermittent creeks to large river systems. They require shallow, slow-flowing water in streams with some cobble-sized substrate. Adults are usually found near water and prefer some riffle habitat or cascade and pool areas with rocky banks (Zeiner et. al. 1988). Breeding occurs between mid-March and May.

There is little or no potential for the occurrence of FYLF due to the presence of barriers to migration into the Project area from known occurrences and habitat degradation. Review of the CNDDB found two occurrences of the FYLF within 5 miles of the Project area; the closest of which was documented in 2003 west of Chesbro Reservoir along Oak Glen Avenue (CNDDB 2013). However, the nearest occurrence with a connection via aquatic habitat to Lake Silveira is more than 5 miles upstream at Chesbro Reservoir, upstream of the dam and reservoir. The presence of predatory fish and bullfrogs reduces the potential for these species to breed successfully in Lake Silveira or the neighboring stream channels, even if they were able to reach the Lake (Balance Hydrologics et al. 2012). The only suitable upland habitat is located in the immediate project area, and the banks upstream of Lake Silveira have been cleared of understory vegetation. The areas outside of the project area have degraded habitat (from urbanization and agriculture) that is unsuitable for FYLF. The reach of Llagas Creek that includes Lake Silveira historically supported savanna or was unvegetated (SFEI 2008). Where Llagas Creek emerged from the hills onto the alluvial plain, it was a non-perennial channel with a braided morphology and was much less incised (SFEI 2008). Thus it is unlikely that this reach supported FYLFs historically. No FYLFs at any life stage were found during spring surveys of the project area in 2012 at Lake Silveira (Balance Hydrologics et al. 2012).

Bay Checkerspot Butterfly *(Euphydryas editha bayensis)*

Bay checkerspot butterfly is federally listed as threatened (USFWS 1987). The only known populations of this species occur in San Mateo and Santa Clara counties; although, the species historically was found in many other counties around the San Francisco Bay Area. The current known range has been reduced to Santa Clara County, where patches of the species' habitat are still present (USFWS 2008b). Critical habitat was designated for this species in San Mateo and Santa Clara counties, but after a final rule in 2008, was reduced (USFWS 2008b). Three of this species' critical habitat units occur adjacent to the Project area; however, the Project area does not include critical habitat for Bay checkerspot butterfly (USFWS 2013). The distribution of the Bay checkerspot butterfly adjacent to the Project area is well represented by critical habitat; this distribution and designated critical habitat are shown in Figure 3.5-1. These areas contain serpentine grassland that provide suitable habitat and conditions of the species primary larval host plant, dwarf plantain (Plantago erecta), secondary host plants for both larvae and adults purple owl's clover (*Castilleja densiflora*), and exserted paintbrush (*Castilleja exserta*) (Black and Vaughn 2005 as cited in SCVWD 2011).

The lifecycle of the butterfly is closely associated with native grasslands on serpentine soils or similar infertile soils and its primary larval host plant. Pupae emerge as butterflies between late February and early May, correlating with the blooming of their nectar plants for feeding. Following the emergence is the active portion of their life-cycle with feeding, mating, and egg laying occurring over the course of 4 to 6 weeks. In dry years, larvae can continue diapause until the following spring when conditions have potentially improved (USEPA 2010b). Populations of the Bay checkerspot butterfly are restricted to areas with serpentine soils that have substantial populations of dwarf plantain.

Relative to the location of the Project area, the Bay checkerspot butterfly is likely to occur very infrequently (e.g., only in or following years of high population size), or only as a migrant through the Project area because of unsuitability of habitat. Designated critical habitat is west and northwest of Reaches 6 and 8, respectively; Reach 6 is within 2 miles of critical habitat. There is low potential for the butterfly to move through the Project area, particularly through those reaches, as it migrates to more suitable habitat. Review of the CNDDB found five occurrences of Bay checkerspot butterfly within 5 miles of the Project area with the closest occurrence at 0.7 mile west of Reach 8 northwest of Morgan Hill. The Project area lies in between USFWS designated critical habitat units for the species and is within dispersal distance for the species. Previous field survey efforts (Balance Hydrologics et al. 2012) to document existing vegetation and habitat conditions around the Project area were completed during a season in which the native plants were not in bloom, thus the absence of the butterflies' host plant cannot be ruled out. Although the likelihood of the species utilizing the Project area is low, a spring botanical survey for the three annual native food plant species (i.e., dwarf plantain, purple owl's clover, and exserted paintbrush) will be performed by a qualified botanist prior to construction and throughout the blooming season to determine whether there is any potential habitat for the Bay checkerspot (Balance Hydrologics et al. 2012).

Opler's Longhorn Moth *(Adela oplerella)*

Opler's longhorn moth (*Adela oplerella*) is a candidate species to be federally listed as threatened or endangered. In California, this species has been found along the west side of San Francisco Bay, Alameda County, Marin County, Sonoma County, Santa Cruz County, Santa Clara County, and the inner Coast Ranges (WRA 2003) on both serpentine and possibly non-serpentine grassland. The documented presence of a population of this species on non-serpentine soils in Santa Cruz County suggests the species is not a serpentine obligate (USFWS 1998c).

Habitat for the Opler's longhorn moth includes serpentine, or similar soils, that support the moth's host plant, cream cups (Platystemon californicus); however, the species may also be found on potential nectar plants, such as goldfields (Lastehenia spp.), tidy tips (Layia sp.), and Linanthus (Linanthus sp.) (USFWS 1988c). This moth completes the active portions of its life cycle during the winter-spring wet season, laying eggs between mid-March and April. Eggs are deposited into unopened flowers of the host plant and larvae feed on developing seeds prior to emergence.

Relative to the location of the Project area, the Opler's longhorn moth is likely to occur very infrequently (e.g., only in or following years of high population size), or only as a migrant through the Project area because of unsuitability of habitat. However, populations of the Opler's longhorn moth have been recorded in Santa Clara County (USFWS 1998c), and the moth may potentially occur in the Project area if it's host plant is present, especially on serpentine-dominated grasslands. Review of the CNDDB indicates four occurrences of Opler's longhorn moth within 5 miles of the

Project area. The closest occurrence of this species was found 0.7 mile west of Reach 8 northwest of Morgan Hill. Previous field survey efforts (Balance Hydrologics et al. 2012) to document existing vegetation and habitat conditions around the Project area were completed during a season in which the native plants were not in bloom, thus the absence of the moth's host plant cannot be ruled out. Although the likelihood of the species utilizing the Project area is low, a spring botanical survey for the annual native food plants species (i.e., California creamcups, goldfields, tidy tips, etc.) will be performed by a qualified botanist prior to construction and throughout the blooming season to determine whether there is any potential habitat for the Opler's Longhorn moth.

Other Bats

Natural communities in the proposed Project area may support suitable roosting habitat for special-status bats. Bats generally exhibit a wide range of habitat usage depending on the species, season, time of day, availability of resources, and level of disturbance; however, bats often exhibit high site fidelity and specificity for roost selection. Roost sites consist of maternity (nursery colonies), bachelor, day, night, and feeding sites within caves, mines, cliffs, rock crevices, tree hollows, loose tree bark, foliage, and in man- made structures, such as buildings and bridges. Some species of bats have complex habitat requirements that vary seasonally. Generally, bat habitat should be managed on a temporal and spatial scale that accounts for each species' specific habitat requirements, resource availability, and sensitivity to disturbance (H.T. Harvey & Associates 2004).

Appendix M, Special-status Wildlife Species Potentially Occurring in the Project Vicinity, identifies three bat species with potential to roost or forage in the Proposed Project area. One of these species, pallid bat, is discussed above. The other two species, hoary bat (Lasiurus cinereus) and Yuma myotis (Myotis yumaensis), are not federally or state listed, nor are they categorized as state species of special concern. Potential roosting and foraging habitat for the following bats is present in the Project area.

Hoary Bat *(Lasiurus cinerus)*

Hoary bat (Lasiurus cinerus) is found in any location in California; although, distribution is patchy in southeastern deserts (Zeiner et al. 1990a). This solitary species winters along the coast and in southern California, breeding inland and north of its winter range. Suitable habitat includes all woodlands and forests with medium to large-size trees and dense foliage (Zeiner et al. 1990a). Hoary bat are solitary roosters and roost in dense foliage of both coniferous and deciduous trees, near the end of branches (Bolster 2005); preferred sites are hidden from above, with few branches below, and have ground cover of low reflectivity, 3–13 meters above ground (Bolster 2005; Zeiner et al. 1990a). Roosts are usually at the edge of a clearing (Bolster 2005).The species prefers open habitats or habitat mosaics, with access to trees for cover and open areas or habitat edges for feeding. Breeding occurs in the autumn, followed by delayed fertilization. Young are born from mid-May through early July (Zeiner et al. 1990a).

Review of the CNDDB found two occurrences of hoary bat within 5 miles of the Project area, the latest of which was documented in 1938. The closest reported occurrence is 1.7 miles south of Reach 4 near the intersection of Monterey Highway and 1st Street.

Yuma Myotis *(Myotis yumanensis)*

Yuma myotis (Myotis yumanensis) is common and widespread in California and found in a variety of habitats including riparian, arid scrubland and deserts, and forests (Bogan et al. 2005); optimal habitats in open forest and woodlands with sources of water (CDFG 1990). The bat roosts in buildings, mines, caves, or rock crevices; the species also roosts in abandoned swallow nests, trees, and under bridges (Bogan et al. 2005). Separate, more open night roosts may be used (CDFG 1990). Maternity colonies are found in buildings, caves, mines, and under bridges. Yuma myotis feed over water sources, such as ponds, streams, and stock tanks. The species breeds in the fall and young are born from late May to mid- June with a peak in early June (CDFG 1990).

Suitable habitat for this species is present in the Project area and the potential for occurrence in the Project area is moderate. The closest reported occurrence of this species is 1.9 miles northwest of Reach 8; and Yuma myotis could potentially roost at future access points to the proposed tunnel (Tunnel Alternative, Applicant’s Proposed Action) (SCVWD 2013d).

Raptors and Migratory Birds

Trees and other vegetation, as well as man-made structures, such as bridges that span within and adjacent to the Project area, provide potential nest sites for common raptors that could also forage within the area. Migratory birds also forage and nest in a variety of habitats, including riparian and coastal scrub regions and man-made structures, such as bridges. Active bird nests potentially found within the Project area are protected under the Migratory Bird Treaty Act (MBTA) and Section 3503.5 of the Fish and Game Code, which prohibits their disturbance or destruction.

3.6 AQUATIC RESOURCES

3.6.1 Introduction

This section describes the aquatic wildlife resources of the Project and discusses Project impacts to aquatic wildlife and habitats that occur within the Project area, including special-status species. In cases where potential impacts have been determined to be “significant”, mitigation measures have been proposed to reduce these impacts to less-than-significant levels. Section 3.6.3, Environmental

Setting, describes the regulations and ordinances that would apply to aquatic wildlife resources.

Baseline information on aquatic wildlife resources in the Project area, including special-status species and their habitats, was compiled from existing published and unpublished literature describing aquatic resources in the region, environmental database searches, consultation with local wildlife professionals, and information provided by staff from the SCVWD. Primary data sources include the following:

- Casagrande, J. 2011. Uvas Creek steelhead distribution, density, growth, and habitat use, 2010. Prepared for the California Department of Fish and Game. 30 pp.
- Casagrande, J. 2012. Uvas and Llagas Creek juvenile steelhead distribution and abundance, 2011. Prepared for the California Department of Fish and Game. 49 pp.
- Smith, J. J. 2007. Steelhead distribution and ecology in the upper Pajaro River system and mainstem Pajaro River (and stream descriptions, habitat quality ratings and limiting factors by reach for the Pajaro River and for the upper Pajaro River tributaries). Unpublished Report, Department of Biology, San José State University, 07 November 2007. 38 pp.
- U.S. Fish and Wildlife Service (USFWS). 2003. Fish and Wildlife Coordination Act Report for the Llagas Creek Flood Control Project, Santa Clara County, California. Prepared for U.S. Army Corps of Engineers, San Francisco District, 211 p.

3.6.2 Project Area

The project area for aquatic resources is any area that would be directly, permanently, or temporarily affected by the construction and maintenance activities associated with all the Project alternatives. The Project consists of seven reaches (4, 5, 6, 7A, 7B, 8, and 14) of Llagas Creek, East Little Llagas Creek, and West Little Llagas Creek from just downstream of Buena Vista Avenue. The project area is approximately 13.9 miles long and includes 6.1 miles of the main branch of Llagas Creek (from Monterey Road downstream to a 1000 feet downstream of Buena Vista Avenue, 2.8 miles along West Little Llagas Creek, 3.4 miles of East Little Llagas Creek (a tributary of Llagas Creek), and 1.6 miles of a new bypass that would be constructed along West Little Llagas Creek to Llagas Creek.

3.6.3 Environmental Setting

The environmental setting for aquatic resources includes all areas that could be affected by modifying the channel within the Project area, including reaches within the Project area, reaches immediately upstream and downstream of the Project area that could be affected by Project actions, and tributaries that enter within the Project area, and in upstream and downstream reaches. Channel modifications within the Project area include Llagas Creek from 1,000 feet downstream of Buena Vista Avenue to Monterey Highway, West Little Llagas Creek from Monterey Highway upstream through Llagas Road, and East Little Llagas Creek from the Llagas Creek confluence to just downstream of the Corralitos Creek confluence. Potentially affected areas upstream of the Project area include Llagas Creek upstream of Monterey Highway to Olive Avenue and West little Llagas Creek upstream of Hillwood Lane; downstream areas include Llagas Creek downstream to the confluence with the Pajaro River.

The Llagas Creek watershed drains an area of 104 square miles before joining the Pajaro River, which drains into the Monterey Bay near Watsonville. Llagas Creek originates in the Santa Cruz Mountains, near the Loma Prieta Mountain Range close to the border of Santa Clara and Santa Cruz counties, at an elevation of approximately 3,000 feet. The creek flows approximately 6 miles from its headwaters to Chesbro Reservoir, then 5 miles from Chesbro Reservoir to the Project area, which begins near the intersection with Monterey Highway. Llagas Creek then flows 5.7 miles through the Project area to the downstream boundary 1,000 feet downstream of Buena Vista Avenue (Figure 2.2-1) and, thereafter, 13 miles downstream to the confluence with the Pajaro River.

Several tributaries enter Llagas Creek within the Project area and just upstream of the Project area. From its headwaters, West Little Llagas Creek flows through Morgan Hill before turning, generally, southeast at Watsonville Road toward U.S. 101. It joins with East Little Llagas Creek near U.S. 101, just upstream of East Middle Avenue. East Little Llagas Creek within the Project area begins just upstream of East Middle Avenue and flows southeast within a channelized section to its confluence with Llagas Creek between Church Avenue and Masten Avenue. Tributaries entering West Little Llagas Creek upstream of the Project area include DeWitt and Edmundsen creeks. Other tributaries entering upstream of the Project area along Llagas Creek below Chesbro Reservoir include Paradise, Machado, Hayes creeks, and numerous ephemeral tributaries.

Aquatic Habitat

Reaches 4 and 5

Reach 4 is the downstream-most reach of Llagas Creek within the Project area. It is an earthen channel, extending approximately 2.4 miles from just downstream of Buena Vista Avenue in the south (downstream) to the East Little Llagas Creek/Llagas Creek confluence in the north (upstream; the intersection of Reaches 4, 5, and 14) (Figures 2.2-7 and 3.6-1). The channel is composed of cobbles, pebbles and sand with some silt/clay, and is largely unshaded with almost no overhanging riparian trees or shrubs. The reach typically dries in late spring and remains as such until early fall or the onset of precipitation. The reach is dry except during and just after significant rainfall (USFWS 2003). The relatively low-gradient reach (<0.3%) is sinuous, containing large bends near Masten and Buena Vista avenues.

Reach 5 is a relatively short (0.5 mile) earthen channel extending west (upstream) from the Llagas Creek/East Little Llagas Creek (Reach 14) confluence to 700 feet upstream of U.S. 101, where it connects with Reach 6

(Figures 2.2-6 and 3.6-2). Similar to Reach 4, Reach 5 is typically dry from late spring to early fall, and is largely unshaded by riparian trees or shrubs. The channel is made up of sand, gravel with some clay/silt, but has few bedforms or discernible aquatic habitat features (e.g., pools and riffles).

Smith (2007) evaluated portions of Reaches 4 and 5 (Llagas Creek from Highway 152 to Church Avenue, which encompasses Reaches 4 and 5) to describe potential steelhead habitat. He concluded that the most limiting factor to steelhead production was spring stream flows to allow smolt outmigration. Smith (2007) noted the presence of grade control structures with fish ladders between Highway 152 and Leavesley Avenue (downstream of the Project area), potentially improving access by reducing the amount of stream flow necessary to allow fish passage. He estimated that adults could, likely, migrate downstream at flows of 10 cubic feet per second (cfs) and smolts could probably emigrate downstream at flows of 3–5 cfs.

USFWS (2003) evaluated riparian and stream habitat within the Project area using a Habitat Evaluation Procedure to develop a Habitat Suitability Index (HSI) for habitat within each reach. The primary components of the stream habitat evaluated were overhead (riparian cover) (percent vegetation overhanging stream), instream cover (percent in-water cover features and type in-water cover), substrate type and condition (streambed particle size and percent embeddedness), and general stream habitat type and condition (sinuosity and number of pools/mile; refer to USFWS [2003] for a complete description of the procedure).

Figure 3.6-1 Reach 4 Looking Downstream from the Intersection of Reaches 5 and 14 (Picture taken January 15, 2013)

Figure 3.6-2 Reach 5 Looking Upstream from the Intersection of Reaches 4 and 14 (Picture taken January 15, 2013)

USFWS (2003) evaluated Reaches 4 and 5. In Reach 4, they found that the stream channel was poorly defined, wide, and shallow, with abundant cobble and gravel. They found relatively good overhead cover from mature trees and a moderate number of pools within the reach. The reach did not have significant spawning area and little potential for such in the future. Reach 5 had very little channel meander and sinuosity, as relatively straight with only two noticeable turns. The reach had a moderate amount of pools (14 observed; 34/mile), but they were not large or deep. They assumed that Reach 5 was not a significant spawning area for native fishes, such as steelhead, and had little potential for use in the future. They noted that in recent years, the upstream half of Reach 5 had intermittent flow. USFWS (2003) concluded that all components of stream habitat within Reaches 4 and 5 were of high value, with the exception of substrate, which was of medium-to-high value.

Reach 6

Reach 6 is an earthen channel made up of silt, sand, and gravel extending 3.2 miles from 700 feet upstream of U.S. 101 in the south (downstream) to Monterey Road in the north (upstream) (Figure 2.2-5). The upstream (northern) portion of the reach, from Monterey Road to San Martin Avenue (approximately 7,000 feet), is typically perennial, maintained by Chesbro Dam releases. The downstream (southern) portion, to the intersection with Reaches 4 and 5 (approximately 10,650 feet), is intermittent depending on flow conditions as substantial percolation occurs within the reach. Stream flow of 6–8 cfs at the upstream end of the reach can be reduced to <0.5 cfs at the downstream end (Smith 2007).

USFWS (2003) and Smith (2007) evaluated aquatic habitat in portions of Reach 6. USFWS (2003) found high habitat diversity, including pool density (>45/mile) and relatively high-stream substrate usability and condition. The gravel and cobble within the site could potentially provide present and future spawning opportunities. They concluded that all components of stream habitat within Reach 6 were of high value; the highest set of ratings for the entire Project area. Smith (2007) evaluated Llagas Creek from Church Avenue to Silveira Lake, roughly corresponding to Reach 6 to describe potential steelhead habitat. He observed infrequent riffles along the reach made up of fine and coarse gravel and other habitat types composed of silt, sand, and fine gravel. Potential spawning habitat and pools were also infrequent (contrary to USFWS 2003). Spawning patches were relatively sandy, while pools were less than 2-feet deep. Smith (2007) also observed high summer water temperatures within Reach 6 (68–79°F) and concluded that the factors most limiting steelhead were water temperature and fast-water feeding habitat for juvenile steelhead, which declined downstream with gradually, decreasing stream flows and channel gradient.

Reach 7A and 7B

Reach 7A extends approximately 1.5 miles upstream from Reach 6, just upstream of the Monterey Road Bridge, to South La Crosse Drive. The majority of Reach 7A is currently agricultural fields (Figure 2.2-4); there is no existing channel here except for a short 0.3-mile length of trapezoidal shaped constructed channel at the upstream end of the reach. Each of the alternatives would excavate a proposed channel (either an earthen channel [with portions culverted] or a tunnel) approximately 1.5 miles long through Reach 7A to divert flows from West Little Llagas Creek upstream of Watsonville Road to Llagas Creek downstream of Lake Silveira at Monterey Road. Reach 7A does not currently support any fisheries resources, nor is there any CDFW record for threatened or endangered fish species (including South Central California Coast steelhead) (CDFW 2012).

Reach 7B is an earthen channel, approximately 1.4 miles long, containing West Little Llagas Creek in an urban, and residential suburban, area of Morgan Hill between South La Crosse Drive in the south, and West Dunne Avenue in the north (Figure 2.1-3). West Little Llagas Creek is ephemeral, fed in the summer by agricultural and urban runoff, and composed of gravel, sand, silt and clay. The stream channel flows through a suburban area with the channel in the southern half of the reach averaging 75 feet in width, and the northern half (north of Tennant Avenue) averaging 15 feet in width. In the northern portion, the stream channel is adjacent to small businesses and is in an underground culvert for the last 650 feet on the northend. Similar to downstream reaches (Reaches 4 and 5), Reach 7B dries in late summer to early fall, unable to support steelhead rearing. There is no CDFW record for threatened or endangered fish species (including South Central California Coast steelhead) occurring within Reach 7B (CDFW 2012), nor is there any account within the literature reviewed for this EIS.

USFWS (2003) did not evaluate Reach 7A for stream habitat characteristics, but did evaluate Reach 7B and found a poorly defined streambed or stream channel, rather it was a series of swales, depressions, with perennially wet and seasonally moist areas. The upstream third of the Reach 7B more resembled a functioning stream system (albeit marginal) with a well-defined, but shallow streambed with low banks. They did not expect steelhead to use this reach after construction of Reach 7A connected Reach 7B to Reach 6. They found that most of the reach currently consisted of fine sediment, with no gravel or cobble substrates. USFWS (2003) concluded that all components of stream habitat within Reach 7B were of medium to high value.

Reach 8

Reach 8 is also a portion of West Little Llagas Creek, extending 1.5 miles upstream from Reach 7B through downtown Morgan Hill from West Dunne Avenue in the south (downstream) through Llagas Road in the north (upstream, Figure 2.2-2). The reach is a trapezoidal channel (Figure 3.6-3) for most of its length, with two 250-foot sections passing underground through concrete box culverts. Flow within the reach is intermittent and the channel is gravel, sand, silt, and clay, running through a heavily urbanized area with businesses, residential areas, and roads abutting many portions of the top of the channel bank. There is no CDFW record for threatened or endangered fish species (including South Central California Coast steelhead) occurring within Reach 8 (CDFW 2012), nor is there any account within the literature reviewed for this EIS.

Figure 3.6-3 Reach 8 Looking Upstream from Wright Avenue (Picture taken January 15, 2013)

USFWS (2003) found that Reach 8 was the most highly urbanized section of the Project area, more indicative of an engineered flood control channel than a functioning stream ecosystem. Still, the report noted the presence of five distinct, large pools, likely fed by urban runoff, occurring in the above-ground portion of the reach that supported fish, including possibly some native minnows and related aquatic organisms. USFWS (2003) concluded that all components of stream habitat within Reach 8 were of medium-to-high value.

Reach 14

Reach 14 is a constructed channel that is a portion of East Little Llagas Creek, which runs parallel to U.S. 101. The reach extends 3.4 miles downstream from near Corralitos Creek to the confluence with Llagas Creek at the intersection of Reaches 4 and 5 (Figure 2.2-8). The channel was straightened in the 1970s by California Department of Transportation (Caltrans), and several portions are maintained under the SCVWD's countywide SMP. The channel is made up of silt, sand, gravel, and cobble and the banks are lined with grass and some sections of rip-rap (Figure 3.6-4).

Figure 3.6-4 Reach 14 Looking Upstream from the Intersection of Reaches 4 and 5 (Picture taken January 15, 2013)

USFWS (2003) evaluated Reach 14 and found the downstream end from Church Avenue to the confluence Llagas Creek a barren landscape with little or no vegetation, no low-flow channel, and very low or non-existent stream habitat value. The area is an engineered channel with little or no aquatic ecosystem attributes or functioning. The streambed was fair to poor habitat, with few pools and low diversity of habitat types; but there were some sections with unembedded gravel and cobble. The upstream section of Reach 14 “began to look like a stream” with fair-to-good gravel with several pools. They observed 27–35 existing pools within the entire reach. USFWS (2003) concluded that all components of stream habitat within Reach 14 were of medium-to-high value.

The reach is hydrologically connected to West Little Llagas Creek and a portion of Reach 7B (Figure 2.2-3). Reach 7B terminates just south of La Crosse Drive, where West Little Llagas Creek flows generally southeast through urban and agricultural land before becoming East Little Llagas Creek on the east side of U.S. 101. As with downstream (Reaches 4 and 5) and adjacent (Reach 6) reaches, the channel is extremely porous and surface water generally percolates to an aquifer, leaving a dry channel for much of the year. The reach does not currently support any fisheries resources, nor is there any CDFW record for threatened or endangered fish species (including South Central California Coast steelhead) (CDFW 2012).

Llagas Creek Downstream of Chesbro Dam to Monterey Road

Habitat below Chesbro Dam is maintained by nearly year round by flow releases from the dam to provide groundwater recharge via percolation. Releases are left instream to percolate into the channel bed or are diverted to percolation ponds near Church Avenue. The percolation ponds are also operated and managed in conjunction with flow releases from Uvas Reservoir, which are transferred through a 2-mile- long pipeline to Llagas Creek near Santa Teresa Boulevard (USFWS 2003). A relatively small amount of water is transferred from Uvas Reservoir to Llagas Creek, most water from the reservoir is currently allocated to maintain flow for steelhead within Uvas Creek. The reach from Chesbro Dam to Monterey Road contains the highest quality remaining habitat for native fish within Project area, as it has the most suitable water temperatures, areas with cobble and gravel substrate, and likely supports occasional steelhead spawning and rearing. This section of Llagas Creek, with the exception of a small portion just upstream of Monterey Road, is upstream of the Project area; and the Project would not affect hydrology or habitat therein.

From Chesbro Reservoir downstream to the Uvas pipeline, Llagas Creek is relatively steep and well shaded by riparian vegetation (willows, sycamores, and oaks), with a channel composed of cobble and gravel in riffles and silty sand and gravel within pools (Smith 2007). Smith (2007) examined habitat within this portion of Llagas Creek and found that, in general, spawning gravel is sparse, especially just downstream of the dam; although, it did occur in the middle of the reach, albeit containing substantial amounts of sand and silt. He observed frequent deep pools with substantial cover in the form of undercut banks and overhanging vegetation, and riffles, runs, and heads of pools (steelhead fast-water feeding habitat) made up 15 percent of the aquatic habitat. Smith (2007) also noted the presence of a concrete pad and culvert about 0.3-mile downstream of the dam as a passage barrier to adult steelhead at most stream flows. Steelhead limiting factors were summer streamflow and late summer water temperatures, food production, fast-water feeding habitat, and lack of spawning habitat near the dam.

Downstream of the Uvas Creek pipeline, flow can be substantially higher in Llagas Creek (Smith 2007). The reach is shaded by dense riparian vegetation (willows, sycamore) and is moderately entrenched with silty gravels and sand. Smith (2007) found that spawning gravel was sparse and usually intruded with sand and silt, and that pools >3 feet depth were frequent with substantial escape cover form overhanging vegetation (willows and blackberry). Riffles, runs, and pools made up less than 25 percent of the habitat and summer water temperatures were moderately warm, but dependent on the depth of Uvas Reservoir at the time of the release to Llagas Creek. He recorded mid-July and late-September water temperatures of 60–62 and 67–69°F above the pipeline and 60–64 and 64–73°F below. There are no significant tributaries to Llagas Creek downstream of Chesbro Dam that maintains perennial stream flow or supports steelhead or other fisheries (Smith 2007).

Lake Silveira

Llagas Creek continues upstream to Chesbro Reservoir from the upstream end of Reach 6 at the intersection of Reaches 6 and 7A. The most downstream end of this reach is occupied by Lake Silveira, which is an on-channel lake created in the 1980s when a landowner removed a berm between a former gravel quarry and Llagas Creek (Smith

2007). Llagas Creek currently flows through Silveira Lake, leaving the former channel as a dry, abandoned streambed, except during flood periods (Harvey and Stanley Associates 1988). Balance Hydrologics (2012) surveyed the bathymetry of Lake Silveira in 2012 and recorded a maximum depth of 10.4 feet and a total area of 8 acres at the surveyed water surface elevation of 304.1 feet (NAVD88). They found physical conditions broadly similar to USFWS (2003), who noted a relatively uniform depth with little nearshore aquatic emergent vegetation. Harvey and Stanley Associates (1988) noted that low dissolved oxygen (DO) concentrations (<3 mg/L) probably occur below 7 feet; and Moore (Balance Hydrologics et al. 2012) recorded 40–60 percent DO saturation within the lake below the hypolimnion, versus >80 percent upstream and downstream (see below for temperature monitoring results) in Lake Silveira. The DO levels within the lake did not meet water quality objectives established by the Regional Water Quality Control Board (Central Coast Region) Water Quality Control Plan (Basin Plan) for the Llagas Creek watershed (RWQCB 2011) that state "for waters not mentioned by a specific beneficial use, DO concentration shall not be reduced below 5.0 mg/L at any time. Median values should not fall below 85 percent saturation as a result of controllable water quality conditions. Harvey and Stanley Associates (1988) also noted that the lake contains sufficient nutrients to sustain phytoplankton blooms. Smith (2007) notes that factors limiting steelhead within Lake Silveira are water temperature, competition for food with warm water fishes, and potential predation of juveniles (De Haven [2003] also notes that sunfish and avian predators may threaten migrating steelhead), suggesting the presence of the lake, and slack water habitat, negatively affect steelhead populations.

USFWS (2003) proposed restoring 1,980-linear feet of Llagas Creek around Lake Silveira, and filling portions of the lake with borrow excavated from Reach 7A. The mitigation proposal called for planting emergent species to create a mosaic of cattails and bulrushes and shallow, open-water habitat. The mitigation would provide thermal benefits for steelhead rearing and migration by removing the lake, which increases surface water temperatures by 3–6°F through increased hydraulic residence time and insolation, and by providing a source of cool water to downstream reaches, (Reach 6), where rearing and downstream migration may occur in the Project area.

Temperature

In addition to channel drying, water temperature can influence the distribution of aquatic resources within the Project area. Systech Engineering, Inc. (2004) summarized temperature data collected in Reach 6, and upstream of the Project area in Llagas Creek downstream of Chesbro Reservoir. Results from 2000 and 2001 show daily average temperatures during the summer ranged from 70–75°F in Reach 6 above the Church Avenue percolation ponds; at San Martin Avenue and downstream of Llagas Avenue; and from 61–66°F below Santa Teresa Boulevard on Llagas Creek. Systech Engineering, Inc. (2004) used a model to estimate temperatures under high, medium, and low flow and different levels of shading (20% overhead riparian canopy and 0 percent overhead riparian canopy) in Reach 6. They compared the average annual temperature for each scenario and found that shading could potentially reduce average annual stream temperature by up to 5°F (from 68–63°F). Systech Engineering, Inc. (2004) did not simulate continuous summer-water temperatures or present an average seasonal temperature (i.e., an average temperature for spring, summer, fall, and winter). The report concluded that under conditions of higher flow, which reduced hydraulic residence time, and increased riparian canopy, which reduced insolation of the water surface, there could be lower water temperatures in Reach 6. Smith (2007) observed high summer-water temperatures within Reach 6 (68–79°F). He also recorded mid-July and late-September water temperatures of 60–62 and 67–69°F upstream of the Uvas Creek pipeline to Llagas Creek and 60–64 and 64–73°F downstream of the pipeline.

Moore (2012) examined temperature within Lake Silveira to assess the lake's impact and potential stress to the fluvial system. The study measured continuous water temperature upstream, within, and downstream of the lake, with probes measuring at 15-minute intervals during spring (May 24 to June 2, 2011), summer (August 1 to August 8, 2011), and winter (January 25 to February 1, 2012). Moore (2012) found that temperature was consistently higher downstream (ranging from 73–77°F), with the effect most pronounced in the summer, varying from 9–14°F greater than upstream (ranging from 63–68°F), in some cases exceeding water quality objectives established by the Regional Water Quality Control Board (Central Coast Region) Water Quality Control Plan (Basin Plan) for the Llagas Creek watershed (RWQCB 2011) stating "at no time or place shall the temperature of any water be increased by more than 5°F above natural receiving temperature". The study concluded that warming within Lake Silveira raises downstream temperatures above optimal temperature range for juvenile steelhead (59–65°F). Daily average temperatures in late August exceeded 75°F, which are stressful and potentially lethal to rearing juvenile steelhead.

Aquatic Species Known to Occur in the Llagas Creek Watershed

A mixture of native and non-native fish species are known to occur in the Project area and upstream of the Project area in Lake Silveira, Llagas Creek below Chesbro Reservoir, and Chesbro Reservoir. USFWS (2003) observed that fishes of Llagas Creek had not recently been inventoried, and besides steelhead (see below), the creek may contain species known to occur within Chesbro Reservoir or downstream in the Pajaro River. Fish known to occur downstream in the Pajaro River include Sacramento blackfish (*Orthodon microlepidotus*), Carp (*Cyprinus carpio*), goldfish, (*Carassius auratys*), mosquitofish (*Gambusia affinis*), Sacramento sucker (*Catostomus occidentalis*), hitch (*Lavinia exilicauda*), Sacramento pikeminnow (*Ptychocheilus grandis*), Golden shiner (*Notemigonus crysoleucas*), prickly sculpin (*Cottus asper*), and three-spine stickleback (*Gasterosteus aculeatus*) (USFWS 2003; Smith 2007). Casagrande (2012) sampled a section of Llagas Creek within Reach 6 downstream of Lake Silveira and Monterey Road in 2011 and found a mixture of native and non-native fish: Sacramento pikeminnow, Sacramento sucker, hitch, prickly sculpin, and common carp. USFWS (2003) recorded the presence of several pools in Reach 8 that supported fish, including possibly native minnows; although, this was a personal observation by the report author and not the result of sampling. The only native minnow reported within Llagas Creek below Chesbro Dam is California roach, but Smith (2007) reported that these fish were extirpated during the 1977 drought and have not recolonized; although, they are abundant upstream of the dam. Moyle et al. (1995) concluded that recent losses of roach populations throughout California have occurred when drought eliminated isolated populations. As such, small fish may occur in some portions of Reach 8, but are likely non-native, such as mosquitofish. No fish species have been reported to occur in Reaches 7A, 7B, and 14.

The fish population of Lake Silveira likely favors non-native sunfish species and catfish, which are both suited to lake environments (USFWS 2003). Harvey and Stanley Associates (1988) conducted limited gill net sampling of the lake and found hitch, Sacramento blackfish, Sacramento squawfish (*Ptychocheilus grandis)*, goldfish, carp, and Sacramento sucker, and noted that Pacific lamprey (*Entosphenus tridentatus*) prickly sculpin, largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), and black crappie (*Pomoxis nigromaculatus*) were probably present. Smith (2007) also noted that large pikeminnows are common in the lake and could prey on migrating steelhead smolts. Moore (2012b) also found a native freshwater mussel, the California floater (*Anodonta californiensis*), at the inflow of Lake Silveira in 3 feet of water in April 2012.

Upstream of the Project area, Sacramento suckers are common throughout the reach below Chesbro Dam, as are Sacramento pikeminnow and hitch. These species likely occur primarily downstream of Watsonville Road (Smith 2007). Prickly sculpin are present, but scarce, primarily downstream of the pipeline from Uvas Reservoir and may come through the pipeline. Pacific lamprey have occasionally been found near Santa Teresa Boulevard.

Chesbro Reservoir likely supports most of the species seen downstream, plus western roach, catfish (bullhead), various sunfish species, largemouth bass, bluegill, and crappie (USFWS 2003). Surveys by Anderson (1976) and Hunter (1980) observed the following non-special-status fish species within Chesbro Reservoir: largemouth bass, bluegill, black crappie, brown bullhead catfish (Ameiurus nebulosus), white catfish (Ameiurus catus), channel catfish (Ictalurus punctatus), threadfin shad (Dorosoma petenense), carp, sucker (Catostomus spp.), hitch, sculpin (Cottus spp.), redear sunfish (Lepomis microlophus), green sunfish (Lepomis cyanellus), and golden shiner.

Special-Status Aquatic Species

A review of available studies (Hunter 1980; Smith 2007; Casagrande 2011, 2012; and Balance Hydrologics et al. 2012) and the California Natural Diversity Database (CDFW 2012) indicates the occurrence of one special-status species within the Project area (Table 3.6-1).

Table 3.6-1 Threatened or Endangered Fish Species, and Associated Critical Habitat, Potentially Occurring Within the Project Area

Scientific Name	Common Name	Status [1]	Critical Habitat in or near Project Area?
Oncorhynchus mykiss	South-central California steelhead	FT	Yes

[1] FE= Federally Endangered, FT = Federally Threatened, SE=State of California Endangered, ST = State of California Threatened

South-Central California Coast Steelhead (S-CCC)

The South-Central California Coast Steelhead (S-CCC) ESU is federally listed as threatened (Federal Register 2006). Steelhead trout utilizing the Pajaro River system are considered to be the northern-most component within the S-CCC ESU, as designated by the NMFS (2004). Steelhead within the S-CCC ESU were listed by NMFS as “threatened” on August 18, 1997. The listing was reaffirmed on January 5, 2006. All steelhead within this ESU are considered “winter steelhead” (NMFS 2004) based on their migratory timing and behavior; ascending streams during the winter when winter rainfall results in suitable flow and temperature (Moyle 2002).

Steelhead are the anadromous form of rainbow trout that migrate to the ocean as juveniles and return to inland waters as adults to spawn. Steelhead in the Pajaro River and tributaries (including Llagas Creek) are considered winter (ocean maturing) steelhead, based on the timing of their return to freshwater and the fact that they tend to be sexually mature when reentering freshwater. Winter steelhead generally enter fresh water between November and April when flow and temperatures are suitable, and spawn soon after arriving at their spawning grounds (Moyle 2002). Migrating adults must have sufficient depths and suitable water velocities to facilitate their upstream migration to suitable spawning grounds. Pools with low velocities in association with instream and near stream cover, such as large woody debris (LWD), undercut banks, or submerged or overhanging vegetation, can provide desirable resting areas for migrating adult steelhead. After reaching their spawning areas, redds (nests) are excavated by adult females in suitable gravel substrate, and spawning occurs soon after. Steelhead are unique among Pacific salmonids in that they can be iteroparous; that is, given the right conditions, they may be able to return to the ocean and then spawn again in one or more subsequent years. Steelhead fry emergence from gravel redds occurs in late spring, and steelhead fry rear for 1 to 3 years in fresh water before migrating to the ocean (Moyle 2002). Steelhead generally spend 2 years in the ocean before returning to freshwater to spawn. However, some individuals might spend 1 to 4 years at sea before reaching sexual maturity (Barnhart 1986).

Like other salmonids, steelhead spawning generally occurs in swift, relatively shallow riffles, pool tailouts, or along the edges of fast runs where an abundance of loose gravel exists. Substrate composition is a critical factor determining the suitability of spawning habitat. They require clean, loose gravel that will remain stable during incubation and emergence. Substrate composition must be low in sand and fines, so that water can flow through the gravel, carrying oxygen to the eggs, and carrying waste products away from the eggs. This process allows successful incubation and emergence of the juveniles (Bjornn and Reiser 1991). Eggs are adversely affected if fine sediments fill the interstitial spaces in the gravel. Accumulation of fine sediments or coarse sand can also cause fry to have difficulty emerging from the redd.

After emergence, steelhead fry tend to select shallow water habitat, such as glides and riffles for rearing, usually near some form of cover. Large rocks, root wads, woody debris, and undercut banks can provide suitable cover. Densities of juvenile steelhead in streams are greatest where instream cover and their invertebrate food source are diverse and abundant. The distribution and abundance of rearing juveniles is influenced by food availability, predation and competition, and the quantity and quality of suitable habitat (Bjornn and Reiser 1991). As fish grow, they move into faster, deeper habitats. During the winter, when water temperatures cool and the metabolic rate of the fish decrease, fish move into pools with ample cover. Temperature is also an important factor for juvenile rearing conditions. In general, water temperatures less than 59°F are suitable for summer rearing of juvenile steelhead, while temperatures greater than 77°F are potentially lethal, and temperatures above 72°C may affect feeding and fitness (Bjornn and Reiser 1991; NMFS 2011).

After 1 to 3 years of rearing in freshwater, most juvenile steelhead begin the process of smoltification[1] and proceed to migrate downstream toward the ocean. Steelhead smolts may immigrate to the ocean from January through June on the receding limb of the winter hydrograph. These fish may reside in the ocean for between 2 and 4 years (Barnhart 1986; Moyle 2002) prior to returning to spawn.

Habitat needs in the Project area for emigrating steelhead (smolts) are similar to those for rearing juvenile steelhead. Migrating smolts are particularly vulnerable to predation, and physical structure and cover (refugia) are important for survival of this life stage. Similar to rearing juveniles, outmigrants rely on the presence of adequate food and suitable resting pools. Lagoons and estuaries at the river mouth are often very important for the rearing of larger juveniles and may provide essential feeding opportunities for smolts prior to entering the ocean (Smith 2002).

Returning adult steelhead are likely to enter the Pajaro River watershed from December through April (Moyle 2002), based on freshwater outflow and temperature. To reach the spawning areas in the upper watershed, adults must enter the Pajaro River/lagoon after the seasonal sandbar has been breached. During periods of low stream flows or droughts, the onset of the steelhead spawning migration can be delayed until breaching of the lagoon sandbar occurs.

Critical habitat[2] for South-Central California Coast steelhead is present in the Project area from Reach 4 (Llagas Creek at Buena Vista Avenue) through Reach 6 (Llagas Creek at Monterey Road), and upstream (Llagas Creek from Monterey Road to Chesbro Dam) and downstream of the Project area (Llagas Creek from Monterey Road to the Pajaro River and stream reaches of the Pajaro River basin to, but not including, the Santa Maria River (NMFS 2005a). Llagas Creek is part of the Pajaro River Subbasin Hydrologic Unit (HU) 3305 and within the South Santa Clara Valley Hydrologic Subarea (HSA) 330530 (NMFS 2005b). CDFW (2013) shows that the segment of Llagas Creek from Monterey Road to Southside Drive, which encompasses Reaches 4, 5, and 6, contains fair spawning habitat, no rearing habitat, and poor migration habitat. The primary constituent elements of South-Central California Coast steelhead critical habitat are: (1) spawning habitat, including spawning substrate and adequate water quantity and quality; (2) freshwater rearing habitat including floodplain connectivity and natural escape and velocity cover; (3) freshwater migration corridors free of obstructions, with water quantity and quality conditions that allow movement; (4) estuarine areas with adequate water quality and quantity to supporting juvenile and adult physiological transitions between fresh and salt water; (5) Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and (6) offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation (NMFS 2005a).

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1 A process whereby physiological and behavioral changes prepare the juvenile steelhead for the marine environment.

2 Section 3 of the ESA (16 U.S.C. 1532(5)) defines critical habitat as ‘‘(i) the specific areas within the geographical area occupied by the species, at the time it is listed on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed

Steelhead or possibly rainbow trout have been observed upstream of the Project in Llagas Creek between Monterey Road and Chesbro Dam. Smith (2007) sampled four sites along this reach in 1997 and found seven juvenile steelhead at the Llagas Road Bridge, just downstream of Chesbro Dam. In 2005, eight juvenile steelhead were found along the same reach. Casagrande (2012) sampled five sites in November 2011 and found a total of ten juvenile steelhead captured at two sites. Seven were captured at near the Llagas Road Bridge, the greatest amount observed since 2005. The remaining steelhead were found near Paradise Land and Bowden Court (upstream of Watsonville Road). All were captured in fast-water habitats (runs and heads of pools). All steelhead observed at the Llagas Road site in 2011 by Casagrande (2012) were young of the year (YOY), ranging in size from 4 to 6 inches (standard length). Yearling steelhead were captured near Bowden Court and were near 9 inches (standard length); and scale samples indicated substantial growth between their first and second years. Casagrande (2011) also observed five YOY near the Llagas Road Bridge (downstream of Chesbro Reservoir) in 2010. The Llagas Road Bridge site has the best observed habitat conditions (substrate quality, abundance of riffles, runs, and heads of pools), and scale samples indicated substantial growth for YOY. Moore (2012b) captured a YOY steelhead in a shallow riffle in Llagas Creek just upstream of the inflow to Lake Silveira in May of 2012.

It is uncertain whether steelhead captured in Llagas Creek near Chesbro Dam were progeny of anadromous steelhead or rainbow trout. Smith (2007) notes the presence of a concrete pad and culvert about 0.3 mile downstream of the dam as a passage barrier to adult steelhead at most stream flows. Genetic analyses conducted on individuals captured in 1997 (described in Smith [2007]) showed low genetic variation, suggesting samples came from a single spawning pair. Smith (2007) concludes that the present steelhead run in Llagas Creek is likely only a few adult fish, possibly strays that only occur in wetter years. Further, it is possible that fish found in Llagas Creek below Chesbro Dam are also resident trout replenished from Chesbro Reservoir. Hunter (1980) noted that Llagas Creek historically sustained steelhead trout, although construction of Chesbro Dam and channelization of lower stream reaches, restricted steelhead spawning and rearing to the 5-mile reach from Chesbro Dam downstream to Santa Teresa Boulevard. As a consequence of the cumulative adverse impacts of channel modifications, streamflow regulation and the severe 1976–1977 drought, spawning had not occurred since 1975 (observation made in 1980). Hunter (1980) further noted that the 1974-year class was the last successful production in Llagas Creek and that summer sampling through 1980 failed to reveal the presence of juvenile steelhead. These observations led to the conclusion the steelhead population in Llagas Creek is greatly diminished and may not be self-sustaining.

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3.7 AGRICULTURAL AND FOREST RESOURCES

3.7.1 Introduction

The potential impact of the various alternatives, including the No Project Alternative, on agricultural and forest resources is considered in this section. The focus of this section is on agricultural lands as the project area is not forested and impacts to forest resources are not anticipated. There are no forestlands in the vicinity of the project area.

The major resource documents used to complete this section are listed here:

- California Department of Conservation. 2010. *Santa Clara County Important Farmland (Map)*. Sacramento, California.
- City of Gilroy. 2002. *City of Gilroy General Plan 2002 to 2020*. Adopted June 2010. Gilroy, California.
  Available online at:
  http://www.cityofgilroy.org/cityofgilroy/city_hall/community_development/planning/general_plan/defaul t.aspx. Accessed on February 15, 2013.
- City of Morgan Hill. 2010a. *Morgan Hill General Plan – Revised 2010*. Morgan Hill, California.
  Available online at: http://www.morgan-hill.ca.gov/index.aspx?NID=75. Accessed on February 15, 2013.
- Santa Clara County. 1994. *Santa Clara County General Plan, 1995–2010*. Adopted December 20. County of Santa Clara, California.
  Available online at: http://www.sccgov.org/sites/planning/Plans%20-%20Programs/General%20Plan/Pages/General- Plan.aspx.
  Accessed on February 15, 2103.
- Santa Clara County, Division of Agriculture. 2012. *2011 Santa Clara Crop Report.* Santa Clara County, California.

3.7.2 Project Area

Countywide, the region had been in a near constant transition in the post-war period from an agricultural area to a region driven by technology and subsequent growth and suburbanization. Most of the agricultural land in the northern end of the Santa Clara Valley has already been converted due to urbanization. However, the southern end of the Valley (including areas in vicinity of the Project area) continues to have an active agricultural industry. Generally, the agricultural lands are along the southern portion of the Project along Reaches 7A, 6, 5, 4 and 14. Reaches 8 and 7B are within Morgan Hill and are, for the most part, urbanized.

3.7.3 Environmental Setting

Agricultural Resources

Countywide Agricultural Production Statistics

The County of Santa Clara, Division of Agriculture (2012), provides annual statistics on agricultural output countywide. In 2011, over 233,000 acres of land were harvested in the county; over 90 percent of the lands were in field crops. The top five crops by acreage are as follows:

1. hay-grain (3,508 acres);
2. wine grapes (1,546 acres);
3. bell peppers (1,466 acres);
4. lettuce (1,244 acres); and
5. corn (1,202 acres).

Countywide, total gross value produced in 2011 was $247,993,900. The top six crops in the county based on gross value rounded to the nearest million, are as followed:

1. nursery crops ($86 million);
2. mushrooms ($62 million);
3. bell peppers ($11 million);
4. fresh tomatoes ($9 million);
5. wine grapes ($7 million); and
6. wax and chili peppers ($7 million).

Important Farmlands and Williams Act Lands

The state's Farmland Mapping and Monitoring Program (FMMP) produces maps and statistics to assist in analyzing potential impacts to agricultural resources. Table 3.7-1 provides acreages and descriptions of the types of Important Farmlands in Santa Clara County and within the Project footprint. Figures 3.7-1a-c map series shows the location of Important Farmlands and Williamson Act Lands in the vicinity of the project area. The figures also show areas only within the Project footprint where growers reported planting crops in 2013 to the county. It should be noted that the Williamson Act Lands, shown in the figures, are from 2009. A new map was developed for 2012–2013; however, GIS files were not available at the time the figures were being finalized. Therefore, the 2009 data was georeferenced with the most recent data, and no differences within the Project footprint or within the flooding extents were found.

Table 3.7-1 Summary of Important Farmlands in Santa Clara County and Within Project Footprint (2010)

Classification	Description	Countywide Acreage[1,2]	Number of Acres Within Project Footprint (% of Countywide Total)[3]	
			Permanent	Temporary
Prime Farmland	Best combination of physical and chemical features able to sustain long-term agricultural production. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields. Land must have been used for irrigated agricultural production at some time during the 4 years prior to the mapping date.	17,270	34 (0.2%)	17 (0.1%)
Farmland of Statewide Importance	Farmland of Statewide Importance is similar to Prime Farmland, but with minor shortcomings, such as greater slopes or less ability to store soil moisture. Land must have been used for irrigated agricultural production at some time during the 4 years prior to the mapping date.	3,630	2 (0.1%)	1(<0.1%)
Unique Farmland	Unique Farmland consists of lesser quality soils used for the production of the state's leading agricultural crops. This land is usually irrigated, but may include non-irrigated orchards or vineyards, as found in some climatic zones in California. Land must have been cropped at some time during the 4 years prior to the mapping date.	2,523	14 (0.6%)	1 (<0.1%)
Farmland of Local Importance	Small orchards and vineyards primarily in the foothill areas. Also, land cultivated as dry cropland for grains and hay.	4,328	Less than 0.5 acre (<0.1%)	0

1 California Department of Conservation (2010) Santa Clara County Important Farmland GIS Data Layer.

2 Grazing land, urban and built up land, other land, and water are not included in the table.

3 Acreages were calculated by Cardno ENTRIX by overlaying Project footprint on Important Farmlands (California Department of Conservation 2010).

As of 2010, there were 17,270 acres of Prime Farmland, 3,630 acres of Farmland of Statewide Importance, and 2,523 acres of Unique Farmland in the county. The majority of these farmlands are in South Santa Clara County. The Project footprint includes areas subject to both permanent and temporary conversion. There are 34 acres of Prime Farmland, 2 acres of Farmland of Statewide Importance, and 14 acres of Unique Farmland subject to permanent conversion within the Project footprint. In general, there is less land subject to temporary conversion (during construction) compared to permanent. It should be noted that the amount of acreage subject to conversion does vary by alternative. Tables 3.7-2 and 3.7-3 show the Important Farmlands within the Project footprint subject to permanent and temporary conversion, respectively by reach. Reach 14 has the most Important Farmlands subject to permanent conversion and Reaches 7B and 8 have no lands designated as Important Farmlands.

Table 3.7-2 Important Farmlands Within Project Footprint by Reach [1,2]

	Subject to Conversion	Reach (acres)							Total within Project Footprint
		4	5	6	7A	7B	8	14	
Permanent	Prime Farmland	8.0	2.8	1.6	7.7	--	--	13.8	**33.9**
Permanent	Farmland of Statewide Importance	--	--	--	0.5	--	--	1.4	**1.9**
Permanent	Unique Farmland	5.6	3.7	3.4	--	--	--	1.2	**13.9**
Permanent	Farmland of Local Importance	--	--	--	--	--	--	0.3	**0.3**
Permanent	**Total By Reach**	**13.6**	**6.5**	**5.0**	**8.2**	**--**	**--**	**16.7**	**50.0**
Temporary	Prime Farmland	6.3	--	1.6	4.4	--	--	4.4	**16.7**
Temporary	Farmland of Statewide Importance	--	--	--	--	--	--	--	**--**
Temporary	Unique Farmland	0.1	0.3	--	--	--	--	0.7	**1.1**
Temporary	Farmland of Local Importance	--	--	--	1.1	--	--	-	**1.1**
Temporary	**Total By Reach**	**6.5**	**0.3**	**1.6**	**5.5**	**--**	**--**	**5.1**	**19.0**

1 Acreages were calculated by Cardno ENTRIX by overlaying Project footprint on Important Farmlands map (California Department of Conservation 2010).

2 Totals may not match those in the row due to rounding.

Table 3.7-3 Williamson Act Lands Within Project Footprint by Reach [1,2]

Subject to Conversion	Reach (acres)							Total within Project Footprint
	4	5	6	7A	7B	8	14	
Permanent	2.2	2.6	10.8	1.0	--	--	0.2	**16.8**
Temporary	0.8	0.3	0.2	--	--	--	0.1	**1.4**
Total by Reach	**3.0**	**2.9**	**11.0**	**1.0**	**--**	**--**	**0.3**	**18.2**

1 Acreages were calculated by Cardno ENTRIX by overlaying Project footprint on the Williamson Act GIS data layer.

2 Totals may not match those in the row due to rounding.

Currently, over 360,000 acres of land in the county were covered under the Williamson Act (Santa Clara County 2013); these lands may also be for open space and not necessarily for agricultural purposes. There are 18.2 acres of Williamson Act Lands in the Project footprint and most (16.8 acres) of these are within the area subject to permanent conversion. Table 3.7-3 shows the amount of lands designated under the Williamson Act within the Project footprint (subject to both temporary and permanent conversion) by reach. For areas subject to permanent conversion, over half (10.8 acres) of the Williamson Act Lands are along Reach 6. Williamson Act Lands are not mutually exclusive from other Important Farmlands; about 5 acres of the Williamson Act Lands within the Project footprint are also classified as Important Farmlands. These include 3 acres also classified as Prime Farmland and about 2 acres classified as Unique Farmland. For example, Farmlands of Statewide Importance may also be enrolled in Williamson Act contracts. Zoning within the project area is discussed in greater detail in Section 3.8, Land Use and Planning; the City of Morgan Hill and the County of Santa Clara are responsible for zoning in the project area. Lands zoned specifically for agriculture are primarily along Reaches 4, 6, and 14. It should be noted that FFMP lands are also within lands zoned as Variable Density Rural Residential. Therefore, it should not be anticipated that the acres of land zoned, or designated specifically for agricultural use, would be equal to the FMMP lands.

Croplands within the Project Footprint

Growers in Santa Clara County, who apply pesticides, are required to obtain permits from the county to apply these to the croplands. The permits require growers to provide the crops that they are planning to cultivate in the treated areas. The data shown in Table 3.7-4 reflects crops expected to be grown within the portion of the Project footprint subject to permanent conversion. For 2013, the most reported land under cultivation was along Reach 6 (12.1 acres). The crops shown, as provided by the Santa Clara County Department of Agriculture (2013), do not include fallow fields that are not being treated with pesticides in 2013 and fields where organic crops are being grown, if any. The table includes only those plots were more than 0.25 acre are within the Project footprint It is common that some lands produce more than one harvest per year; therefore, the acreages associated with the individual crops are not reported, as they may be misleading.

Table 3.7-4 Summary of Crops Grown in Project Footprint Subject to Permanent Conversion (2013) [1]

Reach	Reported Land Under Cultivation in 2013	Crops [2]
4	12.1	Barley; Wheat; Oats; Dried Beans; Pumpkin; Corn; Tomatillo; Cucumber;
5	1.4	Flowering Plant; Celery; Broccoli; Chive; Pea; Chinese Greens
6	0.5	Bak Choy; Gai Choy; Gai Lon (Chinese Broccoli); Chrysanthemum; Flowering Plants; Napa Cabbage
7A	6.8	Dried Beans; Corn; Outdoor Flowers; Peppers
7B	0	No crops reported
8	0	No crops reported
14	<0.1	No crops were on an area within the footprint larger than 0.003 acre

[1] Calculated by Cardno ENTRIX by overlaying Santa Clara County Growers Data GIS Layer on the Project footprint. Organic crops, if any, and unreported uncultivated land are not included but the totals do include uncultivated areas reported to county.

[2] Listed in descending order based on size of field; some fields have multiple crops so acreages are not shown. Crops grown on fields with less than 0.25 acre within the Project footprint are not shown.

The County Department of Agriculture (2013) also provided grower information for the bypass, as proposed in the Reach 6 Bypass Alternative. There are currently, per county records, no crops being grown on any of the properties adjacent to the lands necessary to complete the bypass. However, there are some abandoned greenhouses and a business that ships flowers.

It is worth noting, that some of the Important Farmlands within the Project footprint do not appear to be actively farmed in 2013. In fact, about 27 acres of the Important Farmlands in the Project footprint (both lands subject to permanent and temporary conversion) are being cultivated; and about 42 acres do not include lands where growers reported crops in 2013. Although the exact acreage cannot be determined, some lands are possibly being farmed using organic practices or are being fallowed and not being treated with pesticides in 2013. Regardless, the results suggest the possibility that some of the designated Important Farmlands are not being farmed.

Forest Resources

There are no forest resources in the vicinity of the Project project area.

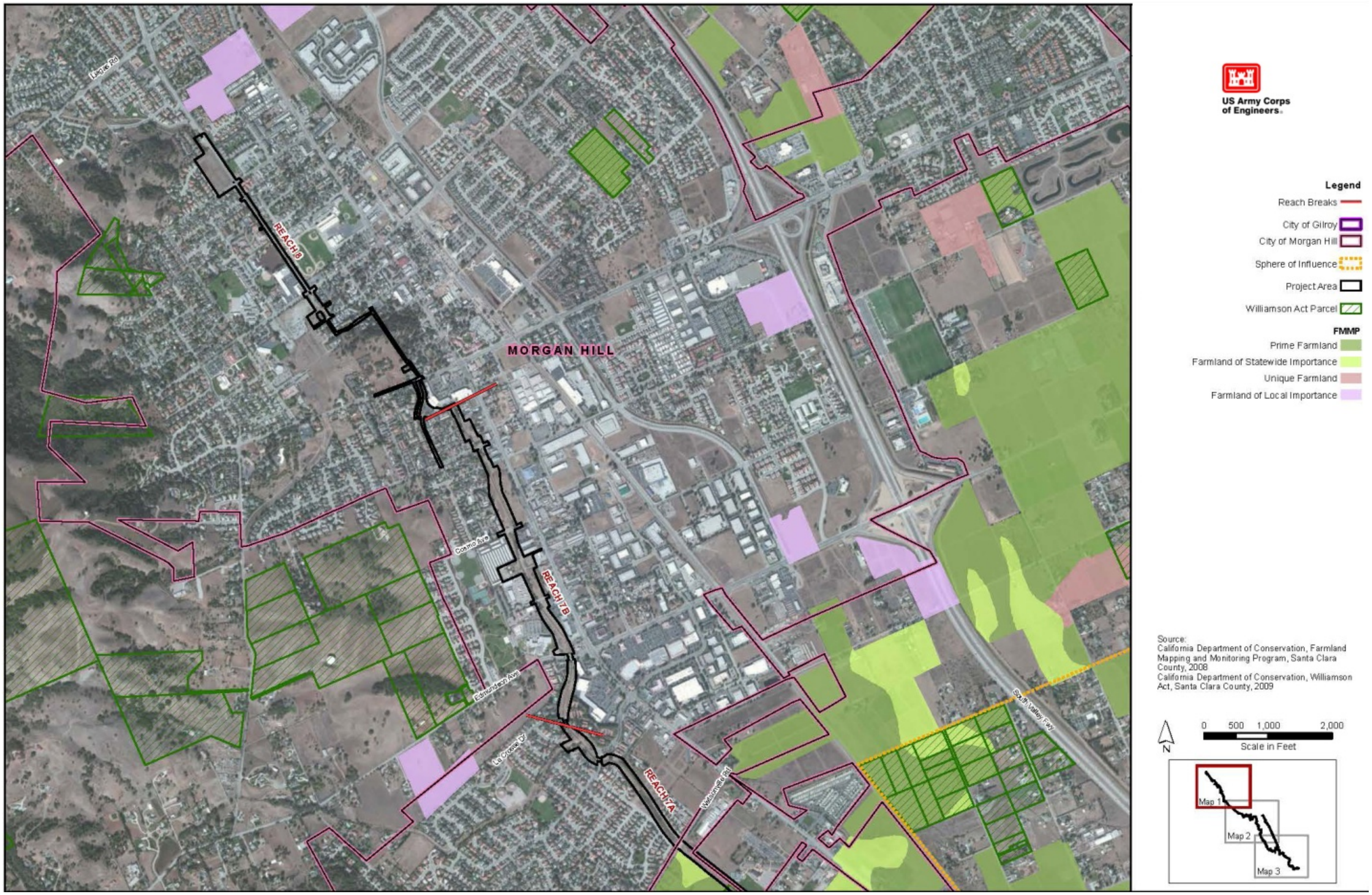

Figure 3.7-1a Agriculture in the Project Vicinity, Map 1 of 3

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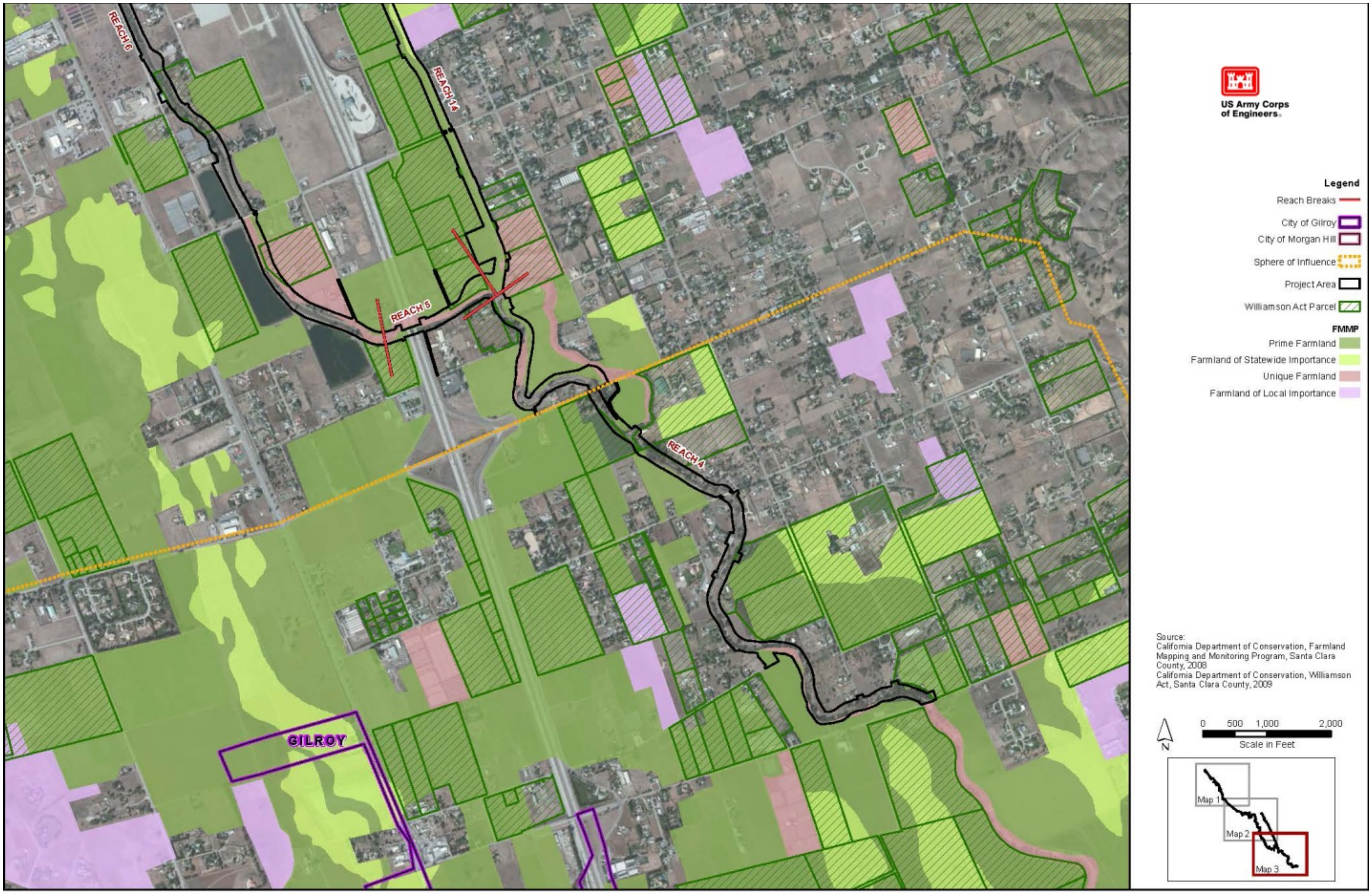

Figure 3.7-1b Agriculture in the Project Vicinity, Map 2 of 3

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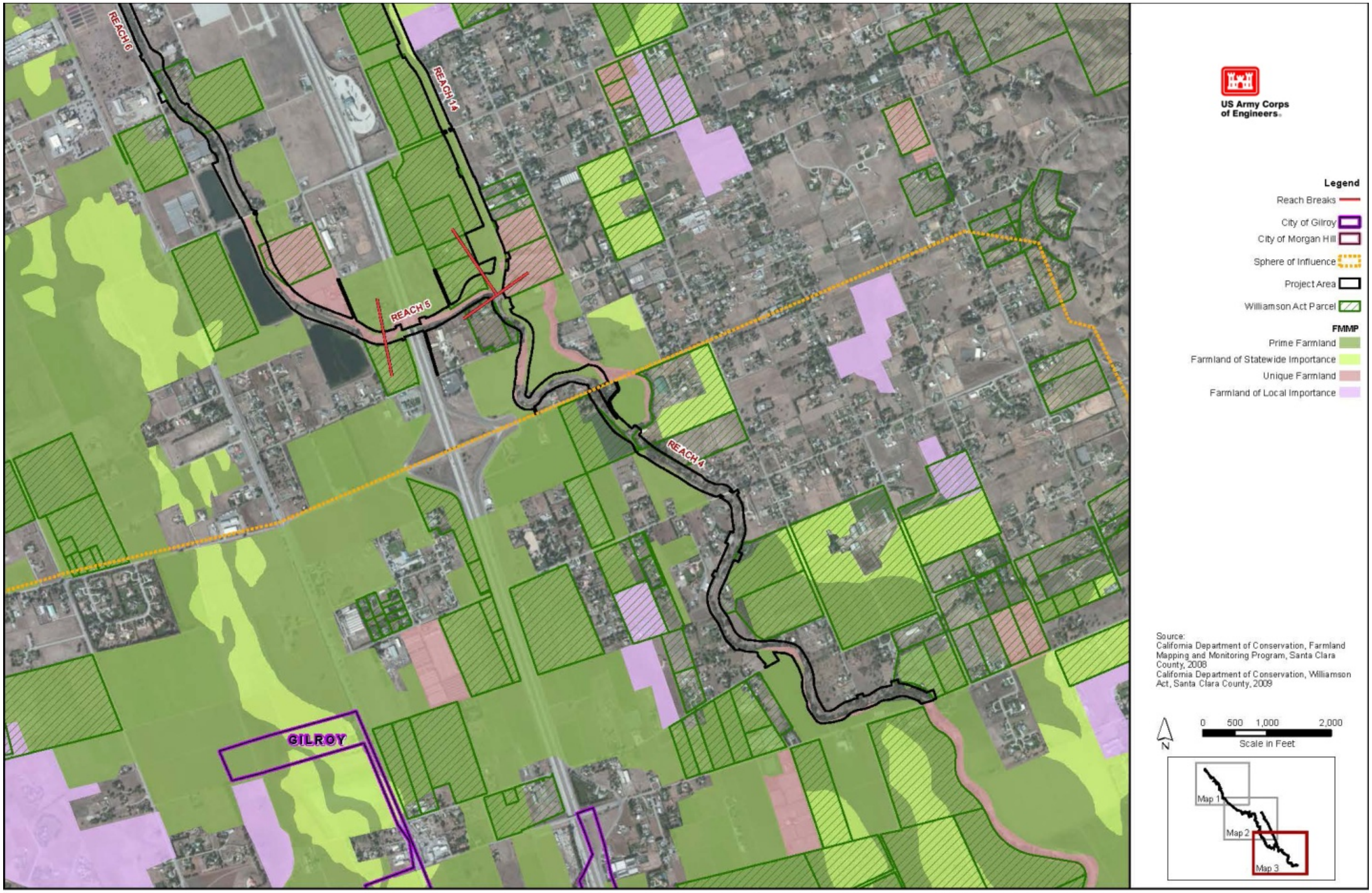

Figure 3.7-1c Agriculture in the Project Vicinity, Map 3 of 3

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3.8 LAND USE AND PLANNING

3.8.1 Introduction

In this section, existing land uses and zoning categories within the project area for the Project along with applicable planning regulations are provided and then reviewed for potential impacts or conflicts with aspects of the various alternatives.

3.8.2 Project Area

Overall, the project area is roughly 20–25 miles southeast of San Jose in the southern end of Santa Clara County. The northern portion (Reaches 8, 7B, and portions of 7A) is within the City of Morgan Hill; a portion of Reach 7A is within unincorporated Santa Clara County, but within Morgan Hill's SOI. Reaches 6, 5, and 14 are within the San Martin planning area and a portion of Reach 4 (north of Masten Avenue) is also in the San Martin planning area. The southern portion of Reach 4 is within unincorporated Santa Clara County and within the City of Gilroy's SOI. In general, the project area has a wide range of land uses as it passes through urbanized areas within Morgan Hill and agricultural areas primarily in the southern reaches. Land uses within the Project area include open space and public facilities along with agricultural, residential, and commercial uses. In general, land uses within the Gilroy SOI are agricultural. The project area is also within the jurisdiction of the SCVWD, which is authorized to provide comprehensive water resource planning for beneficial use and protect Santa Clara County from flooding.

3.8.3 Environmental Setting

The Figures 3.8-1a–c show land uses in and around the Project footprint. The figures combine land use designations from both the City of Morgan Hill and Santa Clara County. Residential land uses were combined for the maps, as were the commercial categories. Figures 3.8-2a–c shows the zoning designations in and around the Project footprint. The Project footprint is divided into areas to be permanently and temporarily converted. One example of an area subject to temporary conversion would be a construction staging area to be used during the construction period, but not after the built features have been completed. Tables 3.8-1 and 3.8-2 show land uses subject to permanent and temporary conversion, respectively, under the various alternatives. Tables 3.8-3 and 3.8-4 show the zoning classifications for areas subject to permanent and temporary conversion respectively by acres within the Project footprint by reach. The area within the Project footprint subject to conversion varies by alternative. A wide range of land uses and zoning classifications exist within the Project footprint. In general, the northern portion of the project area is urbanized while the southern portion is more agricultural and rural. Potential impacts to agricultural resources are addressed in Section 3.7, Agricultural and Forest Resources. It should be noted that acreages attributed to agricultural use vary based on the source. Land uses and zoning are generated at the county and city level, while Important Farmlands were mapped by the California Department of Conservation. For example, Prime Farmland (as identified in Section 3.7) is present not only in areas with land use designated for agriculture, but also in areas designated as open space and residential. Therefore, it is not expected that the Important Farmlands totals would match either the land use totals for agriculture or areas zoned for agriculture.

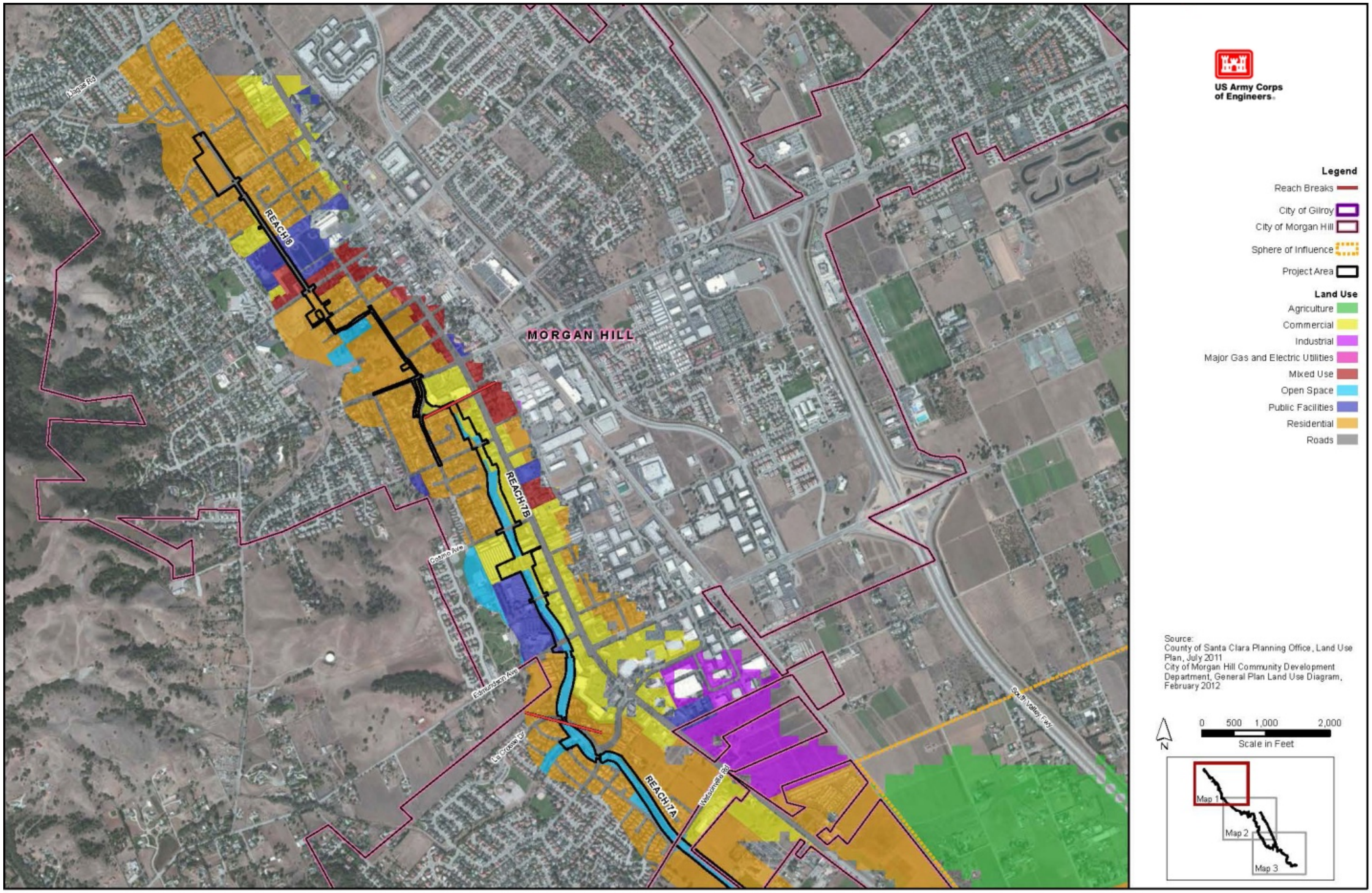

Figure 3.8-1a Land Use in the Project Vicinity, Map 1 of 3

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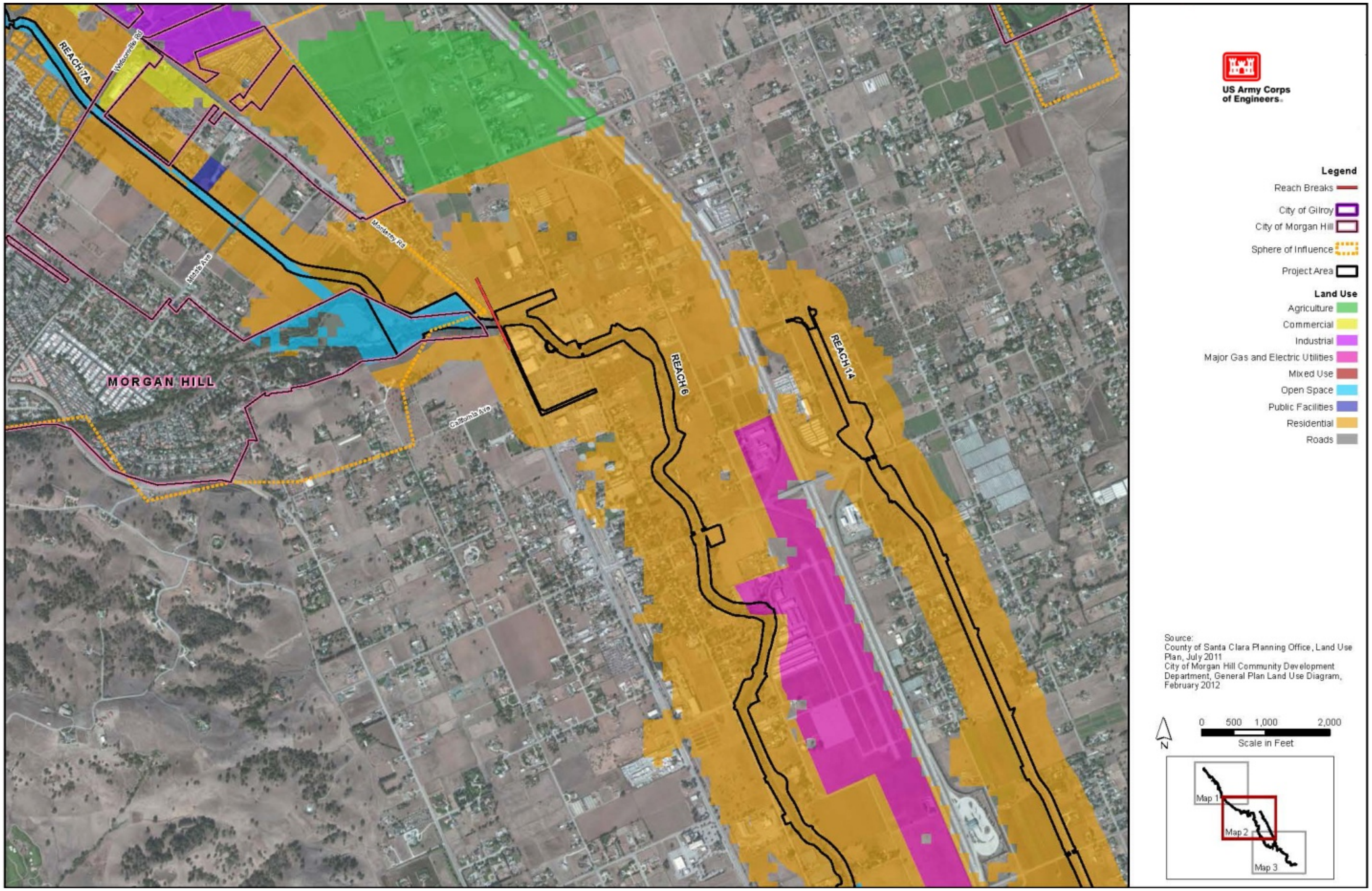

Figure 3.8-1b Land Use in the Project Vicinity, Map 2 of 3

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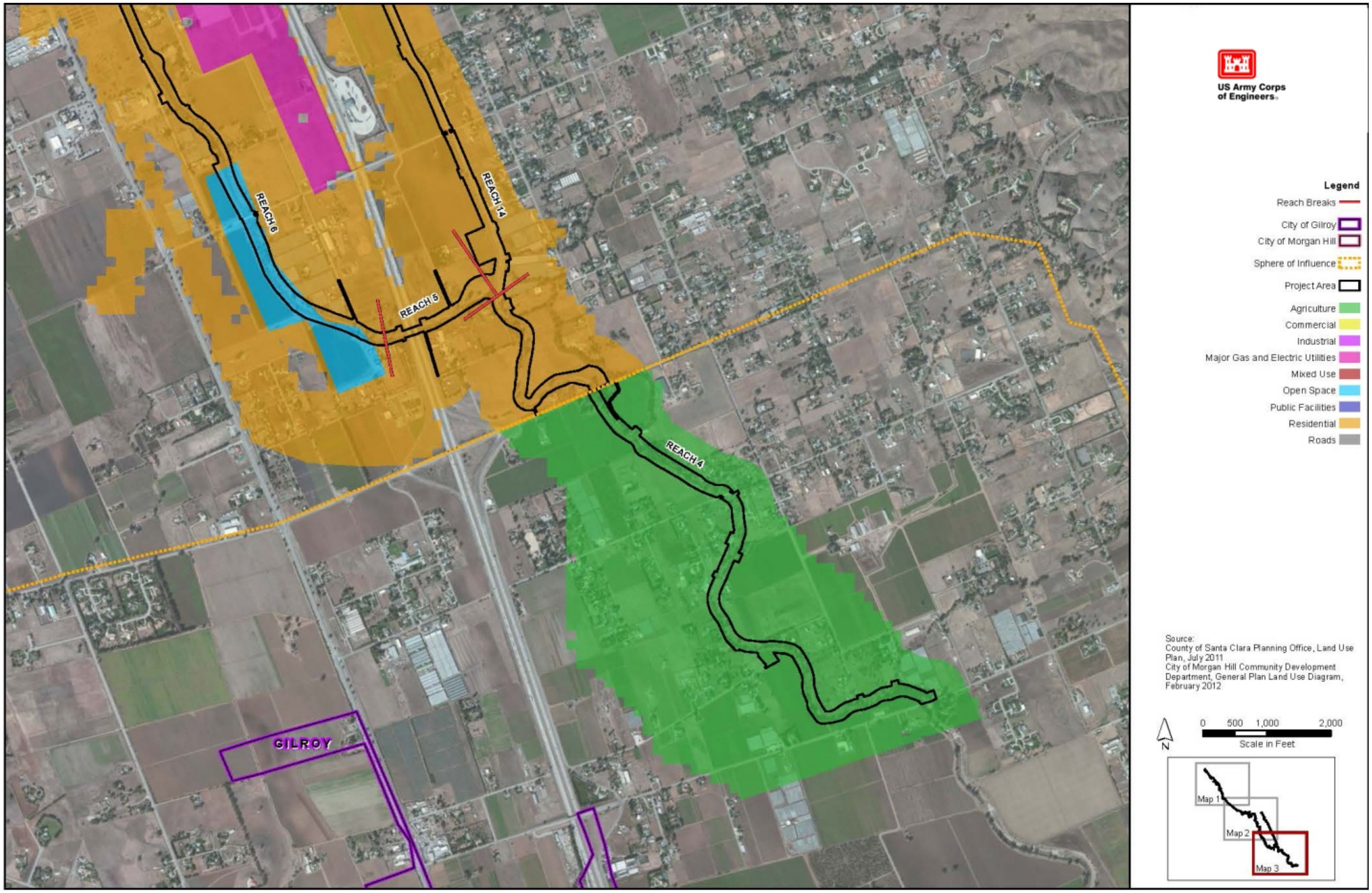

Figure 3.8-1c Land Use in the Project Vicinity, Map 3 of 3

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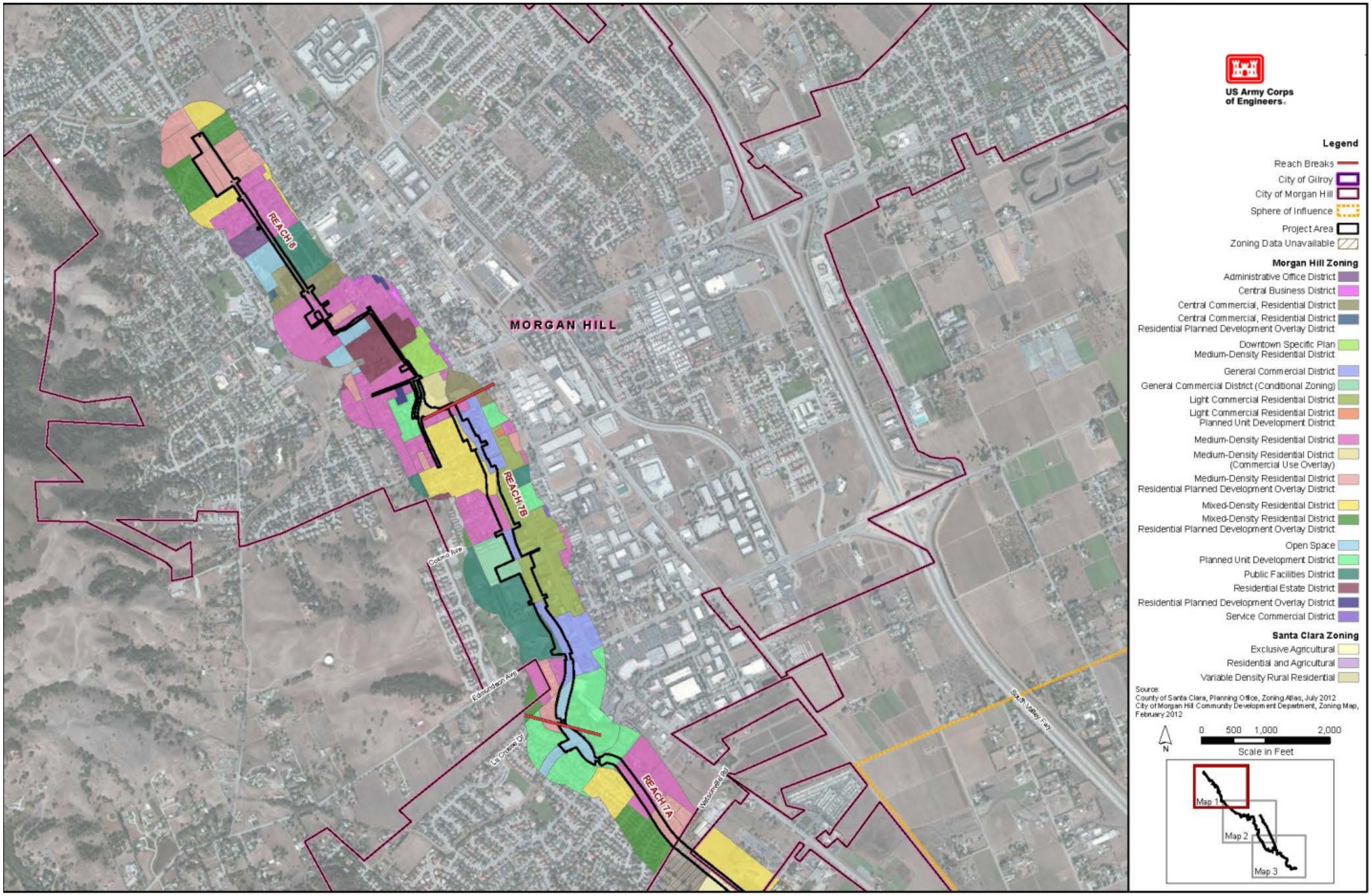

Figure 3.8-2a Zoning in the Project Vicinity, Map 1 of 3

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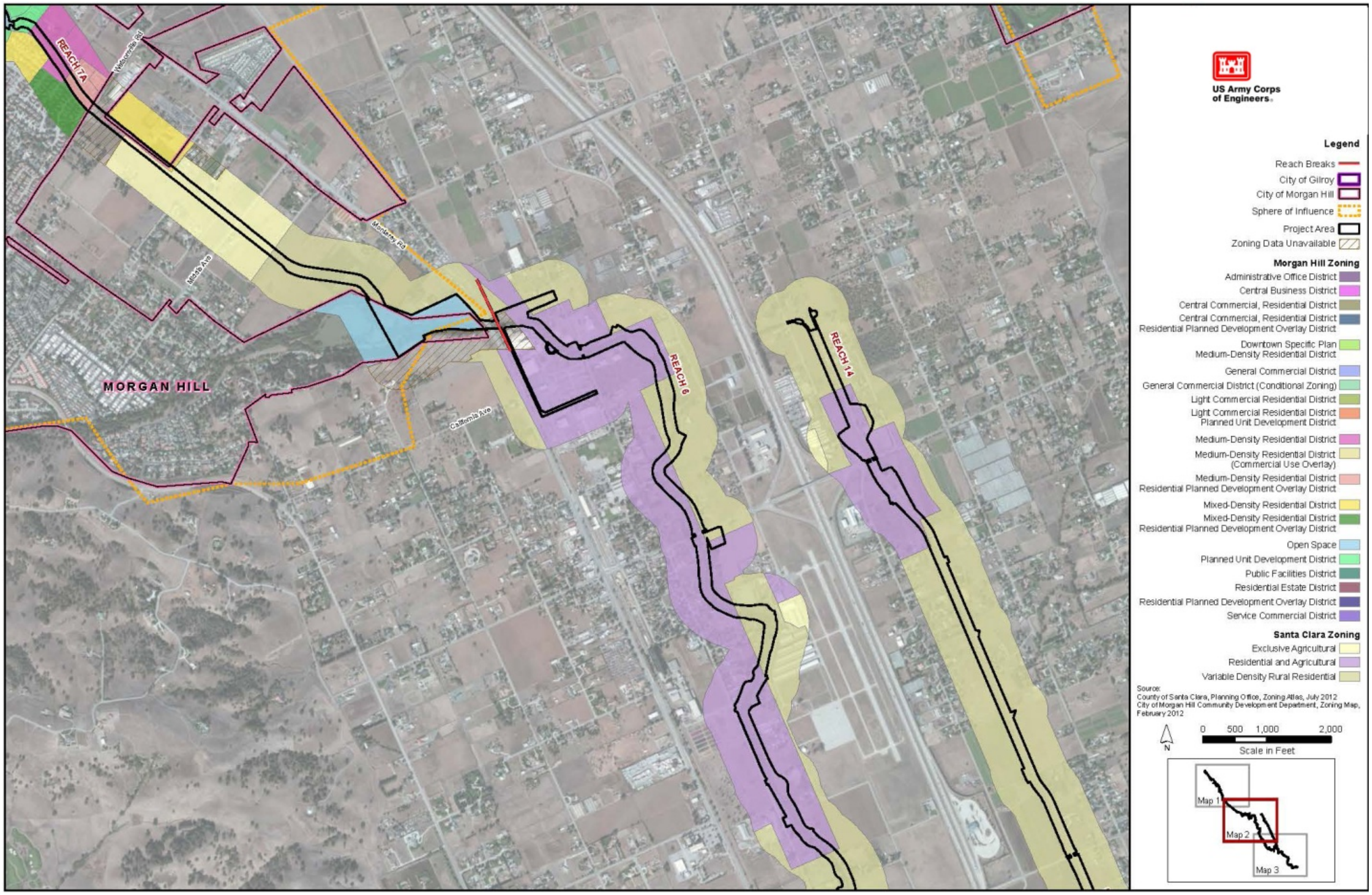

Figure 3.8-2b Zoning in the Project Vicinity, Map 2 of 3

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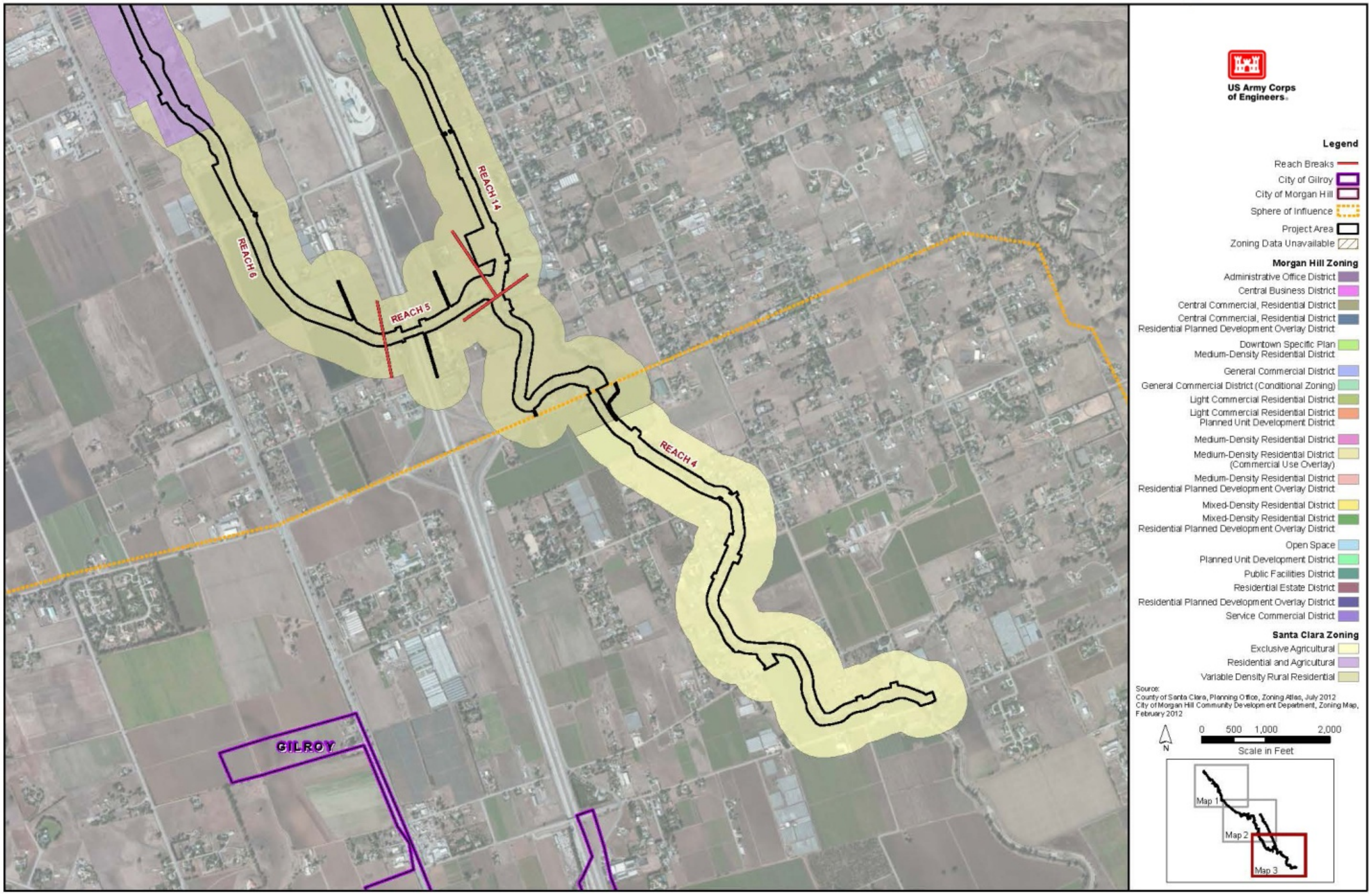

Figure 3.8-2c Zoning in the Project Vicinity, Map 3 of 3

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Table 3.8-1 Land Uses Within Project Footprint Subject to Permanent Conversion by Reach in Acres [1,2,3]

Land Use	Reach							Total Within Project Footprint [5]
	4 [4]	5	6	7A	7B	8	14	
Agriculture	43.2	-	-	-	-	-	-	**43.2**
Residential [6]	14.6	14.1	58.3	13.3	1.7	5.9	41.9	**149.7**
Commercial [7]	--	--	--	-<0.1	4.9	--	--	**4.9**
Mixed Use	--	--	--	--	--	<0.1	--	**<0.1**
Open Space	--	3.2	9.9	54.0	23.5	--	--	**90.6**
Public Facilities	--	--		<0.1	0.6	--	--	**0.6**
Major Gas and Electric Utilities	--	--	1.6	--	--	--	--	**1.6**

[1] Calculated by Cardno ENTRIX by overlaying Project footprint on Santa Clara County and City of Morgan Hill land use maps; the totals do not include areas classified as roads under designated land uses or streets under the Project footprint designation (about
11 acres). The amount of land converted would vary by alternative.

[2] No lands were designated for industrial.

[3] Santa Clara County and City of Morgan Hill Land Use categories were combined.

[4] Most of the Agricultural lands along Reach 4 are within the Gilroy SOI.

[5] Totals may not match those in the row due to rounding.

[6] Includes Rural Residential, Multi and Single Family Low and Medium Density Residential, and Residential Estate.

[7] Includes Commercial and Non-retail Commercial.

Table 3.8-2 Land Uses Within Project Footprint Subject to Temporary Conversion by Reach in Acres [1,2,3]

Land Use	Reach							Total Within Project Footprint [4]
	4	5	6	7A	7B	8	14	
Agriculture	5.7	--	--	--	--	--	--	**5.7**
Residential [5]	2.4	1.6	9.0	6.6	<0.1	4.8	12.7	**37.1**
Commercial [6]	--	--	--	--	1.2	--	--	**1.2**
Open Space	--	0.1	0.2	1.7	0.1	--	--	**2.0**

[1] Calculated by Cardno ENTRIX by overlaying Project footprint on Santa Clara County and City of Morgan Hill land use maps; the totals do not include roads (less than 0.25 acre).

[2] No lands were designated for industrial, mixed use, public facilities, or major gas and electric utilities.

[3] Santa Clara County and City of Morgan Hill Land Use categories were combined.

[4] Totals may not match those in the row due to rounding.

[5] Includes Rural Residential, Multi and Single Family Low and Medium Density Residential, and Residential Estate.

[6] Includes Commercial and Non-retail Commercial.

Table 3.8-3 Zoning within Project Footprint Subject to Permanent Conversion by Reach in Acres [1,2]

Zoning Classification	Reach							Total Within Project Footprint[4]
	4 [3]	5	6	7A	7B	8	14	
Santa Clara County								
Exclusive Agricultural	40.8	--	--	9.3	--	--	--	**50.1**
Residential and Agricultural	--	--	42.4	--	--	--	8.9	**51.2**
Variable Density Rural Residential	17.0	17.3	26.1	7.6	--	--	33.0	**100.1**
City of Morgan Hill								
Central Commercial, Residential District	--	--	--	--	-	0.2	--	**0.2**
General Commercial District	--	--	--	--	7.1	--	--	**7.1**
General Commercial District (Conditional Zoning)	--	--	--	--	0.3	--	--	**0.3**
Light Commercial Residential District	--	--	--	--	2.3	--	--	**2.3**
Medium Density Residential District	--	--	--	3.4	2.3	0.7	--	**6.4**
Medium Density Residential District, (Commercial Use Overlay)	--	--	--	--	0.5	--	--	**0.5**
Medium Density Residential District, Residential Planned Development Overlay District	--	--	--	2.1	0.2	2.4	--	**4.8**
Single Family District	--	--	--	1.2	2.5	--	--	**4.8**
Single Family District, Residential Planned Development Overlay District	--	--	--	<0.1	--	--	--	**<0.1**
Open Space	--	--	<0.1	18.1	5.6	--	--	**23.6**
Planned Unit Development District	--	--	--	1.3	<0.1	--	--	**1.3**
Public Facilities District	--	--	--	--	0.5	--	--	**0.5**

[1] Calculated by Cardno ENTRIX by overlaying Project footprint with Santa Clara County and City of Morgan Hill zoning maps. Roughly 4.5 acres of area classified as streets are not included in the totals.

[2] Unclassified areas within the Project footprint include 1.9 acres of Reach 6 and 2.5 acres of Reach 7A.

[3] The areas zoned for Exclusive Agriculture along Reach 4 are within the Gilroy SOI.

[4] Totals may not match those in the row due to rounding; also, total acreages may not match those from Land Use, because the Land Use tables do not include roads.

Table 3.8-4 Zoning within Project Footprint Subject to Temporary Conversion by Reach in Acres [1,2]

Zoning Classification	Reach 4 [3]	5	6	7A	7B	8	14	Total Within Project Footprint[4]
Santa Clara County								
Exclusive Agricultural	5.7	--	--	6.8	--	--	--	**12.5**
Residential and Agricultural	--	--	4.4	--	--	--	5.4	**9.7**
Variable Density Rural Residential	2.4	1.7	4.7	--	--	--	7.3	**16.1**
City of Morgan Hill								
Light Commercial Residential District	--	--	--	--	0.6	--	--	**0.6**
Medium Density Residential District	--	--	--	0.9	0.1	1.1	--	**2.0**
Medium Density Residential District, Residential Planned Development Overlay District	--	--	--	--	--	1.1	--	**1.1**
Single Family District	--	--	--	<0.1	<0.1	1.9	--	**1.9**
Single Family District, Residential Planned Development Overlay District	--	--	--	--	--	0.7	--	**0.7**
Planned Unit Development District	--	--	--	1.3	<0.1	--	--	**1.3**

[1] Calculated by Cardno ENTRIX by overlaying Project footprint with Santa Clara County and City of Morgan Hill zoning maps.

[2] Unclassified areas include 0.1 acre along Reach 6.

[3] The areas zoned for Exclusive Agriculture along Reach 4 are within the Gilroy SOI.

[4] Totals may not match those in the row due to rounding; also, total acreages may not match those from Land Use, because the Land Use tables do not include roads.

3.9 CULTURAL RESOURCES

3.9.1 Introduction

This section describes the existing regulatory and environmental conditions and the consequences of implementing the Project on cultural resources. Where impacts are identified, mitigation measures are proposed to reduce those impacts to less-than significant levels.

Cultural resources are defined as buildings, sites, structures, or objects, each of which may have historical, architectural, archaeological, cultural, or scientific importance. The California Office of Historic Preservation (OHP) defines a cultural resource as "*any physical evidence of human activities over 45 years old…*" (1995: 2).

The two primary federal cultural resources statutes applicable to the Llagas Creek project are the National Historic Preservation Act (NHPA)and the Archaeological and Historic Preservation Act. The National Historic Preservation Act of 1966 (NHPA) established the National Register of Historic Places (National Register), a listing of prehistoric and historic archaeological sites, buildings, districts, structures and objects significant in American history, architecture, archaeology, engineering and culture.

Section 106 of the NHPA requires federal agencies to “take into account” the effects of a proposed project on National Register-listed cultural resources as well as on those determined eligible for listing in the National Register through a process of the Federal agency consulting with Native American tribes and the State Historic Preservation Officer (SHPO). Such cultural resources may be of local, regional, state or national significance, and are referred to as “historic properties.” Taking into account a project's effects typically involves identifying cultural resources, determining whether they meet the criteria of the National Register, and, if eligible, mitigate any adverse effects caused by project construction. This process of implementing the provisions of Section 106, outlined in regulations issued by the Advisory Council on Historic Preservation (36 C.F.R. Part 800), involves participation by the Federal Agency, the SHPO, tribes, and possibly other parties interested in or have a concern about cultural resources.

The Archaeological and Historic Preservation Act of 1974 (AHPA) provides for the preservation of historic and archaeological data that might otherwise be lost or destroyed as a result of any Federal construction project or federally licensed or assisted undertaking. The AHPA authorizes the lead Federal agency of a project, or the Secretary of the Interior, to undertake recovery or preservation of significant data. Federal project funds, up to one percent of the project cost, may be used, or the agency may request the Secretary of the Interior to conduct the desired measures.

Some of the information presented below is drawn from the following report:

- Upper Llagas Creek Cultural Resources Inventory Report—Cardno ENTRIX Inc. February 2012, prepared for the Santa Clara Valley Water District.

3.9.2 Project Area

The project area for the cultural resources analysis encompasses about 13.9 miles (500 feet on center channel) along Llagas Creek, West Little Llagas Creek and the East Little Llagas Creek, a tributary of Llagas Creek. On the north, the physical limits of the Project area at the creek’s intersection with Llagas Road on West Little Llagas Creek in Morgan Hill; and in the south, 1,000 feet downstream of Buena Vista Avenue in Gilroy. See Chapter 2, Description of Alternatives, for greater detail on the Project.

3.9.3 Environmental Setting

Prehistory

Scant archaeological work was conducted in the Santa Clara Valley until relatively recently. Past research tended to overlook interior areas in favor of coastal areas, such as Monterey Bay, where large shellmounds were relatively easily identified on the landscape. Archaeological research in the Monterey Bay is relevant to the prehistory of the Santa Clara Valley and is discussed in further detail below to provide context to understanding the prehistoric and environmental setting of the Project area.

Archaeological research in the vicinity of Monterey Bay dates back to 1875, when scientist, W.E. Saxe, tested the Sand Hill Bluff site, CA-SCR-7, just north of Santa Cruz (Saxe 1875). Early research was continued by Kroeber (1915), who recorded nine sites near Monterey Bay and by Golomshtok (1922), Hill (1929), and Wood (1930) all of whom conducted surveys near Elkhorn Slough. Following this early work, virtually no archaeological research was conducted in the area again until the late 1940s and 1950s. Research during this period is highlighted by the work of: Pilling (1948), who identified numerous archaeological sites in Monterey County and, specifically, Elkhorn Slough; Greengo (1951), who sampled shellmounds near Elkhorn Slough; and Broadbent (1951a, 1951b), who tested the Berwick Park site, CA- MNT-107.

Recent archaeological work in the Monterey Bay involved the development of regional chronologies and models of culture change for the Bay and its immediate environs. Significant contributions in this regard have been presented by: Breschini (1983); Breschini et al. (1983); Breschini and Haversat (1992); Cartier (1993); Dietz (1985); Dietz et al. (1988); Dietz and Jackson (1981); Hildebrandt and Mikkelsen (1993); Jones and Hylkema (1988); Jones (1993); Jones et al. (1992); Jones and Jones (1992); and Patch and Jones (1984). Relatively recent archaeological investigations in the Santa Clara Valley have also generated models of regional chronology and culture change (cf., King and Hickman 1973b; Bergthold 1982; Elsasser 1986; and Hidlebrandt and Mikkelsen 1993).

The USACE - San Francisco District archaeologist conducted the cultural resources study in two phases. Phase I consisted of research of archaeological records and literature on file with the State of California and in the project files of the USACE office. Phase II consisted of an archaeological survey to identify and, as necessary, evaluate cultural resources for their eligibility for listing in the National Register of Historic Places. The records search and survey was conducted to comply with Section 106 of the National Historic Preservation Act of 1966 (PL89-665, as amended) to consider the effects upon historic properties and historic properties eligible for listing in the National Register of Historic Places (NRHP).

The USACE delineated the Area of Potential Effects (APE), defined as the geographical area within which a project may cause changes, directly or indirectly, in the character or use of historic properties located in the APE. The APE for this project is comprised of the six reaches, totaling approximately 12.7

miles, situated on the main branch of Llagas Creek, West Little Llagas Creek, and East Little Llagas Creek. It encompassed the stream channels and strips of land running parallel on both sides of the streams.

SCL-400: The Corps found most of the area within the previously mapped site boundaries was planted with dense row crops, and thus only the soils in the farm-vehicle paths surrounding the fields were visible. Nonetheless, no prehistoric cultural materials were observed. Sparsely scattered glass and ceramic fragments were found on the surface, consistent with information in the previous site record. To the north of the mapped site boundaries there was a fallow field between Church Creek and Llagas Creek that afforded very good soil visibility. Angular sandstone cobbles were common occurrences, and several pieces of chert were noted; however, none of the items exhibited obvious traits commonly found on cultural materials from prehistoric sites in the vicinity.

SCL-401: The examination of SCL-401 by the Corps verified the previous findings: no evidence of surface prehistoric cultural materials was noted on the floodplain terrace nor in the creek banks. There was very good soil visibility within a landscaped area adjacent to a residence. Historical materials along Llagas Creek associated with past farming activities were described and photographed: a capped well-head, a gas-powered pump ("Continental Motors"), and sections of iron pipe. The farming materials probably date to pre-1950s.

SCL-402: The site was situated in an agricultural field, uncultivated at the time of the survey, and thus the entire recorded site area was bare ground. The surface soils within the mapped site area did not appear to be darker than the surrounding soils. At least 50 pieces of angular sandstone were observed within the recorded site boundaries. None of them exhibited distinct evidence of having been burned. Intuitively selected soil samples (50 x 50 centimeters square and 2-3 centimeters deep) from three areas were screened through 1/4" hardware mesh without recovering any lithics, shell, or other cultural materials commonly found at sites in the region.

SCL-452: The Corps' observations of SCL-452 did not reveal the array of cultural materials previously observed at the site. The sparse vegetation along the creek banks afforded good soil visibility. One chert flake and one piece of ground-stone were observed on the west side of the channel, likely outside the footprint of the flood protection measures. The Corps's observations supported the report that SCL-452 was severely damaged by the past channel construction, and may have been bisected by channel excavation and/or realignment.

Llagas 3: This site was situated in a field of clover that had been harvested, thus providing unobstructed inspection of surface soils of the mapped site boundaries. In addition, gopher activity had brought up subsurface soils in five locations; these soils were screened through 1/4" hardware mesh. The creek-side soils were nearly vegetation free. No prehistoric cultural materials were noted in the surface and screened soils. Two fragments of turquoise colored bottle glass and several pieces of rusted metal were noted near an operating well-pump.

The Paleo-Indian and Milling Stone periods are identified as local expressions of the Paleo-Coastal Tradition (Jones et al. 1996). The Early Period is best represented at CA-MNT-391, and is characterized by Class L Olivella beads (thick and rectangular), contracting stem Rossi Square-stemmed projectile points, mortars and pestles, and handstones and milling slabs (Cartier 1993). The Middle Period is represented at CA-SCR-9, and is characterized by Class G2 Olivella beads, Ańo Nuevo Long-stemmed and contracting stem Rossi Square-stemmed projectile points, mortars and pestles, and handstones and milling slabs (Hylkema 1991). The Late Period has been difficult to define in the Monterey Bay area. Sites CA-MNT-1485/H and -1486/H, however, represent this period and are characterized by Class E, K, and M Olivella beads, Desert Side-notched projectile points, bedrock mortars, and pestles (Breschini and Haversat 1992).

Hildebrandt and Mikkelsen (1993) investigated the relationship between coastal and inland sites in the southern Santa Clara Valley and present a settlement/subsistence model for the area. They suggest that Early Period (3,000 B.C.-500 B.C.) sites in the valley are characterized by hunting, minimal use of wetland resources, and exploitation of marine resources, which implies that regular trips were made to the coast; Middle Period (500 B.C.-A.D. 1150) sites in the valley highlight occupation of the area by less mobile populations and a reduction in the use marine resources from the coast; and Late Period (A.D. 1150-1769) sites in the valley that highlight a further reduction in the mobility of local populations, an abandonment of marine resources, and increased exploitation of lacustrine resources (e.g., waterfowl, turtles, fresh water mussel, and fish). This model suggests that the Santa Clara Valley was inhabited at an early date by populations that split time between the interior and the coast, and that these populations eventually abandoned use of the coast, concentrating on lacustrine resources in the valley.

Ethnography

At the time of Euroamerican contact (ca. 1769) Native American groups of the Costanoan language family occupied the area from San Francisco Bay to southern Monterey Bay and the lower Salinas River. The Costanoan language family consists of eight separate and distinct languages, and approximately

50 tribelets (Levy 1978). The Santa Clara Valley and surrounding area was primarily occupied by speakers of three different Costanoan languages: Awaswas speakers occupied northern Monterey Bay near Aptos; Mutsun speakers occupied the Pajaro River drainage; and Tamyen speakers occupied

the south end of San Francisco Bay and the Santa Clara Valley. The tribelets of Matalan, Pitac, and Chitactac occupied the Santa Clara Valley and the area around the City of Morgan Hill (City of Morgan Hill General Plan EIR 2010a). Unfortunately, Costanoan culture was dramatically affected by missionization, and information (e.g., mission records and travelers logs) regarding its pre-contact organization is incomplete and inconsistent. In fact, Costanoan languages were probably extinct by 1935; and in 1971, the remaining Costanoan descendants united as a corporate entity identified as the Ohlone Indian Tribe (Levy 1978).

Costanoans lived in an area extending from San Francisco Bay to Monterey Bay. This large area was subdivided among several individual tribelets occupying specific territories. Each tribelet consisted of approximately 200 individuals, who were grouped into clans and moieties, usually controlled by a headman (Harrington 1933, 1942; Levy 1978). The position of headman was passed patrilineally, usually from father to son, with succession being subject to approval by the community. If no suitable male heir was available, a woman could also assume the role of headman. Tribelet political organization also included a council of elders, official speakers, and shamans (Levy 1978).

A wide variety of ecological zones, including foothills, valleys, sloughs, and coastal areas, were exploited by Costanoans to obtain subsistence resources. These resources included various seeds, nuts (e.g., acorn, buckeye, laurel, and hazelnuts), berries, grasses, corms, roots, insects, birds (e.g., geese, mallard, and coot), fish (e.g., steelhead, salmon, and sturgeon), shellfish (e.g., abalone, mussel and clam), and both marine and terrestrial mammals (e.g., sea otter, sea lion, harbor seal, deer, elk, grizzly bear, rabbits, antelope, raccoon, and squirrels) (Levy 1978).

History

The conquistador Sebastian Vizcaino’s landing at present day Monterey in 1602 is the earliest documented contact with Native Americans in the area. Following Vizcaino’s landing, other Spanish ships may have stopped at Monterey, but contact was minimal until the initial overland exploration of the area

by Spanish soldier Gaspar de Portolá in 1769 (Hoover et al. 1990). Portolá’s expedition followed the coast, while subsequent exploration of the region by soldier and explorer Pedro Fages in 1770 and 1772, soldier Fernando Javier de Rivera in 1774, and soldier and statesman Juan Bautista de Anza in 1776 traveled on the east side of the Santa Cruz Mountains through the Santa Clara Valley, and along a route that became known as El Camino Real (Beck and Haase 1974).

The Mexican Period (ca. 1821-1848) in California is an outgrowth of the Mexican Revolution, and its accompanying social and political views affected the mission system. In 1833, the missions were secularized and their lands divided among the Californios as land grants called ranchos. These ranchos facilitated the growth of a semi-aristocratic group that controlled the larger ranchos. Owners of ranchos used local populations, including Native Americans, essentially as forced labor to accomplish work on their large tracts of land. Consequently, Costanoans, and other Native American groups across California, were forced into a marginalized existence as peons or vaqueros on the large ranchos. Ranchos in the general Project area include: San Francisco de las Llagas, de Laguna Seca, San Ysidro, Ojo de Agua de la Coche, and Las Animas (Beck and Haase 1974).

The latter half of the 19th century witnessed an ongoing and growing immigration of Euroamericans into the area, which was also accompanied by regional cultural and economic changes. Euroamerican culture expanded at the expense of Hispanic culture. Dispersed farmsteads slowly replaced the immense Mexican ranchos, and the farming of various crops slowly replaced cattle ranching as the primary economic activity in the region. The advent of the railroad in the area in the late 1800s, and the mechanization of farming with steam-driven machinery, once again, altered the economy of the region. For example, larger and larger tracts of land were opened for farming. Some of this land consisted of areas reclaimed from sloughs and lowlands, but corporations specializing in crops grown for export soon purchased many of these farms. These agricultural developments demanded a large labor force and sparked a new wave of immigration into the region. Groups of Chinese were the first new immigrants in the area and were followed by Japanese, Filipino, and Mexican laborers.

History of the Project Area-Morgan Hill and Surrounding Areas

The Spanish established settlements at San Jose and Monterey by the late 1700s. The road that connected these two settlements passed through the Santa Clara Valley and was identified as Monterey Road. The road is still identified today as Monterey Road in the City of Morgan Hill. The earliest settlements in the Santa Clara Valley were established along Monterey Road and included Madrone. Madrone was located in vicinity of the current intersection of Peebles Avenue and Monterey Road in Morgan Hill. The growth of Madrone, and the Santa Clara Valley in general, was accelerated by the construction of a railroad line between San Jose and Gilroy in 1868–1869 (City of Morgan Hill General Plan, EIR 2010a). The founding and growth of Morgan Hill typify the development of the area.

Rancho Ojo de Agua de la Coche, one of the original Mexican land grants in the area, was purchased by Martin Murphy, Sr. in 1835. In the 1880s, Murphy's granddaughter, Diana Murphy, married Hiram Morgan Hill, and the couple took up residence on the rancho. The rancho soon became known as Morgan Hill Ranch, and Hiram and Diana built a home, "Villa Mira Monte" on the ranch in 1884. Trains passing through Santa Clara Valley would stop at the ranch to let off visitors and soon a depot and town were established near the Morgan Hill Ranch. The train stop was identified as Morgan Hill, and as a town grew around the depot, it retained the name of Morgan Hill.

The town of Morgan Hill expanded rapidly in the late 1800s and was incorporated as a city in 1906, with a population of approximately 600 (City of Morgan Hill General Plan, EIR 2010a). Development of the area peaked in the early 1900s and remained relatively stagnant until the 1970s–1980s when U.S. 101 was opened, linking the area to San Jose. At this time, there was a dramatic increase in the population and development of the City of Morgan Hill and the surrounding area. The population and economic development in the City of Morgan Hill and the surrounding area has continued to the present; and it is changing from agricultural area to a suburban residential area.

3.10 TRAFFIC AND CIRCULATION

3.10.1 Introduction

This section presents an analysis of transportation conditions on roads, transit routes, and bicycle and pedestrian facilities in the Project area that would be modified by the Project or used by construction traffic. The analysis of traffic conditions is focused primarily on construction-related effects, such as road closures, detours, deterioration of road conditions related to construction and hauling, and interruptions in transit service. Operations and maintenance related traffic effects after construction is completed are also discussed and addressed.

3.10.2 Project Area

The Tunnel Alternative (Applicant's Proposed Action) and other action alternatives (Project) are located in southern Santa Clara County, approximately 25 miles southeast of San Jose, in the communities of Morgan Hill, San Martin, and Gilroy. The Project consists of the upper seven reaches (4, 5, 6, 7A, 7B, 8, and 14) of Llagas Creek, East Little Llagas Creek, and West Little Llagas Creek above Buena Vista Avenue (see Figures 2.2-1 through 2.2-8).

The total length of the Project area, which includes all action alternatives, is approximately 13.9 miles; 6.1 miles of which are along the main branch of Llagas Creek, 2.8 miles along West Little Llagas Creek; and 3.4 miles along a tributary of Llagas Creek, known as East Little Llagas Creek. An additional 1.6 miles of new bypass channel would also be constructed along West Little Llagas Creek to Llagas Creek. To the north, the physical limits of the Project are at the intersection of Llagas Creek Drive and Llagas Road on West Little Llagas Creek in Morgan Hill, and the southern limit is 1,000 feet downstream of Buena Vista Avenue in Gilroy.

3.10.3 Environmental Setting

Roadways

The following major roadways are potentially affected by construction or construction traffic related to all Project alternatives, which are described by reach from south to north. The major preferred haul routes during construction of the Project are depicted in Figure 3.10-1.

All Reaches

- U.S. 101 runs generally parallel to the Project through all the reaches and crosses Reach 5. It is the major north-south freeway through the Project area. On- and off-ramps for U.S. 101 are located at E. Dunne Avenue, Tennant Avenue, San Martin Avenue, and Masten Avenue. U.S. 101 has three lanes in each direction in the Project area and widens to four lanes in each direction north of Cochrane Road in Morgan Hill.

- Cochrane Road is located north of the Project area and will be a primary haul route for excavated soils from most reaches. It runs generally south to north from Monterey Road under U.S. 101 and then bends east-west to Anderson Dam. Cochrane Road is a four-lane road that runs under U.S. 101 and then turns into a two-lane road at the intersection of Mission View Drive.

Reach 4

- Masten Avenue intersects Reach 4 and is a two-lane rural roadway with unpaved shoulders. It extends between Monterey Road and Center Avenue in unincorporated Santa Clara County. The speed limit is 45 miles per hour (mph), and adjacent land uses are agricultural. Masten Avenue provides access onto U.S. 101.

- Rucker Avenue will be used as a primary haul route in Reach 4 and runs east to west in the Project area and intersects Reach 4 at approximately its half way mark. It is a two-lane road that runs from Monterey Road at its western terminus to New Avenue east of Reach 4 at its eastern terminus.

- Denio Avenue will be used as a primary haul route in Reach 4 and runs east to west in the southern Project area and intersects Reach 4 towards its southern end. It is a two-lane road that runs from No Name Uno at its western terminus and ends at an agricultural field southwest of Reach 4 at its eastern terminus.

- No Name Uno will be used as a primary haul route in Reach 4 and is located in the southern Project area and runs parallel as a frontage road to U.S. 101 in Reach 4. It runs from Las Animas Road and ends at Lena Avenue to the North. It is a two-lane road, which intersects with Masten Avenue at its northern end.

- Buena Vista Avenue is located at the southern end of Reach 4. It is a two-lane rural roadway with unpaved shoulders and a posted speed limit of 35 mph. It extends between Monterey Road and New Avenue in unincorporated Santa Clara County just north of Gilroy. Buena Vista Avenue crosses, but does not provide access, onto U.S. 101.

Reach 6

- San Martin Avenue intersects Reach 6 and is a two-lane rural roadway with unpaved shoulders. The speed limit is 35 mph. San Martin Avenue provides access to U.S. 101 and extends through the unincorporated community of San Martin, connecting Monterey Road and Santa Teresa Boulevard. It reaches east to New Avenue outside of San Martin. Outside of the San Martin community, land uses along San Martin Avenue are primarily agricultural.

- Llagas Avenue runs along mostly the west side of Reach 6 and is a two-lane north-south roadway. The speed limit on Llagas Avenue is 25 mph in the residential area and 35 mph in other areas. Large garbage trucks use this roadway to access a waste disposal site to the north.

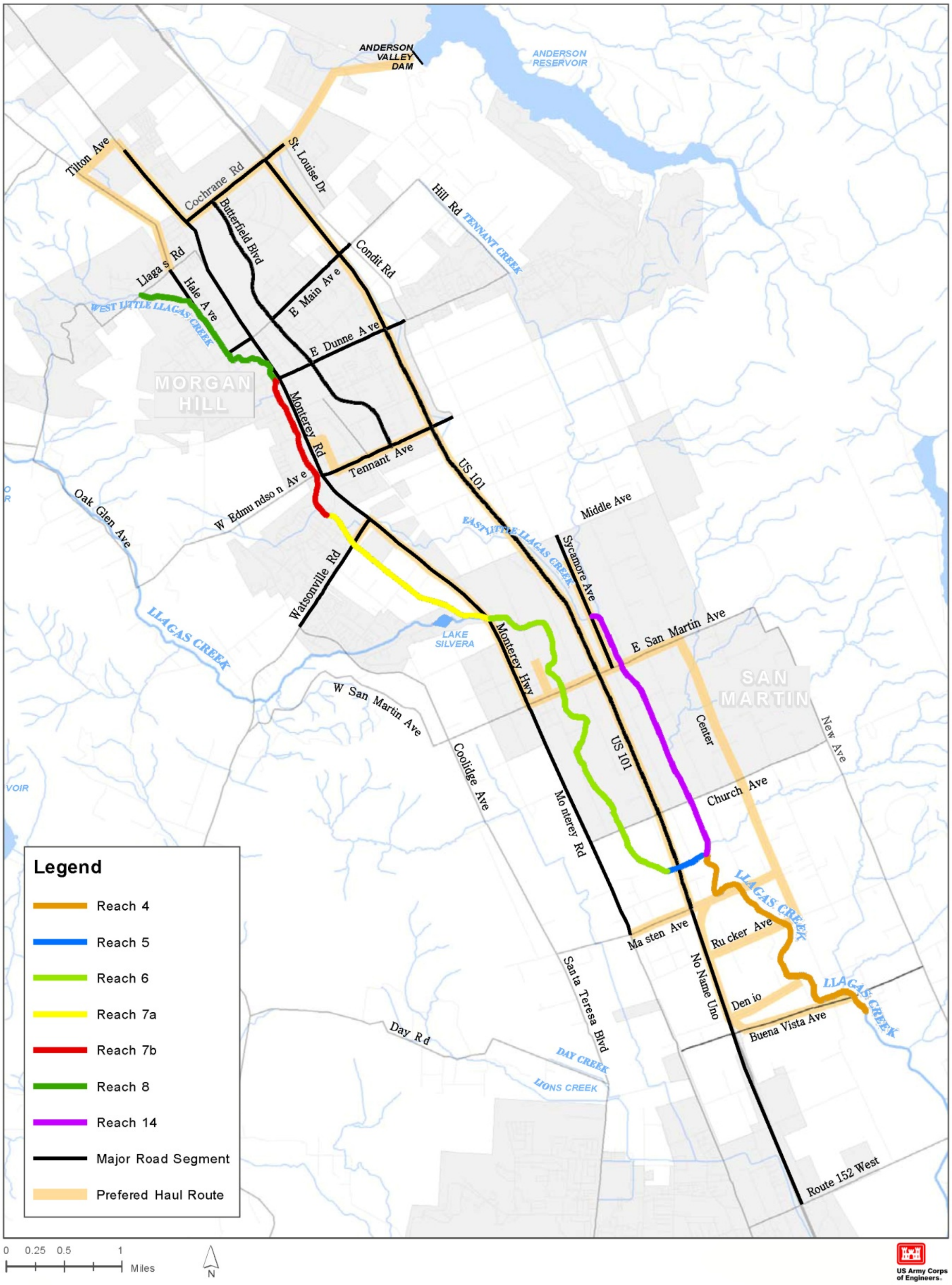
- The interface with Monterey Road begins at Reach 6 and runs generally north-south along Reach 6 and intersects at the north end of Reach 6 and Reach 7A and then continues to run alongside Reaches 7A, 7B, and 8. Monterey Road is the major north-south arterial road between Gilroy and Morgan Hill and is the designated U.S. 101 Business Route. Monterey Road generally has two lanes in each direction with a center turning lane. The speed limit is 35 mph within Morgan Hill city limits, and 45 mph south of Morgan Hill. Land uses along the developed portions of Monterey Road are primarily commercial/shopping centers. South of Morgan Hill, Monterey Road extends along undeveloped and agricultural lands.

- The character of Monterey Road changes as it extends through downtown Morgan Hill between Dunne Avenue (described in Reach 8) and Main Street. Along this segment, Monterey Road is fronted on both sides by downtown commercial uses. The roadway has two lanes in each direction with a landscaped center median. Parallel parking pockets are present on both sides of the roadway.

Reach 7A

- Watsonville Road intersects Reach 7A, which extends west off Monterey Road and connects south to Hecker Pass Highway (State Route 152) outside of Gilroy. Watsonville Road has one through lane in each direction, with an intermittent left-turn lane and bike lanes on the portion between Santa Teresa Boulevard and Monterey Road. Watsonville Road serves as a north-south alternate to U.S. 101 for residents west of the Santa Teresa corridor. Within Morgan Hill, Watsonville Road serves a large residential area west of Monterey Road.

Figure 3.10-1 - Upper Llagas Creek Major Road Segments



US Army Corps of Engineers

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Reach 7B

- Tennant Avenue intersects Reach 7B and is an east-west arterial in the southern part of Morgan Hill, with a 40 mph speed limit. West of U.S. 101, Tennant Avenue has two lanes in each direction with a center turn lane. East of U.S. 101, Tennant Avenue is a two-lane rural roadway and has bike lanes. Adjacent land uses are primarily commercial (shopping centers). Tennant Avenue becomes Edmundson Avenue west of Monterey Road.

- West of Monterey Road, Tennant Avenue becomes Edmundson Avenue. Edmundson Avenue extends west of the City of Morgan Hill into unincorporated Santa Clara County as a mostly two-lane rural roadway. Edmundson Avenue is a four-lane divided roadway near Monterey Road, and transitions to a two-lane undivided roadway west of Olympic Drive with a posted speed limit of 35 mph.

- Butterfield Boulevard is located east of Reaches 7B and 8 and is a four-lane north-south roadway parallel to Monterey Road. Butterfield Boulevard is located just east of the railroad. Commercial and residential uses are served by Butterfield Boulevard. The speed limit on Butterfield Boulevard is 45 mph and is under the jurisdiction of the City of Morgan Hill.

Reach 8

- At Dunne Avenue, Reach 7B ends, and Reach 8 begins. Dunne Avenue provides access between U.S. 101 and downtown Morgan Hill. East of Monterey Road, Dunne Avenue has a speed limit of 35 mph and two lanes in each direction with a center median. Bike lanes are present on this segment of Dunne Avenue.

- Main Street intersects Reach 8 and is a two-lane east-west roadway within the City of Morgan Hill.

- The speed limit on Main Street is 30 mph. A Valley Transportation Authority (VTA) transit center is located near the intersection of Main Street and Hale Avenue.

- Hale Avenue is located in Reach 8 and is a two-lane north-south roadway with a paved shoulder.

- Residential uses are located along the west side of Hale Avenue. Llagas Creek runs in an open channel along the east side of Hale between Wright Avenue and Main Street. The speed limit on Hale Avenue is 40 mph north of Wright Avenue and 35 mph south of Wright Avenue. Hale Avenue is under the jurisdiction of Morgan Hill and Santa Clara County south of the city boundary.

Reach 14

- Center Avenue is a preferred haul route, which is located to the east of Reach 14 and the northern end of Reach 4. Center Avenue runs north to south and is a two-lane road in the Project area.

- Sycamore Avenue is a preferred haul route, which is located to the west of Reach 14 and the northern end of Reach 4. Sycamore Avenue is a two-lane road in the Project area and runs north to south and parallels U.S. 101.

- San Martin Avenue (described under Reach 6) also intersects Reach 14 on the east side of U.S. 101.

Traffic Volumes

Existing average daily traffic (ADT) volumes are summarized in Table 3.10-1 for major roadways within the Project alternatives area.

Table 3.10-1 Existing Daily Traffic Volumes on Project Area Roadways

Roadway	Segment	Number of Lanes	Average Daily Traffic Volume	Reach
Monterey Rd	Burnett Ave to Cochrane Rd	4	16,410	8
Monterey Rd	Cochrane Rd to Old Monterey Rd	3	15,560	8
Monterey Rd	Old Monterey Rd to Main Ave	4	15,880	8
Monterey Rd	Main Ave to Dunne Ave	4	17,780	8
Monterey Rd	Dunne Ave to Tennant Ave	4	21,900	7B
Monterey Rd	Tennant Ave to Watsonville Rd	4	23,430	7A, 7B
Monterey Rd	Watsonville Rd to San Martin Ave	4	15,270	6, 7A
Monterey Rd	San Martin Ave to Masten Ave	4	10,600	6
Butterfield Blvd	Cochrane Rd to Main Ave	4	13,270	8
Butterfield Blvd	Main Ave to Dunne Ave	4	13,210	8
Butterfield Blvd	Dunne Ave to Tennant Ave	4	7,970	7B
Cochrane Rd	Monterey Rd to Madrone Parkway	4	16,040	8 (haul route to Anderson Dam)
Cochrane Rd	Madrone Parkway to U.S. 101	5	32,150	8 (haul route to Anderson Dam)
Cochrane Rd	U.S. 101 to St. Louise Dr	4	12,180	8 (haul route to Anderson Dam)
Dunne Ave	Monterey Rd to Peak Ave	2	6,580	West of reaches at beginning of Reach 8 and end of Reach 7B
Dunne Ave	Monterey Rd to Butterfield Blvd	4	17,170	East of reaches at beginning of Reach 8 and end of Reach 7B

Roadway	Segment	Number of Lanes	Average Daily Traffic Volume	Reach
Dunne Ave	Butterfield Blvd to U.S. 101	4	27,510	Farther East of reaches at beginning of Reach 8 and end of Reach 7B
Dunne Ave	U.S. 101 to Condit Rd	5	22,080	East of U.S. 101, at beginning of Reach 8 and end of Reach 7B
Tennant Ave	Monterey Rd to Butterfield Blvd	4	29,010	East of Reach 7B
Tennant Ave	Butterfield Blvd to U.S. 101	4	27,340	Farther east of Reach 7B
Tennant Ave	U.S. 101 to Condit Rd	4	10,450	Farther east of Reach 7B, east of U.S. 101
Main Ave	Hale Ave to Monterey Rd	2	8,940	From slightly west to east of Reach 8
Main Ave	Butterfield Blvd to Condit Rd	2	6,130	Farther east of Reach 8, to east of U.S. 101
Hale Ave	Llagas Rd to Main St	2	6,210	Parallel to Reach 8
Sycamore Ave	Middle Ave to San Martin Ave	2	970	Northern Reach 14
Watsonville Rd	Sunnyside Ave to Monterey Rd	2	9,900	Intersecting Reach 7A from the west to the east
U.S. 101	Cochrane Rd to Dunne Ave Dunne Ave to Tennant Ave Tennant Ave to San Martin Ave San Martin Ave to Masten Ave	6 6 6 6	125,000 118,000 112,000 109,000	Reach 8 Reach 7B Reaches 7B, 7A, and 14 Reaches 6 and 14
U.S. 101	Masten Ave to State Route 152 West	6	98,000	Reach 4

Source: Alta Planning and Design (2013)

Sidewalks

Sidewalks are present along most of the streets within portions of the Project area located in the City of Morgan Hill. Generally, the rural roads within the unincorporated portions of the Project area lack sidewalks and paved shoulders, but have unpaved shoulder areas. The sidewalks in the Project area vary in width from 4 to 6 feet.

Bicycle Facilities

Class I bicycle facilities, or off-street shared-use pathways, are present in the following locations within the Project area, listed from south to north:

- Along West Little Llagas Creek in Reach 7B, west embankment between Spring Avenue and La Crosse Drive (south);

- Along both embankments of West Little Llagas Creek from La Crosse Drive (south) to Watsonville Road in Reach 7A. This multi-use path segment is directly adjacent to construction activities planned as part of the Project, which will be widened to accommodate maintenance vehicles for the Project;

- Among the neighborhoods surrounding Paradise Park and Morgan Hill Community Park near Reach 7B; and

- Near Reach 8, along the northbound side of Butterfield Boulevard between Central Avenue and San Pedro Avenue.

Signed and striped bike lanes (i.e., Class II facilities) are present on the following roadways within the Project area listed from south to north:

- Sunnyside Avenue between Watsonville Road and Via Del Castille (Reach 7A);

- Watsonville Road between Calle Enrique and Sunnyside Avenue (Reach 7A);

- Monterey Road between Tilton Avenue and Main Avenue in the northern portion of the Project area, and between Dunne Avenue and Middle Avenue in the southern portion of the Project area (Reaches 7A, 7B, and 8);

- Vineyard Boulevard between Monterey Road and Tennant Avenue (Reach 7B);

- Edmundson Avenue between Piazza Way and Monterey Road (Reach 7B);

- Tennant Avenue between Monterey Road and U.S. 101 (Reach 7B);

- Olympic Drive between Denali Drive and Edmundson Avenue (Reach 7B);

- Butterfield Boulevard between Cochrane Road and Tennant Avenue (Reaches 7B and 8);

- An 1,100-foot portion of Walnut Grove Drive north of San Pedro Avenue behind the Home Depot (Reach 7B);

- Along Dunne Avenue between Monterey Road and Gallop Drive, which intersects the beginning of Reach 8 and the end of Reach 7B (Reach 7B);

- Main Avenue between De Witt Avenue and Butterfield Boulevard in the west, and between Laurel Road and Live Oak High School in the east, and Vineyard Boulevard between Monterey Road and Tennant Avenue (Reach 8);

- Peak Avenue between Wright Avenue and Main Avenue (Reach 8);
- Hill Road (southbound side only) between Dunne Avenue and Diana Avenue (Reach 8);
- Sutter Boulevard between Butterfield Boulevard and Cochrane Road (Reach 8);
- Cochrane Road between Monterey Road and San Rafael Street (Reach 8).

  Additionally, bicyclists are permitted to ride on all roadways within the Project area with the exception of U.S. 101.

Parking Conditions

On-street parking is permitted on a number of the major urbanized roadways within the Project area, including Monterey Road, E. Dunne Avenue, Tennant Avenue, Wright Avenue, Main Street, Hale Avenue, and on the local residential streets.

On the rural roads within unincorporated Santa Clara County, on-street parking is generally not available, as the roads are two lanes with narrow or unpaved shoulders. Some informal parking was observed in the unpaved shoulder areas where sufficient width was available to pull completely off the road.

Transit Service

Transit service in the Project area is provided by the VTA. VTA routes that utilize roadways within the Project area include the following, listed by the number that correlates with local to express service:

- Route 16. Categorized by VTA as Community Bus Service, the Morgan Hill Civic Center – Burnett Avenue line. Within the Project area, Route 16 utilizes Main Street.
- Route 68. Categorized by VTA as Regular Bus Service, the Gilroy Transit Center-San Jose Caltrain at Diridon Transit Center line. Within the Project area, Route 68 utilizes Monterey Road, Main Street, and Hale Street.
- Route 121. Categorized by VTA as Express Bus Service, the Gilroy Transit Center – Lockheed Martin Transit Center/Moffett Industrial Park line. Within the Project area, Route 121 Express utilizes Monterey Road and E. Dunne Avenue.
- Route 168. Categorized by VTA as Express Bus Service, the Gilroy Transit Center – San Jose Diridon Transit Center line. Within the Project area, Route 168 Express utilizes Monterey Road, E. Dunne Avenue, Butterfield Boulevard, and Cochrane Avenue.
- Caltrain commuter rail serves Morgan Hill and San Martin. The San

Martin Caltrain Station is located on Monterey Road at San Martin Avenue. The station is served by VTA bus routes 68, 121, and 168. The Morgan Hill station is located on Depot Street at E. 3rd Street. The Morgan Hill station is served by VTA Bus Routes 121 and 168.

VTA offers paratransit service to persons who are unable to independently use the bus or light rail services due to a physical or cognitive disability. A brokerage contractor, Outreach and Escort Inc., manages the paratransit service through agreements with sedan, accessible van, and taxi providers.

Airports

South County Airport is the closest airport within the Project area. South County Airport is adjacent to Reach 6 and is located between U.S. 101 and Reach 6. Reach 14 also runs parallel to the airport on the east side of U.S. 101. At the nearest point, Reach 6 is 0.10 mile from South County Airport. South County Airport is a public airport located at 13030 Murphy Avenue in San Martin (AirNav 2013) and is also referred to as South County Airport of Santa Clara County.

3.11 AIR QUALITY AND GREENHOUSE GASES

3.11.1 Introduction

California state and U.S. federal law defines criteria emissions to include the following: reactive or volatile organic compounds (ROCs or VOCs) as ozone (O_3) precursors, nitrogen oxides (NO and NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), respirable particulate matter (PM_{10}), and fine particulate matter ($PM_{2.5}$). Elimination of tetraethyl lead in motor gasoline has eliminated emissions of lead (Pb) from vehicles and portable equipment, although tetraethyl lead is still used in some types of aviation gasoline. Principal greenhouse gases (GHGs) include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and other fluorinated gases including nitrogen trifluoride and hydrofluorinated ethers.

During construction activities, the Project would cause criteria and GHG emissions from the combustion of fossil fuels (i.e., gasoline and diesel) used to operate off-road equipment, portable equipment, and vehicles in the vicinity of Morgan Hill and San Martin located in southern Santa Clara County. In addition, fugitive dust (as PM_{10} and $PM_{2.5}$) would be generated by earthmoving tasks. This section evaluates Project emissions to determine overall effects of the four variants—Tunnel Alternative (Applicant's Proposed Action), NRCS Alternative, Culvert/Channel Alternative, or Reach 6 Bypass Alternative—in relation to established thresholds of significance.

3.11.2 Project Area

The Project area (Reaches 4, 5, 6, 7A, 7B, 8, and 14) is entirely within Santa Clara County, which is part of the San Francisco Bay Area Air Basin (SFBAAB), under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD).

3.11.3 Environmental Setting

Air districts in California are required to monitor air pollutant levels to assure that National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) are met and, in the event that they are not, to develop strategies to meet these standards. If the standards are met, the local air basin is classified as being in "attainment"; if the standards are exceeded, it is classified as "nonattainment." Where insufficient data exist to make a determination, an area is deemed "unclassified".

The SFBAAB is designated as nonattainment for the state 1-hour, state 8-hour, and federal 8-hour ozone (O_3) standards; and nonattainment for all state PM_{10} and $PM_{2.5}$ (i.e., respirable particulate matter with an aerodynamic diameter of 10 and 2.5 micrometers or less) standards. The SFBAAB is also designated unclassified for the 24-hour federal PM_{10}

standard, and nonattainment and attainment for the federal 24-hour and annual $PM_{2.5}$ standards, respectively. For all other pollutants and standards, the SFBAAB is designated as either attainment or unclassified status (BAAQMD 2012a, CARB 2012b, USEPA 2012a, see Table 3.11-1).

Table 3.11-1 Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards		Federal Standards	
		ppmv	μg/m^3	ppmv	μg/m^3
Ozone (O_3)	1-hour	0.09	177	—	—
	8-hour	0.07	137	0.075	147
Nitrogen Dioxide (NO_2)	1-hour	0.18	338	0.100	188
	Annual	0.03	56	0.053	100
Sulfur Dioxide (SO_2)	1-hour	0.25	655	0.075	196
	3-hour Secondary	—	—	0.50	1,309
	24-hour	0.04	105	—	—
Carbon Monoxide (CO)	1-hour	20	22,898	35	40,071
	8-hour	9	10,304	9	10,304
	Lake Tahoe (8-hr)	6	6,869	—	—
Particulates (as PM_{10})	24-hour	—	50	—	150
	Annual	—	20	—	—
Particulates (as $PM_{2.5}$)	24-hour	—	—	—	35
	Annual Primary	—	12	—	12
	Annual Secondary	—	—	—	15
Lead (Pb)	30-day	—	1.5	—	—
	3-month (rolling)	—	—	—	0.15
Sulfates (as SO_4)	24-hour	—	25	—	—
Hydrogen Sulfide (H_2S)	1-hour	0.03	42	—	—
Vinyl Chloride (C_2H_3Cl)	24-hour	0.01	26	—	—
Visibility Reducing Particles	8-hour	Extinction coefficient of 0.23 per km; visibility of 10 miles or more (0.07 to 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70%.		—	—

ppmv = parts per million by volume

μg/m^3 = micrograms per cubic meter

The 1.5 μg/m^3 federal quarterly lead standard applied until 2008; 0.15 μg/m^3 rolling 3-month average thereafter

For gases, μg /m^3 calculated from ppmv based on molecular weight and standard conditions

Standard Temperature 25 deg. C

Standard Molar Volume 24.465 liter/g-mole

Sources: CARB 2012a, USEPA 2011a

3.11.3.1 Meteorology and Climate

The Project area climate is characterized by moderately wet winters and dry summers. About 90 percent of the annual total rainfall is received in the November through April period. Between June and September, normal rainfall is typically less than 0.6 inch (1.5 centimeters). Temperatures in the Project area average about 60°F (15°C) annually, with average summer highs in the 80 to 90°F (27 to 32°C) range and average winter lows in the 35 to 40°F (2 to 4°C) range. Precipitation averages about 21 inches (53 centimeters) per year, although annual precipitation can vary significantly from year-to-year. Annual average wind speeds in the Project area are about 6 to 8 MPH (2.7 to 3.6 meters per second). The predominant direction of air pollution transport in the Project area is inland from the coastal areas (BAAQMD 2010b; WC 2013; NOAA 2008).

3.11.3.2 Criteria air Pollutants

A criteria or regulated air pollutant is any air pollutant for which ambient air quality standards have been set by the U.S. Environmental Protection Agency (USEPA) or the California Air Resources Board (CARB). Primary air quality standards are established to protect human (public) health. Secondary air quality standards are designed to protect public welfare from effects, such as diminished production and quality of agricultural crops, reduced visibility, degraded soils, materials and infrastructure damage, and damaged vegetation. Criteria pollutants include ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), respirable particulate matter (PM_{10}), and fine particulate matter ($PM_{2.5}$). These six most prevalent criteria pollutants and their potential health effects are described below.

Ozone (O_3)

Ground-level O_3 is a secondary pollutant formed in the atmosphere by a series of complex chemical reactions and transformations in the presence of sunlight above urban areas due to the mixing effects of temperature inversions. Nitrogen oxides (NO_X) and reactive organic gases (ROGs)[1] are the principal constituents in these reactions. NO_X and ROG emissions are predominantly attributed to mobile sources (on-road motor vehicles and other mobile sources). Thus, regulation and control of NO_X and ROGs from these sources is essential to reduce the formation of ground-level O_3.

Ozone (O_3) is a strong irritating gas that can chemically burn and cause narrowing of airways, forcing the lungs and heart to work harder to provide oxygen to the body. A powerful oxidant, O_3 is capable of destroying organic matter, including human lung and airway tissue; it essentially burns through cell walls. O_3 damages cells in the lungs, making the passages inflamed and swollen. O_3 also causes shortness of breath, nasal congestion, coughing, eye irritation, sore throat, headache, chest discomfort, breathing pain, throat dryness, wheezing, fatigue, and nausea. It can damage alveoli, the individual air sacs in the lungs where oxygen and carbon dioxide are exchanged. O_3 has been associated with a decrease in resistance to infections. People most likely to be affected by O_3 include the elderly, the young, and athletes. O_3 may pose its worst health threat to people who already suffer from respiratory diseases, such as asthma, emphysema, and chronic bronchitis (VCAPCD 2003).

Nitrogen Dioxide (NO_2)

Nitrogen dioxide is formed in the atmosphere primarily by the rapid reaction of the colorless gas nitric oxide (NO) with atmospheric oxygen. It is a reddish-brown gas with an odor similar to that of bleach. NO_2 participates in the photochemical reactions that result in O_3. The greatest source of NO, and subsequently NO_2, is the high-temperature combustion of fossil fuels, such as in motor vehicle engines and power plant boilers. NO_2 and NO are referred to collectively as NO_X. NO_2 can irritate and damage the lungs, cause bronchitis and pneumonia, and lower resistance to respiratory infections, such as influenza. Researchers have identified harmful effects, similar to those caused by O3, with progressive changes over 4 hours of exposure causing impaired pulmonary function, increased incidence of acute respiratory disease, and difficult breathing for both bronchitis sufferers and healthy persons (VCAPCD 2003).

Carbon Monoxide (CO)

Carbon monoxide (CO) is a common, colorless, odorless, highly toxic gas. It is produced by natural and anthropogenic (caused by human activity) combustion processes. The major source of CO in urban areas is incomplete combustion of carbon-containing fuels (primarily gasoline, diesel fuel, and natural gas). However, it also results from combustion processes including forest fires and agricultural burning. Ambient CO concentrations are generally higher in the winter, usually on cold, clear days and nights with little or no wind. Low wind speeds inhibit horizontal dispersion and surface inversions inhibit vertical mixing. Traffic-congested intersections have the potential to result in localized high CO levels.

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[1] Also referred to as reactive organic compounds (ROCs) or volatile organic compounds (VOCs).

When inhaled, CO does not directly harm the lungs. The impact from CO is on oxygenation of the entire body. CO combines chemically with hemoglobin, the oxygen-transporting component of blood. This diminishes the ability of blood to carry oxygen to the brain, heart, and other vital organs. Red blood cells have 220 times the attraction for CO as for oxygen. This affinity interferes with movement of oxygen to the body's tissues. Effects from CO exposure include headaches, nausea, and death. People with heart ailments are at risk from low-level exposure to CO. Also sensitive are people with chronic respiratory disease, the elderly, infants and fetuses, and people suffering from anemia and other conditions that affect the oxygen-carrying capacity of blood. High CO levels in a concentrated area can result in asphyxiation. Studies show a synergistic negative health effect when CO and O3 are combined in ambient air, such as in urban environments, where respiratory distress is heightened in the presence of both pollutants. (VCAPCD 2003)

Sulfur Dioxide (SO_2)

Sulfur dioxide (SO_2) is a colorless gas with a sharp, irritating odor. It can react in the atmosphere to produce sulfuric acid and sulfates, which contribute to acid deposition and atmospheric visibility reduction. It also contributes to the formation of PM_{10}. Most of the SO_2 emitted into the atmosphere is from burning sulfur-containing fossil fuels by mobile sources, such as marine vessels and farm equipment and stationary fuel combustion. SO_2 irritates the mucous membranes of the eyes and nose and may also affect the mouth, trachea, and lungs. Healthy people may experience sore throats, coughing, and breathing difficulties when exposed to high concentrations. SO_2 causes constriction of the airways and poses a health hazard to asthmatics, which are very sensitive to SO_2. Children often experience more respiratory tract infections when they are exposed to SO_2 (VCAPCD 2003).

Respirable Particulate Matter, 10 Microns (PM_{10})

Respirable particulate matter, 10 microns consists of particulate matter, fine dusts and aerosols, 10 microns or smaller in diameter. When inhaled, particles larger than 10 microns generally are caught in the nose and throat and do not enter the lungs. PM_{10} can enter the large upper branches of the lungs just below the throat, where they are caught and removed (by coughing, spitting, or swallowing).

The primary sources of PM_{10} include dust from paved and unpaved roads and construction and demolition operations. Lesser sources of PM_{10} include wind erosion, agricultural operations, residential wood combustion, smoke, tailpipe emissions, and industrial sources. These sources have different constituents and, therefore, varying effects on health. Road dust is composed of many particles other than soil dust. It also includes engine exhaust, tire rubber, oil, and truck load spills. Diesel particulate matter (DPM) contains many toxic particle and elemental carbon (soot), and is considered a toxic air contaminant in California. Airborne particles absorb and adsorb toxic substances and can be inhaled and lodged in the lungs. Once in the lungs, the toxic substances can be absorbed into the bloodstream and carried throughout the body. Concentrations of PM_{10} tend to be lower during the winter months, because weather greatly affects PM10 concentrations. During rain, concentrations are relatively low; and on windy days, PM_{10} levels can be high. Photochemical aerosols, formed by chemical reactions with manmade emissions, may also influence PM_{10} concentrations.

Elevated ambient particulate levels are associated with premature death, an increased number of asthma attacks, reduced lung function, aggravation of bronchitis, respiratory disease, cancer, and other serious health effects. Short-term exposure to particulates can lead to coughing, minor throat irritation, and a reduction in lung function. Long-term exposure can be more harmful. The USEPA estimates that 8 percent of urban nonsmoker lung cancer risk is due to PM_{10} in soot from diesel trucks, buses, and cars. Additional studies by USEPA and the Harvard School of Public Health estimate that 50,000 to 60,000 deaths per year in the United States are caused by particulates. Particles of PM10 collect in the upper portion of the respiratory system, affecting the bronchial tubes, nose, and throat. They contribute to aggravation of asthma, premature death, increased number of asthma attacks, bronchitis, reduced lung function, respiratory disease, aggravation of respiratory and cardiovascular disease, alteration of lung tissue and structure, changes in respiratory defense mechanisms, and cancer (VCAPCD 2003).

Fine Particulate Matter, 2.5 Microns ($PM_{2.5}$)

Fine particulate matter, 2.5 microns ($PM_{2.5}$) is a mixture of particulate matter fine dusts and aerosols 2.5 microns or smaller in aerodynamic diameter. Particles of $PM_{2.5}$ can enter the deepest portions of the lungs where gas exchange occurs between the air and the blood stream. These are the most dangerous particles, because the lungs have no efficient mechanisms for removing them. If these particles are soluble in water, they pass directly into the blood stream within minutes. If they are not soluble in water, they are retained deep in the lungs and can remain there permanently. This increases the risks of long- term disease including chronic respiratory disease, cancer, and increased and premature death. Other effects include increased respiratory stress and disease, decreased lung function, alterations in lung tissue and structure, and alterations in respiratory tract defense mechanisms.

Particles of $PM_{2.5}$ are emitted from activities, such as industrial and residential combustion processes, wood burning, and from diesel and gasoline-powered vehicles. They are also formed in the atmosphere from gases, such as SO_2, NO_X, ammonia, and VOCs that are emitted from combustion activities and then become particles as a result of chemical transformations in the air (secondary particles) (VCAPCD 2003).

3.11.3.3 Sources of Air Pollutants

The most significant regional sources of O_3, NO_2, and CO in ambient air are automobiles, trucks, and other on-road vehicles, along with trains, vessels, and aircraft. Ozone is not directly emitted; rather, photochemical O_3 is formed by the atmospheric reaction of VOCs and NO_X in sunlight. Gasoline and diesel engines emit VOCs and NO_X as combustion products, as does natural gas-fired equipment (stationary sources), such as pump engines, gas turbine generators, process heaters, and steam boilers.

Local emissions of PM_{10} are primarily the result of fugitive dust from travel on unpaved roads, as well as construction and agricultural activities. Coarser particles also may be emitted from activities that disturb the topsoil. Other sources include wind-blown dust, pollen, salts, brake dust, and tire wear. Although $PM_{2.5}$ is a subset of PM_{10}, it differs from the rest of PM_{10}. While most of the ambient PM_{10} results from direct emissions of the pollutant, a significant amount of the ambient $PM_{2.5}$ results from transformation of precursors and condensing of gaseous pollutants in the atmosphere. Other than direct $PM_{2.5}$ emissions, the key pollutants contributing to $PM_{2.5}$ concentrations in the atmosphere are SO_2, NO_X, VOCs, and ammonia (CARB 2005).

The Project would cause emissions of criteria pollutants: VOC, CO, NO_X, SO_2, PM_{10}, and $PM_{2.5}$, primarily in diesel engine exhaust (off-road equipment, portable equipment, and larger trucks), and also in gasoline engine exhaust (small equipment and worker vehicles). Earthmoving activities would also generate emissions of fugitive dust as PM_{10} and $PM_{2.5}$.

3.11.3.4 Ambient Air Quality

Air quality is affected by a variety of sources in the general vicinity of the Project area. Large stationary sources, such as oil refineries and power plants emit substantial amounts of NO_X and ROCs, along with PM_{10} and $PM_{2.5}$. Light motor vehicles, diesel powered construction equipment, and commercial trucks used in the Project area would be another source of these pollutants. Noncombustion sources of PM_{10} and $PM_{2.5}$ include fugitive dust from roads, construction, demolition, and earthmoving. Finally, commercial and general aviation aircraft generate emissions that affect air quality.

The major sources of O_3 precursors NO_X and VOC in the Bay Area are motor vehicles and other mobile equipment (including agricultural equipment), solvent use, petroleum industry activities, nonelectric agricultural water pumping, and electric utilities operation.

BAAQMD operates an extensive regional air monitoring network comprised of monitoring stations (sites) that collectively measure the ambient concentrations of six criteria air pollutants: O_3, NO_2, CO, SO_2, PM_{10}, and $PM_{2.5}$. Not all monitoring stations are fully instrumented for these pollutants, while some sites have not been operating for adequate periods of time to provide representative data for characterization of attainment status.

Monitoring stations within or near the Project area are San Martin (O_3 only), Gilroy (O_3 and $PM_{2.5}$), and San Jose (O_3, NO_2, CO, SO_2, PM_{10}, and $PM_{2.5}$); there is no monitoring station in Morgan Hill. A 3-year (2009 through 2011) summary of ambient air quality monitored at these sites is presented in Section 3.11-3, Regulatory Setting. In general, air quality in the Project area is good with occasional exceedences of O_3 and $PM_{2.5}$ ambient air quality standards.

3.11.3.5 Sensitive Receptors

Certain population groups are considered more sensitive to air pollution and odors than others; in particular, children, elderly, and acutely ill and chronically ill persons, especially those with cardio respiratory diseases, such as asthma and bronchitis. Sensitive receptors (land uses) indicate locations where such individuals are typically found, namely schools, daycare centers, hospitals, convalescent homes, residences of sensitive persons, and parks with active recreational uses, such as youth sports.

Persons engaged in strenuous work or physical exercise also have increased sensitivity to poor air quality. Residential areas are considered more sensitive to air quality conditions than commercial and industrial areas, because people generally spend longer periods of time at their residences, resulting in greater exposure to ambient air quality conditions. Recreational uses, such as parks, are also considered sensitive, due to the greater exposure to ambient air quality conditions and because the presence of pollution detracts from the recreational experience.

A project with the potential to expose sensitive receptors (including residential areas) or the general public to substantial levels of toxic air contaminants, as designated by CARB under 17 California Code of Regulations (CCR) Subchapter 7, Sections 93000 and 93001, would be deemed to have a significant impact. Air toxics are pollutants that may result in an increase in mortality or serious illness, or that may pose a present or potential hazard to human health. Health effects of air toxics include cancer, birth defects, neurological damage, damage to the body's natural defense system, and diseases that can lead to premature death.

DPM is considered a carcinogenic air toxic in California (§93000). At the federal level, Title III of the Clean Air Act Amendments of 1990 identifies 188 pollutants as Hazardous Air Pollutants (HAPs), the federal term for air toxics. In 2001, the USEPA identified 21 HAPs as mobile source air toxics (MSATs), six of which are designated priority pollutants (66 Federal Register 17235): acetaldehyde, acrolein, benzene,1,3-butadiene, diesel exhaust (particulate matter and organic gases), and formaldehyde. The California Office of Environmental Health Hazard Assessment ([OEHHA] 2009) has published a cancer Unit Risk Value (URV) for DPM, which aggregates the individual URVs for the principal hazardous constituents of DPM, including aromatic hydrocarbons (benzene, ethylbenzene, toluene, xylenes – BETX), carbonyls (acrolein, acetaldehyde, formaldehyde), and PAHs (polycyclic aromatic hydrocarbons).

A screening-level Health Risk Assessment (HRA) for DPM was performed using conservative methodology for maximum excavation activity levels and timeframes. Conservative methodology overestimates impacts; thus, actual impacts would be lower. Detailed quantitative results of the HRA are presented in Sections 3.11.5 and 3.11.6. In general, due to the broad geographic dispersion of Project activities and their short-term temporary nature at any particular location, no significant risk to sensitive receptors or the general public would be posed by Project-related engine exhaust.

3.12 NOISE

3.12.1 Introduction

This section describes the general characteristics of noise and discusses the existing noise environment in southern Santa Clara County, the cities of Morgan Hill and Gilroy, the community of San Martin, and surrounding Llagas Creek, East Little Llagas Creek, and West Little Llagas Creek in relation to the Project.

This section also identifies applicable noise and vibration regulations, analyzes potential impacts, and provides mitigation measures associated with the implementation of the alternatives. Specifically, this section analyzes the potential noise and vibration impacts stemming from the proposed flood risk management and improvements in the project area, relative to applicable noise and vibration criteria and the existing ambient oise environment.

3.12.2 Project Area

The Project area is located in southern Santa Clara County, with portions located within the jurisdictions of the City of Morgan Hill, and the unincorporated town of San Martin. The project area includes lands bordering Reaches 4, 5, and 6 on Llagas Creek, Reaches 7A, 7B, and 8 on West Little Llagas Creek, and Reach 14 on East Little Llagas Creek.

Fundamental Concepts of Environmental Noise

Sound is mechanical energy transmitted by pressure waves in a compressible or incompressible medium, such as air or water, respectively (U.S. Department of Transportation [DOT], Federal Transit Administration [FTA] 2006a). Sound is a fluctuation of air pressure, and the number of times the fluctuation occurs in a second is known as frequency. Some sounds, like whistles, are associated with a single frequency and known as a “pure tone.” Usually, sound is made up of many frequencies, all blended together. When sound becomes excessive, annoying, or unwanted, it is referred to as noise. Noise may be continuous (constant noise with a steady decibel level), steady (constant noise with a fluctuating decibel level), impulsive (having a high peak of short duration), stationary (occurring from a fixed source), intermittent (occurring at the same rate), or transient (occurring at different rates). Noise levels are quantified using units of decibels (dB). The decibel is defined as ten times the base 10 logarithm (an exponent used in mathematical calculations to depict the perceived levels of variable quantities, such as visible light energy, electromagnetic field strength, and sound intensity) of the ratio between the two quantities of sound pressure squared. Sound pressure level attenuates (reduces with increased distance from the noise source), with respect to the inverse distance law, where sound pressure is inversely proportional to the distance from the noise source (USEPA 1974 and Plog 1988). Table 3.12-1 provides the dB of some common sound levels.

Two measurements used by local, state, and federal agencies, which relate the time-varying quality of environmental noise to its known effect on people are (1) the 24-hour equivalent sound level (L_{EQ}(24)); and (2) the day-night sound level (L_{DN}). The L_{EQ}(24) is the level of sound with the same energy as the time-varying sound of interest, averaged over a 24-hour period. The L_{DN} is the L_{EQ}(24) with 10 decibels on the A-weighted decibel scale (dBA) (the equivalent constant sound level for a varying sound level measured over a period of time) added to nighttime sound levels between the hours of 10:00 p.m. and 7:00 a.m. to account for people’s greater sensitivity to sound during nighttime hours. The 10th percentile-exceeded sound level, L_{10}, is the A-weighted sound level, which happens 10 percent or more of the time of the measurement (USEPA 1974). Other measures include L_{50} and L_{90}, which represent 50 percent and 90 percent of the case, respectively.

Table 3.12-1 Typical Sound Level Characteristics

Level dB	Sound Level Characteristic
160	Rocket Launch
150	Military Jet Plane Takeoff
140	Threshold of Pain
130	Commercial Jet Plane Takeoff
120	Industrial Chipper or Punch Press
110	Loud Automobile Horn
100	Passing Diesel Truck
90	Factory - Heavy Manufacturing
80	Factory - Light Manufacturing
70	Open Floor Office - Cubicles
60	Conversational Speech
50	Private Office - Walled
40	Residence in Daytime
30	Bedroom at Night
20	Recording or Broadcasting Studio
10	Threshold of Good Hearing - Adult
0	Threshold of Excellent Hearing – Child

Source: Plog 1988

Noise Levels, Perception, and Sources

In 1974, the USEPA published *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of* Safety. This document provides information for state and local agencies to use in developing their ambient noise standards.

In the EPA document, the agency identified outdoor and indoor noise levels to protect public health and welfare. A L_{EQ}(24) of 70 dBA was identified as the level of environmental noise that would not result in any measurable hearing loss over a lifetime. A L_{DN} of 55 dBA outdoors and a L_{DN} of 45 dBA indoors were identified as noise thresholds that would prevent activity interference or annoyance. These levels are not “peak” levels but are 24-hour averages over several years. Occasional high levels of noise may occur. A LDN of 55 dBA is equivalent to a continuous noise level of 48.6 dBA. Examples of typical noise levels measured at a typical distance (within 50 feet) from the source are as follows (USEPA 1974):

- Quiet room: 28–33 dBA;
- Computer room: 37–45 dBA;

- Refrigerator: 40–43 dBA;
- Forced hot air heating system: 42–52 dBA;
- Microwave oven: 55–59 dBA;
- Clothes dryer: 56–58 dBA;
- Clothes washer: 65–70 dBA;
- Telephone ringer: 66–75 dBA;
- Garbage disposal: 76–83 dBA;
- Hair dryer: 80-95 dBA; and
- Grass trimmer: 94–96 dBA.

The following relationships occur with regard to increases in noise measured on the A-weighted decibel scale (USEPA 1974):

- A change of 1 dBA cannot be perceived by humans, except in carefully controlled laboratory environments;
- Outside of the laboratory, a 3 dBA change is considered a just-perceivable difference by humans;
- A change in level of at least 5 dBA is required before any noticeable change in human response would be expected; and
- A 10 dBA change is subjectively heard as approximately a doubling in loudness and can cause an adverse response.

In most areas, transportation sources, such as automobiles, trucks, trains, and aircraft are the principal sources of ambient noise. Industrial and commercial equipment operations and wind-related sounds also contribute to the ambient noise environment in their vicinities. According to the National Institutes of Health, National Institute on Deafness and Communication Disorder (NIDCD), Noise-Induced Hearing Loss (NIHL) can occur when one is exposed to harmful noise. Brief exposure to sounds that are very loud, or longer-term exposure to fairly loud sounds can cause damage to the sensitive structures of the inner ear, called hair cells, in the cochlea (auditory portion of the inner ear). Once damaged, the hair cells cannot grow back, resulting in permanent NIHL (NIDCD 2008).

Sources of noise that can cause NIHL include loud motorcycles, firecrackers, and small firearms, all emitting sounds from 120 to 150 dBA. In addition, long or repeated exposure to sounds at or above 85 dBA can cause hearing loss, such as in an industrial setting. The louder the sound, the shorter the time period for NIHL to occur. Sounds of less than 75 dBA, even after long exposure, are unlikely to cause significant hearing loss. In populated areas, excessive noise levels of 90 to 110 dBA, which are typical during jet flyovers at 1,000 feet or a diesel truck at 50 feet, commonly result in complaints to civic authorities. Although being aware of decibel levels is an important factor in protecting one's hearing, distance from the source of the sound and duration of exposure to the sound are equally important (NIDCD 2008).

Noise also varies with distance. As an example, typical highway traffic 50 feet from a receptor typically produces sound levels of approximately 70 dBA. The same highway noise measures 66 dBA at a distance of 100 feet, assuming soft ground conditions (as opposed to hard surface such as rock). This decrease is known as attenuation. The outdoor attenuation rate for line sources, such as traffic, is a decrease of approximately 4.5 dBA (for soft ground) for every doubling of distance between the source of noise and the receptor (for hard ground the outdoor drop-off rate is 3 dBA for line sources). Assuming soft ground, for point sources, such as amplified music or speech, the outdoor attenuation rate is a decrease of approximately 7.5 dBA for every doubling of distance between the noise source and receptor (for hard ground the outdoor attenuation rate is 6 dBA for point sources).

Vibration

Vibrations are energy transmitted in waves through soil. These energy waves dissipate with distance from the vibration source (e.g. pile driving). Since energy is lost during the transfer of energy from one particle to another, vibration that is distant from the source is usually less perceptible than vibration closer to the source. However, actual human and structure response to different vibration levels is influenced by a combination of factors, including soil type, distance between the source and receptor, duration, and the number of perceived events.

If great enough, the energy transmitted through the ground as vibration can result in structural damage. To assess the potential for structural damage associated with vibration, the vibratory ground motion in the vicinity of the affected structure is measured in terms of peak particle velocity (PPV) in the vertical and horizontal directions (vector sum), typically in units of inches per second. A freight train passing at 100 feet can cause peak particle velocities of 0.1 inch per second, while a strong earthquake can produce peak particle velocities in the range of 10 inches per second. Minor cosmetic damage to buildings can begin in the range of 0.5 inch per second.

Ground-borne vibration consists of rapidly fluctuating motions within the ground that have a net motion of zero. The effects of ground-borne vibrations typically cause a nuisance only to people, but at extreme vibration levels, damage to buildings may occur. Although ground-borne vibration can be felt outdoors, it is typically an annoyance only to people indoors, where the associated effects of the shaking of a building can be notable and because people are moving around less indoors (e.g., seated). Induced ground-borne noise is an effect of ground-borne vibration and only exists indoors, since it is produced from noise radiated from the motion of the walls and floors of a room and may consist of the rattling of windows or dishes on shelves.

Although the perceptibility threshold is about 65 VdB (vibration decibels), human response to vibration is not usually significant unless the vibration exceeds 70 VdB with the threshold of potential architectural damage to fragile (e.g., old masonry) structures at about 100 VdB. Human response to different levels of ground-borne noise and vibration are as follows (FTA 2006a,b):

- 65 VdB produces a noise level between 25 (low frequency) and 40 dBA (high frequency) and is the approximate threshold of perception for many humans. Low-frequency sound is usually inaudible, mid-frequency sound can be excessive for quiet sleeping areas;
- 75 VdB produces a noise level between 35 (low frequency) and 50 dBA (high frequency). Approximate dividing line between barely perceptible and distinctly perceptible. Many people find transit vibration (e.g., passing trains) at this level annoying. Low-frequency noise acceptable for sleeping areas, mid-frequency noise annoying in most quiet occupied areas; and
- 85 VdB produces a noise level between 45 (low frequency) and 60 dBA (high frequency). Vibration acceptable only if there are an infrequent number of events per day. Low-frequency noise annoying for sleeping areas, mid-frequency noise annoying even for infrequent events with institutional land uses, such as schools and churches.

Blasting Airblast and Vibration

The two primary environmental effects of blasting are ground vibration (discussed above) and airblast. The following is a brief discussion of the two types of airblast.

Airblast

Energy released in an explosion creates an air overpressure, commonly called an airblast in the form of a propagating wave. If the receiver is close enough to the blast, the overpressure can be felt as the pressure front of the airblast passes. The accompanying booming sound lasts for only a few seconds. The explosive charges used in mining and mass grading are typically wholly contained in the ground, resulting in an airblast with frequency content below about 250 cycles per second, or hertz (Hz).

Because an airblast lasts for only a few seconds, use of L_{EQ}, a measure of sound level averaged over a specified period of time, to describe blast noise is inappropriate. Airblast is properly measured and described as a linear peak air overpressure (i.e., an increase above atmospheric pressure) in pounds per square inch (psi). Modern blast monitoring equipment is also capable of measuring peak overpressure data in terms of unweighted dB. Decibels, as used to describe airblast, should not be confused with or compared to dBA, which are commonly used to describe relatively steady-state noise levels. An airblast with a peak overpressure of 130 dB can be described as being mildly unpleasant, whereas exposure to jet aircraft noise at a level of 130 dBA would be painful and deafening.

Human Response to Airblast and Ground Vibration

Human response to blast vibration and airblast is difficult to quantify. Vibration and airblast can be felt or heard well below the levels that produce any damage to structures. The duration of the event has an effect on human response, as does blast frequency. Blast events are relatively short, on the order of several seconds for sequentially delayed blasts. Generally, as blast duration and vibration frequency increase, the potential for adverse human response increases. Studies have shown that a few blasts of longer duration produce a less adverse human response than short blasts that occur more often.

The average human response to ground vibration and airblast that may be anticipated when a person is at rest in quiet surroundings is listed below. If the person is engaged in any type of physical activity, the level required for the responses indicated would be increased considerably.

- Barely to distinctly perceptible—0.02 to 0.10 PPV;50 to 70 dB;
- Distinctly perceptible to strongly perceptible—0.10 to 0.50; 70 to 90 dB;
- Strongly perceptible to mildly unpleasant—0.50 to 1.00; 90 to 120 dB;
- Mildly unpleasant to distinctly unpleasant—1.00–2.00; 120 to 140 dB; and
- Distinctly unpleasant to intolerable—2.00 to 10.00; 140 to 170 dB

It is important to understand that the foregoing describes the responses of average individuals. Individual responses can fall anywhere within the full range of the human response spectrum.

Sensitive Receptors

Some land uses are generally regarded as being more sensitive to noise and vibration than others due to the types of population groups or activities involved. Sensitive population groups generally include children and the elderly. Noise sensitive land uses typically include all residential uses (single- and multi- family, mobile homes, dormitories, and similar uses), hospitals, nursing homes, schools, and parks.

Sensitive land uses are present along all proposed reaches, with the densest residential area in Morgan Hill along Reaches 7A, 7B, and 8, but more rural residences occurring along all reaches. The closest hospitals to the Project area are located north of Reach 8 in San Jose and south of Reach 4 in Gilroy. The closest nursing homes are along Reaches 6, 7B, and 8. The closest schools and parks are along Reaches 7A, 7B, and 8.

Table 3.12-2 lists the nearest residential receptors to each reach, while Table 3.12-3 summarizes the non-residential sensitive receptors closest to the Project area.

Table 3.12-2 Nearest Residential Sensitive Receptors

Reach	Distance to Nearest Receptor
4	40 feet
5	100 feet
6	50 feet
7A	50 feet
7B	40 feet
8	25 feet
14	85 feet

Table 3.12-3 Nearest Sensitive Receptors (Non-Residential)

Receptor	Reach	Distance and Direction
St Louise Regional Hospital	4	4,500 feet south
South County Retirement Home	6	750 feet east
Pacific Hills Manor/Morgan Hill Villa	8	1,500 feet west
Britton Middle School	8	50 feet east
Crossroads Christian Center School	8	400 feet east
Oakwood School	7A	250 feet east
San Martin/Gwinn Elementary School	6	650 feet west
Paradise Valley Elementary School	7B	900 feet west
PA Walsh Elementary School	8	950 feet west
Kiddie Academy of Morgan Hill	7A/7B	1,150 feet east
Stratford School Morgan Hill	8	900 feet north
Rucker Elementary School	5	3,300 feet west
Galvan Park	8	200 feet west
Morgan Hill Community Park/Dog Park	7B	800 feet west
Paradise Park	7B	1,100 feet west

3.12.3 Environmental Setting

This section describes the existing noise setting by Project reach as described in Chapter 2, Description of Alternatives.

Noise Setting

Noise measurements were collected at seven locations in the Project area in November and December 2011 to determine baseline noise levels for existing noise sources. Below is a description of the primary noise sources by reach and the estimated noise levels from the 2011 measurements. This information is summarized in Table 3.12-4. All measurements were taken on Wednesday, Thursday, or Friday; and 1 hour measurements were taken in late morning. Automobile traffic was the dominant noise source observed at all locations. Other sources of detectable noises included landscaping (lawn mowers, hedge trimmers, and leaf cutters), pedestrian traffic, and vegetation blowing during gusts of wind. Figure 3.12-1 shows the locations of the seven measurement sites. Appendix L, ULC Baseline Noise Measurements, includes noise measurement data and observations.

Table 3.12-4 Baseline Noise Measurement Locations

Site No.	Reach	Location	Duration	Average Noise Level (dB L_{EQ})	Primary Noise Sources Observed
1	14	Amistad Lane/ Church Avenue, San Martin	24-hr	63.6	traffic
2	6	Spring Street/Llagas Avenue, San Martin	24-hr	55.4	traffic, airport
3	7A	Watsonville Road/La Jolla Drive, Morgan Hill	24-hr	63.3	traffic
4	8	Warren/Hale Avenue, Morgan Hill.	24-hr	49.5	landscaping
5	8	Del Monte Avenue between Dunne Avenue/5th Street, Morgan Hill	24-hr	53.5	traffic
6	4	Rucker Avenue/Borges Court south of San Martin	1-hr	60.1	traffic
7	7B	Monterey Road/Spring Avenue, Morgan Hill	1-hr	62.1	traffic

Reach 4

Reach 4 is a semi-urban area with residential, agricultural, and commercial uses along the stream banks. A 1-hour noise measurement (Site 6) was collected along Reach 4, near Rucker Avenue and Borges Court south of San Martin on November 17, 2011. The L_{EQ} was 60.1 dB. Primary sources of noise observed during measurements included light traffic along Rucker Avenue.

Reach 5

Reach 5 is a semi-urban area with residential, agricultural, and commercial uses along the stream banks. The closest noise measurement to Reach 5 was Site 1 along Reach 14, approximately 0.5 mile from Reach 5. A 24-hour noise measurement was collected at Amistad Lane and Church Avenue in San Martin on November 22, 2011. The L_{EQ} was 63.6 dB. Primary sources of noise observed during measurements included light vehicle traffic along Church Avenue, agricultural vehicle traffic in fields to the west, minor noise from the South County Airport west of U.S. 101 and minor levels of U.S. 101 freeway traffic.

Reach 6

Reach 6 is a semi-urban area with residential, agricultural, and commercial uses along the stream banks and the South County Airport to the east. A 24-hour noise measurement (Site 2) was collected along Reach 6 near Spring Street and Llagas Avenue in San Martin on November 30, 2011. The L_{EQ} was 55.4 dB. Primary sources of noise observed during measurements included noise along Llagas Avenue and minor airport noise.

Reach 7A and Reach 7B

Reaches 7A and 7B are increasingly urbanized traveling north along these reaches, with dense residential populations along Reach 7A. A 24-hour noise measurement (Site 3) was collected along Reach 7A near Watsonville Road and La Jolla Drive in Morgan Hill on December 21, 2011, with an L_{EQ} of 63.3 dB. A 1-hour measurement (Site 7) was collected along Reach 7B near Monterey Road and Spring Avenue in Morgan Hill on November 15, 2011, with an L_{EQ} of 62.1 dB. Primary sources of noise observed during measurements at Site 3 included a moderate amount of flowing traffic along Watsonville Road and minor neighborhood traffic along La Jolla Drive. Primary sources of noise observed during measurements at Site 7 included vehicle traffic along Spring Avenue, truck backup alarms, and pedestrian traffic.

Reach 8

Reach 8 is an urbanized area within Morgan Hill with dense residential and commercial uses along the stream banks. Two 24-hour noise measurements (Sites 4 and 5) were collected along Reach 8 near Warren Avenue and Hale Avenue and along Del Monte Avenue between Dunne Avenue and 5th Street, respectively, in Morgan Hill. Site 4 was collected November 15, 2011 with an L_{EQ} of 49.5 dB, while Site 5 was collected December 20, 2011 with an L_{EQ} of 53.5 dB. Primary sources of noise observed during measurements at Site 4 included lawnmowers and leaf blowers. Primary sources of noise observed during measurements at Site 5 included light traffic along Del Monte Avenue.

Reach 14

Reach 14 is a semi-urban area with residential, agricultural, and commercial uses along the stream banks and the South County Airport to the west. A 24-hour noise measurement was collected along Reach 14 at Amistad Lane and Church Avenue in San Martin on November 22, 2011. The L_{EQ} was 63.6 dB. Primary sources of noise observed during measurements including light vehicle traffic along Church Avenue, agricultural vehicle traffic in fields to the west, minor noise from the airport west of U.S. 101 and minor levels of U.S. 101 freeway traffic.

Vibration Setting

Vibration sources in an area with both residential and industrial use, such as along most of the Project area, would include truck and vehicle traffic, as well as industrial operations. Vibration levels are not typically measured for background information, rather expected vibration levels are calculated for the various phases of a project, as is done for the Proposed Project activities. Vibration impact criteria do not take existing vibration levels into account. Typically, the existing environment does not include a significant number of perceptible ground-borne vibration events (which is true for the Project area). When a project would result in vibration levels greater than 5 VdB over the existing source, the existing source is not considered, and standard vibration criteria is applied (FTA 2006a,b).

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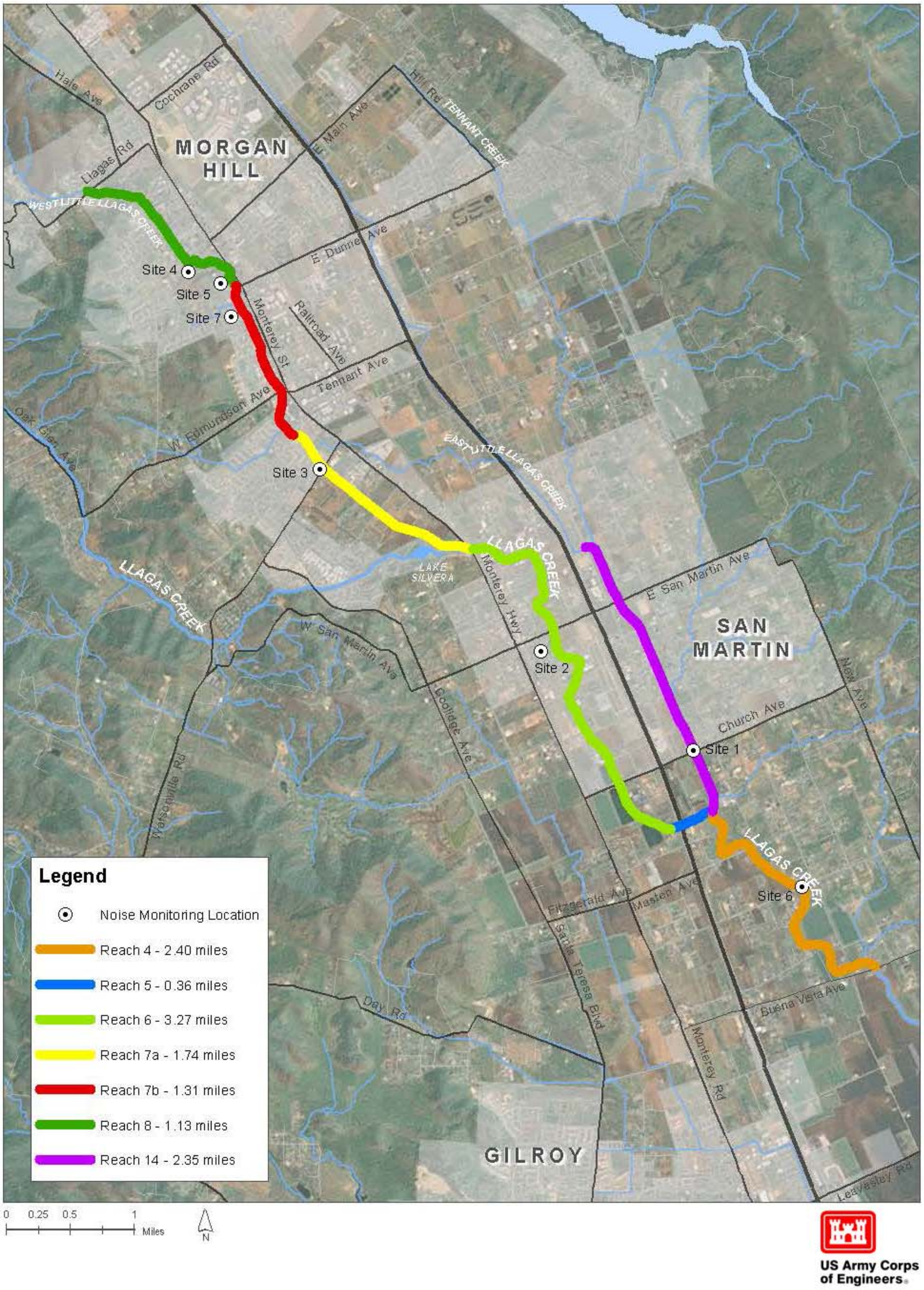

Figure 3.12-1 Noise Measurement Locations

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3.13 AESTHETIC RESOURCES

3.13.1 Introduction

This section evaluates potential impacts on visual resources (aesthetics) from implementation of the alternatives identified for the Project. The environmental setting presents an overview of the visual character of the regional landscape; a detailed description of visual character along the Project reaches; and contains federal, state, and local ordinances and regulations that are applicable to the Project. Results of the impact evaluation are provided in Section 4.13.

Visual resources are the physical characteristics of a landscape that determine its scenic quality. These characteristics are both natural and human-made features that make up a specific landscape scene. Natural features include landform, water surfaces, and vegetation. Human modifications include structures, roads, transmission lines, levees, etc. Since scenic quality is a measure of human sensory experience, the visual resources most important are those within the “seen area” of areas accessible to people (roadways, recreational areas, and human developments).

This visual assessment relies partly on the visual assessment methodology established by the Federal Highway Administration (FHWA) as described in the FHWA Visual Assessment Methodology manual. The aesthetic value of an area is a measure of its visual character and quality, combined with the viewer response to the area (Federal Highway Administration 1988). Viewer response is a combination of viewer exposure and viewer sensitivity. Viewer exposure is a function of the number of viewers, number of views seen, distance of the viewers, and viewing duration. Viewer sensitivity relates to the extent of the public’s concern for a particular viewshed. These terms and criteria are described in detail below.

3.13.2 Project Area

The project area for this visual resources analysis encompasses the Project site encompassing the area covered by all the action alternatives, as well as those portions of the adjacent residential and rural areas that are visible in the line of site of the Project alternatives and related activities. This would constitute a long narrow band running paralleling either side of Upper Llagas Creek through most of the creek reaches.

Visual Character

Both natural and artificial landscape features make up the character of a view. Character is influenced by geologic, hydrologic, botanical, wildlife, recreational, and urban features. Urban features include aspects of landscape settlement and development, such as roads, utilities, structures, earthworks, and the results of other human activities. The perception of visual character can vary significantly among viewers depending on their level of sensitivity and interest.

Among sensitive viewers, perception can vary seasonally and even hourly as weather, light, shadow, and the elements that compose the viewshed change. Form, line, color, and texture are the basic components used to describe visual character and quality for most visual assessments. The appearance of the viewshed is described in terms of the dominance of each of these components.

Visual Quality

Visual quality is evaluated using an approach to visual analysis adopted by FHWA, which employs the concepts of vividness, intactness, and unity, as defined below:

- *Vividness* is the visual power or memorability of landscape components, as they combine in striking or distinctive visual patterns.

- *Intactness* is the visual integrity of the natural and human built landscape and its freedom from encroaching elements; this factor can be present in well-kept urban and rural landscapes, as well as in natural settings.

- *Unity* is the visual coherence and compositional harmony of the landscape considered as a whole; it frequently attests to the careful design of individual components in the artificial landscape.

Visual quality is evaluated based on the relative degree of vividness, intactness, and unity, as modified by its visual sensitivity. High quality views are highly vivid, relatively intact, and exhibit a high degree of visual unity. Low quality views lack vividness, are not visually intact, and possess a low degree of visual unity.

Viewer Exposure and Sensitivity

The measure of the quality of a view is also correlated to the overall sensitivity of the viewer. Viewer sensitivity or concern is based on the visibility of resources in the landscape, proximity of viewers to the visual resource, elevation of viewers relative to the visual resource, frequency, and duration of views, number of viewers, and type and expectations of individuals and viewer groups. The importance of a view is related in part to the position of the viewer relative to the resource; therefore, visibility and visual dominance of landscape elements depend on their placement within the viewshed. To identify the importance of views of a resource, a viewshed is broken into zones of foreground, middleground, and background. Generally, the closer a resource is to the viewer, the more dominant it is and the greater its importance to the viewer. It is important to note that zones in a viewshed may also vary between different geographic regions or types of terrain.

Visual sensitivity depends on the number and type of viewers and the frequency and duration of views. Visual sensitivity is also modified by viewer activity, awareness, and visual expectations in relation to the number of viewers and viewing duration. For example, visual sensitivity is generally higher for views seen by people who are driving for pleasure and people engaging in recreational activities, such as hiking, biking or camping, and homeowners. It can also be inferred that sensitivity tends to be lower for views seen by people commuting to and from work or as part of their work. Commuters and non-recreational travelers typically have fleeting views and tend to focus on commute traffic, not on surrounding scenery; therefore, they are generally considered to have low visual sensitivity due to the transient nature of their viewing experience. Residential viewers typically have extended viewing periods and are concerned about changes in the views from their homes; therefore, they are generally considered to have high visual sensitivity. Viewers using recreation trails and areas, scenic highways, and scenic overlooks are usually assessed as having high visual sensitivity. The same landform or visual resource appearing in different geographic areas could have a different degree of visual quality and sensitivity in each setting. For example, a small hill may be a significant visual element on a flat landscape but have very little significance in mountainous terrain.

3.13.3 Environmental Setting

The Project area is located along the Upper Llagas Creek corridor in southern Santa Clara County running through the City of Morgan Hill to the north and south through San Martin and south to the City of Gilroy. In the Project area, Upper Llagas Creek, East and West Little Llagas Creek run generally parallel on the west and east of U.S. 101. The Project area landscape contains agricultural and low intensity land uses in the south and primarily urban in nature running north through portions of densely populated and commercial areas. Currently, much of the Project vicinity is urbanized or is farmed.

3.13.3.1 Project Area Overview

An overview of visual conditions within the Project area is provided below, followed by the existing visual character and conditions by Project reach.

The major topographical features of Santa Clara County include the Santa Clara Valley, the Diablo Range to the east, and Santa Cruz Mountains to the west. Santa Clara Valley is ringed by rolling hills and runs the entire length of the county from north to south. The Diablo Range covers the entire eastern half of the county. It consists mainly of grasslands, brush and oak savannah, due mostly to sparse rainfall (Santa Clara 1994). The Project area is located in Santa Clara Valley near the foothills of the Santa Cruz Mountains. From view corridors, visual elements in the Project area include views of farmlands, both the Santa Cruz Mountains and Diablo Range in the background and wandering creeks in the middle ground. The City of Morgan Hill is the most urbanized portion of the Project area along U.S. 101, with agricultural lands surrounding the city limits.

There are no officially designated scenic highways in the Project area.

Reach 4

Reach 4 is in the southern most extent of the Project area and contains an intermittent stream channel that winds through agricultural and suburban areas. Accessible views of the Reach 4 creek corridor are available from the bridges crossing over the creek, such as at Buena Vista Avenue, Rucker Avenue, and Masten Avenue, as well as some roads that run parallel to the creek.

Reach 5

Reach 5 is a short 0.4 mile segment connecting Reaches 6 and 14 and crossing under U.S. 101 in an east-west direction. Land use to the north and south is agricultural, with a lesser degree of urban development to the south. Views of this reach are available from U.S. 101 and an agricultural road just north of the reach that runs parallel to the creek corridor.

Reach 6

Upper Llagas Creek flows through the Reach 6 channel in a southerly direction on the west side of U.S. 101. The channel is composed of gravel, sand, and silt. The southwestern portion of Reach 6 is adjacent to several SCVWD percolation ponds and the southeastern portion or Reach 6 is adjacent to greenhouses and agricultural fields. The middle portion of Reach 6 traverses through agricultural fields, small corporation yards, and suburbanized areas with South County Airport of Santa Clara County located between Reach 6 and U.S. 101. Portions of this reach are adjacent to paved roads. The northern portion of Reach 6 passes through an industrialized area and waste treatment facilities. Views of the Reach 6 creek corridor are available from the bridges crossing over the creek, such as at Church Avenue and East San Martin Avenue. The creek corridor is also visible from paths within Silveira Park.

Reach 7A and Reach 7B

Reach 7A does not contain a creek channel. The southern half of Reach 7A is a topographically flat section of land with a combination of heavy agricultural use (plowed fields) or fallow land that has been converted to annual non-native grassland. The northern half of Reach 7A runs through a residential neighborhood and ends to the north at the intersection of West Little Llagas Creek and Reach 7B. Reach 7A runs through a suburban area offering accessible views, including views from John Wilson Way at Oakwood Country School looking west.

Reach 7A covers flat, undeveloped, grassland south of Watsonville Road surrounded by residential and commercial development. Reach 7A exhibits a more rural character south of Watsonville Road, while the northern portion of this reach has a suburban character.

Views of Reach 7A are available from bridges crossings, such as at Monterey Road, West Middle Avenue, Watsonville Road, La Crosse Drive, which also intersects with Reach 7B.

Reach 7B is in a suburban area with residences to the west and commercial uses to the east. Morgan Hill Community Park is directly west of Reach 7B to the north of West Edmundson Avenue. Views of the Reach 7B creek corridor are available from the bridges crossing over the creek, such as La Crosse Drive, West Edmundson Avenue, and West Dunne Avenue, which also intersects with Reach 8. Views of Reach 7B from Morgan Hill Community Park are screened by intervening vegetation.

Reach 8

Reach 8 contains an intermittent stream (West Little Llagas Creek). The channel transects a heavily urbanized area with businesses, residential areas, and roads abutting many portions of the top of the channel bank.

Reach 8 passes through urban residential and commercial neighborhoods in Morgan Hill, where Llagas Creek runs underground in channelized culverts and occasionally comes to the surface. The aboveground sections of the creek in this reach are bordered by riparian or ruderal vegetation. The remaining open channels in Reach 8 can be seen from some sidewalks, road sides, and bridges along Monterey Road, along Hale Avenue, and other streets in downtown Morgan Hill.

Reach 14

Reach 14 consists of an engineered flood channel east of and parallel to U.S. 101. Reach 14 does not have a clearly defined riparian corridor, but some scattered trees and bushes are present along this reach. Areas beyond the roads on each side of the channel consist of agricultural fields or are heavily suburbanized. Expansive irrigated croplands line Reach 14, allowing the channel to be clearly seen from nearby roads, including Church Avenue and San Martin Avenue.

Creek corridor views are available at bridges crossing the creek corridor, including at Church Avenue, East San Martin Avenue, and Sycamore Avenue, as well as some roads (e.g., Amistad Lane) and agricultural areas on either side.

Key Observation Points

To capture the baseline visual setting of the Project area as seen by viewers in the area, eight key observation points were identified in the visual simulations (Figures 3.13-1a–h). These key observation points were assessed to determine, which would be the most representative of the Project's potential effects on the viewshed. Each visual simulation contains the name of the reach and the alternative it represents. Many of the visual simulations are representative of all the action alternatives since they are the same in many of the reaches. Some of the key differences between alternatives are also represented in these simulations.

Hale Avenue looking south (Viewpoint 1)

Visual Simulation of Applicant's Proposed Action

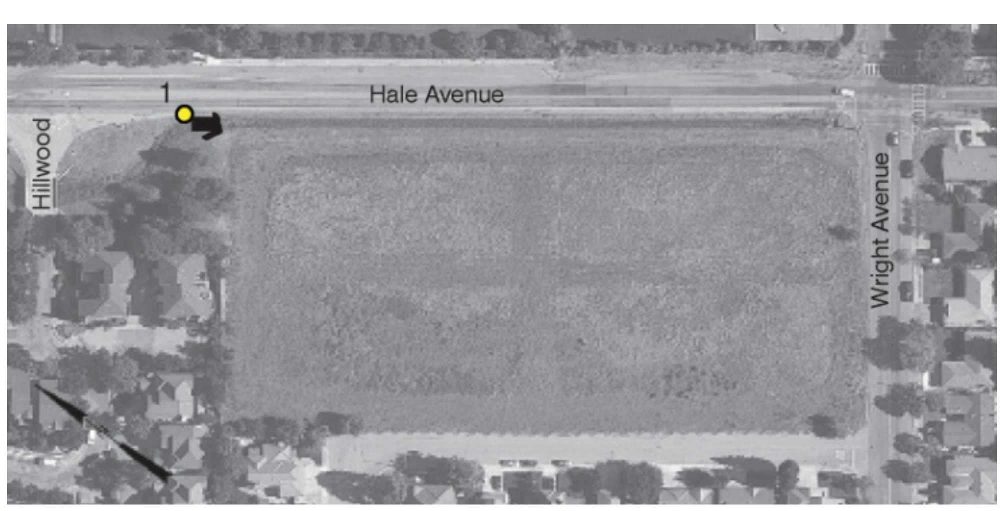

Figure 3.13-1a Visual Simulations 1. Hale Avenue Existing View and Visual Simulation

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Monterey Road at 4th Street looking west (Viewpoint 2)

Visual Simulation of NRCS Alternative

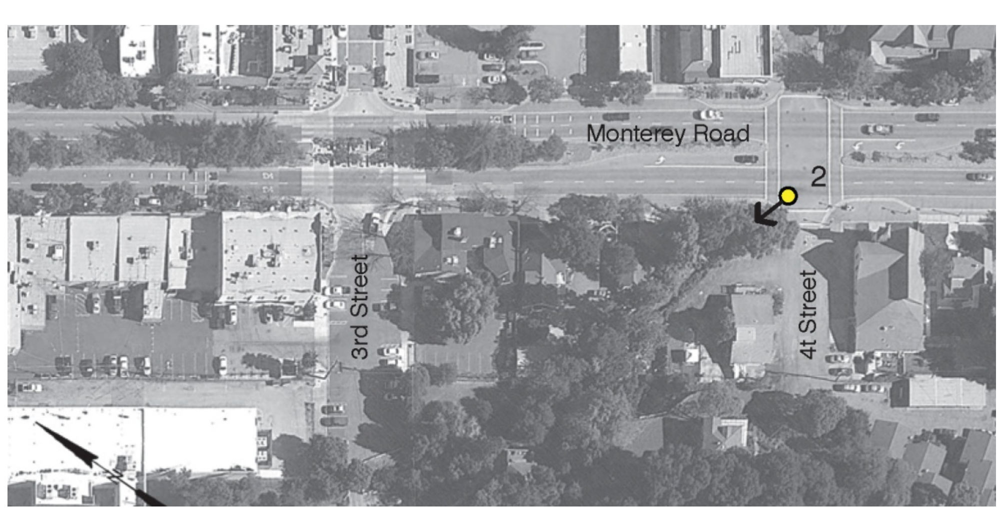

Figure 3.13-1b Visual Simulations 2. Monterey Road Existing View and Visual Simulation

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Spring Avenue looking northwest (Viewpoint 3)

Visual Simulation of Applicant's Proposed Action

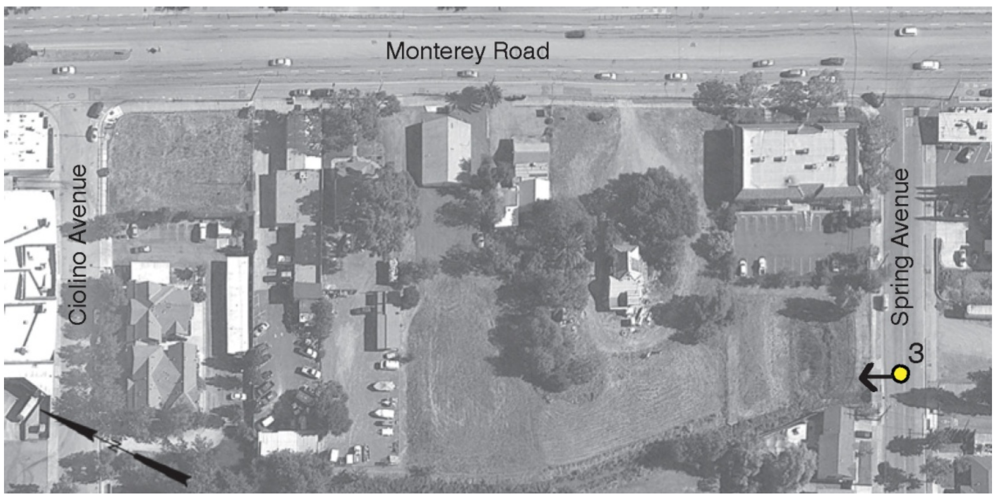

Figure 3.13-1c Visual Simulations 3. Spring Avenue Existing View and Visual Simulation

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Near La Crosse Drive looking northwest toward Llagas and Edmundson creeks (Viewpoint 4)

Visual Simulation of Applicant's Proposed Action

Figure 3.13-1d Visual Simulations: 4. La Crosse Drive Existing View and Visual Simulation

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Trail near La Jolla Drive looking southeast (Viewpoint 5)

Visual Simulation of Applicant's Proposed Action

Figure 3.13-1e Visual Simulations: 5. La Jolla Drive Existing View and Visual Simulation

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Highway 101 looking east (Viewpoint 6)

Visual Simulation of Applicant's Proposed Action

Figure 3.13-1f Visual Simulations 6: Highway 101 Existing View and Visual Simulation

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Rucker Avenue near Borges Court looking east (Viewpoint 7)

Visual Simulation of Applicant's Proposed Action

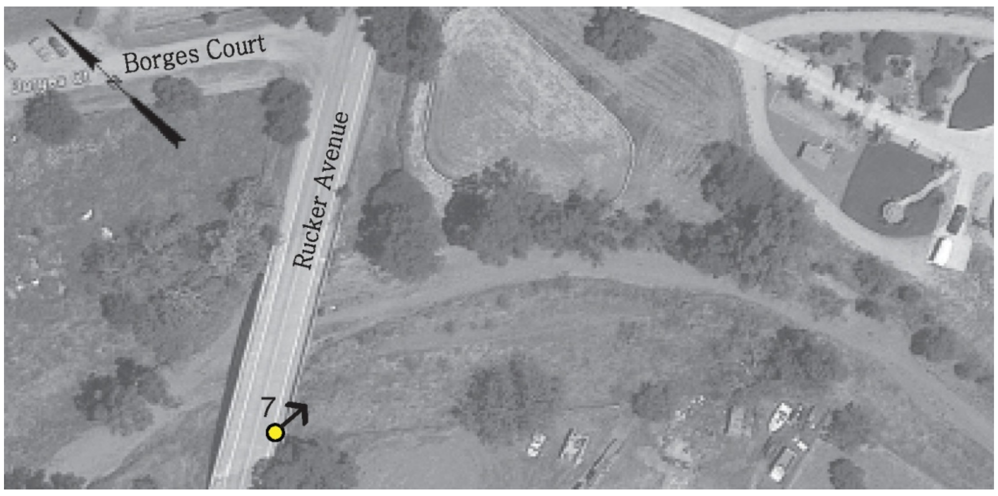

Figure 3.13-1g Visual Simulations: 7. Rucker Avenue Existing View and Visual Simulations

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Church Avenue Near Amistad Lane Looking North At Reach 14 (Viewpoint 8)

Visual Simulation of Applicant's Proposed Action

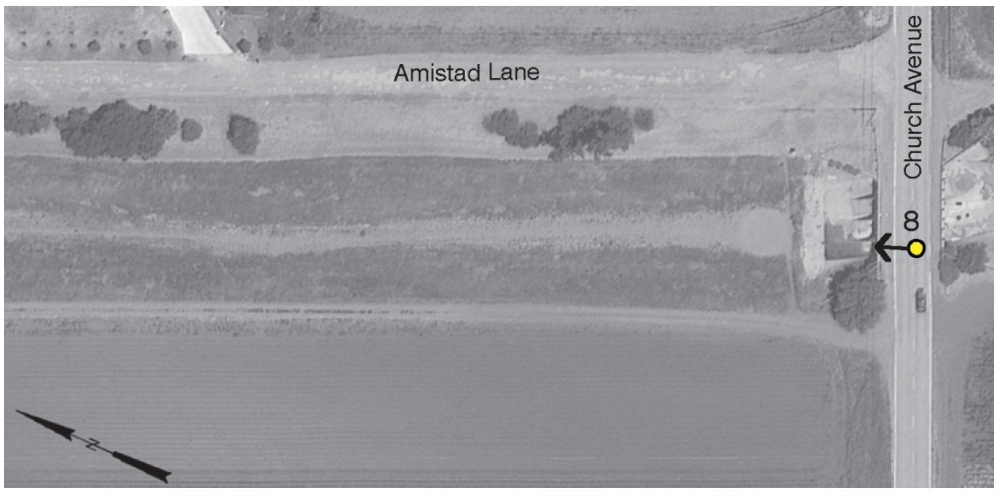

Figure 3.13-1h Visual Simulations: 8. Church Avenue Existing View and Visual Simulation

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3.14 UTILITIES AND PUBLIC SERVICES

3.14.1 Introduction

In this section, the potential for the alternatives to affect utilities or increase demand for various public services is assessed. Utilities considered in this section include electricity and natural gas, water, sewer and wastewater, landfills, stormwater drainage, as well as telecommunications and cable. Public services considered in the section include fire and police services, and schools. Potential impacts to parks are considered in Section 3.15, Recreation Resources. Public services are delivered by cities, counties, and special districts located in the vicinity of the project area, while utilities are delivered by both public and private entities. In general, the various alternatives are not expected to increase demand for utilities and public services in the project area, because the Project is not anticipated to increase population in the region (see Section 3.16, Population and Housing). In addition, operations and maintenance of the various alternatives is not anticipated to increase demand for these services. Therefore, the focus of the section is on how utilities and public services may be affected by the various alternatives; and this section will not focus on the potential for the Project to increase growth and, therefore, increase demand for the various utilities. The SCVWD will comply with all regulations associated with the management of solid waste and would do so under each alternative.

The major resource documents used to complete this section are listed here:

- California Department of Water Resources (DWR) and U.S. Army Corp of Engineers (USACE). 2013. *California's Flood Future: Recommendations for Managing the State's Flood Risk (Public Review Draft).* Sacramento, California.
- City of Gilroy Water Department. 2011. *Annual Water Quality Report – 2011.* Gilroy, California.
- City of Gilroy. 2013. *South County Regional Wastewater Authority.* Available online at: http://www.cityofgilroy.org/cityofgilroy/city_hall/community_development/bles/industrial_waste/default. aspx. Accessed on February 16, 2013.
- City of Gilroy, City of Morgan Hill, Santa Clara County. 2009. *Draft Regional Storm Water Management Plan.* Santa Clara County, California.
- City of Morgan Hill. 2010b. *City Council Policy Briefing: Solid Waste Management and Recycling*. Morgan Hill, California.
- Santa Clara Local Agency Formation Commission (LAFCO). 2006. *Santa Clara LAFCO Service Reviews and Sphere of Influence Recommendations for the South Central Santa Clara County Area*. San Jose, California.

- Santa Clara Local Agency Formation Commission (LAFCO). 2010. 2010 Countywide Fire Service Review. San Jose, California.
- Santa Clara Local Agency Formation Commission (LAFCO). 2011. *Countywide Water Service Review.* San Jose, California.
- *Santa Clara Valley Water District (SCVWD). 2012d. Where does our water come from? South County. San Jose, California.*

3.14.2 Project Area

The project area is within Morgan Hill and unincorporated Santa Clara County (including the community of San Martin). The southern extent of the project area is less than 1 mile from the City of Gilroy, although it lies within Gilroy's SOI as determined by LAFCO (see discussion in Section 3.8, Land Use and Planning). The northern portion (Reaches 8, 7B, and portions of 7A) is within the City of Morgan Hill; a portion of 7A is within unincorporated Santa Clara County, but within Morgan Hill's SOI. Reaches 6, 5, and 14 are within the San Martin planning area while a portion (north of Masten Avenue) of Reach 4 is also in the San Martin planning area. The southern portion of Reach 4 is within unincorporated Santa Clara County and within the City of Gilroy's SOI.

A small special district, Lions Gate Community Services, lies southwest of San Martin and west of the Project. The district provides sewage collection, wastewater treatment, and potable water services for residents within the service area. The district is outside of the project area and is not discussed in this section. Also, the project area lies within the Santa Clara County Open Space Authority; a discussion of this special district is provided in Section 3.15, Recreation Resources.

3.14.3 Environmental Setting

In this section, utility providers are first discussed, and then a summary of public service providers is included. Table 3.14-1 provides a list of providers of utilities and public services in the project area. Each service is discussed later in the section.

Table 3.14-1 Summary of Utility and Public Service Providers

Utility/Public Service	Provider(s)	Notes
Electricity and Natural Gas	Pacific Gas & Electric	
Water	City of Morgan Hill San Martin County Water District Numerous Mutual Water Companies	
Sewer and Wastewater	City of Morgan Hill City of Gilroy * South County Regional Wastewater Authority (SCRWA) Septic tanks are used in unincorporated areas	The treatment facility is operated by SCRWA (a Joint Powers Authority). *City of Gilroy is listed because wastewater system is operated in cooperation with Morgan Hill.
Stormwater Drainage	City of Morgan Hill Santa Clara County	
Solid Waste	Recology South Valley GreenWaste	Several landfills serve the project area.
Telecommunications	Verizon AT&T	
Cable	Charter Communications	
Fire Protection	South County Fire District Cal Fire City of Gilroy Fire Department **	**Listed due to mutual aid agreements.
Police Protection	City of Morgan Hill Police Department Santa Clara County Sheriff's Department City of Gilroy Police Department ***	***Listed due to mutual aid agreements.
Schools	Morgan Hill Unified School District Gilroy Unified School District	
Parks	See Section 3.15, Recreation Resources	

3.14.3.1 Utilities

In this section, the providers and service areas of the various utilities within the project area are described. No information is provided on the capacities of the various utilities, because the various alternatives are not anticipated to create additional demand for these resources. The facilities, including above- and below-ground lines (e.g., electricity, natural gas, sewer, water, stormwater drainage, cable, telecommunications including fiber-optic lines, etc.) managed by the various utilities are widespread in the project area and within the Project footprint and these facilities would be affected under the various alternatives.

Electricity and Natural Gas

PG&E provides electricity and natural gas service in the project area (California Energy Commission 2007).

Water

The City of Morgan Hill provides water service to residents and businesses within the city limits (Santa Clara LAFCO 2006). Morgan Hill also provides water to the unincorporated Holiday Lakes Subdivision west of Anderson Reservoir. The source of the water is groundwater from the Coyote Valley within the Santa Clara Subbasin and the Llagas Subbasin (within the Gilroy-Hollister Basin). The San Martin County Water District (SMCWD), an independent special district, serves a portion of the unincorporated community of San Martin (Santa Clara LAFCO 2011); the SMCWD draws groundwater from the Llagas Subbasin for delivery to their customers. In addition to the service provided by Morgan Hill and the SMCWD, several mutual water companies each serve relatively small number of customers (generally less than 100) in and around the project area. Just outside of the project area, the City of Gilroy uses nine wells to extract groundwater from the Llagas Subbasin to provide water for city residents (City of Gilroy Water Department 2011). Management of groundwater resources in the vicinity of the project area is the responsibility of SCVWD. Three sources are used to replenish groundwater in the groundwater basins: (1) percolation of local rainfall; (2) water captured in local reservoirs released to creeks and recharge ponds; and (3) water imported from the Delta (SCVWD 2012d). In fact, the Church Street Percolation ponds along Reach 6, divert water from Llagas Creek into SCVWD recharge ponds.

Figure 3.14-1 shows the location of 11 wells that are within 500 feet of the Project area. There is one well each along or near both Reaches 8 and 7B. There are three wells along Reach 14 while six of the wells are along or near Reach 6. The SCVWD operates four of the wells, three of which are close to the recharge ponds along Reach 6. The other SCVWD well is along Reach 7B. The other seven wells are operated by private entities for the purposes of water supply and/or irrigation wells.

Sewer and Wastewater

The City of Morgan Hill maintains a sewer system within the city and some unincorporated areas adjacent to the city (City of Morgan Hill 2013a). The effluent is sent via an interceptor sewer line to the wastewater treatment facility near Gilroy. Also, the City of Gilroy maintains a sewer system for residents within the city limits, and the wastewater is sent through the system for treatment (City of Gilroy 2013). Wastewater from within the cities of Morgan Hill and Gilroy is treated at the South County Regional Wastewater Authority (a joint powers authority) in Gilroy. The waste treatment facility is co-located with a recycled water facility (operated in cooperation with the SCVWD). Sewer service is not provided throughout much of the unincorporated areas, including San Martin, where residences use septic systems.

Stormwater *Drainage*

The Llagas Creek channel is the primary stormwater infrastructure feature within the project area. The City of Morgan Hill maintains laterals and drains to West Little Llagas Creek within the city limits. The county is responsible for stormwater drainage within the unincorporated portions of the project area. Recently, the cities of Gilroy and Morgan Hill, along with the county implemented a stormwater management plan (City of Gilroy, City of Morgan Hill, and Santa Clara County 2009). The primary goal of the plan is to provide a framework for Phase II of the National Pollutant Discharge Elimination System (NPDES) Stormwater Discharge Permit compliance.

Solid Waste

Garbage, recycling, and organic waste is collected by Recology South Valley in Gilroy, Morgan Hill, and parts of unincorporated San Martin. Whereas, GreenWaste provides pick up for other unincorporated areas within the project area. Both Recology and GreenWaste are private companies operating on contract with the local jurisdictions. Recology also maintains a transfer station in San Martin where construction and demolition debris are accepted with the exception of dirt, rock, concrete, and brick. The San Martin Transfer station is adjacent to the Project footprint. As of 2011, Santa Clara County reported that the county has greater than 15 years of landfill capacity remaining (Cal Recycle 2011).

Telecommunications and Cable

The primary provider of phone service in Gilroy and Morgan Hill is Verizon, while the San Martin unincorporated area is served by AT&T (California Public Utilities Commission 2007). Charter Communication provides cable service within the project area (Federal Communications Commission 2013).

3.14.3.2 Public Services

Fire Protection

Although the various agencies have defined jurisdictions, mutual aid agreements make it possible that agencies will respond to incidents outside of their jurisdictions. A countywide mutual aid agreement exists in Santa Clara County (Santa Clara LAFCO 2010).

As of early 2013, the City of Morgan Hill commenced a 5-year agreement with Cal Fire to provide fire protection within the city limits (CBS – San Francisco Bay Area 2013). The Santa Clara County Fire District had provided fire protection for Morgan Hill for the previous 17 years. Currently, Cal Fire employs an additional 22 in-line firefighters, along with two battalion chiefs in Morgan Hill. Cal Fire is contracted by the South

Santa Clara Fire Protection District to provide fire protection for unincorporated areas in the vicinity of the project area. In total, CAL Fire operates five fire stations in the project area. Fire protection services within the City of Gilroy are provided by the city's fire department. The city maintains three fire stations. Although the project area is outside of the city limits, mutual aid agreements provide the possibility that the Gilroy Fire Department could respond to a fire in the southern extent of the project area. No fire stations are within the Project footprint.

Police Protection

Police services are provided by multiple agencies in the vicinity of the project area (Santa Clara LAFCO 2006). Within the city limits of Morgan Hill, police services are provided by the Police Department. The department is approved to have 36 fulltime sworn officers. The Sheriff has primary jurisdiction for police services in the unincorporated portions in the project area. Currently, there is 586 fulltime, sworn badge staff and the headquarters in San Jose. Along with providing police services for the unincorporated portions of the county, the communities of Cupertino, Los Altos Hills, and Saratoga are also served by the Sheriff. The Sheriff maintains a sub-station in unincorporated San Martin; other communities served by this sub-station include Rucker and Uvas Canyon, as well as unincorporated areas around Morgan Hill and Gilroy. The Gilroy Police Department has 65 sworn officers and has primary jurisdiction within the city limits. The project area does not fall within the city limits of Gilroy, but is within 1 mile. Mutual aid agreements are managed both at a countywide and regional level. The police stations and sheriff station are outside of the Project footprint.

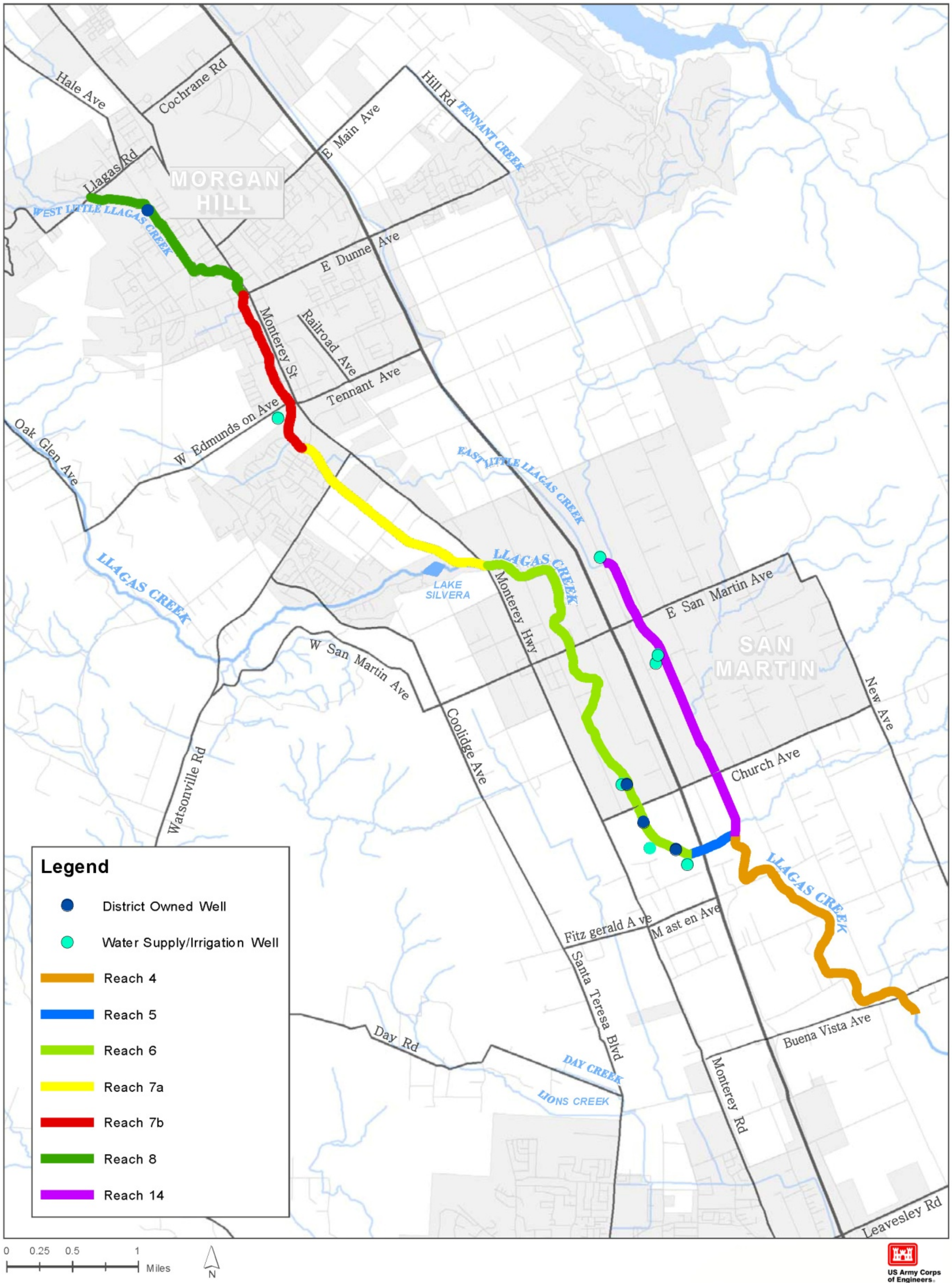

Figure 3.14-1 Wells Within 500 Feet of Upper Llagas Creek Project

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Schools

The entire Project is within Santa Clara County and there are 31 total school districts (6 unified, 5 high school, and 21 elementary) in the county. Two school districts, Morgan Hill Unified School District and Gilroy Unified School District, serve the project area.

The Morgan Hill Unified School District serves the areas within the city limits of Morgan Hill, a small area in South San Jose and unincorporated areas in the county south of Bernal Avenue to Church Avenue in San Martin (Morgan Hill Unified School District 2013). The district has 14 schools and an enrollment of 8,700 students. Britton Middle School is adjacent to the Project footprint; in fact, the ball fields adjacent to the school would be within the construction zone under the Culvert/Channel Alternative. This is discussed in greater detail in Section 3.15, Recreation Resources. The Gilroy Unified School District (2013) serves the southernmost regions within the county including the City of Gilroy and unincorporated areas. The southern extent of the project area (south of Church Avenue) is within this district. There are 16 schools in the district serving over 11,000 students.

Parks

Information on potential impacts to parks is addressed in Section 3.15, Recreation Resources.

3.15 RECREATION RESOURCES

3.15.1 Introduction

In this section, recreation resources and providers within the vicinity of the project area are discussed, and then the alternatives are reviewed for potential impacts. The completion of the Project would not create additional demand at existing local or regional parks, nor is it anticipated that the Project would require the completion of additional parks that would adversely affect the environment. Therefore, the focus of this section is to assess if the alternatives have the potential to physically impact existing recreational resources in the project area, such as parks or trails located within the Project footprint, which may be impacted by construction.

3.15.2 Project Area

The Project area is within Morgan Hill, and unincorporated areas within the county (including the community of San Martin). The northern portion (Reaches 8, 7B and portions of 7A) is within the City of Morgan Hill; a portion of Reach 7A is within unincorporated Santa Clara County, but within Morgan Hill's SOI[1]. Reaches 6, 5, and 14 are within the San Martin planning area, while a

[1] The SOI for SCVWD is coterminous with its boundary and County's boundary. The SOI for the SCVWD was last reviewed in 2007 and no changes were made at that time

portion (north of Masten Avenue) of Reach 4 is also in the San Martin planning area. The southern portion of Reach 4 is within unincorporated Santa Clara County and within the City of Gilroy's SOI. Public recreation opportunities in the vicinity of the project area are delivered by the following providers: City of Morgan Hill Parks and Recreation, Santa Clara County Parks, the City of Gilroy's Community Services, and the Santa Clara County Open Space Authority.

The City of Morgan Hill provides a wide range of recreational opportunities from small neighborhood parks to larger parks with sports fields, as well as special use facilities such as an aquatic center and a skate and bicycle motocross (BMX) Park. Generally, the region has a fair amount of natural resource based recreational opportunities including hiking, mountain biking, camping, and nature study, as Santa Clara County Parks and Santa Clara County Open Space Authority maintain parks and open spaces throughout South Santa Clara County. These opportunities are generally outside of the project area, but accessible to the local population, in the hills and peaks of the Santa Cruz Mountains (to the west) and Diablo Range (to the east). In addition, a large State Park, Henry W. Coe, is about 15 miles east of Morgan Hill. Figure-3.15-1 shows the location of recreational resources pertinent to this section.

3.15.3 Environmental Setting

Santa Clara County Parks

Santa Clara County Parks (2013) maintains 45,000 acres of urban and undeveloped parks and trails throughout the county. Several parks are in the general vicinity of the project area including the following with acreages:

- Anderson Lake (3,109 acres)
- Chesbro Reservoir (216 acres)
- Coyote Lake – Harvey Bear Ranch (4,595 acres)
- Uvas Reservoir (626 acres)

These facilities serve residents in the vicinity of the project area but are not within the Project footprint and are not expected to be impacted by the various alternatives.

Santa Clara County Parks maintains 125 miles of bike trails (both paved and for mountain bikes) throughout the county and numerous trails designated for hiking. Close to the project area, Coyote Creek Parkway is a paved 15-mile-long trail from Coyote Heller County Park to Cochrane Road in the northern part of Morgan Hill. The trail is multipurpose for both hikers and bikers.

Santa Clara Open Space Authority

The Santa Clara Open Space Authority, a special district, preserves open space throughout much of the county, including 548-acre Coyote Ridge north of Morgan Hill and 5,575-acre Upper Coyote, and an assortment of lands and easements obtained over a 10-year period, in the hills east of Morgan Hill and Gilroy. These facilities are not within the Project footprint.

Santa Clara Valley Water District (SCVWD)

The West Little Llagas Creek Trail (Reaches 7A and 7B) is on SCVWD-owned land. The trail was recently upgraded in cooperation with the City of Morgan Hill. The trail provides opportunities for walking, biking and other trail related activities. The trail runs along the creek from Spring Avenue (about 0.25 mile south of downtown) through Watsonville Road. The trail is on both sides of the channel from La Crosse Drive south to Watsonville Road. The trail is within the Project footprint and would be impacted by the action alternatives. This route is paved and includes some small areas of landscaping and several benches. The trail is operated in conjunction with the City of Morgan Hill, per a Joint Use Agreement. The City of Morgan Hill is responsible for maintenance and upkeep, such as trash and graffiti removal. Under the Joint Use Agreement, it is noted that the trail should not “unreasonably interfere” the SCVWD’s goal of using these lands for flood protection. The agreement also states that any trail improvements as installed by the City of Morgan Hill are subject to removal if the area is deemed necessary for flood protection, as is the case for the action alternatives.

City of Morgan Hill

The City of Morgan Hill maintains parks and recreational facilities in the city. According to Santa Clara LAFCO, the City maintains over 100 acres of parks with the inclusion of the outdoor sports center (LAFCO 2006). These include neighborhood parks, sports fields, an aquatic center, and a skate and BMX park, among other facilities. The City seeks to maintain a variety of park types and experiences by developing different classifications for the parks and the varied recreational experiences. The City classifies and maintains the following park types: mini park (< 1.5 acre); neighborhood park (3–10 acres); community park and community/school park (10 acres minimum); trails/linear parks (no acreage limit); sports park (20 acres minimum), and special use facilities (City of Morgan Hill 2006). In total, the department lists 26 parks or facilities within the city limits. Additional facilities are available adjacent to, and in cooperation with, Morgan Hill Unified Schools.

A review of a park map reveals that the Centennial Recreation Center is very close to the Project footprint. The Centennial Recreation Center operates in cooperation with the Mount Madonna YMCA. The 54,000-square-foot facility has workout facilities, an indoor pool, and facilities for teen and senior programs. The facility is adjacent to the West Llagas Trail just north of Edmondson Avenue.

Also, the Project footprint is close to Galvan Park and Britton Field ball fields, adjacent to Britton Middle School (both along Reach 8). In fact, the Culvert/Channel Alternative would cross under the ball fields.

In 2008, the City produced a Bikeways Master Plan (2008) update to both track progress from the 2001 plan and to develop future goals. This section focuses on what the City designates as Class I: Bike Paths and paths that are separated from automobile roadways and not on trails with features (such as bike lanes) available along roads. The 2008 master plan shows four Class 1 trails in the city.

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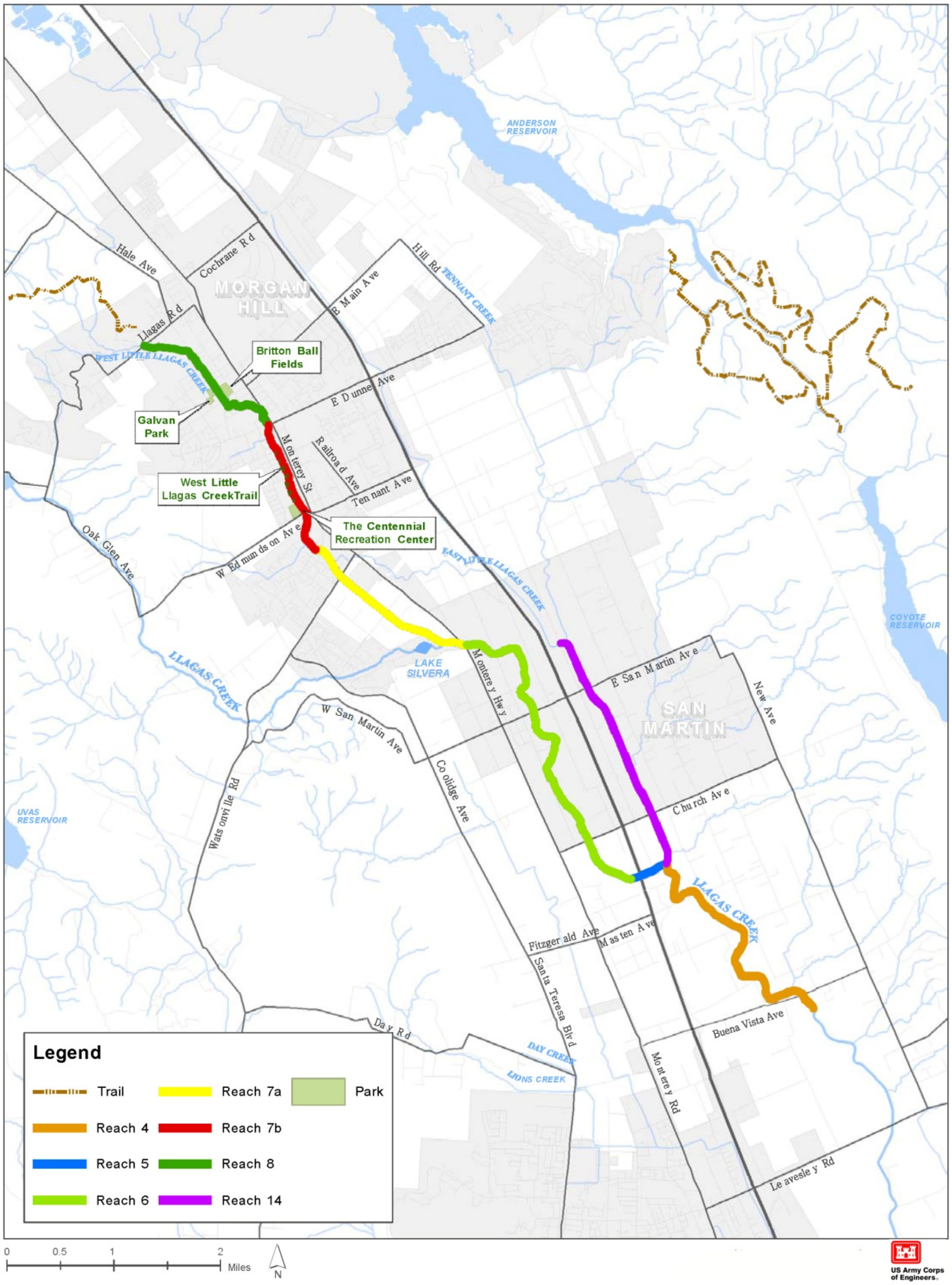

Figure 3.15-1 Recreational Facilities in Close Proximity to Project Footprint

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City of Gilroy

The City of Gilroy Community Services maintains over 125 acres of developed parklands and 129 acres of preserve land (Santa Clara LAFCO 2006). The City of Gilroy does not maintain any parks outside of the city limits; therefore, there are no parks within or near the Project footprint.

Other *Recreational* Facilities

Lake Silveira, located near Reach 7A, currently receives recreation use along informal trails in and around the lake. However, Lake Silveira is not a sanctioned recreation site and public access is not formally allowed; people do currently recreate near the lake. The lake is within the Project footprint, as it would be altered as part of restoration of the creek in all action alternatives for the Project.

3.16 POPULATION AND HOUSING

3.16.1 Introduction

In this section, existing conditions related to population and housing in the vicinity of the project area are provided and the potential impacts of the various alternatives are assessed.

The major resource documents used to complete this section are listed here:

- Association of Bay Area Governments and Metropolitan Transportation Commission. 2013. Selected Census Data for the San Francisco Bay Area.
- City of Gilroy. 2011. 2007–2014 Housing Element (Public Review Draft). Gilroy, California.
- City of Morgan Hill. 2010c. Draft Housing Element. Morgan Hill, California.
- Santa Clara County. 2010. County of Santa Clara Housing Element Update 2009–2014. Adopted by the Board of Supervisors, August 2. San Jose, California.
- State of California, Department of Finance. 2013. Report P-1 (County): State and County Total Population Projections, 2010–2060. Sacramento, California.
- U.S. Census Bureau. 1992. 1990 Census of Population: General Population Characteristics - California. Section 3 of 3. Washington D.C.

3.16.2 Project Area

The project area is entirely within Santa Clara County including parts of the City of Morgan Hill and unincorporated areas within the county. The project area is not within the city limits of Gilroy, but is within the SOI[2] as determined by LAFCO.

3.16.3 Environmental Setting

Generally, the project area is suburban and agricultural. The Project area has experienced a continuing transition of agricultural lands being converted for residential and commercial development and the population has increased substantially since the 1970s. The northern portion (Reaches 8, 7B, and portions of 7A) of the project area lies within the City of Morgan Hill; a portion of Reach 7A is within unincorporated Santa Clara County, but within Morgan Hill's SOI. Reaches 6, 5, and 14 are within the San Martin planning area; in addition, a part of Reach 4 (north of Masten Avenue) is also in the San Martin planning area. The southern extent of Reach 4 is within unincorporated Santa Clara County and within the City of Gilroy's SOI.

3.16.3.1 Population

Table 3-16.1 provides census data for communities in close proximity to the project area. In general, population has increased rapidly within Santa Clara County (67%) from 1970–2010. Morgan Hill and Gilroy have grown at even a greater rate over the same time period; although, some growth is attributable to annexation of unincorporated areas. San Martin is within unincorporated Santa Clara County and is a Census Designated Place (CDP). Population totals are provided for San Martin since 1990, the first census where CDPs were delineated from county-level data. Similar to Morgan Hill and Gilroy, the San Martin CDP has increased substantially since 1990.

Table 3.16-1 Population Trends for Communities in the Vicinity of Project area [1, 2]

City / Community	1970	1980	1990	2000	2010	Increase 1970–2010
Santa Clara	1,064,714	1,295,071	1,497,577	1,682,585	1,781,642	67%
Morgan Hill	6,485	17,060	23,928	33,556	37,822	483%
Gilroy	12,665	21,641	31,487	41,464	48,821	285%
San Martin (CDP)	Census tracts were not delineated		1,713 [2]	4,230	7,027	--

[1] Association of Bay Area Governments and Metropolitan Transportation Commission (2013)

[2] U.S. Census Bureau (1992)

[2] SOI refers to "boundaries for all agencies within its jurisdiction, indicating the physical boundary and service area each agency is expected to serve". Source: Santa Clara County 2006.

In general, the rate of growth is anticipated to decrease substantially within Santa Clara County over the next several decades. The California Department of Finance provides population projections by county (Table 3.16-2). When comparing the 2010 census figure listed in the previous table with the projected 2060 population, the increase is expected to be 23 percent over the time period.

Table 3.16-2 Population Projections for Santa Clara County [1]

City / Community	2020	2030	2040	2050	2060	Projected Increase 2010–2060
Santa Clara County	1,889,898	1,986,545	2,083,710	2,152,199	2,198,503	23%

[1] California Department of Finance (2013)

Housing

In general, there are some differences in the household characteristics of the three communities (Morgan Hill, Gilroy, and San Martin) compared to Santa Clara County as a whole. Table 3.16-3 presents housing related data for Santa Clara County and for the communities in close proximity to the project area. Both Morgan Hill and Gilroy have vacancy rates close to the average for the county as a whole, while San Martin's vacancy rate is substantially higher. Compared to the county, all three communities have a lower percentage of multi-unit structures, a higher percentage of owner occupied units, and a larger average household size.

Table 3.16-3 Population Projections for Communities in the Vicinity of Project area [1]

City / Community	Housing Units	Vacant Units	% of Units in Multi Unit Structures	Owner Occupied	Renter Occupied	Average Househol d Size
Santa Clara County	579,329	2.3%	32.8%	59.8%	40.2%	2.92
Morgan Hill	11,091	2.2%	15.5%	72.5%	27.5%	3.05
Gilroy	12,152	2.3%	24.9%	75.9%	24.1%	3.46
San Martin (CDP)	2,122	6.1%	6.3%	65.7%	34.3%	3.46

[1] Association of Bay Area Governments and Metropolitan Transportation Commission (2013)

3.17 SOCIOECONOMIC RESOURCES

This section analyzes potential impacts of the Applicant's Proposed Action on social and economic (socioeconomic) resources within the project area. Impacts to specific components of socioeconomic characteristics including population, housing, land use, recreation, and public utilities are addressed in other section of the EIS. Impacts to employment, income, taxes, and similar socioeconomic factors associated with each of the Project alternatives are identified and assessed in this section relative to the existing condition of the potentially affected socioeconomic resources. A set of criteria is developed for evaluating the significance of each impact and potential mitigation measures are identified for any impacts determined significant.

3.17.1 Introduction

The Applicant's Proposed Action is located in southern Santa Clara County along 13 miles of Upper Llagas Creek bisecting the City of Morgan Hill, the San Martin CDP, and the City of Gilroy. The Project area spans seven reaches of Upper Llagas Creek (8, 7B, 7A, 6, 5, 4, and 14) and encompasses approximately 300 acres. By design, the Applicant's Proposed Action would increase flood capacity in the upper reaches, while ensuring no induced flooding in the lower reaches.

Socioeconomic resources considered in this impact analysis include population and housing; components of the economic base, such as employment, income, economic output, and fiscal resources; and land use. Cardno ENTRIX staff compiled baseline information on these socioeconomic resources by searching databases of social, demographic and economic data, and indices reported for various geographic levels of detail within and around the project area. The primary sources for this study include:

- U.S. Department of Commerce, Bureau of Census. 2011. *American Community Survey 5-Year Estimates, 2007–2011*.
- U.S. Department of Commerce, Bureau of Census. 2009. *American Community Survey 1-Year Estimates, 2009*.
- U.S. Department of Commerce, Bureau of Census. 2010a. *ZIP Code Business Patterns (ZBP)*.
- U.S. Department of Commerce, Bureau of Census. 2000. *DP-3 Median Value (Dollars) For All Owner-Occupied Housing Units, 2000*.
- U.S. Department of Labor, Bureau of Labor Statistics. 2011b. *Occupational Employment Statistics (OES) Survey*, *May 2011*.
- Minnesota Impact Analysis for Planning (IMPLAN) Group, Inc. 2013. *Total Output by Industry, Santa Clara County, California, 2010*.
- State of California Board of Equalization. 2011. *2010–11 Annual Report, Statistical Appendix*.

These data sources are widely utilized by social scientists and many are frequently referenced in reports by the general media.

3.17.2 Project Area

The project area for the socioeconomic impacts analysis is the area formed collectively by the City of Morgan Hill, the San Martin CDP, and the City of Gilroy. These cities are located in southern Santa Clara County along U.S. 101, approximately 25 miles southeast of San Jose. These cities contain the entire Project area and the primary socioeconomic resources potentially subject to direct and indirect impacts. While the demand for construction labor may indirectly impact socioeconomic resources in additional nearby population centers, this impact analysis focuses on the jurisdictions in and nearby the Project area. Figure 3.17-1 displays the socioeconomics project area with reference to various geographic reporting units for the social, demographic, and economic data informing this analysis.

3.17.3 Environmental Setting

This section describes the existing condition of the socioeconomic resources within the project area. These existing conditions were used to conduct qualitative and quantitative analysis of potential impacts of the various Project alternatives. Although this section relies on the latest available data for each intended demonstrative table available at the time of the study, much of the data pre-dates 2012 and certain economic indicators in the project area may have since changed.

Socioeconomic resources in the project area are described at the city/community level of detail, where available or estimated, with county level data presented for context. While other sections describe the subject resource by river reach, much of the key economic data sources are not of sufficient geographic detail. Further, evaluations of economic resources may be distorted if conducted for highly detailed geographies that do not approximate the true geographic extent of the relevant market or accounting unit for the resource.[1] Table 3.17-1 provides general correspondence between the cities in the project area, ZIP codes, and the reaches of Upper Llagas Creek forming the Project area.[2]

1 For example, although available for individual Census Tracts closely corresponding to individual river reaches, the cumulative housing stock in and around the Project area is the relevant baseline metric for evaluating potential impacts associated with in- migration of construction labor. In the case of flood protection afforded by the Project, socioeconomic resources potentially affected may extend outside the physical area nearby the river reach.

2 ZIP Code Business Patterns data published by the U.S. Census Bureau are utilized to describe business establishments within the project area. As reflected in Table 3.17-1, this study assumes ZIP code 95037 to represent Morgan Hill, ZIP code 95046 to represent the San Martin CDP, and ZIP code 95020 to represent Gilroy.

Table 3.17-1 Geography of the Socioeconomics Project Area

City / Community	Corresponded to: ZIP Code	Census Tracts	Reach
Morgan Hill	95037	5123.05, 5123.07, 5123.08, 5123.09, 5123.10, 5123.11, 5123.12, 5123.13, 5123.14	8, 7A, 7B
San Martin (CDP)	95046	5124.01, 5124.02	6, 5, 14
Gilroy	95020	5124.01, 5125.03, 5125.05, 5125.06, 5125.08, 5125.09, 5125.10, 5126.02, 5126.03, 5126.04	4*

ZIP code, Census Tract, and reach are corresponded to the majority city/community by acreage.

* Reach 4 does not physically extend into the City of Gilroy but it is the nearest reach to this jurisdiction.

Population and Housing

Section 3-16, Population and Housing, presents historic and current population levels and detailed housing characteristics for communities within the project area and Santa Clara County. Many of the following statistics are directly reported in Section 3.16, or are derived from the statistics reported therein.

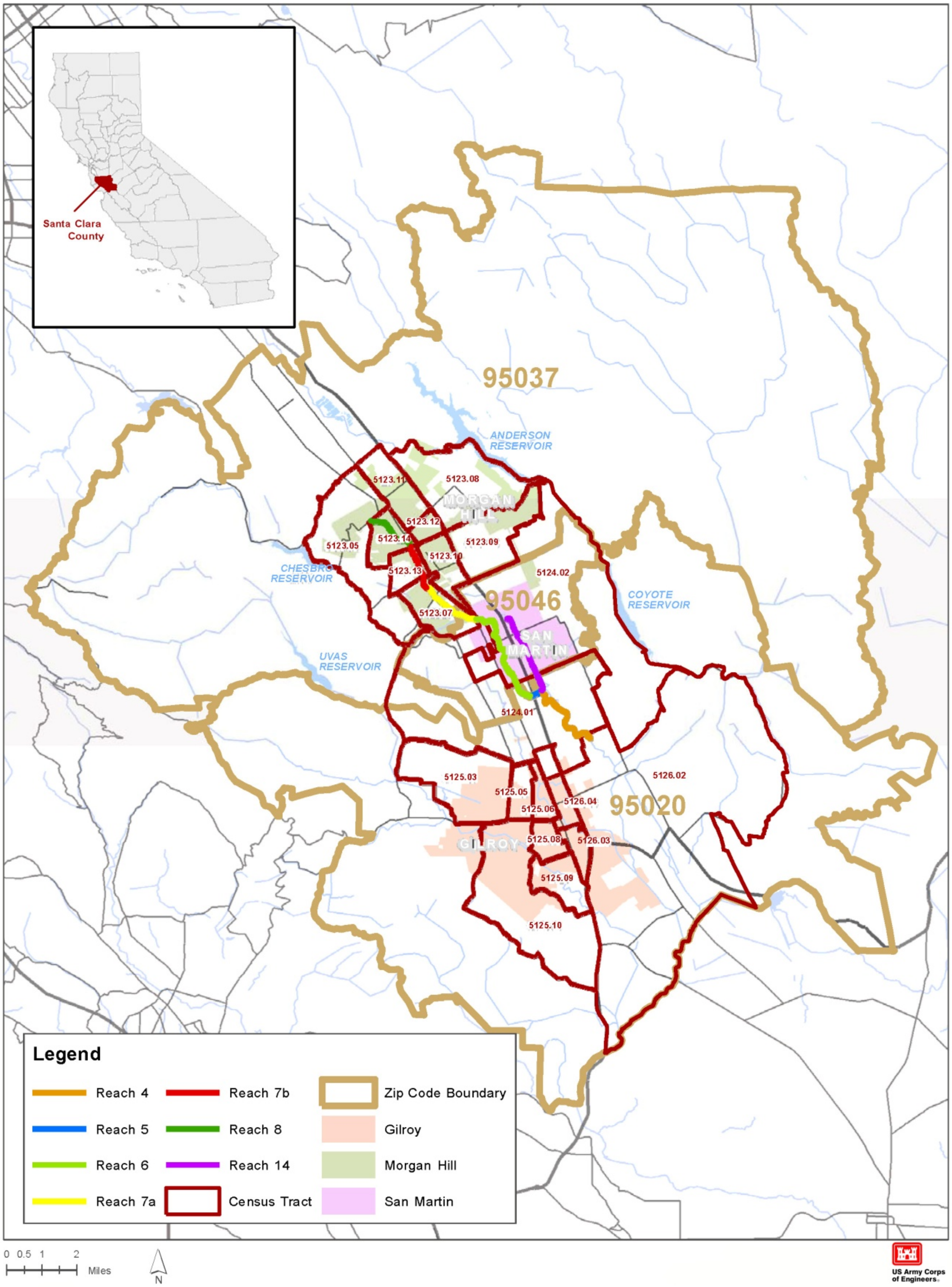

Figure 3.17-1 Socioeconomic Resources Project Area

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As of 2010, the population of the project area was 93,670 people: 37,822 in Morgan Hill, 7,027 in San Martin, and 48,821 in Gilroy. The project area has been characterized by substantial population growth in recent history. Population within the project area increased 63 percent between 1990 and 2010 (3.2% annually) compared with a 17 percent increase (0.9% annually) throughout the remainder of Santa Clara County. Access via U.S. 101 to the expanding high-tech job base in Silicon Valley has been largely responsible for population growth in the project area, particularly Morgan Hill, which is known as a bedroom community for the high-tech industry. Over the next 20 years the rate of population growth in Santa Clara County is expected to be slower than in the previous 20 years.

As of 2010, there were approximately 25,000 housing units within the project area. This accounts for just 4 percent of all housing units in Santa Clara County. Aside from San Martin, housing availability within the project area is somewhat limited. Vacant units account for approximately 2 percent of all housing units in Morgan Hill, Gilroy (approximately 523 units), and Santa Clara County compared with 6 percent in San Martin. San Martin accounts for less than 10 percent of the housing units in the project area.

Owner-occupancy is more prevalent in the project area than in Santa Clara County as a whole. Owners occupy approximately 75 percent of the housing units in Morgan Hill and Gilroy compared with 60 percent in Santa Clara County. Additionally, single-family units are more prevalent in the project area (80%) relative to Santa Clara County as a whole (67%). Within the project area, multi-family units are more prevalent in Gilroy (25% of units), relative to Morgan Hill (15% of units) and San Martin (6% of units).

Whether a person owns or rents, housing costs are the major component of living expenses for most of the United States population. Housing comprises 29 percent of living costs nationwide (CCER 2010). At the same time, a home can represent a family's most valuable real asset over the long term. The cost of housing in the San Jose-Sunnyvale-Santa Clara Metropolitan Statistical Area (MSA) is among the highest in the nation.

As of 2009, the median home value in the project area was just over $500,000, 17 percent below the Santa Clara County median home value (Table 3.17-2). Even in light of the recent housing crisis, the value of homes in the project area appreciated by 13 percent between 2000 and 2009. With typical loan terms, a prospective homeowner in the project area can expect to face approximately $2,400 in monthly mortgage principal, interest, taxes, and insurance. Rental housing in the project area costs approximately half as much as homeownership. Median rents ranged from $1,222 (Gilroy) to $1,485 (Morgan Hill), increasing while moving south to north through the project area toward Silicon Valley (U.S. Census Bureau 2012). Rental rates in Morgan Hill are higher than in Santa Clara County as a whole; this is due, in part, to larger supply of rental housing as a proportion of total housing in the rest of Santa Clara County.[3]

[3] No analysis of the comparability of rental units (e.g., size, # bedrooms) between the areas was conducted for the purpose of this study.

Table 3.17-2 Median Home Value, 2000 to 2009

Median Home Value (2009 dollars)	2000	2009	Percentage Change
Gilroy/Morgan Hill Urbanized Area	$473,694	$536,500	13.3%
Santa Clara County	$526,244	$645,500	22.7%

Source: U.S. Census Bureau: Census 2000; U.S. Census Bureau: ACS 2009 1-Year Estimates

Land Use

Land is a factor of production and, thus, an important socioeconomic resource. Land use is constrained by both social (e.g., community connectivity, safety) and economic development criteria. Flood protection objectives also inform land use planning. Section 3.8, Land Use and Planning, describes the land use patterns within the Project footprint and the 1-percent flood extent along Upper Llagas Creek.[4]

Project Footprint

At approximately 300 acres, the Project footprint comprises 2 percent of acreage within the boundaries of the cities/communities forming the socioeconomics project area (not including roads).[5] Land designated as Residential and Open Space comprises the majority of the Project footprint (80%), followed by Agriculture (16%). Table 3.17-3 describes the land use within the Project footprint in and around the cities and community forming the socioeconomics project area. Much of the Project footprint in Open Space use near Reaches 8, 7A, and 7B is Llagas Creek itself (Section 3.8, Land Use and Planning; Figure 3.8-1a, Land Use in the Project Vicinity).

Table 3.17-3 Land Use Within the Project Footprint

City / Community	Reach	Land Use
Morgan Hill	8, 7A, 7B	**Open Space (61%)**; Residential (27%); Roads (7%); Commercial (10%)
San Martin (CDP)	6, 5, 14	**Residential (90%)**; Open Space (9%)
Gilroy	4	**Agriculture (74%)**; Residential (26%)

4 While not congruent with the full extent of the socioeconomics project area, information on land use in the 1-percent flood extent is useful for informing the specific significance criteria developed to evaluate potential socioeconomic impacts of the Project.

5 A portion of the 1-percent flood extent covers unincorporated areas of Santa Clara County within the project area whereas city acreage is calculated based on the boundary lines of the incorporated areas.

Existing 1-percent Flood Extent

At approximately 3,000 acres, the existing 1-percent flood extent comprises approximately 19 percent of the acreage within the boundaries of the cities/communities forming the socioeconomics project area (not including roads) (Section 3.8, Land Use and Planning; Table 4.8-5, Acres of Land Uses Flooded Under the Various Alternatives).[6] Land designated for residential use and agricultural use comprise approximately 21 and 53 percent of the flood extent, respectively, for a total of 74 percent. Another 11 percent of the flood extent is comprised of open space, while utilities infrastructure, roads and commercial land comprise much of the remaining 15 percent.

Economic Base

Employment

Employment is the means by which people earn income. High unemployment is an indicator of a weak economy. Table 3.17-4 describes the employment characteristics of the project area. The labor force is the number of persons living in the area with employment or who are actively seeking employment. The labor force residing in the project area averaged 47,809 during 2007–2011, comprising 5 percent of Santa Clara County’s total labor force. Over the same period, unemployment among the labor force in the project area averaged 10.3 percent, compared to 8.6 percent in Santa Clara County, 9.6 percent in California, and 7.6 percent in the United States (Bureau of Labor Statistics 2012).

Table 3.17-4 Labor Force and Unemployment, 2007–2011

Area	Labor Force	Unemployment Rate
Morgan Hill	19,439	9.3%
San Martin	3,792	13.0%
Gilroy	24,578	10.9%
Santa Clara County	931,510	8.6%

Source: U.S. Census Bureau, 2007-2011 American Community Survey

[6] *Ibid*

The industry composition of the employed population residing within the project area is presented in Table 3.17-5. The top five industry sectors, by number employed, comprised 65 percent of total employment in the project area. These sectors include: Education and Health Services, 18.7 percent; Manufacturing, 15.4 percent; Retail Trade, 11.5 percent; Professional, Management and Administrative (private), 11.2 percent; and Construction, 8.5 percent. Although with different composition, the same five industry sectors comprise the top five by number employed for the resident labor force of each of the three communities within the project area and Santa Clara County.

In the context of assessing socioeconomic impacts of the Applicant's Proposed Action, it is important to recognize that not everyone who lives in the project area also works in the project area.[7] Approximately 50 percent of the labor force within the project area commutes 30 minutes or longer to work, with 24 percent commuting 45 minutes or longer (U.S. Census Bureau 2011). Table 3.17-6 presents estimates of the number of persons employed at establishments in each industry sector within the project area, regardless of where they reside.[8] The top five industry sectors by number employed comprise 72 percent of the employment located within the project area. These industries are: Retail Trade, 19.9 percent; Manufacturing 14.8 percent; Education and Health Services 14.3 percent; Arts, Entertaining and Food Services, 13.1 percent; and Professional, Management and Administrative (private), 10.7 percent.

Future employment within the project area is uncertain. For the San Jose-Sunnyvale-Santa Clara MSA, which covers San Benito and Santa Clara counties, the projections show a 21.6 percent increase in total employment from 2010 to 2020 (California Employment Development Department 2011).[9] The Information sector is projected to have the largest growth at 45.6 percent. Construction has the second highest projected growth at 34.5 percent.

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[7] Employment statistics based on place of residence may provide a misleading picture of the industry sectors active within the project area, especially in smaller less populated geographic units. For example, in California and in other states where counties are relatively large, presenting data on employment by county of residence is likely to accurately reflect the industry sectors active within the area.

[8] Employment by industry, based on place of work, is published by the Bureau of Economic Analysis for counties and MSAs. Data are not available for individual cities and towns. An estimate of employment by industry within the communities forming the project area was derived using ZIP Code Business Patterns data published by the U.S. Census Bureau. The ZIP Code Business Patterns data provides the number of private establishments by size, as determined by a range of number of employees (e.g., 1-4 employees, 5–9 employees, etc.). Additionally, the data provides the total number of paid employees for a sample pay period. To estimate the number of employees by industry, the midpoint of each firm size range was computed. For each industry, the number of firms in each size range was multiplied by the midpoint number of employees in the size range. The estimated number of employees by firm size was then totaled for each industry, summed across industries, and the percent of the estimated total was computed for each industry. The estimated percent of employees in each industry was then used to allocate the total number of paid employees reported for the sample pay period across industries.

[9] The California Employment Development Department publishes employment projections for MSAs covering one or more counties, but not for cities and towns within the county.

Table 3.17-5 Employment by Place of Residence

Industry Sector	Morgan Hill		San Martin		Gilroy		Project area		Sant a
									#
Farming	94	0.5	55	1.6	138	0.6	287	0.7	1,692
Agriculture, forestry, fishing and hunting, and mining	267	1.5	123	3.7	1,082	4.9	1,472	3.4	4,425
Construction	1,194	6.7	422	12.6	2,033	9.2	3,649	8.5	47,005
Wholesale trade	573	3.2	84	2.5	498	2.3	1,155	2.7	20,252
Information	490	2.8	15	0.4	389	1.8	894	2.1	32,627
Other services, except public administration	1,173	6.6	134	4.0	1,306	5.9	2,613	6.1	36,330
Public administration	911	5.1	66	2.0	942	4.3	1,919	4.5	22,421
Manufacturing	3,025	17.1	705	21.0	2,920	13.3	6,650	15.4	167,034
Retail trade	1,319	7.4	347	10.3	3,301	15.0	4,967	11.5	81,918
Transportation and Utilities	378	2.1	272	8.1	477	2.2	1,127	2.6	23,578
FIRE	1,033	5.8	107	3.2	1,021	4.6	2,161	5.0	44,015
Professional, Management, and Administrative	2,415	13.6	331	9.9	2,069	9.4	4,815	11.2	152,960
Education and Health Services	3,691	20.8	391	11.7	3,996	18.1	8,078	18.7	157,349
Arts, Entertainment, and Food Services	1,162	6.6	302	9.0	1,846	8.4	3,310	7.7	60,638
Total	**17,725**	**100.0**	**3,354**	**100.0**	**22,018**	**100.0**	**43,097**	**100.0**	**852,244**

FIRE stands for Finance, Insurance and Real Estate.

Source: U.S. Census Bureau, 2007–2011 American Community Survey; U.S. Department of Agriculture, National Agricultural
Statistics Service: 2007 Census of Agriculture.

Table 3.17-6 Employment by Place of Work

Industry Sector	Morgan Hill		San Martin		Gilroy		Project area Total		Santa Clara County	
	#	%	#	%	#	%	#	%	#	%
Farming	94	0.7	55	4.7	138	0.9	287	0.9	1,692	0.2
Agriculture (support), forestry, fishing and hunting, and mining	9	0.1	4	0.3	64	0.4	77	0.2	222	0.0
Construction	867	6.0	154	13.2	1,397	8.6	2,418	7.6	34,068	4.0
Wholesale trade	1,770	12.3	61	5.2	644	4.0	2,475	7.8	86,564	10.2
Information	450	3.1	5	0.4	180	1.1	635	2.0	64,073	7.6
Other services, except public administration	518	3.6	27	2.3	630	3.9	1,175	3.7	26,796	3.2
Manufacturing	3,191	22.1	188	16.1	1,307	8.1	4,686	14.8	89,570	10.6
Retail trade	1,605	11.1	89	7.6	4,630	28.6	6,324	19.9	76,686	9.1
Transportation and Utilities	43	0.3	34	2.9	301	1.9	378	1.2	11,556	1.4
FIRE	633	4.4	39	3.3	526	3.3	1,198	3.8	38,005	4.5
Professional, Management, and Administrative	1,708	11.8	191	16.4	1,504	9.3	3,403	10.7	213,956	25.3
Education and Health Services	1,976	13.7	26	2.2	2,540	15.7	4,542	14.3	129,133	15.2
Arts, Entertainment, and Food Services	1,551	10.8	294	25.2	2,303	14.2	4,148	13.1	76,423	9.0
Total	**14,415**	**100.0**	**1,167**	**100.0**	**16,164**	**100.0**	**31,746**	**100.0**	**847,052**	**100.0**

FIRE stands for Finance, Insurance and Real Estate.

Source: U.S. Census Bureau, 2010 Zip Code Business Patterns; Author's Calculations

Income and Earnings

Income is a key indicator of a population's economic well-being. Income earned by the population through employment is recirculated throughout the local economy through expenditures on goods and services and tax revenue. Typical measures of income include annual income per person (per-capita income) and annual income per household (typically reported for the median household). The poverty rate measures the proportion of individuals within a given geographic area with incomes lower than the threshold identified as the poverty line for individuals or households with similar family characteristics (Section 3.19, Environmental Justice).

Income data for the project area are presented in Table 3.17-7. Annual income of the median household in Morgan Hill averaged $94,301 during 2007–2011. This was as much as 25 percent higher than the median household elsewhere in the project area and 6 percent higher than that of Santa Clara County. Despite this household income disparity, per-capita income in Morgan Hill and San Martin were similar, but substantially higher than in Gilroy. The poverty rate is similar throughout the project area, at approximately 11 percent, and higher than the 9.2 percent poverty rate prevailing for Santa Clara County. The data imply that one out of every ten households in the project area live on income below the poverty line.

Table 3.17-7 Income and Poverty, 2007–2011

Area	Per-Capita Income	Median Household Income	Poverty Rate
Morgan Hill	$39,433	$94,301	11.0%
San Martin	$37,094	$77,188	11.9%
Gilroy	$28,719	$75,483	11.0%
Santa Clara County	$40,698	$89,064	9.2%

Source: U.S. Census Bureau, 2007–2011 American Community Survey

Data on earnings and wages by industry sector indicate the importance of individual sectors to income generation and the quality of jobs within the area. Earnings and wage data are reported for counties and MSAs, but not for individual communities. Table 3.17-8 presents total earnings in Santa Clara County by industry sector during 2010. Total earnings amounted to $101,805 million. Earnings in the Manufacturing sector total $26,784.1 million (26.3%) followed by $23,022.8 million in earnings within the Professional, Management, and Administrative sector (22.6%). Earnings by the Education and Health Services ($10,214.5 million) and Information ($11,056.6 million) combined to account for another 20 percent of earnings countywide.

Table 3.17-8 Earnings by Industry, Santa Clara County 2010

Industry Sector	$ (millions)	%
Farming	$107.2	0.1%
Agriculture (support), forestry, fishing and hunting, and	$79.4	0.1%
Construction	$3,269.6	3.2%
Manufacturing	$26,784.1	26.3%
Wholesale trade	$4,968.7	4.9%
Retail trade	$4,265.5	4.2%
Transportation and Utilities	$1,158.8	1.1%
Information	$11,056.6	10.9%
FIRE	$4,347.2	4.3%
Professional, Management, and Administrative	$23,022.8	22.6%
Education and Health Services	$10,214.5	10.0%
Arts, Entertainment, and Food Services	$2,521.6	2.5%
Other services, except public administration	$2,089.2	2.1%
Government/ Public Administration	$7,919.8	7.8%
Total	**$101,805.1**	**100.0%**

Source: U.S. Bureau of Economic Analysis 2010

Economic Output

Total Industry Output (TIO) reflects the value of intermediate and final goods and services produced. It can be measured from either the demand side (purchases) or the supply side (outlays plus value added). When reported by industry, output measures indicate the relative economic importance of each industry. TIO estimates for Santa Clara County are presented in Table 3.17-9. At $122,190.3 million, the Manufacturing sector accounts for nearly half the value of economic output in Santa Clara County. Together, industry sectors Financial, Insurance, and Real Estate (FIRE); Professional, Management and Administrative; and Information combine to account for another 34 percent of total output. It is worth noting that these patterns do not adequately represent the industry composition of Gross Regional Product (GRP) within the project area. In particular, there are major differences between the type of manufacturing in Silicon Valley and the manufacturing activities in the project area.[10]

[10] The North American Industry Classification System (NAICS) code for Manufacturing includes 300 distinct industries ranging from Fruit and Vegetable Canning, to Sawmills, to Semiconductor and Related Device Manufacturing.

Table 3.17-9 Total Industry Output, Santa Clara County 2010

Industry Sector	$ (millions)	%
Farming	$247.7	0.1%
Agriculture (support), forestry, fishing and hunting, and	$728.5	0.3%
Construction	$7,389.9	2.8%
Manufacturing	$122,190.3	45.5%
Wholesale trade	$9,058.1	3.4%
Retail trade	$8,071.9	3.0%
Transportation and Utilities	$3,140.8	1.2%
Information	$23,587.7	8.8%
FIRE	$33,981.4	12.7%
Professional, Management, and Administrative	$34,001.5	12.7%
Education and Health Services	$15,491.2	5.8%
Arts, Entertainment, and Food Services	$6,276.9	2.3%
Other services, except public administration	$4,278.1	1.6%
Total	**$268,443.9**	**100.0%**

FIRE stands for Finance, Insurance and Real Estate.

Source: Minnesota IMPLAN Group 2013; USDA/Santa Clara County Agricultural Commissioner.

Fiscal Resources (Property and Sales Taxes)

Property Taxes

Property taxes are a tax levied on the assessed value of land, buildings, and improvements. Counties, cities, schools, and special districts in California depend on the property tax as a primary source of revenue, which can be used for multiple purposes.

In Fiscal Year (FY) 2010–2011, the locally assessed value of county-assessed property in Morgan Hill and Gilroy was $6.2 billion and $5.6 billion, respectively (State of California, Board of Equalization 2011a). This resulted in approximately $68.6 million in tax revenues for Gilroy and $73.9 million in tax revenues for Morgan Hill[11]. The net taxable assessed value of property in Santa Clara County was $297.3 billion and tax revenues generated from property tax assessments totaled over $3.5 billion in Santa Clara County (State of California, Board of Equalization 2011b).

Sales Taxes

Sales taxes are levied on the consumption of goods and services and are calculated as a percentage of the sales price. The base 2013 sales tax rate in California is 7.5 percent, of which 0.25 percent is apportioned to the local county transportation funds and 0.75 percent is apportioned to the local cities and county as operation funds percent (State of California, Board of Equalization 2013a).

The effective sales tax rate in any area can be higher due to local assessments. In 2013, the sales tax rate in Santa Clara County and the entire project area was 8.625 percent (State of California, Board of Equalization 2013b). In FY 2010–2011, Santa Clara County received a total of $235.4 million in sales tax revenues, of which $4.3 million was distributed to Morgan Hill and $9.3 million was distributed to Gilroy (State of California, Board of Equalization 2011c).

Economic Resources Subject to Flooding Addressed by the Applicant's Proposed Action

Flood events can have tremendous direct impacts on socioeconomic resources located within the extent of the outflow, as well as indirect economic impacts throughout the region and elsewhere. Incremental flood protection afforded to socioeconomic resources typically improves local and regional economic conditions relative to existing conditions.

The Applicant's Proposed Action is designed to increase flood capacity of Reaches 8, 7B, and 7A to contain the 1-percent flood event (100-year flow) and of Reach 14 to contain the 10-percent flood event. Project activities, including channel widening/deepening and infrastructure modifications along Reaches 6, 5, and 4, are designed to ensure modifications upstream do not induce incremental flooding downstream.

Reaches 8, 7B, and 7A bisect Morgan Hill and the flood flows from the area expand into northern San Martin. This area has flooded several times in recent history, including 1997 and 1998 and as recently as 2008 and 2009:

- Morgan Hill and San Martin sustained $350,000 (by local estimates) in damages from floods along the Upper Llagas Creek during 1997 and 1998.
- The January 4, 2008 storm inundated Morgan Hill's downtown as local officials declared an emergency and opened their Emergency Operations Center to deal with the widespread flooding. As of 2010, associated damages had not been monetized.
- Downtown Morgan Hill was again flooded on October 13, 2009. Storm waters entered homes and businesses, families were displaced, and roads closed. Much of the downtown was inundated with several inches of water causing businesses to shutter for days.[12]

Comments made during the public scoping meeting for this Project echoed concerns about continued flooding of downtown Morgan Hill (Reaches 8 and 7B) causing a detriment to its future economic growth. As reported in Table 3.17-10, downtown Morgan Hill is home to at least 109 different commercial business establishments of various types.

11 Calculation assumes the Santa Clara County average property tax rate of 1.191% (State of California, Board of Equalization 2011b).

12 No estimates of the economic impacts appear to be available in the public domain.

Table 3.17-10 Business Establishments in Downtown Morgan Hill

Type of Establishment	Number of Establishments
Restaurant	25
Retail	18
Professional	37
Services	23
Recreation	6

Source: Morgan Hill Downtown Association 2013.

Reaches 7B and 7A are characterized by residential, commercial, and industrial areas. Types of businesses in these reaches include major retail shopping outlets, mixed-use commercial centers, a major self-storage facility, schools (private and public), gas stations, crop production, nursery production, a food processing plant, and developable land, among others.

Approximately 550 acres of the 1-percent flood extent was planted with crops or left fallow in 2013. A significant portion of this acreage is like to be Important Farmland (see Table 4.7-6, Acres of Williamson Act and Important Agricultural Lands Flooded Under 1-Percent Flood Scenario by Alternative).[13] The Project is projected to protect approximately 370 acres, comprised mainly of vegetables including peppers, leafy greens, celery, cabbage, and bok choy (31%); oats and hay (28%); outdoor flowers (2%); and acreage to a mix of these crops (39%) (Santa Clara County Department of Agriculture 2013)[14].

In addition to commercial, industrial, and agricultural operations, approximately 16,000 people live in 5,200 housing units within the Census Tracts bisected by Reaches 8, 7B, and 7A (5123.14, 5123.13, 5123.07) in and around the flood extent. Housing units and population in the area has steadily increased over the years in spite of historical and contemporaneous flood events.

[13] Important Farmland: Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Local Importance. The data source for specific planted and fallowed acreage is different from the data source identifying Important Farmland.

[14] Crop distribution on protected acreage computed by Cardno ENTRIX GIS staff from cited data sources

While the Project would virtually remove this entire area from the existing 1-percent flood extent, the associated economic value to the region is unknown. The NRCS's analysis of Alternative F in the 1982 EIS/EIR estimated the Project would protect 1,123 residential structures, 65 mobile homes, 463 commercial establishments, 24 industrial buildings, and 1,300 acres of agricultural land (See Section 2.3.1). By the NRCS's estimate, avoided flood damages afforded by the entire Project would amount to approximately $2.3 million annually (adjusting for inflation only).[15] However, the substantial population growth and shifts in land use patterns within the area since the 1980s, and the fact that portions of the Project along Lower Llagas Creek have since been completed, render the NRCS's estimate obsolete. No update of the original NRCS study was available to inform this study.

[15] Alternative F in the 1982 EIS/EIR is reflected closely by the NRCS Alternative in this EIS. Annual benefits associated with Alternative F were estimated at $941,100. This estimate was inflated to 2012 price levels using the Consumer Price Index (CPI) for all items published by the U.S. Bureau of Labor Statistics for the San Francisco-Oakland-San Jose area. Portions of the Project along Lower Llagas Creek have been completed since the original study was conducted in 1982.

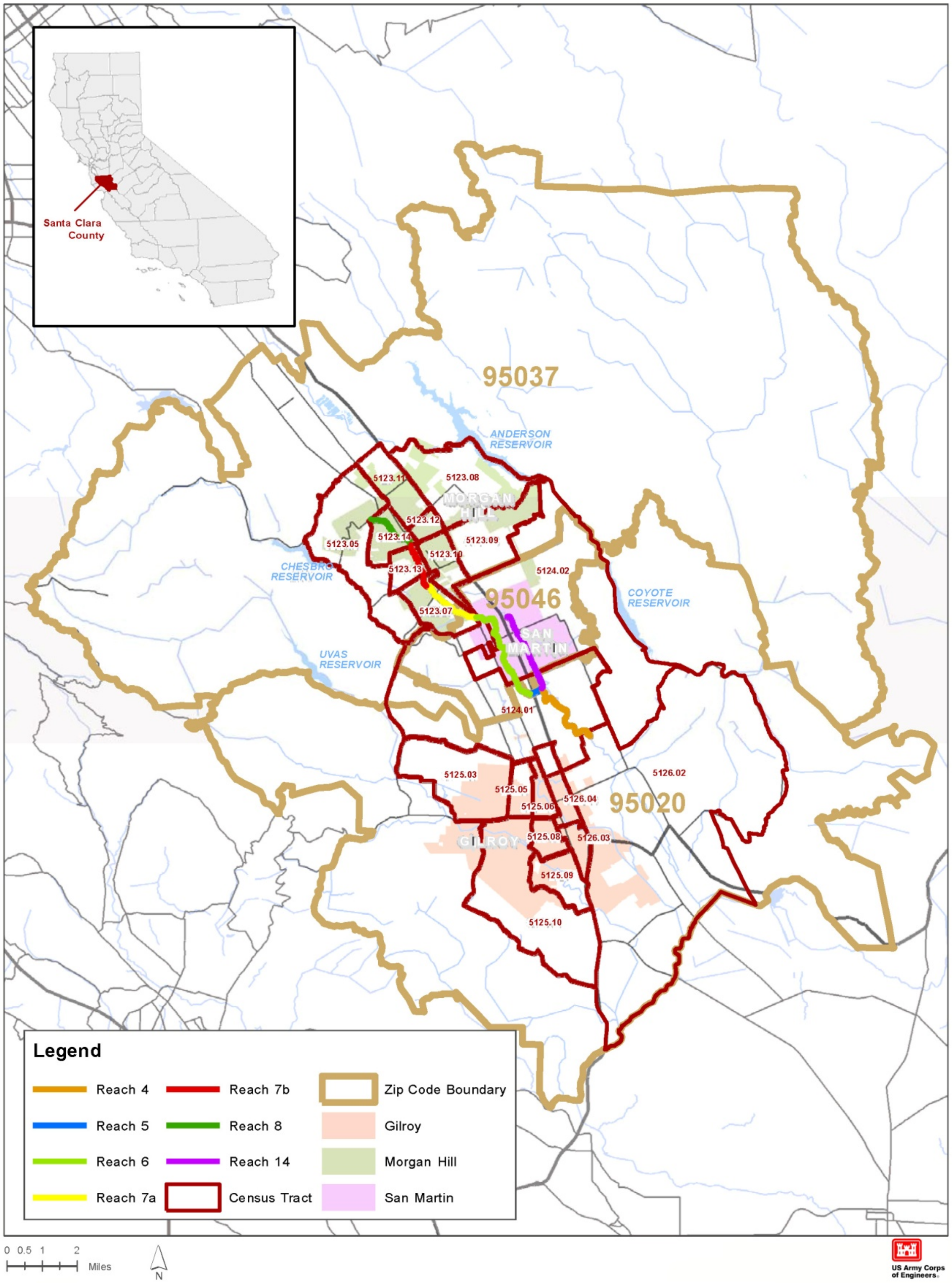

Figure 3.17-1 Geography of the Socioeconomics Project Area

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3.18 HAZARDS AND HAZARDOUS MATERIALS

This section describes the existing environment and assesses potential impacts related to hazards and hazardous materials for the Project. Potential hazards addressed in this section include issues related to hazardous materials in soil and groundwater, releases of hazardous materials during construction, fires, and interference with an adopted emergency response or emergency evacuation plan. If Project-related impacts are found to exceed thresholds of significance, mitigation measures are identified.

Information on potential soil and groundwater contamination hazards in the Project area was drawn primarily from a Hazardous Materials Assessment Report titled *Draft Memorandum Presenting Findings of Hazardous Materials Assessment Reports Review for Upper Llagas Creek Flood Protection Project*, prepared by Weiss Associates (Weiss), dated November 15, 2011. Weiss compiled existing conditions information on hazards and hazardous materials in the Project area based on review of Phase I Environmental Site Assessment (Phase I ESA) reports, Phase II Environmental Site Assessment (Phase II ESA) reports, and database searches.

3.18.1 Introduction

The potential environmental concerns identified in the project area include pesticides and fertilizers, nitrates, fecal coliform, potentially hazardous chemicals, petroleum hydrocarbons, heavy metals, naturally-occurring asbestos, asbestos-containing building materials, lead-based paint, and polychlorinated biphenyl-(PCB)-containing lighting fixtures.

This section describes potential hazards and hazardous materials by Project reach, as described in Chapter 2. In general, the following potential Constituents of Concern (COCs) were identified for all reaches:

- Pesticides and fertilizers from prior or ongoing agricultural activities;
- Asbestos and lead-based paint from buildings constructed prior to 1978; and
- Naturally-occurring asbestos in soil.

3.18.2 Project Area

The Project is located in southern Santa Clara County, approximately 25 miles southeast of San Jose, in the communities of Morgan Hill, San Martin, and Gilroy (Figure 1.1-1, Regional Area Map). From south to north, the Project passes through rural residential areas in Gilroy and San Martin before entering rural areas again, then residential areas, and finally through the main commercial district of Morgan Hill. The Project consists of the upper seven reaches (4, 5, 6, 7A, 7B, 8, and 14) of Llagas Creek, East Little Llagas Creek, and West Little Llagas Creek from just downstream of Buena Vista Avenue (Figure 2.2-1, Upper Llagas Creek Project Area Reaches). Weiss determined that the project area for the hazardous materials assessment comprises nearly 400 discrete parcels. The project area generally represents a 25-foot buffer from the top of bank.

All potential COCs are identified in the specific reach descriptions, below.

3.18.3 Environmental Setting

Reach 4

Reach 4 is an intermittent stream channel that winds through agricultural and suburban areas. According to Weiss, a previous Phase I ESA identified an oil stain in a Reach 4 parcel that could indicate the presence of petroleum hydrocarbons in the soil. Other potential COCs in Reach 4 include the following:

- Residual pesticides and fertilizers (from prior and ongoing nearby agricultural uses);
- Nitrate;
- Fecal coliform;
- Asbestos and lead paint;
- Non-friable asbestos in buildings;
- Total petroleum hydrocarbons (TPH);
- Tetrachloroethylene (PCE) in groundwater (source unknown); and
- Polychlorinated Biphenyls (PCBs) from transformers.

Reach 5

Reach 5 is a short 0.4-mile segment connecting Reaches 6 and 14 that averages 15 feet wide at the OHWM. Land use is heavy agricultural to the north and urbanized to the south. Potential COCs include:

- Residual pesticides and fertilizers (from prior and ongoing nearby agricultural uses);
- Asbestos and lead-based paint; and
- Non-friable asbestos from building materials.

Reach 6

Upper Llagas Creek flows through the Reach 6 channel in a southerly direction. The channel is composed of gravel, sand, and silt. The southwestern portion of Reach 6 is adjacent to several SCVWD percolation ponds. The southeastern portion or Reach 6 is adjacent to greenhouses and agricultural fields. The middle portion of Reach 6 traverses through agricultural fields, small corporation yards, and suburbanized areas. Portions of this central reach are adjacent to paved roads. The northern portion of Reach 6 passes through an industrialized area and waste treatment facilities including a former waste transfer station. Potential COCs in Reach 6 include the following:

- Residual pesticides and fertilizers (from prior and ongoing nearby agricultural uses);
- Non-friable asbestos from building materials;
- Asbestos and lead-based paint;
- VOCs, Semi-volatile Organic Compounds (SVOCs) and metals from activities related to a food processing, landfill and junk yard;
- Fecal coliform and nitrate from a septic tank and leach field; and
- Excess nutrients from a food processing waste holding tank area and/or holding pond sediment.

Reach 7A and Reach 7B

Reach 7 is divided into two sections, Reaches 7A and 7B. Reach 7A is the southern reach and Reach 7B is the northern reach. The southern portion of Reach 7A is a topographically flat section of land (there is no channel) with a combination of heavy agricultural use (plowed fields) or fallow land that has been converted to annual non-native grassland. The northern half of Reach 7A runs through a residential neighborhood and ends to the north at the intersection of West Little Llagas Creek and Reach 7B

Reach 7B contains West Little Llagas Creek; and the channel is composed of gravel, sand, silt, and clay. The stream channel transects a suburban area. The banks and the non-disturbed areas beyond the top of the bank contain annual grassland species. In the northern portion, the stream channel is adjacent to small businesses and is in an underground culvert for the last 650 feet on the north end.

Concentrations of arsenic, cobalt, nickel, and vanadium were reported to exceed screening levels in Phase II ESAs for Reaches 7A and 7B. According to Weiss, these metals may be naturally occurring, but it is unclear whether soil concentrations of these metals are elevated across the entire Project area or only in Reaches 7A and 7B.

Potential COCs specific to Reach 7A include the following:

- Pesticides, herbicides, metals, petroleum hydrocarbons, VOCs, SVOCs, and nitrates from agricultural activities, potential COCs from an automobile junk yard and large manure pile;

- Pesticides, metals, PCBs, SVOCs, and TPH potentially from a fuel tank; and
- Asbestos and lead based paint in structures.

Potential COCs identified specific to Reach 7B include the following:

- VOCs, SVOCs, metals, and methyl tertiary butyl ether (MTBE)
- Asbestos and lead based paint in structures;
- Non-friable asbestos in buildings;
- Unknown stored chemicals potentially sourced to a garage with no secondary containment, poor housekeeping, or an unlabeled 55-gallon drum; and
- Lube oil and kitchen grease from 55-gallon drums.

Reach 8

Reach 8 contains an intermittent stream (West Little Llagas Creek). The channel is composed of gravel, sand, silt, and clay and averages 12 feet in width. The channel transects a heavily urbanized area with businesses, residential areas, and roads abutting many portions of the top of the channel bank. The channel runs underground for 250 feet.

Potential COCs specific to Reach 8 include the following:

- PCBs in soil from a small electrical substation;
- Residual pesticides and fertilizers;
- Non-friable asbestos in buildings; and
- Potential releases from the Union 76 service station that is adjacent to a Reach 8 parcel.

Reach 14

Reach 14 is a wide channel with several portions that were excavated in 2011. The areas beyond the roads on each side of the channel consist of agricultural fields or are heavily suburbanized. Potential hazardous materials include:

- Residual pesticides and fertilizers from row crops and orchards; and
- Perchlorate may be present in groundwater underlying Reach 14.

Weiss identified two sites near Reach 14 with potential COCs, a scrap metal recycling facility and a school (Table 3.18-1).

Potential Releases of Hazardous Materials

The Olin site, less than 1 mile from the project area at 425 Tennant Avenue, was known to have affected groundwater quality underlying parcels in Reaches 4, 5, and 6. This site has been identified as having a previous significant release of Perchloroethylene (PCE) (Piers 2003 as cited in Weiss 2011). Other sites, listed in Table 3.18-1, had previous releases of hazardous materials, as discussed below.

Table 3.18-1 Summary of Sites Identified in Geotracker and Envirostor Databases

Reach	Sites within Project area	Site Near Project area	Cleanup Status	Potential	Medium
4	None Identified	None Identified	N/A	N/A	N/A
5	None Identified	None Identified	N/A	N/A	N/A
6	None Identified	San Martin Auto Wreckers, 14155 Llagas Ave., San Martin, CA (~600 feet)	Closed as of 2011	Arsenic, copper, diesel, nickel, other metals, waste oil: motor, hydraulic lubricating	Soil, aquifer used for drinking water
	--	San Martin Closed Landfill, 14070 Llagas Ave., Gilroy, CA (overlaps with SCVWD ROW)	Closed with Deed Restriction	Landfill waste	Soil
	--	Air and Auto Salvage Services, 13895 A Llagas Ave., San Martin, CA (~200 feet)	Closed as of 1988	LUST cleanup site	Soil
	--	Western Refrigeration, 13805 Llagas Ave., San Martin, CA (~100 feet)	Closed as of 1987	LUST cleanup site	Soil
7A	Royal Oak Mushroom, 15480 Watsonville Rd., Morgan Hill, CA 95037	--	Closed as of 1996	LUST cleanup site	Soil
	--	Lico Distributing, 14245 Monterey Road	Closed as of 2002	LUST cleanup site	Groundwater, aquifer used for drinking water
7B	Morgan Hill Corporation Yard, 105 Edes Court, Morgan Hill, CA 95037	--	Remediation OPEN	LUST cleanup site: benzene, fuel oxygenates, gasoline, toluene, xylene	Soil, surface water, aquifer used for drinking water supply

Reach	Sites within Project area	Site Near Project area	Cleanup Status	Potential	Medium
	--	Word Oil, 16720 Monterey, Morgan Hill, CA 95037 (~200 feet)	Site assessment OPEN	LUST cleanup site: gasoline	Aquifer used for drinking water supply
	--	Olin Corporation[2], 425 Tennant Avenue, Morgan Hill, CA 95037	Remediation as of April 2004 OPEN	Cleanup program site: perchlorate	Aquifer used for drinking water supply, well used for drinking water supply
	Don Love Auto, 17090 Monterey Hwy, Morgan Hill, CA 95037	--	Closed as of 1988	LUST cleanup site	Soil
	--	Unocal, 17015 Monterey St., Morgan Hill, CA 95037 (~100 feet)	Closed as of 1996	LUST cleanup site	Soil
	--	Monterey Mushroom Inc., 642 Hale Ave., Unincorporated, CA	Closed as of 2001	LUST cleanup site	Soil
14[1]	None Identified	Winston Chan Property (recycling scrap metal) 14735 Monterey Highway, San Martin, CA	Cleanup completed 1986. No further action.	DDE, DDT, DDD	Soil
	--	Barrett Avenue Elementary School. The nearest surface water is 1.1. miles to the south, Llagas Creek. 10 acre site was formerly an orchard and was used since 1987 to raise flowers. since 1987 to raise flowers.	Voluntary cleanup completed 2003.	Dieldrin and toxaphene. No metals or herbicides were found.	Soil

Unless otherwise noted, data obtained from Geotracker database at http://geotracker.swrcb.ca.gov, accessed August– September 2011. Sites "near project area" are defined as within approximately 500 feet, except for the Olin site, which is approximately 2000 feet from Reach 7B.

Abbreviations:
COC = Constituent of Concern
DDD = metabolite of dichlorodiphenyldichloroethane
DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyltrichloroethane
LUST = leaking underground storage tank
N/A = not applicable

[1] Data obtained from Envirostor database, accessed August to September 2011.

[2] Data obtained from GeoTracker database, accessed February 2013.

Source: Weiss 2011, GeoTracker database (SWRCB 2013)

Geologic and Hydrogeologic Conditions

Soil borings obtained during Phases II ESAs conducted in 1997 and 2004 showed shallow alluvial soils that are generally coarse-grained with a high sand content. The borings also show that fine-grained sediment content increases with depth and soils at depths greater than 10 feet are generally sandy to silty clays. In Reaches 7A and 7B, groundwater was encountered in many borings at depths of 14 to 26 feet during the 2011 study (Weiss 2011). In other reaches, the depth to groundwater was not reported, because only surface sampling was conducted (Weiss 2011).

Naturally Occurring Asbestos

Local geographic information suggests that serpentinite, an ultramafic rock, is not present in the project area. However, there is a slight possibility that it could be inadvertently discovered during construction of the Project as discussed in Section 4.1, Geology and Soils, contains additional discussion of the location of ultramafic rocks outside the Project Area.

Comparison With Screening Levels

Weiss compared analytical data for soil and groundwater samples obtained from Phase II ESAs with the following environmental and human health screening levels:

- Environmental screening levels (ESLs) from the California Regional Water Quality Control Board – San Francisco Bay Region (RWQCB-SF).
- California Human Health Screening Levels (CHHSLs) from California Department of Toxic Substances Control (DTSC).
- Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites from the Environmental Protection Agency.
- Maximum Contaminant Limit (MCLs) for Drinking Water Contaminants set by the USEPA under the National Primary Drinking Water Regulations.

Soil data were compared with screening values applicable to residential land use. Weiss then compared constituent concentrations that exceeded screening levels with maximum background values.

Reported concentrations of arsenic in soil samples from Reaches 7A and 7B exceeded all screening levels, with the highest concentration reported at 14 mg/kg. Reported concentrations of thallium in deep soil (deeper than three meters below ground surface [bgs]) samples from Reach 7A exceeded all screening levels, with the highest concentration at 13 mg/kg. Nickel concentrations exceeded ESLs in shallow soil (0–3 meters bgs) in Reach 7A, with the highest concentrations reported at 300 mg/kg, but did not exceed the CHHSLs or RSLs. Reported concentrations of vanadium in soil in Reach 7A exceeded the ESL, with the highest concentration of 110 mg/kg, but did not exceed the CHHSLs or RSLs. One soil sample in Reach 7A was reported to have a concentration of mercury of 5.3 mg/kg, exceeding the ESL, but not exceeding the CHHSLs or RSLs. Reported antimony concentrations exceeded all screening levels in one soil sample in Reach 7A at a concentration of 210 mg/kg. Reported cobalt concentrations in shallow and deep soil samples from Reach 7A exceeded the RSL, with the highest concentration of 36 mg/kg.

Reported pesticide concentrations exceeded the screening levels in four shallow soil samples (< 3 meters bgs): dieldrin was reported at 0.0029 mg/kg in one soil sample from Reach 4 and at 0.0034 mg/kg in one soil sample from Reach 5, and endosulfan I was reported at 0.008 mg/kg in one sample from Reach 4 and at 0.021 mg/kg in one sample from Reach 5.

Nearly all herbicide results were reported at concentrations below the detection limit. No ESLs exist for these constituents. No detections of PCBs, VOCs, or SVOCs exceeding the screening levels were reported in soil samples from Reaches 7A or 7B. Fecal coliform was reported at concentrations below the detection limit in samples collected in Reach 4.

In Reaches 7A and 7B, groundwater was encountered at depths 14 to 26 feet (Weiss 2011); groundwater samples were analyzed for a range of contaminants in these reaches. Reported concentrations of arsenic, barium, beryllium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, vanadium, and zinc in groundwater samples from Reach 7A exceeded groundwater ESLs. Reported concentrations of Total Petroleum Hydrocarbons as Diesel (TPH-D) exceeded the ESL in groundwater samples collected in Reach 7A, but they were not detected above the ESLs in soil in the same area. Reported concentrations of arsenic, barium, cadmium, chromium, and mercury exceeded MCLs in samples collected from Reach 7A.

Nitrate concentrations reported in groundwater samples collected in Reach 7A exceeded the MCL. Reported concentrations of 4,4'- Dichlorodiphenyldichloroethylene (DDE) and heptachlor exceeded their respective ESLs in groundwater samples from Reach 7A.

Vector-Borne Disease Hazards

The principal vector-borne disease concern in the Project area relates to diseases spread by mosquitoes. West Nile Virus (WNV) has had a serious impact upon the health of humans, horses, and wild birds throughout the state. Mosquito-borne viruses belong to a group of viruses commonly referred to as arboviruses (for arthropod-borne). Although 12 mosquito-borne viruses are known to occur in California, only WNV, western equine encephalomyelitis virus (WEE), and St. Louis encephalitis virus (SLE) are significant causes of human disease. Since 2004, there have been 16 human cases of WNV in Santa Clara County and no deaths (SCVCD 2011). In 2012, there were 471 WNV human cases in the state; however, none of these 2012 cases occurred in Santa Clara County (California Department of Public Health 2013).

Mosquito Breeding

Many mosquitoes lay their eggs on the surface of fresh or stagnant water. A body of standing water represents a potential breeding habitat for mosquitoes, including water in cans, barrels, horse troughs, ornamental ponds, swimming pools, puddles, creeks, ditches, or marshy areas (SCVCD 2011). Within cities and developed areas, runoff from landscape watering, car washing, and storms often collects in retention ponds or catch basins long enough to produce mosquitoes. Mosquito larvae can develop anywhere water stands for at least 5 days (California Department of Health Services 2005).

Mosquito Control

In California, local vector control agencies have the authority to conduct surveillance for vectors, prevent the occurrence of vectors, and abate production of vectors (California Codes: Health and Safety Code Section 2040). Vector control agencies also have authority to review, comment, and make recommendations for projects with respect to their potential vector production (California Health and Safety Code Section 2041). Vector control agencies utilize a combination of mosquito abatement procedures tailored to the period in the mosquito life cycle and specific habitat conditions. Mosquito control methods may include the use of biological agents (e.g., mosquitofish), microbial control agents (e.g., Bacillus thuringiensis israelensis and B. sphaericus), pesticides, and source reductions (i.e., emptying containers holding water that could produce mosquitoes) (California Department of Health Services 2005). The entire Project area is within the jurisdiction of the Santa Clara County Vector Control District. The Santa Clara County Mosquito-borne virus Response and Operations Plan provides an overview of procedures and strategies for surveillance and operational response to mosquito-borne viruses in the county, outlines risk assessment models, and prompts surveillance and control activities. The document is based on the California Mosquito-Borne Virus Surveillance and Response Plan that provided statewide guidelines (SCVCD 2011).

Wildfire Hazards

The combination of highly flammable fuel, long dry summers, and steep slopes creates a significant natural hazard of large wildland fires in many areas of Santa Clara County. A wildland fire is a fire in
which the primary fuel is natural vegetation. Wildland fires can consume thousands of acres of vegetation, timber, and agricultural lands. Fires ignited in wildland areas can quickly spread, if unabated, to areas where residential or commercial structures are intermingled with wildland vegetation. Fires that start in urbanized areas can grow into wildland fires. Wildland/urban interface fire hazards are especially pronounced in areas of high structure densities adjacent to undeveloped open space areas with dense vegetation (Santa Clara County 2008).

Wildfire behavior is based on three primary factors: weather, topography, and fuel. Wildland fire season in Santa Clara County spans the months after the last spring rains have fallen and until the first fall or winter rains occur. The months of August, September, and October have the greatest potential for wildland fires as vegetation dries out and humidity levels fall.

Each city in Santa Clara County is responsible for its fire protection either by utilizing its own resources or contracting with the California Department of Forestry and Fire Protection (CAL FIRE), a fire district, or adjacent municipal service. The unincorporated area is the primary responsibility of CAL FIRE, along with some fire protection districts and volunteer fire companies.

Wildfires can be caused by natural events, such as lightning or high winds. However, most wildland fires are human caused. Campfires, careless smokers, electrical sparks, and arson cause most wildland and wildland/urban interface fires. In Santa Clara County, electrical equipment, such as power lines and transformers, have caused numerous fires. Fires started by the use of mowing and power equipment around very dry vegetation are also cause for concern.

Santa Clara County's fire agencies have signed a countywide mutual aid agreement to ensure that firefighting resources and personnel will be available to combat wildland urban interface fires (Santa Clara County 2008).

Based on the California Department of Forestry's wildfire hazard real estate disclosure map for Santa Clara County, the Project area is outside areas with substantial forest wildland fire hazards (California Department of Forestry 2012). However, some Project elements would be constructed in areas that could pose wildfire risks under dry conditions. Portions of Reaches 7A, 7B, and 8 are located less than 1 mile from a very high fire hazard severity zone in a local area of responsibility (CAL FIRE 2008).

Airports

The nearest public airport to the Project is San Martin Airport, located less than 0.20 mile from Reach 6 and less than 0.40 mile from Reach 14.

Schools

As discussed in Section 3.14, Utilities and Public Services, several schools occur within 0.25 mile of the Project reaches and are listed in Table 3.18-2.

Table 3.18-2 Schools Within 0.25 mile of a Project Reach

Project Reach	School(s)	Address
4	No schools within 0.25 mile	
5	No schools within 0.25 mile	
6	San Martin/Gwinn Elementary School	100 North Street, San Martin, CA 95046
7A 8and 7B	Kiddie Academy of Morgan Hill	15750 Monterey Street, Morgan Hill, CA 95037
8	Paradise Valley Elementary School Oakwood School Stratford School Britton Middle School P.A. Walsh School	400 La Crosse Drive, Morgan Hill, CA 95037 105 John Wilson Way, Morgan Hill, CA 95037 410 Llagas Road Morgan Hill, CA 95037 80 W. Central Avenue, Morgan Hill, CA 95037 353 West Maine Avenue, Morgan Hill CA 95037
14	No schools within 0.25 mile	

3.19 ENVIRONMENTAL JUSTICE

3.19.1 Introduction

This section describes the environmental justice implications of the Project in the Project area, including an analysis of communities of concerns for both minority and low-income characteristics and the disproportionate distribution of negative effects on communities of concern.

3.19.2 Project Area

The Project area for this analysis is all of the 2010 Census Tracts intersected by the Project footprint, which includes Tracts 5123.07, 5123.13, 5123.14, 5124.01, and 5124.02 (Figure 3.19-1). These tracts are located in Santa Clara County, California. This area contains the urban city of Morgan Hill and the unincorporated area of San Martin.

3.19.3 Environmental Setting

This section describes the demographic characteristics by Project reach as described in Chapter 2, Project Description, and by geographic region. Demographic characteristics are used to identify communities of concern in environmental justice analyses. The geographic region is defined for the purpose of taking a census tract. For a more detailed investigation of population and housing see Sections 3.16 and 4.16, Population and Housing. For a more detailed investigation of socioeconomics see Sections 3.17 and 4.17, Socioeconomic Resources.

Reach 4 and Reach 5

Reaches 4 and 5 are contained within Census Tract 5124.01. According to the U.S. Census Bureau (Bureau of Census as defined in Title 13 U.S.C. §11), the 2010 population in this tract was 4,782 people and its population density was 299 persons per square mile. Of this population, 65.5 percent reported their race as White, 43.1 percent reported their ethnicity as Hispanic or Latino, and 6.4 percent reported their ethnicity as Asian (U.S. Census Bureau 2010b). The median household income is $79,213 and 9.6 percent of people have income below the poverty level (U.S. Census Bureau 2011a).

Reach 6 and Reach 6 Bypass

A small portion of Reach 6 lies within Census Tract 5124.01, which is described above. The majority of Reach 6 and all of Reach 6 Bypass lie within Census Tract 5124.02. According to the U.S. Census, the 2010 population in this tract was 5,167 people and its population density was 321 persons per square mile. Of this population, 63.3 percent reported their race as White, 40.7 percent reported their ethnicity as Hispanic or Latino, and 7.7 percent reported their ethnicity as Asian (U.S. Census Bureau 2010b). The median household income is $113,125 and 6.6 percent of people have income below the poverty level (U.S. Census Bureau 2011a).

Reach 7A

The proposed Reach 7A is contained within Census Tract 5123.07. According to the U.S. Census, the 2010 population in this tract was 6,344 people and its population density was 3,003 persons per square mile. Of this population, 74.9 percent reported their race as White, 23.5 percent reported their ethnicity as Hispanic or Latino, 7.6 percent reported their ethnicity as Asian, and 1.6 percent reported their ethnicity as Black or African American (U.S. Census Bureau 2010b). The median household income is $95,357 and 1.2 percent of people have income below the poverty level (U.S. Census Bureau 2011a).

Reach 7B

A small portion of Reach 7B lies within Census Tract 5123.07, which is described above. The majority of Reach 7B lies within Census Tract 5123.13. According to the U.S. Census, the 2010 population in this tract was 3,887 people and its population density was 3,831 persons per square mile. Of this population, 55.4 percent reported their race as White, 55.3 percent reported their ethnicity as Hispanic or Latino, 5.5 percent reported their ethnicity as Asian, and 2.4 percent reported their ethnicity as Black or African American (U.S. Census Bureau 2010b). The median household income is $77,103 and 19.2 percent of people have income below the poverty level (U.S. Census Bureau 2011a).

Reach 8

Reach 8 is contained within Census Tract 5123.14. According to the U.S. Census, the 2010 population in this tract was 5,932 people and its population density was 4,132 persons per square mile. Of this population, 60.7 percent reported their race as White, 48.3 percent reported their ethnicity as Hispanic or Latino, 7.3 percent reported their ethnicity as Asian, 1.6 percent reported their ethnicity as Black or African American, and 1.2 percent reported their ethnicity as American Indian and Alaska Native (U.S. Census Bureau 2010b). The median household income is $65,913 and 24.6 percent of people have income below the poverty level (U.S. Census Bureau 2011a).

Reach 14

A small portion of Reach 14 lies within Census Tract 5124.01 and the majority of Reach 14 lies within Census Tract 5124.02. These tracts are described above for Reach 6.

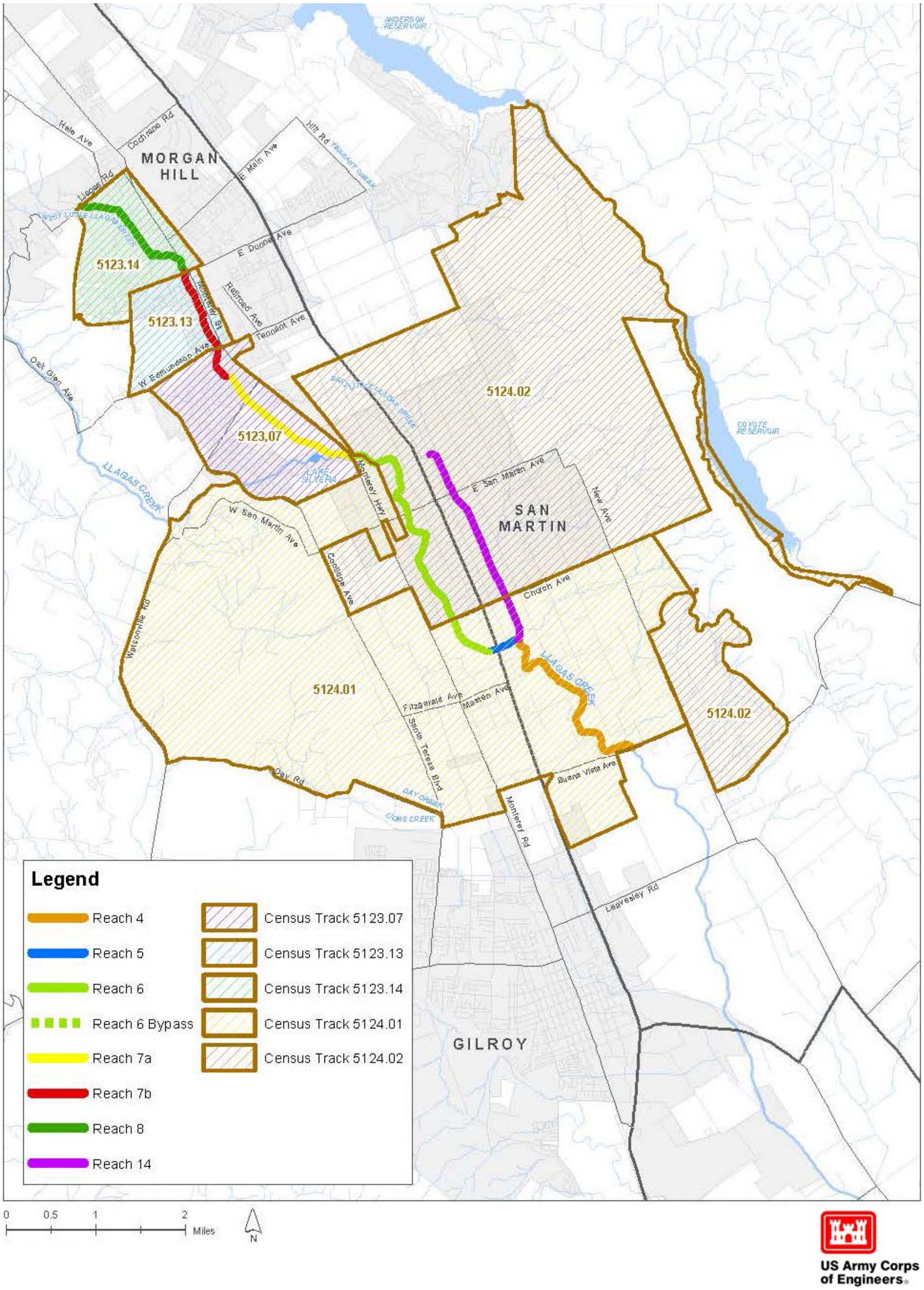

Figure 3.19-1 Environmental Justice Project Area

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CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

This chapter provides a discussion of the potential environmental effects, which can be either positive or negative, that could result from implementation of the Alternatives. A detailed description of the alternatives is provided in Chapter 2. The evaluation of the effects was based on results of modeling simulations, vegetation and serpentine soil mapping, current information including scientific literature, direct observation, project design reports, reasonable scientific judgment, the scoping process, and the environmental review CEQA documents. The No Action Alternative considers the environmental conditions in the affected regions without the Applicant's Proposed Action.

Environmental impacts include both direct and indirect effects. Under the Council on Environmental Quality (CEQ) regulations, direct effects are "caused by the action and occur at the same time and place," while indirect effects are "caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems" (40 C.F.R. 1508.8). This chapter also discusses potential impacts of this project in concert with other reasonably foreseeable projects (cumulative impacts), unavoidable adverse impacts, effects to the resources that cannot or would not be reversed in a foreseeable amount of time (irreversible and irretrievable commitment of resources), any conflicts and controversy associated with this project, and environmental commitments.

This chapter describes in-depth environmental consequences in 19 resource and issue areas for the Upper Llagas Creek Project (Project):

- Geology and Soils (Section 4.1)
- Hydrology and Water Quality (Section 4.2)
- Mineral Resources (Section 4.3)
- Botanical Resources (Section 4.4)
- Wildlife Resources (Section 4.5)
- Aquatic Resources (Section 4.6)
- Agriculture and Forestry Resources (Section 4.7)
- Land Use and Planning (Section 4.8)
- Cultural Resources (Section 4.9)
- Traffic and Circulation (Section 4.10)
- Air Quality and Greenhouse Gases (Section 4.11)
- Noise (Section 4.12)
- Aesthetics Resources (Section 4.13)
- Utilities and Public Services (Section 4.14)
- Recreation Resources (Section 4.15)
- Population and Housing (Section 4.16)
- Socioeconomics Resources (Section 4.17)
- Hazards and Hazardous Materials (Section 4.18)
- Environmental Justice (Section 4.19)

Some impacts are identified as "beneficial" consistent with the National Environmental Protection Act (NEPA). An adverse impact would be less than significant if the impact is less than the significance threshold. If mitigation can be applied to an otherwise potentially significant impact to reduce it below the threshold of significance (“less than significant”), the impact is thus identified as “less than significant with mitigation.” If mitigation cannot reduce the impact to less than significant, it would be identified as “significant and unavoidable.” In the case of the No Action Alternative, mitigation is not discussed or provided; because at the end of the NEPA process mitigation measures would not be implemented for the No Action Alternative.

Where appropriate, impacts are described in terms of their duration. We define “short-term” impacts to be those effects that occur up to the length of the construction period (coterminous with the number of construction seasons, which vary from one alternative to another) and do not endure beyond the construction period. “Long-term” impacts are effects that endure beyond the construction period, even if not permanent.

Cumulative impacts (Section 4.20) are described and evaluated in this Chapter. Cumulative impacts may result from individually minor but collectively significant effects of several projects over a period of time. Cumulative effects may occur when a project’s incremental impacts, added to those of other closely related past, present, and reasonably foreseeable probable future projects, become environmentally important.

Following NEPA, this Environmental Impact Statement (EIS) identifies the Proposed Project and its alternatives, including a No Action Alternative. The impacts of all of the alternatives (No Action Alternative, the Applicant’s Proposed Alternative [Tunnel Alternative], Natural Resource Conservation Service [NRCS] Alternative, Culvert/Channel Alternative, and the Reach 6 Bypass Alternative) are compared to one another and to existing conditions in the Project area.

4.1 GEOLOGY AND SOILS

4.1.1 Introduction

The Upper Llagas Creek Project (Project) area is located within an actively forming geologic environment of earthquakes and faulting as well as associated uplift of mountain ranges and lowering of basins. These geological processes, ongoing for millions of years, have created the landforms upon which the Project streams flow; and, as a result, must be accounted for in Project design and potential impacts. In addition, the Project involves excavation of soils and exposure of underlying geologic layers in order to construct Project features, such as new or expanded channels, culverts, maintenance, and access roads. The ongoing risks of major earthquakes and potential hazards resulting from ground shaking and failures, such as ruptures and liquefaction are important factors to consider in design of key Project elements.

For the Project area, the provisions and requirements of Alquist-Priolo and Seismic hazards Mapping Act are incorporated within the Santa Clara County Geological Ordinance (Ordinance) which was created to address Geologic Hazards within designated zones, including those caused by earthquakes and landsliding (Santa Clara County 2006). The Ordinance incorporates various zones designated by maps of specific geologic hazards, such as fault rupture, seismic shaking, liquefaction, ground failures, and landslides. This Ordinance is explained in Part 1. General Provisions, Sec. C12-600 Purpose:

"This chapter is enacted for the purpose of establishing minimum requirements for the geologic evaluation of land based on proposed land uses. It further establishes procedures to enforce these requirements, including rules and regulations for the development of land which is on or adjacent to known potentially hazardous areas, or which has the potential to create or increase the risk of geologic hazard. The provisions of this chapter also are intended to ensure that the County fulfills its duties under state law regarding geologic hazards, including the Alquist-Priolo Earthquake Fault Zoning Act and the Seismic Hazards Mapping Act. This chapter may be cited as the "Santa Clara County Geologic Ordinance."

The Project area lies within the county-designated liquefaction hazards zone (Santa Clara County 2012a), which require geologic reporting and consideration in a project design.

4.1.2 No Action Alternative

The No Action Alternative would follow existing conditions into the future without any new constructed features or changes in the existing flood control system. As a result, there would be no proposed activities or construction that would change existing conditions for geology and soils conditions and therefore, no new impacts would result from earthquake liquefaction failure.

The No Action Alternative would not change the existing maintenance and operation activities. The Santa Clara Valley Water District (SCVWD) has addressed the impacts of maintenance activities under the Stream Maintenance Program (SMP), which was recently revised and reimplemented in 2012. A description of the operation and maintenance activities under the SMP is provided in Section 2.4 of Chapter 2, Description of Alternatives, in this EIS.

As detailed in the 2012 SMP, work is divided into two general categories: regularly-scheduled work (most vegetation management and trash pick-up) that occurs in the same place and the same manner with a predictable frequency; and other routine work that is not undertaken on a regular annual schedule, but is done as the need arises. This latter type of work (e.g., sediment removal and bank protection) has a less predictable frequency and location. Therefore, selection of Best Management Practices (BMPs) is managed differently for these two types of work. As the existing SMP is an ongoing project that would not change under the No Action Alternative, there would be no new impacts due to earthquake induced failures related to operations and maintenance of the existing facilities.

4.1.3 Action Alternatives

With all of the action alternatives Project features could be subject to failure due to earthquake-induced liquefaction ground failures, which could diminish flood capacity and protection and/or present physical hazards to public safety. In the aftermath of a major earthquake, the SCVWD would inspect the Project culverts, maintenance roads, and channel for any failures that require repair or remediation and implement repairs for all of the Action Alternatives. In some circumstances, state and federal governments may provide disaster assistance to enable rapid response, funding, and resources for repairs under Federal Emergency Management Agency (FEMA) disaster assistance.

4.1.3.1 Tunnel Alternative (Applicant's Proposed Action)

The main components of the Tunnel Alternative are described in Section 2.6. The key feature of this Alternative that could be subject to failure and could present a physical hazard in the case of earthquake induced failure is an underground concrete tunnel through Nob Hill in Reach 8 (which is also a feature of the Reach 6 Bypass Alternative). The tunnel construction would be carried out by drilling then lining the earthen tunnel with reinforcements and concrete. The other constructed features of the Applicant's Proposed Action include widening and deepening the existing channel, constructing a new diversion channel in Reach 7A, new culverts, maintenance roads, a sediment detention basin, exhuming two buried bridges, and construction of the Lake Silveira mitigation element (see Section 2.5.6 and Section 5.3 for description of the features and construction at Lake Silveira).

The nature of structural engineering requirements for tunnels are different than that of surface constructed channels and pipes; however, the same procedures are required to define and account for an earthquake's potential liquefaction in the seismic design (i.e., selection of design event and conditions and engineering to offset anticipated forces). Design would meet the following seismic requirements:

- 2010 California Building Code, California Code of Regulations Title 24, Part 2, Volumes 1 and 2
- American Society of Civil Engineers Standard 7-05 "Minimum Design Loads for Buildings and Other Structures"
- American Concrete Institute 318, "*Building Code Requirements for Structural Concrete*" (Chapter 21)
- American Association of State and Highway Transportation Officials (AASHTO) Load Resistance
- Factor Design Bridge Design Specifications (6th. Edition)
- AASHTO Standard Specification for Highway Bridges (17th. Edition)

Included within these requirements is a mechanism for monitoring seismic induced structural offset within the tunnel. Displacement bands or their equivalent would be incorporated into the tunnel's construction to monitor tunnel movement. By meeting the design requirements listed above no impacts would result from the construction of the Project.

The Project area is situated within portions of the Liquefaction Failure Hazard Zone, as defined in the Building Code Ordinance. This means that Project features, such as sediment detention basin, earthen stream banks, maintenance roads, and box culverts may fail during an earthquake due to land heaving, ground ruptures, or landsliding. Such failures could compromise the operational performance of the flood management system, potentially rerouting flows outside of the channel conveyance system causing flooding, reducing flood capacity, or presenting physical hazards to adjacent land uses that could threaten public health and safety. Implementation of mitigation measures as shown in Table 5.4-1 of this EIS would reduce the impact of impaired flood conveyance capacity due to earthquake related ground failure.

Flood conveyance would be most at risk if there was failure within the tunnel. Monitoring of displacement bands that are planned as part of the tunnel construction would identify if there was a potential structural failure. When an earthquake of Magnitude 3.7 (typically the smallest magnitude with visually observable damage) or greater occurs in the Project vicinity, tunnel displacement bands will be inspected for any structural instability and any necessary repairs will be made.

Implementation of mitigation measures as shown in Table 5.4-1 of this EIS would reduce the impact of impaired flood conveyance capacity due to earthquake related ground failure within the tunnel.

Vegetation, sediment, and minor maintenance activities are implemented solely for the purpose of ensuring that the Project features are functioning to maintain the flood design capacity. Consequently, implementation of these maintenance activities would help to ensure that the design channel capacity is not impaired and thereby reduce the risk of failure of the project features and associated potential for risk to people or public property.

Mitigation measures and BMPs for this alternative, including O&M activities, are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.1.3.2 Natural Resources Conservation Service (NRCS) Alternative

The NRCS Alternative consists of Project features that are very similar to the Tunnel Alternative with the exception that there will be no tunnel construction within Reach 8 (see Section 2.5 for description of NRCS Alternative features and construction). All other Project reaches would have the same level of protection; and the same Project features would be constructed, as described for the Applicant’s Proposed Action. Construction impact determinations, including O&M impacts, for the NCRS Alternative are similar to those in the Applicant’s Proposed Action, except there would be none of the impacts, monitoring, or mitigation measures associated with the construction of the tunnel within Reach 8.

Mitigation measures and BMPs for this alternative, including O&M activities, are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.1.3.3 Culvert/Channel Alternative

The key difference between the Culvert/Channel Alternative and the NRCS Alternative is elimination of the need for channel deepening and widening through residential properties between West Main Avenue and West 2nd Street in Reach 8. The construction impacts of the Culvert/Channel Alternative, including O&M impacts, would be the same as the NRCS Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities, are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.1.3.4 Reach 6 Bypass Alternative

The Reach 6 Bypass Alternative has similar impact concerns as the Tunnel Alternative (including a sediment detention basin and a tunnel), but has some different design and flood management structures than the Tunnel Alternative; most notably, a proposed weir and gate structure to divert high flows at the upstream end of Reach 6 to Reach 14.

Operations and maintenance proposed under the Reach 6 Bypass Alternative would be substantially similar to that described for the Tunnel Alternative (described in detail in Section 2.5.5.) with the exception of maintenance for the bypass channel hydraulic control structure in Reach 6. The concrete weir hydraulic control structure would be regularly inspected and maintained to ensure that the concrete is not cracking, spalling, or otherwise losing its structural integrity and that the sluice gates are free of debris and properly functioning.

Failures due to ground shaking could compromise the operational performance of the bypass channel hydraulic control structure for the Reach 6 Bypass, potentially rerouting flows outside of the channel conveyance system causing flooding, reducing flood capacity, or presenting physical hazards to adjacent land uses that could threaten public health and safety. Similar to the Tunnel Alternative, when an earthquake of Magnitude 3.7 (typically the smallest magnitude with visually observable damage) or greater occurs in the Project vicinity, tunnel displacement bands will be inspected for any structural instability and any necessary repairs will be made.

Mitigation measures and BMPs for this alternative, including O&M activities, are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.1.4 Summary of Impacts to Geology and Soils

The only Project impact to people and property from geology and soils risks would be caused by earthquake-induced liquefaction. Mitigation measures and BMPs, as appropriate, for the various Action Alternatives to reduce the impacts to Geology and Soils are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

4.2 HYDROLOGY AND WATER QUALITY

4.2.1 Introduction

This section is an analysis of the potential impacts related to hydrologic and water quality conditions that could be affected by implementation of the Project.

Potential impacts related to hydrology and water quality conditions were evaluated on the basis of flood maps, water quality data in reports, streamflow from existing models for Project design, field observations, and other information on surface and groundwater conditions that are available in both published and unpublished reports. How each of the Project alternatives would alter the overall direction and trend of existing fluvial processes is considered and characterized.

The overall purpose, design, and effect of the Project is to reduce flooding through Morgan Hill in Reaches 8, 7A, and 7B by containing the 1-percent exceedance flow; in Reach 14 by containing the 10-percent exceedance flow; and to not induce flooding in Reaches 4, 5, or 6, due to the upstream flood capacity improvements, for all of the Project alternatives. As shown by comparison of Figures 2.4-1 and 2.5-1, the Project only reduces the extent of flooding—it does not cause increased flooding at any location. This is a fundamental purpose and objective of the Project design. Additionally, the operations and maintenance of the Project (Section 2.5.5) is intended to maintain the designed flood capacity of the Project. Consequently, both construction and maintenance would have no impact to a beneficial effect in relation to each of the four significance criteria, listed above, that are associated with flooding. Each of the summary impact assessment tables reflect this determination of no impact and beneficial effect related to flooding.

The analysis addressing the potential to deplete groundwater supplies or interfere with groundwater recharge considers the extent to which the Project construction could lower the groundwater table by excavation to deepen and widen existing channels and creating a new diversion channel (Reach 7A). Excavation depths that intersect the groundwater table have the potential to locally drain groundwater and, thereby, potentially lower the water table near stream banks that in some locales support riparian vegetation (primarily in Reach 6); or if excavation is deep enough, could lower the aquifer. This EIS considers the available well data that provides information on depth to groundwater in relation to proposed excavation depths in order to determine the potential for depleting groundwater supplies for each of the alternatives.

Regarding potential to interfere with groundwater recharge, none of the action alternatives create any areas of new impervious surfaces that would impede recharge in any reach. This includes new maintenance roads, which are designed with an aggregate base; and, therefore, would allow percolation to groundwater. All action alternatives, except for the Reach 6 Bypass Alternative, would require the inlet pipe to the SCVWD Church Street Percolation Ponds in

Reach 6 to be adjusted so that it continues to take water from the channel at a new lower elevation. This is necessary to maintain the same volume of water diversion to the ponds after Project construction. Given the lack of new impervious surfaces to be constructed under the Project design and continued maintenance of inflow to the Church Street Percolation Ponds, the Project has no potential to alter recharge to groundwater. Therefore, the issue of recharge to groundwater is not considered further; and the focus of the analysis for each alternative is on excavation depths in relation to groundwater elevations.

In regards with the potential to alter existing drainage patterns resulting in substantial erosion or siltation on- or off-site, there are three potential causal mechanisms that are considered: construction related activities that may cause erosion and siltation, maintenance activities that may cause erosion and siltation, and the overall stability of the channels as they function under the post-construction design and hydrology. Construction and maintenance activities are described in Sections 2.5.3 and 2.5.5. Construction activities that may cause erosion and siltation involve grading and other earth moving activities, particularly where the channel may be flowing perennially primarily in a portion of Reach 6. SCVWD project BMPs address issues related to potential water quality impacts from construction, which are identified and considered under each of the alternatives below. The maintenance activity likely to have a potential for increasing erosion and siltation is sediment removal to maintain channel capacity. The potential for these construction and maintenance activities to cause significant impacts from erosion and siltation is based on the adequacy of the SCVWD project BMPs and construction approach.

If the proposed channel improvements are not designed so that they are stable, then there could be issues associated with channel bank erosion and siltation. However, a stable channel design analysis was performed by conducting sediment transport and hydraulic studies (Balance Hydrologics 2012; Noble Consultants and Northwest Hydraulics 2008). This analysis assisted with determining stable channel dimensions and form that would not result in channel aggradation (i.e., sediment deposition), or degradation (i.e., scour and incision), and that would reduce potential long-term maintenance and would continue to meet flood capacity objectives. The channel cross-sectional form was designed to be in a stable, dynamic equilibrium to match the flow conditions and sediment regime of the Llagas Creek watershed. The stable channel form incorporates the additional flow volume and discharge that would occur by cutting off a section of West Little Llagas Creek and routing that additional flow from Reaches 7B to 7A and into Reach 6, just below Lake Silveira. The stable channel form includes a bankfull channel morphology, whereby the width-depth ratio, slope, sinuosity, and overall channel dimensions have been sized to accommodate the flow and sediment load contributed by the drainage area. This stable channel form is applicable to all of the action alternatives within their respective construction footprints.

Additionally, all of the Project action alternatives include grade control structures to arrest existing incision processes and ensure the Project channels are vertically stable. The stable channel form does not and should not imply that there would be absolutely no erosion; but it does mean that the channel dimensions and planform should remain about the same over the long term; and would, therefore, not generate excess sediment that could cause any siltation or aggradation.

The drainage pattern associated with the 9,600-foot length of West Little Llagas Creek, from near La Crosse Avenue to East Little Llagas Creek at U.S. 101, would also be altered under all Project alternatives. This section of West Little Llagas Creek would be cut off from discharge generated upstream through Reach 8 so that only runoff from the immediate drainage area and local storm drain outfalls would provide flow. Under existing conditions, this portion of West Little Llagas Creek flows intermittently during periods when sufficient rainfall generates runoff. Flow in West and East Little Llagas Creek would be diminished so that periodic, high flows during storm events will be of a smaller magnitude. Consequently, this reach (between the cut-off point and 6,500 feet downstream where the Butterfield channel extension confluences with West Little Llagas Creek) would experience less frequent flooding and during the 1-percent exceedance event a smaller area of flooding (compare Figures 2.4-1 and 2.5-1), which is a beneficial effect of the Project. Downstream from the Butterfield channel extension East Little Llagas Creek would continue to flood during a 1-percent exceedance event, similar to, but somewhat less than pre-Project extents. There will be a smaller reduction in flow magnitude for the more infrequent larger magnitude flow events compared with the greater reduction in magnitude for the more moderate flood events. Overall, the reduction in flow magnitude with the Project would also reduce the potential for erosion, incision, or siltation of the channel. The intermittent nature of the channel flows would persist with flow occurring only during storm events, due to the local drainage area contributions to runoff that will continue with the Project.

The Basin Plan outlines water quality standards and TMDLs for Llagas Creek. RWQCB approved erosion and sedimentation controls are detailed in approved area-wide BMPs, which are identified within the Regional SWMP and described in the SCVWD, BMP Handbook, Revision A, May 22, 2008. These BMPs are intended to minimize degradation of water quality to levels set forth in the Basin Water Quality Control Plan related to DO, turbidity, sedimentation, and nitrates. Additionally, a Project SWPPP to be prepared in accordance with the CGP will contain additional BMPs intended to protect water quality during Project construction. The effect of the Lake Silveira mitigation element on temperatures and DO conditions is not addressed in Section 4.2, Hydrology and Water Quality, but is addressed in Section 4.6, Aquatics Resources, because of the important connection of these water quality parameters to steelhead growth and survival. However, it is noted here that the proposed restoration of flow into the formerly abandoned Llagas Creek channel around Lake Silveira; and the creation of wetland habitat represents a net benefit to water quality to the downstream Project reaches by reducing high water temperatures, improving DO, and providing a wetlands sink for nutrients such as nitrogen and phosphorus. As such, water quality during stormflow runoff through the Lake Silveira project element would be improved and this is a beneficial effect of the Project.

There are no waste or nutrient discharges related to any of the Project alternatives; however there are Project-related changes to the existing stormwater drainage systems. Eliminating over-bank flows during floods through Morgan Hill (Reaches 8 and 7B, including the cut-off portion of West Little Llagas

Creek), the potential to entrain sediments and carry pollutants from urban and agricultural lands on the floodplain, which then drain back into the channel, would be substantially reduced, improving water quality. Although operational activities do not contribute any additional runoff, all of the action alternatives would bypass flow from the existing West Little Llagas Creek channel through a newly constructed diversion channel in Reach 7A that would add runoff to the downstream Llagas Creek Reaches 4, 5, and 6. However, this is not an impact on the capacity of the stormwater drainage system. This is because the Project design fundamentally includes an increase in the flood capacity of these downstream reaches so that there is no induced flooding due to upstream project improvements. Additionally, as discussed above, the downstream reaches are dimensioned so that they are hydraulically stable under the new flow conditions. As such, there is no operational impact to the stormwater drainage system. Vegetation management, sediment management, and minor maintenance activities are proposed and conducted only to maintain the flood capacity of the channels under all of the action alternatives. Consequently, maintenance activities do not add to runoff, rather maintenance ensures that the channels function efficiently to handle the runoff and maintain the hydraulic capacity of the channel design.

Excavation to deepen and widen existing stream channels and to create a new diversion channel (Reach 7A) could potentially intercept local groundwater as indicated by stream side well elevations, and recent piezometer readings and pump tests specifically pertinent to Reach 7A (see Chapter 3-Section 3.2.4 for description of existing groundwater conditions). An analysis is provided for each alternative for the potential to substantially lower the groundwater table, along West Little Llagas, East Little Llagas, and Llagas Creek in the Project design. The analysis considers the extent, to which excavation will deepen the channel in relationship to expected groundwater levels, describes the extent to which groundwater elevations could be lowered and considers the potential for groundwater lowering to affect adjacent riparian vegetation.

Through the implementation of SWPPP BMPs, the action alternatives would not directly contribute substantial sources of potentially impacted runoff during construction. Operation of the Project under all Project alternatives due to the planned stable channel design would reduce ongoing channel incision and bank erosion and, thereby, improve water quality and reduce sedimentation and siltation impairment, helping to achieve the TMDL targets in Llagas Creek and the Pajaro River.

4.2.2 No Action Alternative

Under the No Action Alternative, the Project would not be built. As such, there would be continued flooding, potentially exposing structures and people to 100-year flood hazards. Flooding in the urban areas of Morgan Hill and San Martin would continue through Reaches 8 and 7B, and the cut-off segment of West and East Little Llagas Creek. This periodic flooding would continue to contribute to water quality degradation. Historic rates of channel streambed incision[1] of 0.4 to 0.8 foot per decade, (Balance Hydrologics 2012) and resultant channel bank erosion and widening would likely continue. This process of channel incision would contribute to sedimentation and would not help to achieve TMDL targets. Under the No Action Alternative, storm runoff would continue through channelized reaches, there would be no fish habitat improvement features installed, and the diversion channel in Reach 7A would not be constructed.

Ongoing operations in an unstable, incising channel would contribute to bank erosion and sedimentation. Periodic flooding along Reaches 8, 7B, and West Little Llagas Creek would continue, contributing to water quality degradation and to continued impairment of the existing water quality standards. Continuing maintenance activities would not contribute any additional runoff water that would influence the capacity of stormwater drainage systems. This is because there are no maintenance activities that contribute to increasing the volume of runoff. Maintenance activities are designed to improve the rate at which water flows through the channel and culverts, thereby reducing potential flooding; but it does not do anything to impede runoff or add water volume to the stormwater drainage system. Further, maintenance does not substantially add to sources of impacted runoff as it is a continuing and existing condition, consequently there are no related impacts.

Maintenance of stream channels would continue under the SCVWD SMP. Maintenance activities, which broadly include sediment and vegetation management, bank erosion repair, and minor maintenance, is described in Section 2.4. Through the SMP and in accordance with the CCRWQCB Basin Plan, SCVWD project BMPs will reduce any maintenance related impacts.

Impacts from operations and maintenance related to groundwater recharge would be the same as under existing conditions. Groundwater supplies and water table elevations would fluctuate naturally and with SCVWD recharge. Sediment removal is the only maintenance activity that could potentially lower the channel bed elevation and, thereby, potentially influence a shallow groundwater table if it is near the channel invert. However, this type of activity has occurred and will continue to occur very infrequently (every 4 to 5 years), only in small and localized areas, and there have been no known effects interfering with groundwater recharge or altering the groundwater table. Therefore, there are no maintenance or operational impacts with potential to deplete or interfere with groundwater under the No Action Alternative.

4.2.3 Action Alternatives

4.2.3.1 Tunnel Alternative (Applicant's Proposed Action)

The Applicant's Proposed Action tunnel construction, channel improvements (excavation to widen and deepen) and construction and operations and maintenance are described in Section 2.7. Llagas Creek

[1] Causes of historic and ongoing channel incision are identified as the cumulative effects of decades of changes in land use, the increase in impervious surfaces from urbanization, sediment supply loss associated with Chesbro Reservoir, water diversions, hydrograph modifications, and past channelization (Balance Hydrologics 2012a; Schaaf & Wheeler 2012).

is currently on the CWA Section 303(d) list for impaired water bodies for multiple water quality parameters. Sedimentation and nitrates are the primary parameters with impairment.

Project construction (see Sections 2.5 and 2.7 for a complete description of construction activities) would include channel modifications (excavation to deepen and widen), constructing a tunnel, excavating a diversion channel in Reach 7A, constructing or replacing culverts; installing maintenance roads or access ramps; constructing temporary and permanent grade control structures, and upgrading bridge crossings. These actions are all surface-disturbing activities. When portions of the Project area are excavated or otherwise disturbed, the potential for unstabilized incidental material fallback, soil erosion and/or elevated sediment levels to occur in runoff discharging from the site would substantially increase. Construction activities would also have the potential to mobilize sediments and associated organics, pesticides and herbicide residues contained in the soils. In addition, equipment used during the construction activities would have the potential to leak polluting materials, including oil and gasoline. These sediments and contaminants may be transported into and decrease or impair water quality in Llagas Creek or downstream drainages and water bodies. Potential to violate water quality standards during construction activities would minimized following the SCVWD project BMPs and by implementation of the SWPPP.

The SWPPP requires practices to reduce the potential for equipment to introduce pollutants to the program area, and would require accidental spill containment and disposal planning. In addition, the erosion and sediment control plans within the SWPPP would be required to include BMPs to minimize the potential for, and effects from, spills of hazardous, toxic, or petroleum substances during construction activities. If a spill occurs, the contractor’s superintendent would take action to contact the appropriate safety and cleanup crews to ensure that the Spill Prevention Control Plan (SPCP) is followed. A written description of reportable releases would be submitted to the RWQCB and the Department of Toxic Substances Control (DTSC) by the contractor or owner. This submittal would be required to contain a description of the release, including the type of material and an estimate of the amount spilled, the date of the release, an explanation of why the spill occurred, and a description of the steps taken to prevent and control future releases. The releases would be documented on a spill report form. If an appreciable spill occurs and results determine that Project activities have adversely affected surface water or groundwater quality, a detailed analysis would be performed to the specifications of DTSC to identify the likely cause of contamination. This analysis would include recommendations for reducing or eliminating the source or mechanisms of contamination. Based on this analysis, contractors would select and implement measures to control contamination with a performance standard that surface and/or groundwater quality must be returned to baseline conditions. These measures would be subject to approval by the SCVWD and/or the RWQCB.

Although operational activities do not contribute any additional runoff, the Tunnel Alternative (as well as all of the action alternatives) would bypass flow from the existing West Little Llagas Creek channel through a newly constructed channel in Reach 7A that would add runoff to the downstream Llagas Creek Reaches 4, 5, and 6. The Project design includes an increase in the flood capacity of these downstream reaches so that there is no induced flooding due to upstream project improvements. Additionally, the most of the cut-off section of West to East Little Llagas Creek (up to the Butterfield extension channel) would experience reduced flooding during the 1-percent exceedance event; a benefit to water quality. In other reaches of the Project, the extent of flooding would remain exactly the same as under existing conditions, so water quality would not be degraded beyond existing conditions due to flooding.

As part of the Lake Silveira project element (compensatory mitigation) described in Section 5.3 of this EIS, new upland and riparian vegetation plantings are proposed along the channel alignment through Reach 7A that takes into consideration the post-construction ground contour elevations and associated groundwater elevation as appropriate for plant growth and survival. The Tunnel Alternative (and all action alternatives) would result in a vegetated corridor along the Reach 7A channel alignment. Although the groundwater table will be intercepted in Reach 7A, this is not a substantial lowering of the groundwater table or attendant adverse effects.

Project construction activities would have no effect on existing storm drain systems since there is no expansion or alteration of storm drain locations for this alternative. Since construction activities do not expand or otherwise alter existing storm drain locations, they also do not add substantial additional sources of contaminated runoff to the stormwater drainage system; as such, there are no impacts.

The Tunnel Alternative would result in flow through a designed stable channel morphology, which would reduce ongoing, existing channel incision and with little potential for bank erosion. This would reduce sedimentation and improve water quality. Flooding would be reduced in Reaches 8, 7A, and 7B, which is also a water quality improvement. The 6,500-foot-long cutoff portion of West and East Little Llagas Creek to the Butterfield channel extension confluence would also no longer experience high flows of the same magnitude, although some flooding will still occur during the larger storm events. The reduction in flood magnitude and extent which would reduce potential scour, erosion, and degradation of water quality during over-bank flow events. This is a beneficial water quality effect. In addition, within Reach 6, the proposed channel widening would encroach upon a deed restricted property (see Table 3.18-1). The deed restriction requires that any planning of any ground disturbing work within the parcel requires consultation with the CCRWQCB to confirm compliance with regulatory guidelines that pertain to a closed landfill. The current property owner would also participate in consultation and final design resolution. Compliance with the deed restriction and the resulting consultation requirements would reduce potential water quality impacts.

Maintenance, including vegetation management, sediment management, and minor maintenance work, for the Tunnel Alternative is described in Section 2.5.5. Maintenance activities, predominately sediment removal, would have the greatest potential to mobilize sediments and introduce associated excess nutrients contained in soils. Because nearly all of the stream reaches only flow intermittently, including during the winter season, it is expected that most maintenance activities would occur when the channels are dry, which would substantially reduce the potential for siltation, release of nutrients, and prevent or substantially minimize adverse changes in water quality parameters, such as DO and turbidity. SCVWD BMPs include measures to isolate sites, such as by the use of a flow bypass (WQ-12), that would address sediment removal activities that might need to occur within a flowing section of channel. Potential to violate water quality standards during maintenance activities would be reduced by following the SCVWD project BMPs including, but not limited to, those mitigation measures as discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

A potential water quality issue specific to the construction and operation of the tunnel in Reach 8 is related to potential bat colonization. Bats are known to use structures, such as tunnels for roosting. Operation of the tunnel portion within Reach 8 could pose a water quality problem if bats use the tunnel to roost. If bats colonize the tunnel, then bat guano could enter the channel and degrade water quality. Bat guano can introduce nitrogen and E. Coli bacteria. Besides the water quality issue, there is also an issue of potential for harm and injury to a colony if bats use the tunnel. Consequently, a bat monitoring program will be implemented upon completion of tunnel construction per the guidance of regulatory agencies and local bat experts as described in Chapter 5 (Section 5.5.5 Wildlife Resources) of this EIS.

Mitigation measures and BMPs for this alternative, including O&M activities, are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.2.3.2 Natural Resources Conservation Service (NRCS) Alternative

The NRCS Alternative is similar to the Applicant's Proposed Action, except that no diversion tunnel or sediment detention basin would be constructed through a portion of Reach 8, replaced by channel improvements between West Main Avenue and West Dunne Avenue. This will increase the Project footprint, and require more channel to be maintained relative to the Applicant's Proposed Action. The NRCS Alternative provides the same 1-percent flood management as the Applicant's Proposed Action in Reach 8 protecting downtown Morgan Hill, as well as in Reaches 7A and 7B. See Section 2.6.1 for more detail on features of the NRCS Alternative. All other Project reaches would have the same level of protection; and the same Project features would be constructed, as described for the Applicant's Proposed Action. Impact determinations for the NCRS Alternative are similar to those in the Applicant's Proposed Action, except there would be none of the impacts, monitoring, or mitigation measures associated with the construction of the tunnel within Reach 8.

Mitigation measures and BMPs for this alternative, including O&M activities, are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.2.3.3 Culvert/Channel Alternative

The Culvert/Channel Alternative is similar to the NRCS Alternative. The Culvert/Channel Alternative provides the same 1-percent flood management as the NRCS Alternative in Reaches 7A, 7B, and 8, protecting downtown Morgan Hill. The primary difference from the NRCS Alternative is routing flows through the Britton athletic fields instead of along Hale Avenue. See Section 2.8.1 for more detail on features of the Culvert/Channel Alternative. Under the Culvert/Channel Alternative, the impacts would be the same as those under the NRCS Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities, are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.2.3.4 Reach 6 Bypass Alternative

The Reach 6 Bypass Alternative is the most dissimilar from the other alternatives, but provides for the same level of flood protection. The Reach 6 Bypass Alternative would construct a high flow bypass channel (i.e., Reach 7A diversion channel) between Reach 6 of Llagas Creek and Reach 14 of East Little Llagas Creek. The bypass would be designed so that no flood capacity improvements would be needed along Reach 6 (downstream of bypass) or Reach 5; and there would be no increased inflow from upstream improvements. Flood conveyance improvements for the upstream Project Reaches 8, 7A, and 7B, and for the downstream Reach 4 would remain the same as that described for the Action Alternatives. The Reach 6 Bypass would convey extra flow from Reaches 7A, 7B, and 8 directly into Reach 14 in East Little Llagas Creek. Reach 14, downstream of the bypass, would be designed to carry the extra flow, maintaining capacity for a 10-percent exceedance flow event. The bypass segment would provide protection from a 1-percent event.

However, within Reach 5 and 6 (downstream of the Reach 6 bypass) where the channel would not be modified under this alternative, the existing creek would remain subject to the instability, predominantly channel down-cutting which has been an ongoing process. Channel down-cutting eventually leads over time to over-steepened streambanks with resultant channel erosion and widening. This would increase water turbidity and potentially cause channel sedimentation. Consequently, the

Bypass Alternative has the potential over time to cause a degradation of water quality relative to the other action alternatives. In addition, Maintenance activities for these portions of Reach 5 and Reach 6 would be implemented based on the existing SCVWD SMP BMPs under the Bypass Alternative, only in locations the SCVWD has existing maintenance easements. See Section 2.9.1 of this EIS for more detail on features of the Reach 6 Bypass Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities, are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.2.4 Summary of Impacts to Hydrology and Water Quality

Effects of Project activities on hydrology, channel geomorphology, and water quality vary. Effects of Project construction activities on water quality are minimized for the Tunnel, NRCS, and Culvert/Channel Alternatives through the implementation of the SCVWD project BMPs and the SWPPP required under the GCP. One water quality issue associated with the Tunnel Alternative is identified but mitigated with mitigation measures and BMPx as described in Chapter 5 (Section 5.5.5 Wildlife Resources) of this EIS. This mitigation measure would eliminate the potential for bat roosting with consequent contamination and degradation of water quality by bat guano in the tunnel section of Reach 8.

The Reach 6 Bypass Alternative, differently from the other Action Alternatives, would have significant impacts associated with the water quality and would result in substantial erosion due to ongoing process of channel incision that would continue through most of Reach 6 and in Reach 5 since these channel reaches are not part of the constructed design for the Reach 6 Bypass Alternative.

There are no adverse impacts related to flooding from construction activities with implementation of any of the Project alternatives. Effects of all operation and maintenance activities on flooding under all of the action alternatives would be beneficial by eliminating the 1-percent flood exceedance extents in Reaches 8 and 7B. The segment of West to East Little Llagas Creek where flows would be reduced to local drainage flows by the construction of the Reach 7A diversion channel would be subject to beneficial water quality effects for all action alternatives due to the reduced flooding over a portion of the channel length (up to the point of confluence with the Butterfield extension channel).

Mitigation measures and BMPs, as appropriate, for the various Action Alternatives to reduce the impacts to Hydrology and Water Quality are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

4.3 MINERAL RESOURCES

4.3.1 Introduction

This section describes the impacts for the various Alternatives to mineral resources within of the Project area, including the designation of mineral resource zones (MRZ) in the Project area as delineated on statewide MRZ maps. This section will describe the pertinent federal, state, and local regulations related to mineral resources.

4.3.2 No Action Alternative

There would be no construction under the No Action Alternative and, therefore, no impact to loss of availability of mineral resources.

Under the No Action Alternative, removal of sands and gravels would occur during maintenance of the existing channels. Due to the proximity of urban areas, rural residences, and significant aquatic habitat (Section 4.6.2, Aquatic Resources), these areas have limited or no accessibility for mining operations and would likely render such operations infeasible in accordance with the Santa Clara County General Plan criteria; therefore, there would be no impact.

4.3.3 Action Alternatives

With all of the action alternatives, construction could inadvertent discovery of the locally important semi-precious stone resource, poppy jasper. In addition, all the action alternatives would result in removal of aggregate material resources.

4.3.3.1 Tunnel Alternative (Applicant's Proposed Action)

The key feature of the Tunnel Alternative is an underground concrete tunnel within Reach 8 through downtown Morgan Hill with channel widening and deepening being restricted to the areas between Llagas Road and to approximately Hillwood Lane. The main components of the Tunnel Alternative are described in Section 2.7 of this EIS.

The Tunnel Alternative modifications would entail excavation in Reaches 4, 5, 6, and 14 for channel widening or deepening. Channel modifications in Reaches 4, 5, 6, and 14 (areas identified at MRZ-2) would result in removal of aggregate material resources. Aggregate materials removed from the Project area would be stockpiled for future reuse. Use of aggregate materials in the future would not represent a loss of a resource and would represent a reduction in demand from local quarries reflecting a beneficial use. Due to the proximity of urban areas, rural residences, and significant aquatic habitat (Section 4.6.3.1, Aquatic Resources), these areas have limited or no accessibility for mining operations and would likely render such operations infeasible in accordance with the Santa Clara County General Plan criteria; therefore, there would be no impact. Instream complexity features for fish habitat would also be installed in Reaches 4, 5, and 6.

This alternative would also include installation of subterranean pipes and culverts in places within Reach 8. The subterranean construction would be carried out by drilling then lining the earthen tunnel with reinforcements and concrete. Reaches 7 and 8 are not designated as MRZ-2 and, therefore, implementation of this alternative would have no impact on a known mineral resource. Since the tunnel would be constructed beneath the town of Morgan Hill, it is possible that an inadvertent discovery of the locally important semi-precious stone resource, poppy jasper, could be encountered.

Extractable localities of poppy jasper have been well documented by Morgan Hill and are protected. The likelihood of encountering a previously undiscovered extractable quantity within the Project area is a possibility due to the Project Area relative to the existing location of poppy jasper parent rock outcrops. In accordance with guidance received from the City of Morgan Hill Planning Department, the property owner would be notified of the discovery, as they would be the legal owner of the mineral and have final decision on its disposition (Maxey Pers. Com. 2013b). The Applicant has discussed donating any Poppy Jasper that may be discovered during the construction of the Applicant's Proposed Action to the City of Morgan Hill for use by the City in a future public art's and/or recreation project where the mineral can be viewed and enjoyed by the public.

Post construction, operations and maintenance for all the Action Alternatives would consist of maintenance activities described in Section 2.7. Operations and maintenance of the Project would result in no impact to mineral accessibility. In addition, because post-construction maintenance activities are not expected to involve major earthwork because of the geomorphologic bankfull channel design. Therefore, finding a previously undiscovered deposit of a mineral resource, such a poppy jasper, is remote.

Mitigation measures and BMPs for the various Action Alternatives are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

4.3.3.2 Natural Resources Conservation Service (NRCS) Alternative

The NRCS Alternative consists of Project features that are very similar to the Tunnel Alternative with the exception that there will be no tunnel construction within Reach 8 (see Section 2.6 for description of NRCS Alternative features and construction). Impact determinations for the NCRS Alternative are similar to those in the Applicant's Proposed Action, except there would be none of the impacts, monitoring, or mitigation measures associated with the construction of the tunnel within Reach 8.

Mitigation measures and BMPs for this alternative, including operations and maintenance (O&M) activities, are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.3.3.3 Culvert/Channel Alternative

The key feature of the Culvert/Channel Alternative is elimination of the need for channel deepening and widening through residential properties, as proposed for the NRCS Alternative between West Main Avenue and West 2nd Street within Reach 8.

Impact determinations for the NCRS Alternative are similar to those in the Applicant's Proposed Action, except there would be none of the impacts, monitoring, or mitigation measures associated with the construction of the tunnel within Reach 8.

Mitigation measures and BMPs for this alternative, including O&M activities, are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.3.3.4 Reach 6 Bypass Alternative

The construction and maintenance impacts, BMPs, and necessary mitigation for the Reach 6 Bypass Alternative would be similar as those previously described under the Tunnel Alternative. The Reach 6 Bypass Alternative would include maintenance for the bypass channel hydraulic control structure constructed in Reach 6; however, this maintenance would not result in impact levels different than those described under the Tunnel Alternative.

The Reach 6 Bypass Alternative would construct a high flow bypass channel between Reach 6 of Llagas Creek and Reach 14 of East Little Llagas Creek. The bypass would be designed so that no flood capacity improvements would be needed along Reach 6 or Reach 5 of Llagas Creek downstream of the proposed bypass. Flood conveyance modifications for the upstream Project Reaches 8, 7A, and 7B, and for the downstream Reach 4 would remain the same as that described for the Tunnel Alternative.

Therefore, though Reach 5 and a portion of Reach 6 would not require excavating of materials to facilitate additional channel capacity, thus reducing the likelihood to impact existing mineral resources, the excavation of the Reach 6 bypass would off-set this reduced impact. Thus, the impacts to mineral resources is similar to all the other Action Alternatives.

Mitigation measures and BMPs for this alternative, including O&M activities, are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.3.4 Summary of Impacts to Mineral Resources

No impacts to aggregate resources would result from implementation of Project alternatives due to the proposed use of aggregate materials in the future retrofit of Anderson Dam. This use would be beneficial by reusing material and reducing demand on nearby quarries.

An impact could occur to the locally significant semi-precious gem resource, poppy jasper, with an unanticipated discovery of a deposit during major earthwork necessary to construct the Project.

Mitigation measures and BMPs, as appropriate, for the various Action Alternatives to reduce the impacts to Mineral Resources are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

4.4 BOTANICAL RESOURCES

4.4.1 Introduction

Potential permanent and temporary impacts to vegetation, special-status plant species and potential jurisdictional waters were evaluated by quantifying the impacts to these existing resources for the Applicant's Proposed Action (Tunnel Alternative). The Geographic Information System (GIS) footprint, based on the 65-percent design, was overlaid vegetation and habitats and potential jurisdictional waters to calculate acreages of impacts. Relative impacts of the action alternatives were compared with the Tunnel Alternative. The potential impacts to special-status plant species are based on an evaluation likelihood of occurrence in the project area and impacts to suitable habitat.

The vegetation impact analysis is based on impacts to CAR habitats (USFWS 2003). The canopy of all trees that would be removed for construction was considered permanent impacts to riparian forest (PFO). In addition, the determination of permanent impacts to trees outside of the Project footprint was based on analysis of impacts to critical root area. The critical root area is a radius equal to 1.25 times a trees' dbh reported in feet (Coder 2010). If construction would remove at least 33 percent of a trees' critical root area, then the tree was assumed permanently impacted. The same methodology was applied for impacts to California sycamore woodland, which is a subset of riparian forest. Permanent impacts also include any native Riparian Scrub-shrub (PSS) habitat that would be graded and any vegetation converted to hardscape within the Tunnel Alternative footprint. Grading impacts to upland herbaceous habitat, perennial marsh and seasonal wetlands are considered temporary because these areas are expected to reestablish after grading. Additional GIS analysis was conducted for the Tunnel Alternative to determine impacts to CAR habitats outside the CDFW boundary.

The impact analysis for vegetation and habitats as well as jurisdictional waters for the NRCS, Culvert/Channel, and Reach 6 Bypass alternatives are estimated because the exact Project footprints including the constructed stream widths have not been defined for these action alternatives. The impact analysis for these action alternatives are based on a qualitative comparison with the Tunnel Alternative. However, the alternatives share a common footprint over most of the

Project area so that the variation in botanical and waters area between the action alternatives is generally small as described in the following sections.

4.4.2 No Action Alternative

The No Action Alternative would consist of continuation of the current management regime through the period covered by existing project permits (10 years), as described in Chapter 2, Section 2.4. The Project would not be built and no construction activities would occur. This alternative consists of continued implementation of the SCVWD 2012-

2022 SMP (SCVWD 2012c), including routine maintenance of stream channels, sediment removal, vegetation management, bank protection, and associated minor activities. The SMP includes a series of resource protection policies and BMPs. Vegetation management and giant reed control would be performed as part of the SCVWD's countywide SMP. The environmental permits associated with the SMP cover impacts associated with routine maintenance which would occur under the No Action Alternative.

Maintenance activities in the channel would be carried out according to the SCVWD's SMP, first implemented in 2002 and currently undergoing re-authorization. The SMP procedures for routine maintenance of stream channels involve ongoing sediment removal, vegetation management, bank protection, and associated minor activities.

California sycamore woodlands would not be impacted under the No Action Alternative because there would be no change to operations and maintenance; however, with hydrologic changes to Llagas Creek from agriculture and upstream development, including the construction of Chesbro Reservoir, this habitat type is expected to continue to decline.

Some activities conducted under the SMP could impact rare or important plant communities or special-status plant species and their habitats. Rare or important plant communities in the project area that are under the jurisdiction of CDFW include broad-leaved woodland, riparian native scrub, and riparian woodland. Permanent direct impacts include the direct mortality of special-status plant species and a loss of suitable habitat and direct loss of rare or important plant communities through authorized SMP activities including vegetation removal, giant reed control, and use of herbicides in all reaches. Potential indirect consequences from SMP activities include the spread and establishment of invasive non-native species, such as Himalayan blackberry that could eventually displace rare or important plant communities or special-status plant species and their habitats due to vegetation removal. However, BMPs would avoid and minimize these potential consequences (see Section 5.6 of this EIS).

4.4.3 Action Alternatives

The action alternatives would result in temporary and permanent impacts to vegetation types and habitats and USACE jurisdictional features that are associated with construction activities and operation and maintenance activities. Permanent construction impacts would be primarily a result of grubbing and grading, including removing mature riparian canopy trees along the creek corridor. Temporary impacts include areas that would be temporarily disturbed by access roads, equipment access, and staging areas, as well as areas that would be grubbed or graded areas in some vegetation types that would naturally regenerate following construction. Temporary disturbance to botanical resources could result in the eventual decline and the loss of stability or reproductive success of individual plants and vegetation communities. Operation and maintenance activities that permanently remove vegetation or temporarily disturb vegetation could also impact botanical resources. Construction or operation and maintenance activities that potentially result in erosion, sedimentation, or chemical contamination could damage or degrade botanical resources.

Mitigation measures and BMPs for the various Action Alternatives are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

4.4.3.1 Tunnel Alternative (Applicant's Proposed Action)

The Tunnel Alternative includes a variety of channel widening, deepening, and other improvements as described in Chapter 2. This alternative was developed to reduce the footprint of the NRCS Alternative, thus impacts within Reach 8 by creating an underground concrete tunnel instead of widening and deepening existing West Little Llagas Creek through the downtown City of Morgan Hill.

Construction activities in all reaches would result in the direct removal regulated federal and state waters. Impacts to wetlands include jurisdictional perennial marsh and seasonal wetlands (PEM). Impacts to non- wetland waters (Aquatic) include intermittent streams, perennial stream, and culverts. Tables, 4.4-1, and 4.4-2 summarize the impacts to vegetation types and habitats by reach that would result from construction of the Tunnel Alternative. Permanent impacts are a result of grubbing and grading for the construction of new channels, roads, and the installation of culverts, except for areas proposed for replanting as compensatory mitigation for impacts to wetlands and other waters of the United States and state waters. Disturbed areas that are replanted are considered temporary impacts. Temporary impacts would also include areas that would be disturbed by temporary access roads, equipment access and staging areas.

Most impacts to USACE jurisdictional areas are temporary due to channel excavations (32.88 acres). Only small amounts of fill (0.41 acre) would occur in USACE perennial marsh and aquatic habitats. This estimate is based on the 65-percent design and may change slightly as Project design is refined, but is not expected to increase. In general, the Tunnel Alternative has lower direct impacts to jurisdictional wetlands and non-wetland waters than other action alternatives (except the Reach 6 Bypass Alternative), because the construction of the tunnel would reduce direct wetland removal by reducing in-channel construction in downtown Morgan Hill. With implementation of mitigation measures, such as revegetation of the creek and the creation of a new wetland at Lake

Silveira as described in Section 5.3 of this EIS, impacts to wetlands would be minimized.

In addition, within Reach 4, 5, and 6, the installation of aquatic habitat enhancements would constitute fill in jurisdictional wetlands and other waters of the United States. Aquatic enhancements include the placement of large woody debris, boulders, root wads, wing log deflectors, and divider logs on Reaches 4, 5, 6, and 7A, which would minimally reduce the extent of wetlands and waters; however, this impact would be mitigated.

Table 4.4-1 Permanent and Temporary Impacts to USACE Jurisdictional Habitats for the Tunnel Alternative

Jurisdiction	Habitat	Permanent Impacts Area (ac)	Temporary Impacts Area (ac)
USACE	Perennial Emergent Marsh (PEM)	0.32[1]	4.45
	Aquatic	0.09*	28.43

[1] Permanent impacts to wetland and aquatic habitats were calculated based on the 65% design. Source: adapted from H.T. Harvey & Associates 2013b

Table 4.4-2 Impacts to Vegetation Types and Habitats Outside of USACE Jurisdiction for the Tunnel Alternative

Vegetation Type or Habitat	Permanent Impacts (Acres)	Temporary Impacts (Acres)
Reach 4		
Riparian Forest (PFO) (native and non-native)	0.8	1.9
Riparian Scrub-shrub (PSS) (native and non-native)	0.1	--
Upland Herbaceous (U/H)	--	29.0
Developed	--	0.7
Reach 5		
Riparian Forest (PFO) (native and non-native)	0.1	0.2
Riparian Scrub-shrub (PSS) (native and non-native)	--	--
Upland Herbaceous (U/H)	--	7.8
Developed	--	0.3
Reach 6		
Riparian Forest (PFO) (native and non-native)	0.4	0.6
Riparian Scrub-shrub (PSS) (native and non-native)	0.2	--
Upland Herbaceous (U/H)	--	22.9
Developed	--	3.9
Reach 7a		
Riparian Forest (PFO) (native and non-native)	0.2	0.4
Riparian Scrub-shrub (PSS) (native and non-native)	0.2	--
Upland Herbaceous (U/H)	--	34.3
Developed	--	0.4
Reach 7b		
Riparian Forest (PFO) (native and non-native)	0.1	0.5

Vegetation Type or Habitat	Permanent Impacts (Acres)	Temporary Impacts (Acres)
Riparian Scrub-shrub (PSS) (native and non-native)	0.1	--
Upland Herbaceous (U/H)	--	9.5
Developed	--	1.0
Reach 8*		
Riparian Forest (PFO) (native and non-native)	0.3	--
Riparian Scrub-shrub (PSS) (native and non-native)	0.5	--
Upland Herbaceous (U/H)	--	3.4
Developed	--	0.2

Note: The area of permanent and temporary project impacts for Reach 8 between Hillwood Lane and Llagas Road are not available. As such, all Riparian Forest and Riparian Scrub-shrub within the work area was conservatively assumed permanently removed and upland herbaceous impacts are assumed to all be temporary.

Permanent direct impacts from construction include vegetation removal, which may result in direct mortality of special-status plant species and a loss of their potential habitats and direct loss of rare or important plant communities. Key impacting construction activities would include but are not limited to the construction of the tunnel and portal, new diversion channel in Reach 7A and new low flow channels, widening existing channels, constructing access roads, culvert installation and replacement, utility relocation and replacement, and exhuming bridges. Vegetation would be grubbed and areas would be graded, resulting in permanent removal of vegetation. In addition to the direct removal of vegetation, these construction activities would also be associated with temporary disturbance of rare or important plant communities and special-status plant species and their habitats. The installation of aquatic habitat enhancements could require removing or displacing sensitive wetland or riparian habitats.

The greatest acreage of habitat impacts would be to upland herbaceous in all reaches. Construction would result in impacts to Riparian Forest (native and non-native) in all reaches and Riparian Scrub-shrub (native and non-native) in all reaches except Reach 5. However, impacts to Riparian Forest (native and non-native) and Riparian Scrub-shrub (native and non-native) would be comparatively minor to Upland Herbaceous. Impacts to Riparian Forest and Riparian Scrub-shrub, not including California sycamore woodland, would be considered significant due to rarity and important biological functions of these habitats.

The Tunnel Alternative would result in the direct loss of up to 11.17 acres of California sycamore woodland, which is rare in the region due to changed hydrologic conditions that have altered habitat suitability in recent decades. Channels have become incised as a result of urban development, agricultural use, reservoir construction, and groundwater management in the project area. Of the approximately 600 western sycamore in the Project reaches, up to 292 would be removed. Avoidance and minimization measures will be refined to reduce impacts to this important resource as the Project design is finalized. Llagas Creek has limited sycamore restoration potential for the reasons stated in

Section 5.5.4 and narrowing of the riparian corridor as a result of suburban development, agriculture, and leveed channels. Mitigation measures as discussed in Section 5.5.4 will include the replanting of native sycamores wherever they would be successful within the Project area, generally around Lake Silveira and near the confluence of the new Reach 7A diversion channel and within Reach 6 of Llagas Creek. However, sufficient area with appropriate conditions for replacement trees is not available to attain the number generally required by resource agencies for impacts to western sycamore trees. Impacts to sycamore woodland would remain unavoidable.

Permanent direct impacts of the Project include the spread of non-native invasive species including giant reed, cape ivy, and Himalayan blackberry. Construction would disturb these populations which may cause the spread of these invasive plant species downstream. The SCVWD would implement mitigation measures as discussed and as described in Section 5.5.4 of this EIS to ensure invasive exotic species are properly handled and do not invade sensitive plant communities downstream.

Several local plans and policies address preservation of riparian and wetland habitat, including from the Santa Clara County General Plan (C-RC31, R-RC31, and SC 16.10), City of Gilroy Open Space and Conservation Policies (1e and 5b), and the City of Gilroy General Plan Policies (20.01a and 20.03, 20.c). In addition, several other local plan and policies address preservation of special status plant species including the City of Gilroy General Plan Policy 20.04. Removal of riparian vegetation and impacts to special-status plant species associated with construction and operations and maintenance would conflict with these policies. Impacts to riparian habitat, special-status plant species or wetlands could occur when vegetation is removed to maintain channel capacity or other maintenance work is conducted.

Temporary impacts include areas that would be disturbed by equipment access and staging areas. Temporary disturbance would cause individual plants or plant communities to decline in vigor and reproductive capabilities or be displaced by the establishment of invasive non-native species, such as giant reed. Implementation of mitigation measures and BMPs are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

Without the implementation of BMPs many construction activities could also result in indirect permanent impacts from hazardous material releases or erosion and sedimentation that could potentially damage individual plants and lead to their decline or death. The use of standard BMPs related to hazardous materials and sediment control would ensure that such impacts are avoided or minimized.

The diversion of West Little Llagas Creek into the new diversion channel on Reach 7A would result in a permanent indirect impact to waters of the United States. The reduced flow in this intermittent stream channel may convert wetland portions of this channel to upland habitat or reduce the jurisdictional width of the channel's flow. West Little Llagas would have reduced flows between the new diversion channel in Reach 7A and the Butterfield Detention Basins, except when flows exceed approximately the 5-year event, those high flows would continue to occur. Minimal flow regime changes would occur within West/East Little Llagas downstream of the Butterfield detention facility, except that low flows would be reduced. This reduction in water could indirectly permanently impact vegetation, particularly riparian habitat which is limited to scattered trees adjacent to agricultural fields in this area and wetland habitat, which is discussed below. The most common native trees in this area are oaks, but there are also many willows and scattered cottonwoods and western sycamores. Because this reach is relatively short (approximately 6,500 feet) and wetlands and riparian habitat is limited in this area, the potential additional area of impact would be relatively small. If physiological stress due to the changed flow regime causes reduced growth rates, morphological changes or mortality in mature trees, this impact would be a considered significant. Implementation of mitigation measures would require the monitoring of West/East Little Llagas Creek and contingencies should mature trees or existing vegetation be adversely affected, would reduce this impact.

Flows in Llagas Creek will increase immediately downstream from where the Reach 7A diversion channel would connect with Llagas Creek just downstream from Lake Silveira at the upstream end of Reach 6. The Reach 7A diversion channel effectively increases the drainage area of Llagas Creek at this confluence point. Therefore, both the magnitude and the duration of flows will increase into Reach 6. Additionally, the Reach 7A diversion channel will intercept groundwater at the lower end of the reach near the lake, because there is a shallow groundwater table in this area and the channel bottom will be constructed several feet below the groundwater table elevation. This will likely cause some shallow groundwater to be influent to the channel, expressing itself as surface flow in the lowermost segment of Reach 7A, including during the drier summer months, that will contribute to flow in Reach 6. These flow contributions are likely to be small over the summer months, but over time would help to sustain flow and support riparian growth and habitat in Reach 6. Although interception of groundwater in Reach 7A has the potential to lower the shallow groundwater table, which could in turn adversely affect the growth and survival of riparian vegetation close to the proposed channel construction, there is no existing Reach 7A channel and no existing riparian vegetation on the proposed channel alignment that could be affected.

Operation and maintenance activities of the newly constructed features would be as described in Section 2.5.5, and could result in permanent or temporary impacts to rare or important plant communities or special-status plant species and their habitats. Vegetation management would be expanded over existing conditions, because the Project would require the revegetation of much of the Project area. Vegetation maintenance would be determined based on the maintenance of design flows by maintaining the appropriate channel roughness coefficients as shown in Table 2.5.5. Areas restored as part of mitigation measures discussed and described in Section 5.5.4 are not a part of channel improvements (such as Lake Silveira, infill planting areas, and areas where invasive non-native species are removed) would not require vegetation management and, therefore, there would be no impacts to these areas. In areas where vegetation management would be required (see Section 2.5.5.1 for description of maintenance activities and methods) to maintain channel capacity, the direct removal of vegetation would cause temporary disturbance to rare or important plant communities and permanent impacts to special-status plant species and their habitats if these species become established in the future. Special-status plant species or rare or important plant communities are not anticipated to become established in the channel at these locations. Therefore, impacts would be less than significant. Vegetation removed by mowing would be expected to resprout or grow back quickly; vegetation removed by herbicide use may take up to a year to re-establish.

Minor maintenance activities would be performed on all reaches to repair and maintain SCVWD facility functions. Minor maintenance activities are described in Section 2.5.5. New channels are designed to minimize erosion; therefore, only minor erosion control is anticipated for the new channels. Accumulated sediment at two locations (at the confluence of Reaches 4, 5 and 14; and near the top of Reach 6) would be removed every 10 or more years.

Mitigation measures and BMPs for the various Action Alternatives are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

4.4.3.2 Natural Resources Conservation Service (NRCS) Alternative

The NRCS Alternative would have similar impacts as the Tunnel Alternative, because the Project alignment, construction, and facilities are similar. The key difference between this alternative and the Tunnel Alternative is (1) channel widening and improvements to the existing channel between West Main Avenue and West Dunne Avenue; and (2) omission of the tunnel construction within a Section of Reach 8 to address high flow events. As a consequence, impacts are very similar to the Tunnel Alternative, the primary difference being greater wetland and riparian vegetation removal in the section of between West Main Avenue and West Dunne Avenue where channel widening would be necessary.

As described for the Tunnel Alternative, most construction activities for the NRCS Alternative in all reaches would result in the removal or temporary disturbance of vegetation types and habitats that provide suitable habitat for four special-status plant species or that are rare or important plant communities. While the route and Project plans for most of the NRCS Alternative are well-defined, the extent of the impact area and precise plans has not been developed for the section of Reach 8 between West Main Avenue and West Dunne Avenue. For that reason, precise area of impact cannot be determined for this segment of channel, which represents about 4 percent of the total Project length. However, it is unlikely that special-status plant species occur within the disturbed sections of West Little Llagas Creek in downtown Morgan Hill. Impacts for the rest of the Project are well defined, as described above under the Tunnel Alternative.

Relative to the Tunnel Alternative, the NRCS Alternative would result in removal of rare or important plant communities in the additional 3,000-foot section that is not part of the Tunnel Alternative. Impact activities for temporary and permanent impacts would be the same as described for the Tunnel Alternative. Upland herbaceous habitat would account for the majority of the vegetation removal associated with this alternative and approximately 1.5 additional acres of native riparian forest would be removed as compared to the Tunnel Alternative.

Construction of the NRCS Alternative, similar to the Tunnel Alternative, would result in the same impacts to California sycamore woodland, would disturb invasive exotic species populations during construction which could spread downstream, could result in a permanent indirect impact to wetlands in the portion of West Little Llagas Creek where flows are reduced as a result of the Reach 7A diversion channel. In addition, impacts to jurisdictional wetlands would be similar to the Tunnel Alternative, except that impacts would be slightly greater, because they include the additional area of channel widening described above, which is estimated to be 0.3 acre of waters of the United States and 0.1 acre of jurisdictional wetlands.

Operation and maintenance activities of the newly constructed features would be the same as for the Tunnel Alternative, as described in Section 2.5.5, except that additional maintenance would be required on West Little Llagas Creek between Main Avenue and West Dunne Avenue to ensure that high flows are not impeded.

Mitigation measures and BMPs for the various Action Alternatives are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

4.4.3.3 Culvert/Channel Alternative

The Culvert/Channel Alternative would have similar impacts to the NRCS Alternative, because the Project alignment, construction, and facilities are similar. The key difference between this alternative and the NRCS Alternative is that an approximately 1,700-foot section of the channel would not be widened in Reach 8 and flows would be routed into two culverts under existing developed areas near downtown Morgan Hill. As a consequence, impacts are very similar, the primary difference being slightly less wetland and riparian vegetation removal in the section between Hale Avenue at the Britton School athletic fields and Del Monte Avenue where culvert would be built. In addition, flows in channel avoided section would be limited to runoff from the local area as described below. Given the amount of impervious area and amount of irrigated landscape, flows are expected to be relatively low, but present periodically at least during the rainy season which will support some vegetation, but possibly at reduced quantity from the existing condition.

As described for the NRCS Alternative, most construction activities for the Culvert/Channel Alternative in all reaches would result in the removal or temporary disturbance of vegetation types and habitats that provide suitable habitat for special-status plant species or that are rare or important plant communities. While the route and Project plans for most of the Culvert/Channel Alternative are well-defined the extent of the impact area and precise plans has not been developed for the section of Reach 8 between Hale Avenue at the Britton School athletic fields and Del Monte Avenue. For that reason, precise area of impact cannot be determined for this segment of channel or south of this location where channel widening would differ from the Tunnel Alternative. Combined with the additional segment of the NRCS Alternative, this represents about 7 percent of the total Project length. However, impacts for the rest of the Project are well defined as described above under the Tunnel Alternative.

Construction of the Culvert/Channel Alternative, similar to the NRCS Alternative, would result in the same impacts to California sycamore woodland, would disturb invasive exotic species populations during construction which could spread downstream, could result in a permanent indirect impact to wetlands in the portion of West Little Llagas Creek where flows are reduced as a result of the Reach 7A diversion channel.

Relative to the NRCS Alternative, the Culvert/Channel Alternative would result in less removal of rare or important plant communities and potential habitat for special-status plant species in the 1,700-foot section that would be avoided by construction of the culverts. Impacting activities for temporary and permanent impacts would be the same as described for the Tunnel Alternative. Upland herbaceous habitat would account for the majority of the vegetation removal associated with this alternative. As compared to the NRCS Alternative, approximately 1.12 acres of riparian forest and 0.02 acre of riparian scrub would not be removed, but could be indirectly affected by reduced flows in this section of creek. Additional planted trees around the athletic fields and streets would need to be removed, thus impacted.

Operation and maintenance activities of the newly constructed features would be the same as for the NRCS Alternative, as described in Section 2.5.5, except that maintenance would not be required on West Little Llagas Creek between Hale Avenue at the Britton School athletic fields and Del Monte Avenue.

Mitigation measures and BMPs for the various Action Alternatives are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

4.4.3.4 Reach 6 Bypass Alternative

Impacts of the Reach 6 Bypass Alternative would be similar to the Tunnel Alternative, except that there would be (1) reduced high flow events in the Reach 6 below the bypass and in Reach 5; (2) the magnitude of high flow events will increase in Reach 14 due to the bypass; (3) there would be no construction disturbance to the lower part of Reach 6 below the junction with the bypass channel and in Reach 5; and (4) there would additional disturbance of Reach 14 to enlarge the channel to accommodate the additional flow from the bypass channel. This equates to substantially less vegetation and wetland removal in Reaches 5 and 6.

As described for the Tunnel Alternative, most construction activities for the Reach 6 Bypass Alternative in all reaches would result in the removal or temporary disturbance of vegetation types and habitats that provide suitable habitat for special-status plant species or that are rare or important plant communities. While the route for most of the Reach 6 Bypass Alternative is well-defined, the extent of the impact area and precise plans has not been developed for the bypass section. For that reason, area of impact cannot be determined for this segment, which represents about 2 percent of the total Project length. Impacts for the rest of the Project are well defined, as described above under the Tunnel Alternative.

Relative to the Tunnel Alternative, the Reach 6 Bypass Alternative would result in less removal of rare or important plant communities and potential habitat for special-status plant species, because approximately 3 miles of channel downstream of the bypass (Reach 5 and a portion of Reach 6) would not be directly impacted as like with the other Action Alternatives.

Impact activities for temporary and permanent impacts would be the same as described for the Tunnel Alternative. Upland herbaceous habitat would account for the majority of the vegetation removal associated with this alternative. However, approximately 3.1 acres of Riparian Forest and 13.7 acres Riparian Scrub (not including California sycamore woodland) would be avoided as compared to the Tunnel Alternative. Construction of the Reach 6 Bypass Alternative would result in the direct loss of up to approximately 8 acres of California sycamore woodland, which is less than for the Tunnel Alternative. However, similar to the No Action Alternative, with hydrologic changes to Llagas Creek from agriculture and upstream development, including the construction of Chesbro Reservoir, this habitat type is expected to continue to decline within the undisturbed Reach 5 and a portion of Reach 6.

Indirect impacts include reduced vigor of riparian and wetland vegetation the portion of the creek that would be bypassed and introduction on non-native invasive species. Impacts to vegetation in the bypassed creek section are expected to be negligible to positive, because only high flows would be diverted and high flows are not generally necessary for the maintenance of vegetation and wetlands. Furthermore, high flows promote scour which can result in the loss of herbaceous wetland vegetation and small shrubs and trees.

Construction of the Reach 6 Bypass Alternative, similar to the other Action Alternatives, would disturb invasive exotic species populations during construction which could spread downstream, could result in a permanent indirect impact to wetlands in the portion of West Little Llagas Creek where flows are reduced as a result of the Reach 7A diversion channel.

Operation and maintenance activities of the newly constructed features would be the same as for the Tunnel Alternative, as described in Section 2.5.5, except that maintenance would not be necessary on approximately 3 miles of channel downstream of the bypass in Reaches 5 and 6, as these are outside the construction footprint of this alternative. As described for the Tunnel Alternative, maintenance activities could result in permanent or temporary impacts to rare or important plant communities, or special-status plant species, or their habitats. Vegetation removal would result in impacts to rare or important plant communities that require mitigation, as described for the Tunnel Alternative.

Mitigation measures and BMPs for the various Action Alternatives are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

4.4.4 Summary of Impacts to Botanical Resources

Impacts to sensitive plant communities (except California sycamore woodland), riparian communities, special-status plants and their habitats, and jurisdictional wetlands and waters of the United States as a result of implementation of the Action Alternatives would be mitigated with mitigation measures. All action alternatives would result in unavoidable impacts to California sycamore woodlands. The Tunnel Alternative would have fewer impacts to rare or important plant communities and special-status plant species, and waters of the United States, compared to the NRCS and the Culvert Channel alternatives, primarily due to the smaller footprint in Reach 8 associated with the construction of the tunnel.

The NRCS Alternative, compared to other alternatives, has the highest acreage of impacts to vegetation communities that potentially support special-status plants or sensitive vegetation communities. The Reach 6 Bypass Alternative has the lowest acreage of impacts to vegetation communities. This alternative reduces the construction footprint in Reach 8 compared to the NRCS and Culvert/Channel alternatives and also has the smallest footprint in Reach 5 and in Reach 6 downstream of the bypass channel. The Culvert/Channel Alternative has a footprint in Reach 8 that is smaller than the NRCS Alternative but larger than the Tunnel Alternative.

Mitigation measures and BMPs, as appropriate, for the various Action Alternatives to reduce the impacts to Botanical Resources are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

4.5 WILDLIFE RESOURCES

4.5.1 Introduction

This section describes the wildlife resources of the Project area, including wildlife habitats, common wildlife species, and special-status wildlife species. In addition, this section discusses potential Project impacts to special-status wildlife species and their habitats that occur within the Project area.

Section 3.5.3, Environmental Setting, describes the regulations and ordinances that apply to wildlife resources.

A list of special-status wildlife species was compiled for the Project area based on the following sources: the CDFW, California Natural Diversity Data Base (CNDDB; Appendix H; Figure 3.5-1), the USFWS species lists for the Project Quadrangles, and the Santa Clara County List (Appendix I).

Baseline information on wildlife resources in the Project area, including special-status species and their habitats, was compiled from existing published and unpublished literature describing biological resources in the region, environmental database searches, consultation with local wildlife professionals, and information provided by staff from the CDFW, USFWS Pacific Southwest Region, the SCVWD, and the USACE. Primary data sources include the following:

- Baseline Biological Resources/Habitat Mapping—Verification and updated habitat map of the 2006 Tetra Tech habitat map and updated California Natural Diversity Database (CNDDB) query of the Upper Llagas Creek Flood Protection Project. Condor Country Consulting, Inc. 2012. (prepared for Cardno ENTRIX).

- Biological Resources Report for Lake Silveira Master Plan—H.T. Harvey & Associates (prepared for Amphion Environmental Inc.) 1988.

- Hydrography, Hydrology, Water Quality, and Plant Communities of Lake Silveira, Morgan Hill area, Santa Clara County. July 23, 2012 (prepared for Cardno ENTRIX).

- Baseline Biological Study of Lake Silveira—prepared by Condor Country Consulting, Inc.

- Surveys for Red-legged Frog and California Tiger Salamander—prepared by Santa Clara Valley Water District.

- Butterfield Biological Boulevard Resources Extension Assessment—Wetlands Research Associates (WRA), Inc. May 2010 (prepared for the City of Morgan Hill, California).

- California Red-legged frog distribution and status—1997. H.T. Harvey & Associates (prepared for SCVWD).
- California Tiger Salamander Distribution and Status—1999. H.T. Harvey & Associates (prepared for SCVWD).
- California Tiger Salamander Surveys and Site Assessments at Selected Santa Clara County Locations H.T. Harvey & Associates (August 2012).
- Final Recovery Plan for the Least Bell's Vireo (Vireo bellii pusillus)—U.S. Fish and Wildlife Service (USFWS). March 1998.
- Draft Upper Llagas Creek Flood Protection Project Biological Assessment—Santa Clara County. November 2001.
- Lake Silveira Restoration Project Design Development Report—H.T. Harvey & Associates (Prepared for RMC Water and Environment). October 18, 2013.
- Least Bell's vireo breeding records in the Central Valley following decades of extirpation—Howell, C.A., Wood, J.K., Dettling, M.D., Griggs, K., Otte, C.C., Lina, L., Gardali, T. 2010. pp. 105-113.
- Lower Llagas Creek Least Bell's Vireo Surveys (Project # 3035-14), H.T. Harvey & Associates. August 19, 2010.
- Upper Llagas Creek Bridge and Culvert Surveys for Bat Habitat (HTH Project #3270-18)—H.T. Harvey & Associates (prepared for SCVWD). January 28, 2013.
- Upper Llagas Creek Flood Protection Project: Inclusion of Bat Evaluations into Environmental Documents—Technical Memorandum from Melissa Moore to Mitchell Katzel—Cardno ENTRIX. February 6, 2013.
- Upper Llagas Creek Flood Protection Project: Biological Report—Least Bell's Vireo Assessment.
- Technical memorandum from Stephen M. Ferranti to Mitchell Katzel—Cardno ENTRIX. February 6, 2013.
- Upper Llagas Creek Flood Protection Project Burrowing Owl Survey and Impact Assessment, H.T. Harvey & Associates. July 5, 2013.
- Upper Llagas Creek Flood Protection Project least Bell's vireo Assessment. Unpublished report prepared by Dr. Rottenborn, H.T. Harvey & Associates. September 26, 2011.
- Upper Llagas Creek Flood Protection Project, Notice of Preparation, SCH #2012102032, Santa Clara County. California Department of Fish and Wildlife.

- Upper Llagas Creek Flood Protection Project: West Little Llagas Creek Wildlife Habitat Assessment Technical Memorandum (HTH Project #3270-21)—H.T. Harvey & Associates (prepared for SCVWD). September 13, 2013.
- Upper Llagas Creek Project: Lake Silveira special study: focused surveys for detection of California red-legged frog and California tiger salamander final report. Santa Clara Valley Water District (SCVWD). 2012.
- Upper Llagas Creek Tunnel Bat Exclusion Design (HTH Project #3270-17)—H.T. Harvey & Associates (prepared for SCVWD). December 21, 2012.

4.5.2 No Action Alternative

Under the No Action Alternative, the Project would not be built, and no new land purchases or construction activities would occur. Flooding in the residential areas of Morgan Hill and San Martin would continue. Storm runoff would continue through the West Little Llagas Creek, East Little Llagas Creek, and Llagas Creek channel reaches. The bypass channel in Reach 7A would not be constructed under the No Action Alternative, and channel bank erosion and widening would likely continue. Maintenance of the Upper Llagas Creek facilities would be conducted in accordance with the guidelines established in the SMP Update 2012–2022 (SCVWD 2011). SMP activities, including routine maintenance of stream channels involving ongoing sediment removal, vegetation management, bank protection, and associated minor activities, would continue to directly and indirectly impact wildlife and wildlife habitat. The SMP includes a series of resource protection policies and BMPs to reduce impacts to wildlife. The SMP also includes measures to nuisance and invasive species including vegetation management and giant reed (Arundo spp.) control.

Under the No Action Alternative, construction activities and channel improvement would not occur. Therefore, no impacts to common and special-status nesting birds, special-status reptiles or amphibians, common and special-status bats, San Francisco dusky-footed wood rat, special-status invertebrates, migratory mammals, including San Joaquin kit fox and American badger, would occur due to construction activities.

Operation and maintenance activities, such as vegetation and sediment removal may result in both direct and indirect impacts by disturbing nesting birds, reptiles or amphibians, serpentine-associated invertebrate species, including Opler's longhorn moth and Bay checkerspot butterfly, bats, such as pallid and hoary bat, San Francisco dusky-footed wood rat, invertebrates, migratory mammals, including coyote, deer, bobcat, San Joaquin kit fox, and American badger. These species could use habitat within the Project area and habitat adjacent to the Project area for foraging, water, and as refuge during migration or dispersal to more suitable foraging and or breeding areas. Although the San Joaquin kit fox and American badger would be expected to occur infrequently and at very low number of individuals, the species could move through the Project area during dispersal, between areas of known breeding habitat and to areas outside of the Project area.

Vegetation maintenance, sediment removal, and or minor maintenance activities could result in: disturbance from maintenance personnel, noise, and maintenance equipment; accidental trapping and killing of individuals if equipment (e.g., trucks, excavators, etc.) compacts or fills burrows. Vegetation maintenance of upland habitat and in-channel sediment and vegetation removal may reduce and remove suitable prey habitat and/or decrease availability of prey species (e.g., frogs, fish, invertebrates, rodents, etc.), thus impacting larger special-status mammal species foraging opportunities. Special-status migratory mammalian species may be forced to move from suitable, temporary refuge habitat to less suitable habitat due to removal of understory vegetation and or emergent vegetation in or around the channel (e.g., deer are known to seek shelter in dense cattails during low channel flows and/or around sand bars that form in the channel as a result of sediment accumulation).

Removal of smaller trees and trees with dense foliage would also reduce roosting habitat and result in both direct and indirect impacts to wildlife. Generally operation and maintenance activities result in limited trimming and possible removal of limited amounts of woody riparian vegetation and does not include removing large, mature trees that could potentially disturb wildlife. Direct impacts to the aforementioned wildlife would occur when individuals are physically injured or killed during removal of vegetation or sediment, subjected to stress from being disturbed during hibernation, or face increased risk of predation when forced to leave their preferred habitat. Structural element maintenance would be performed on an as needed basis. Excessive noise during maintenance activities of vegetation and sediment removal, and maintenance of structural elements (e.g., culverts and bridges) could disturb wildlife and result in abandonment of their young.

Maintenance activities within the creek channel would continue to be carried out according to the SCVWD’s SMP. The SMP established procedures for routine maintenance of stream channels involving ongoing sediment removal, vegetation management, bank protection, and associated minor activities, as described in Section 2.4. The SMP incorporated a wetland and riparian mitigation program, a series of resource protection policies, and BMPs to address and reduce environmental impacts from the aforementioned maintenance activities. Such BMPs have provisions for revegetating channel banks and benches, identification and avoidance of occupied roosts, minimize impacts to aquatic reptiles and amphibians by reducing impacts to water quality (e.g., erosion and sediment control), provisions to ensure that the best means to bypass flows through a work area would be used, minimize disturbance to the channel, and avoid direct mortality of aquatic animals. See Appendix B of this EIS for the SCVWD’s SMP BMPs.

BMPs for the No Action Alternative, including O&M activities are discussed and described in Chapter 5 and Appendix B of this EIS.

4.5.3 Action Alternatives

4.5.3.1 Tunnel Alternative (Applicant's Proposed Action)

The Tunnel Alternative includes channel improvements (i.e., widening and deepening), excavation of diversion channels, and construction of permanent maintenance roads, reinforced concrete boxes, and grade control structures in Reaches 4, 5, 6, 7A, 7B, 8, and 14. In Reach 8 an underground concrete tunnel would be constructed under Nob Hill to convey high flows. A 250-foot-long sediment detention basin and inlet weir would be constructed between Wright Avenue and Hillwood Lane to capture sediments from traveling to downstream reaches. Culverts would be constructed leading downstream from the sediment basin to the tunnel entrance along Hale Avenue and from the tunnel outlet to downstream of Ciolino Avenue. Under the Tunnel Alternative culverts in Reach 6, drainages in Reach 14, and a new diversion channel in Reach 7A would also be constructed. Two bridges in Reach 7A would be exhumed and culverts in Reach 7B would be modified. The Lake Silveira mitigation element would consist of constructed inlet and outlet structures to split flow from Llagas Creek into the historic Llagas Creek channel and Lake Silveira, as well as restoration activities to increase riparian and wetland habitat (see Section 2.5.6 and Section 5.3 for further details). Construction activity associated with the Tunnel Alternative would affect wildlife resources within the Project area as compared to the No Action Alternative. A sediment detention basin and inlet weir will be constructed in the channel through a ruderal field within Reach 8. This new feature would also have a maintenance/access road installed at the top one bank of the channel.

Direct impacts would occur if construction equipment and personnel kill, injure, or crush ground nesting birds, and/or modify habitat suitability for nesting birds (i.e., through the removal of suitable ground nesting habitat to construct the detention basin). Construction of permanent maintenance roads on channel banks could result in impacts to nesting birds that utilize the channel banks for foraging and or nesting opportunities, as well as burrow destruction and direct loss of habitat or individual through disturbance of grassland areas that support small mammal habitat.

Removal of riparian vegetation (e.g., native shrub and hardwood trees), in-channel emergent vegetation, and upland vegetation in Project area reaches during channel construction could result in potential impacts to nesting special-status birds, migratory birds and non-special-status birds protected by the MBTA (including raptors, wading birds, and other passerines) if foraging and nesting activities occur in or adjacent to the construction site. Removal of riparian vegetation would decrease or remove suitable foraging habitat, roosting, and nesting habitat for tree and shrub nesting birds such as western burrowing owl, western Meadowlark, and killdeer. Upland grading, for the construction of maintenance roads, would remove riparian scrub vegetation that would provide habitat for a variety of nesting birds. Upland grading and excavation of a channel through agricultural and open habitat could result in potential impacts to ground nesting birds, such as western burrowing owl, western Meadowlark, and killdeer. Potential disturbance to breeding individuals and/or destruction of burrows, nests, and scrapes could occur during the nesting season if ground nests are located in or adjacent to the construction zone.

Excavation and grading of a channel, particularly construction of a sediment detention basin and inlet weir along the creek in Reach 8 and through the agricultural lands (predominately through Reach 7A), could impact ground nesting species, such as western burrowing owl, western meadowlark, and San Francisco dusky-footed woodrat, and foraging habitat for diurnal raptors, such as red-tailed hawk and American kestral. Excavation through this habitat would result in compaction of burrows and direct mortality, decreasing suitable habitat for prey species. However, the Project would not impact nesting habitat for burrowing owls due to the absence of breeding owls. The Project has limited potential to impact foraging habitat for owls breeding outside the Project area; and, although, there is some potential to impact roosting and foraging habitat for wintering owls, these affected areas represent a small portion of the regionally available foraging habitat (H.T. Harvey & Associates 2013f).

Potential habitat occurs within the Project area that could provide suitable migratory corridors for common and special-status species, such as coyote, deer, bobcat, San Joaquin kit fox, and American badger. Mammalian wildlife could use the habitats within the Project area and habitat adjacent to the Project area for foraging, water, and as refugia. During the construction phase, portions of the channel would not be available for wildlife to use as a migratory corridor, because exclusionary fencing would be installed around facilities and adjacent work areas that are to be protected from construction-related disturbance. Discontinuity of riparian vegetation and habitat would possibly interrupt the ability of mammalian wildlife to move from one suitable habitat patch to another, especially if the migratory corridor goes through the Project area. However, within the Project area, the San Joaquin kit fox and American badger would likely occur only as a rare dispersant between areas of known habitat. Their occurrence is expected to be very low and infrequent. Indirect impacts would result to migratory mammalian species, if the Project area were utilized as a “resting stop” between patches of more suitable habitat; if habitat within the Project area was no longer available to the species, the individual would be forced to continue moving at the expense of increased physiological stress that could affect survivability. The disruption of movement corridor as a result of construction activities would range from 1 to 5 years. Impacts on movement corridors for wildlife species would be significant without mitigation. Construction of sediment detention basin and tunnel under Nob Hill would occur in downtown Morgan Hill. This area is highly developed and urbanized, thus does not provide a high quality migratory corridor to such mammalian species; migratory species would not likely occur in that reach.

In addition, there is the potential for impacts to special-status reptiles and amphibians when using upland habitat for estivation. These species are associated with annual and perennial grassland and commonly observed in open, agricultural areas with ground squirrel activity. Construction of a sediment detention basin could directly harm WPT that maybe inhabiting the channel in Reach 8. Indirect effects would also occur through alteration of the channels habitat suitability (e.g., decrease emergent wetland vegetation or basking sites) and if necessary foraging and nesting habitat is altered or destroyed, if water quality is impaired as a result of construction activities, or through the introduction of predators. Similar direct impacts would occur as a result of construction of culverts.

Opler's longhorn moth and Bay checkerspot butterfly have the potential to occur within the Project area and in adjacent serpentine grasslands where their host plants could occur. Any construction activity, during vegetation management, sediment removal, grading, equipment use, vehicle traffic, and worker foot traffic that would occur in or adjacent to serpentine habitat may result in the injury or mortality of individual serpentine associated plant and serpentine associated invertebrate. Vegetation removal, particularly removal of serpentine grasslands adjacent to the channel and upland grading for access and maintenance roads, would have the potential to remove and/or destroy larval food plant. Direct impacts to individuals would occur if the species is within the construction zone and construction equipment or personnel kill, injury, or trample a special-status invertebrate. Construction activities within channel would likely not impact the Bay checkerspot butterfly or Opler's longhorn beetle, as it is unlikely these species would be utilizing the channel for forage. Many moths are attracted to artificial lights and stay in close proximity to the light as long as it is turned on. This could result in use of excessive energy, which could result in interference in mating or make them easy prey for nocturnal predators, such as bats.

San Francisco dusky-footed woodrat nests were observed adjacent to Reach 7A near the intersection of Watsonville Road and Monterey Road in (WRA 2010). Nests were observed along West Little Llagas Creek at the edge of riparian woodland habitat. Wood rats may use more than one nest and may move from nest to nest as they forage within their home range. The nest serves as a place of residence to store food and bear young. Due to this dependency, nests are of particular importance to wood rats and disturbance to them would be avoided to the extent possible. Removal or conversion of riparian habitat would directly impact active woodrat nests, individual woodrats, and would reduce woodrat nesting and foraging habitat. If night work occurs in the vicinity of these nests, it could result in delay of their nightly emergence in the presence of lighting, which could result in shortened feeding time, difficulty in foraging, or increased mortality due to impairment of night vision.

In addition, in-stream work could alter water quality through accidental discharge of hazardous material or discharging sediment downstream and impair foraging and breeding habitat for the aforementioned wildlife. Special-status amphibians and reptiles habitat would be lost if the aforementioned structures are placed in occupied breeding, foraging, or estivating habitat for the species. Construction along the channel would remove riparian vegetation that could provide refuge and shelter from predators; removal of this vegetation may increase predation risks for amphibians by decreasing suitable habitat that provided cover and possibly making the modified habitat attractive to predatory animals (e.g., cats, coyotes, raptors, and raccoons). Indirect impacts could occur if necessary foraging and nesting habitat is altered or destroyed, if water quality is impaired as a result of construction activities, or through the introduction of predators.

Habitat enhancement of Lake Silveira and re-establishment of the historic Llagas Creek channel would require some vegetation removal in order to construct the inlet and outlet structures and to provide access for equipment and personnel. Habitat loss for nesting birds, for common and special-status bats and for the San Francisco dusky-footed woodrat would be temporary and the majority of vegetation removed would be invasive blackberry. Suitable migratory corridors for common and special-status mammalian species could be temporarily impacted. These areas would be restored with native riparian woodland plant species, benefiting common and special-status mammalian species and further benefiting nesting birds. The restoration of the lake would increase the amount of emergent marsh habitat and would attract bird species not currently supported at the site (H.T. Harvey & Associates 2013g). The restoration of the lake would increase the amount of emergent wetland habitat. This would increase the amount of breeding habitat for all frogs, including bullfrog (Rana catesbeiana) that could predate on native special-status amphibians and reptiles. Although the restoration effort would possibly increase bullfrog populations, the habitat would be improved for native frogs. Restoration of Lake Silveira would not impact special-status serpentine associated invertebrates, because the areas to be impacted during construction do not support serpentine grassland habitat.

Under the Tunnel Alternative, there would be less vegetation removal in some Project reaches. Impacts to nesting birds, for common and special-status bats and for the San Francisco dusky-footed woodrat are lessened with reduced vegetation removal along the existing West Little Llagas Creek channel. With construction of the tunnel under Nob Hill, there would be no channel widening as the channel section through downtown Morgan Hill would be avoided, thus reducing nesting and foraging habitat impacts.

The cut-off section of West Little Llagas Creek would have reduced flows except for local runoff (due to construction of a diversion channel in Reach 7A) would indirectly impact nesting birds (such as great egret, great blue heron, or mallards) by decreasing foraging habitat; intermittent flows at West Little Llagas Creek may support small prey species (e.g., amphibians, small mammals, fish, and invertebrates, etc.) that wading birds utilize for forage. Loss of flows to this creek could decrease suitable habitat for the prey species, thus indirectly decreasing foraging habitat for nesting birds. However, suitable nesting habitat for common and special-status nesting birds is absent from the site and from adjacent areas along West Little Llagas Creek (H.T. Harvey & Associates 2013g).

Under the Tunnel Alternative, the tunnel would be constructed under Nob Hill between Warren Avenue and Del Monte Avenue and culverts would be constructed in Reaches 7B and 8. There will be no regular maintenance required in the tunnel. The tunnel would be constructed to minimize smaller crevices and openings for bats to roost in. It is anticipated that air would regularly flow through the tunnel with differences in the ambient outside temperature and the in-tunnel temperature. It is less likely that bats would roost in situations with air movement; however, bats would be expected to roost in warm dead air spaces, such as the area inside three planned access points (H.T. Harvey & Associates 2012a). If bats develop a roosting colony in the tunnel they could present a water quality problem due to the presence and build-up of guano which can introduce *E. coli* and nitrogen. Additionally, if a colony establishes in the tunnel, then they could be subject to injury or killed when high flows occur. Consequently to ensure that bats are not injured and to protect water quality they should be precluded from establishing a roosting colony in the tunnel.

Bats are expected to use the existing structures found in the Project area as only night-roosts, as the structures lack appropriate crevices, weep hole, or other features that could be used by day-roosting bats. Furthermore, bats are expected to use the Masten Avenue (Reach 4), U.S. 101 north and south (Reach 5), and Llagas Avenue (Reach 6) bridges only during the warmer months based on lack of fresh guano below roost sites during field surveys conducted in late winter (H.T. Harvey & Associates 2013e).

Displacement or directly harming of roosting bats in culverts being replaced could occur in various Project reaches. Removal of agricultural, residential, and commercial/industrial buildings in the Project area would also result in loss of roosting areas. If night work requiring light occurs in these areas, it would result in delay of their nightly emergence in the presence of lighting, which could result in shortened feeding time, difficulty in foraging, or increased mortality due to impairment of night vision.

Yuma myotis and pallid bat are known to commonly use bridges as roosts (Johnston et al. 2004 as cited in H.T. Harvey & Associates 2012a). Bridges are frequently used as roosts, because the upper surface of the bridge heats ups during the day and remains warmer than ambient temperatures through the night. Tunnels are often used the same species where the tunnels ceiling surface is warmer. Two buried bridges are to be exhumed as part of the Tunnel Alternative. Following their construction, these bridges may provide suitable roosting habitat for some species.

Construction equipment, noise, lights for night work, and increased human presence would likely deter wildlife from entering the work area that would normally utilize the area for forage or refuge; even if construction activities were performed during the day, alteration of existing habitat (as a result of channel widening and deepening and upland grading) may result in decreased habitat suitability for many wildlife species. The habitats within the Project area provide valuable foraging and refuge resources for wildlife; if wildlife species are excluded from using these habitats, it would force them into adjacent habitat that would be less suitable and could result in both direct and indirect impacts to the species. Direct impacts could result if, for example, a dispersing bobcat were to normally migrate through the riparian corridor within the Project was not able to because of construction disturbance and was forced to cross busy streets and residential area, the bobcat could be struck by a vehicle and killed.

The noise associated with construction of the tunnel may disturb birds nesting within the vicinity of the construction area. Noise disruption would be temporary and the birds would be able to move to adjacent suitable habitat outside of the noise range. The construction of a tunnel under Nob Hill would not impact special-status serpentine associated invertebrates, because the location of the tunnel would be through an existing urban environment and there would be no likelihood of serpentine grassland to occur there.

Under the Tunnel Alternative, operation and maintenance activities (i.e., vegetation management, sediment removal, and maintenance of other features, such as roads, culverts, and grade control structures) would be similar to the No Action Alternative with the added maintenance of new constructed features, such as the tunnel and grade control structures. Operation and maintenance activities would be implemented as described in Section 2.5.5.

Operation and maintenance activities in the channel could potentially result in temporary impacts to nesting birds. Minor maintenance activities would be performed to repair and maintain channel capacity and SCVWD facility functions and could occur anywhere within the Project area. Pruning or removal of riparian vegetation could potentially disturb a variety of common and special-status nesting birds that rely on this habitat type for foraging and nesting activities. Maintenance activities that disturb nesting birds have the potential to result in nesting birds abandoning their nests, resulting in failure of nesting attempts or loss of chicks. Abandonment of a nest resulting in the failure of eggs or death of chicks would be a significant impact. Removal of in-stream vegetation associated with sediment removal activities may result in the temporary loss of breeding and/or foraging habitat. Sediment management would be reduced in downstream Project reaches with the newly constructed detention basin capturing sediments traveling from upstream.

Re-grading of existing access roads and pedestrian paths could result in the destruction of ground nesting bird scrapes and/or mortality of adults and chicks in ground nests (e.g., common dove and kill deer commonly occupy ground nests in gravel and disturbed areas). Minor maintenance activities could result in a reduction in the quality of breeding or foraging habitat because of the accidental introduction of non-native vegetation (i.e., mud on the underside of construction crew boots may contain seeds of invasive weeds and grasses). Minor vegetation removal (i.e., trimming of shrubs and mowing of annual grasses) would decrease suitable habitat for invertebrate prey species and small mammal cover that are important food sources for nesting birds, including raptors. Loss of small mammals, from small mammal controls (either through rodenticide or trapping), would reduce the availability of burrows and prey for western burrowing owl.

In addition, operation and maintenance activities of the newly constructed features could result in permanent or temporary impacts to special-status reptiles and amphibians and their habitats. Minor maintenance activities would be performed to repair and maintain SCVWD facility functions and could occur anywhere within the Project area. Vegetation management would likely be expanded over existing conditions since the Project would require the revegetation of much of the Project area. Vegetation maintenance would be based on the maintenance of design flows according to the roughness coefficients, as shown in Table 2.5.5. Vegetation removal methods include herbicides, hand pruning, hand removal, and mowing. Amphibians could be impacted by the absorption of chemicals through their skin. Hand or mechanical pruning or removal impacts along channel banks could include mortality of individuals crushed or injured by vehicles or equipment and disturbance to mammal burrows used as refugia. Sediment removal would be conducted in a couple of areas on regular intervals. Removal of sediment is estimated to be required no more than once every 10 years.

Maintenance culverts would need to be periodically performed and could adversely affect pallid bat and Yuma myotis. These two species of bats commonly use bridges, culverts, and other tunnels for roosting habitat (H.T. Harvey & Associates 2012a). Tunnels and culverts are used by the bats when the "tunnel ceiling approaches the ground or road surface as access points where solar heat warms through to the tunnel's ceiling surface" (H.T. Harvey & Associates 2012a). Maintenance activities in the culverts include sediment and debris removal, and may displace or directly harm common and special-status roosting bats that are attracted to the structure and use it as a day, night, or maternity roosts. Individual bats could be harmed or killed; loss of individual special-status bats would be a significant impact.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.5.3.2 Natural Resources Conservation Service (NRCS) Alternative

The NRCS Alternative differs from the Tunnel Alternative (Applicant's Proposed Action) in that it would increase the Project footprint in Reach 8. The NRCS Alternative would require a larger amount of Right of Way, increase the amount of vegetation to be removed along the existing West Little Llagas Creek, increase the extent of bank excavation, increase the amount of fill into jurisdictional waters, increase the amount of hardscape required in Reach 8, increase utilities relocation, and increase culvert replacements through downtown Morgan Hill. The construction approach and duration for the NRCS Alternative would be the same throughout the entire Project reaches as previously described for the Tunnel Alternative, except in Reach 8. The NRCS Alternative would require 3,600 feet of channel modifications, culvert replacements between West Main Avenue and West Dunne Avenue, and increase the Project footprint in Reach 8 as compared to the Tunnel Alternative.

There are several features unique to the NRCS Alternative that could cause direct and/or indirect impacts to common and special-status nesting birds. Increased channel widening and deepening between West Main Avenue and West Dunne Avenue in Reach 8 as compared to the Tunnel Alternative could cause direct impacts would occur if construction equipment and personnel may kill, injury, or crush nesting birds, and/or modify habitat suitability for nesting birds (i.e., through the removal of suitable nesting trees).

Channel widening/deepening and culvert replacements would increase nesting and foraging habitat indirect impacts to nesting birds at that reach with the removal of riparian habitat for nesting birds. Overall, more construction activities would increase both direct and indirect impacts to nesting birds compared to the Tunnel Alternative.

As compared to the Tunnel Alternative, more channel widening/deepening and culvert replacements through downtown Morgan Hill in Reach 8 would be needed for this alternative, thus increasing impacts on breeding, foraging, or estivating habitats of special-status amphibians and reptiles. Impacts are further increased with greater amounts of vegetation removal along the existing West Little Llagas Creek channel as part of this alternative. A larger footprint of right of way would increase the extent of upland habitat modification and result in more impact to habitat suitability for special-status amphibians and reptiles, although downtown Morgan Hill is not likely to support special-status amphibians and reptiles. Direct and indirect impacts that result in the loss of special-status reptiles and amphibians would be reduced with BMPs and mitigation as described in Chapter 5 of this EIS.

Construction related impacts to special-status bats would be similar to the Tunnel Alternative, except under the NRCS Alternative there would be more impact to upland habitat because this alternative requires a larger footprint of right of way and an increased amount of vegetation removed in Reach 8; increased construction related impacts to upland and riparian habitat would results in more direct and indirect impacts to roosting bats through more disturbance to potential roosting and foraging habitat. With increased channel widening/deepening and culvert replacement activity through downtown Morgan Hill in Reach 8, impacts to roosting and foraging habitat for bats would be increased compared to the Tunnel Alternative. Increased construction activities would increase potential impacts to habitat that migratory mammals would use during dispersal events. This area is highly developed and urbanized, thus does not provide a high quality migratory corridor to such mammalian species as the San Joaquin kit fox or American badger; these species would not likely occur in that reach. All other construction impacts to migratory mammals, including San Joaquin kit fox and American badger, are similar to those described in the Tunnel Alternative.

San Francisco dusky-footed woodrat have the potential to occur with the Project area and in riparian woodland habitat. Vegetation removal, particularly removal of riparian scrub adjacent to the channel, and upland grading for access and maintenance road would have the potential to remove and or destroy nesting habitat. Under the NRCS Alternative, there would be an increase in right of way, increased amounts of vegetation removal along the existing West Little Llagas channel, and increased culvert replacements as compared to the Tunnel Alternative. Increased upland habitat disturbance and increased vegetation removal under this alternative would increase the potential for direct and indirect impacts to woodrats.

Opler’s longhorn moth and Bay checkerspot butterfly have the potential to occur with the Project area and in adjacent grasslands where their host plants could occur. Vegetation removal, particularly removal of grasslands adjacent to the channel, and upland grading for access and maintenance road would have the potential to remove and or destroy larval food plant. Under the NRCS Alternative there would be an increased right of way, increased amounts of vegetation removal along the existing West Little Llagas channel, and increased culvert replacements as compared to the Tunnel Alternative, although there are no known serpentine habitats through downtown Morgan Hill.

Operation and maintenance (O&M), such as vegetation maintenance activities (e.g., vegetation trimming and removal), would be managed similarly to the SCVWD SMP but under permits and conditions for the Tunnel Alternative. As with the Tunnel Alternative, periodic maintenance activities as described in Section 2.5.5 could potentially disturb foraging habitat. O&M related impacts would be increased in downstream Project reaches without the constructed detention basin capturing sediments traveling from upstream, as well as increased amounts of channel in Reach 8 to maintain; therefore, management activities and impacts would be increased as compared to the Tunnel Alternative. O&M related impacts to special-status amphibians and reptiles are similar to those described in the Tunnel Alternative, except for the level of sediment management. The amount of sediment needed to be removed from downstream reaches would be increased as compared to the Tunnel

Alternative, without the construction of the upstream sediment basin. O&M related impacts to roosting bats are also similar to those described in the Tunnel Alternative, except this Alternative would not construct a new tunnel where there exists an opportunity for bats to potentially colonize. Sediment and debris removal as part of culvert maintenance could also disturb roosting bats. Impacts to special-status invertebrates would be similar to those described in the Tunnel Alternative.

O&M related impacts to migratory mammals, including San Joaquin kit fox and American badger, are similar to those described in the Tunnel Alternative. There would be in increased in vegetation sediment in downstream reaches compared to the Tunnel Alternative. Periodic removal of riparian vegetation to maintain conveyance capacities could potentially disturb foraging habitat. Vehicles and crews maintaining new structures could disturb both common and special-status mammalian species taking refuge adjacent to the channel. The operation and maintenance impacts (both direct and indirect) to migratory mammalian species, including San Joaquin kit fox and American badger, would be similar to those described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.5.3.3 Culvert/Channel Alternative

The Culvert/Channel Alternative would require a larger right of way footprint and increase the amount of vegetation to be removed along the existing West Little Llagas Creek in Reach 8 relative to the Tunnel Alternative. The Culvert/Channel Alternative differs from the Tunnel Alternative in that it would increase the Project footprint in Reach 8 with the construction of a 1,700-foot segment of a double box culvert through the Britton School athletic fields and continue under Del Monte Avenue to West 2nd Street. Flows would pass through this section and would result in a 1,820-foot section of the existing channel drying up, except for local runoff. Substantially reducing flows through this section could result in the permanent loss of up to 0.33 acre of jurisdictional wetlands; however, several other habitat categories would be less impacted than for the NRCS Alternative (see Section 4.4, Botanical Resources, for detailed discussion). From West 2nd Street to West Dunne Avenue the same channel widening and deepening, along with culvert replacements at 2nd, 3rd, 4th, and 5th streets, would be the same as described under the NRCS Alternative. All other Project reaches would have the same features described in the Tunnel Alternative. The construction approach and duration for the Culvert/Channel Alternative would be the same throughout the entire Project reaches, as previously described for the Tunnel Alternative. Operation and maintenance activities would be similar to those described for the Tunnel Alternative, except for Reach 8 where the widened channel through Morgan Hill would need to be maintained along with periodic culvert maintenance.

Increased construction activities in Reach 8 through commercial areas would result in more construction related direct or indirect impacts to nesting birds as compared to the Tunnel Alternative. Although this is marginally suitable habitat, construction of the double box culvert through Reach 8 will take place on previously disturbed areas; however, channel modification and vegetation removal would occur between West 2nd Street and West Dunne Avenue. Increased construction related impacts to upland and riparian habitat would result in more direct and indirect impacts to nesting birds through more disturbance to nesting and foraging habitat as compared to the Tunnel Alternative. In addition, this described condition could result in more direct and indirect impacts to roosting bats through more disturbance to roosting and foraging habitat. The construction of the double box culvert will take place in previously disturbed areas without removal of roosting habitat; therefore, there would not be any impact associated with this activity.

Increased construction activities in Reach 8 through residential property could result in more construction related impacts to special-status amphibians and reptiles and San Francisco dusky-footed woodrat, and special-status invertebrates as compared to the Tunnel Alternative. Increased construction related impacts to upland and riparian habitat could result in more direct and indirect impacts to amphibians and reptiles through more disturbance to foraging habitat. Construction of the double box culvert through Reach 8 along Hale Avenue, through the Britton School athletic fields, and under Del Monte Avenue will take place on previously disturbed, developed areas. However, flows would bypass approximately 1,820 feet of the existing channel between Hale Avenue and the Del Monte Avenue/West 2nd Street intersection, leaving this section dry except for local runoff thus reducing the availability of wetland habitat (see Section 4.4, Botanical Resources, for detailed discussion). It is unlikely, however, that special-status amphibians and reptiles would be occupying this section due to the surrounding urbanization; therefore, there would not be significant impacts from this activity. Impacts to special-status invertebrates are unlikely given the lack of serpentine grasslands present. The construction of the double box culvert would not impact special-status serpentine associated invertebrates, because the location of the culvert would be through an existing urban environment and there would be no likelihood of serpentine grassland to occur there.

Under the Culvert Channel Alternative, the double box culvert constructed could potentially be used for night roosts (H.T. Harvey & Associates 2013e). Culverts would need to be periodically inspected and debris removed. Maintenance activities may displace or directly harm bats using this structure; loss of individual special-status bats would be a significant impact. West Little Llagas Creek would travel through the culvert instead of the segment of the channel between Hale Avenue and Del Monte Avenue. Vegetation and sediment management activities and associated in channel activities would be increased for this alternative; therefore, maintenance impacts to this species would be increased compared to the Tunnel alternative.

All other construction related impacts to the aforementioned wildlife are similar to those described in Tunnel Alternative; therefore, implementation of BMPs and mitigation would reduce impact as discussed and described in Chapter 5 of this EIS.

Operation and maintenance (O&M) activities, such as vegetation and minor maintenance, would be similar to those described in the Tunnel Alternative, except for the maintenance of the channel between West 2nd Avenue and West Dunne Avenue. Vegetation and sediment management activities and associated with in channel activities would be increased for this alternative compared to the Tunnel Alternative; however the use of project BMPs would reduce the potential for impacts as described in Chapter 5 of this EIS.

O&M related impacts to common and special-status nesting birds and special-status amphibians and reptiles are similar to those described in Tunnel Alternative, except that maintenance would be increased through downtown Morgan Hill in Reach 8 due to more channel to maintain. In addition, O&M related impacts to special-status invertebrates, migratory mammals, are similar to those described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.5.3.4 Reach 6 Bypass Alternative

The Reach 6 Bypass Alternative differs from the Tunnel Alternative in that it would construct a bypass channel between Reach 6 of Llagas Creek and Reach 14 of East Little Llagas Creek to carry flows over the 10 year event. The bypass would run east through open fields, continue under Murphy Avenue and U.S. 101, then connect to Reach 14. East Little Llagas Creek downstream of the bypass (Reach 14) would be designed to carry the extra flow from the upstream channel capacity. The construction approach and duration for the Reach 6 Bypass Alternative would be similar to the Tunnel Alternative except for the following: no creek modifications in Reaches 5 and 6 downstream of bypass, greater channel widening in Reach 14 as compared to Tunnel Alternative (approximately two times greater), control structures (hydraulic gates) at Reach 6, three bridge constructions at U.S. 101 and Murphy Road, maintenance roads would be constructed at the top of banks on both side of the bypass channel, and culvert modification at Reach 14. Project activities for the upstream Project Reaches 8, 7A, 7B, and 14 (downstream of E. San Martin Avenue to the confluence with Llagas Creek reach) and for the downstream Reach 4 would remain the same as described for the Tunnel Alternative. Maintenance of Reaches 5 and 6 would be conducted under the SCVWD SMP since these reaches are not part of this alternative. All other maintenance activities (e.g., vegetation removal, sediment removal, and other minor activities) would be maintained according to the BMPs outlined in Section 2.5.5.

There are several features unique to the Reach 6 Bypass Alternative that could result in direct and/or indirect impacts to common and special-status nesting birds, to common and special-status amphibians and reptiles, including Western pond turtle and CTS, and to migratory mammals, including deer, San Joaquin kit fox and American badger. Greater channel widening in Reach 14 (approximately two times wider than under the Tunnel Alternative) would result in greater losses of nesting bird habitat and could potentially lead to greater direct impacts to nesting birds and losses of aquatic habitat. Construction activities associated with Reach 6 Bypass, including construction of maintenance roads on top of both side of the bypass channel, could result in direct impacts to nesting birds and common and special-status amphibians and reptiles, including Western pond turtle and CTS, and to migratory mammals, including San Joaquin kit fox and American badger if construction equipment and personnel kill, injury, or crush ground nesting wildlife. Indirect impacts to the aforementioned wildlife could occur if construction activities modified the habitat such that habitat suitability for this wildlife was reduced or destroyed (i.e., through the removal of suitable nesting trees along the maintenance road ROWs). Construction of hydraulic control structures at Reach 6 would have similar direct and indirect impact to nesting birds, as construction activities of the Reach 6 Bypass.

Agriculture dominates the area surrounding Reach 14. Reach 14 is ephemeral and typically dry in summer and fall months; and the channel contains a combination of annual grasses and bare ground. Vegetation along the channel also contains native trees. Because the channel is ephemeral, the potential for occurrence of aquatic reptiles and amphibians is reduced; however, agricultural drainages and ditches (in particular, drainages with emergent vegetation) adjacent to the planted fields could provide suitable habitat for species, such as the WPT. Construction of hydraulic control structures at Reach 6 would have similar direct and indirect impact to amphibians and aquatic reptiles as construction activities of the Reach 6 Bypass. Any construction activities requiring night lighting could cause disorientation and change natural behaviors of special-status amphibians and reptiles resulting in vulnerability to predators or traffic, reduced foraging or mating.

Construction of three new bridges at Murphy Avenue, and U.S. 101 southbound and northbound would have an impact if construction and staging areas associated with the construction activity removed suitable nesting habitat and suitable aquatic foraging and/or breeding habitat. However, upon the completion of the bridge construction, some species of nesting birds (e.g., swallows) may utilize the bridge for nesting; thus the impact would be beneficial. In addition, upon the completion of the bridge construction, some species of bats found within the Project area, would utilize the bridge for roosting; thus, the impact would be beneficial to common and special-status roosting bats. Construction of the bridges would not impact woodrats, as they are not expected to occur at the proposed bridge locations which are currently in agricultural use.

Under the Reach 6 Bypass Alternative, no channel modification would occur in Reaches 5 and 6 downstream of the bypass; this would remove the impacts to nesting birds, roosting bats, and reduce impacts to special-status amphibians and reptiles, as compared to proposed activities under the Tunnel Alternative at these reaches. Project activities for upstream Project Reaches 8, 7A, 7B and 14 (downstream of E. San Martin Avenue), and for downstream Reach 4, would be the same as described under the Tunnel Alternative; thus, the types and levels of impacts would be the same. Reduced construction activities in Reaches 5 and 6 downstream of the bypass would reduce potential impacts to San Francisco dusky-footed woodrat as compared to the Tunnel Alternative. Reduced construction activities in Reaches 5 and 6 downstream of the bypass would reduce impacts to special-status invertebrates as compared to the Tunnel Alternative Construction activities associated with Reach 6 Bypass Alternative have the potential to result impacts to common and special-status bats. Greater channel widening in Reach 14 would result in greater loss of roosting bat foraging areas and/or roosting trees, in addition to potential for direct loss of individual bats. Construction of Reach 6 Bypass, and its associated maintenance/access roads and hydraulic control structures, would also reduce roosting bat habitat if construction activities removed suitable roosting trees. Direct impacts would occur if individual bats and maternal colonies were lost or abandon as a result of construction related disruption (e.g., noise, increase human presence etc.). If night work requiring light occurs, it could result in delay of their nightly emergence in the presence of lighting, which could result in shortened feeding time, difficulty in foraging, or increased mortality due to impairment of night vision.

Impacts to common and special-status roosting bats could occur as a result of maintenance of hydraulic gates at the bypass channel, maintenance of access roads for the bypass channel, and maintenance of bridges built at Murphy Avenue, and U.S. 101 northbound and southbound. The pallid bat could potentially use the newly constructed structure as a night-roost and during the warmer months (H.T. Harvey & Associates 2013e).

Features of the Reach 6 Bypass Alternative that could result in direct and/or indirect impacts to San Francisco dusky-footed woodrat include construction of the bypass through Reach 6, construction of hydraulic control structures at Reach 6, and construction of access and maintenance roads to the bypass. Construction equipment and personnel may kill, injury, or displace woodrats and their dens. If night work occurs in the vicinity of these nests, it could result in delay of their nightly emergence in the presence of lighting, which could result in shortened feeding time, difficulty in foraging, or increased mortality due to impairment of night vision. There would be greater channel widening and deepening through Reach 14, as compared to the Tunnel Alternative; however, construction activities associated with this reach would likely not have a significant impact on San Francisco dusky-footed wood rat as the area is open and does not provide high habitat suitability for woodrats.

Opler's longhorn moth and Bay checkerspot butterfly have the potential to occur within the Project area and in adjacent grasslands where their host plants could occur. Construction activity that resulted in the removal of grasslands, particularly in serpentine soils, adjacent to the channel, and upland grading for access and maintenance road would have the potential to remove and/or destroy larval food plant. Construction activities associated with Reach 6 Bypass Alternative would result in construction of a bypass channel through Reach 6 and additional widening of Reach 14 (upstream of E. San Martin Avenue). If serpentine soils are within or adjacent to the construction zone, there is potential to directly and indirectly impact serpentine associated special-status invertebrates, including Bay checkerspot butterfly.

Many moths are attracted to artificial lights and stay in close proximity to the light as long as it is turned on. This could result in use of excessive energy, which could result in interference in mating or make them easy prey for nocturnal predators, such as bats if night-time lighting is required for construction. Construction impacts, both direct and indirect, could occur as a result of construction activities from installation of three bridges under this alternative if the construction areas and staging area occurs in serpentine soils.

Potential habitat occurs within the Project area that could provide suitable migratory corridors for common and special-status species, such as coyote, deer, bobcat, San Joaquin kit fox, and American badger. Wildlife could use the habitats within the Project area and habitat adjacent to the Project area for foraging, water, and as refugia.

Operation and maintenance (O&M) impacts to nesting birds, special-status amphibians and reptiles, San Francisco dusky-footed woodrat, migratory mammals, such as San Joaquin kit fox and American badger, and special-status invertebrates are similar to those described in Tunnel Alternative, except for the maintenance of hydraulic gates to the bypass channel, maintenance of access roads to the bypass channel, and the maintenance of bridges built under the Reach 6 Bypass Alternative. Impacts from hydraulic gates and access roads at the bypass could occur if the aforementioned wildlife are disturbed, killed, or injured by maintenance activities. Impacts from bridge maintenance work would occur if there were swallows nesting on the structure. O&M activities have the potential to directly impact roosting bats through killing or injuring an individual that may be roosting upon the structure or if roosting trees are disturbed or removed as a result of the maintenance activity. Although unlikely, impacts from hydraulic gates and access roads at the bypass could occur if special-status invertebrates are disturbed, killed, or injured by maintenance activities. No impacts to special-status invertebrates would be expected to occur from bridge maintenance since this does not involve vegetation management. Maintenance of Reaches 5 and 6 downstream of the bypass would be carried out through the SCVWD SMP, since these reaches would not be improved under this alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.5.4 Summary of Impacts to Wildlife Resources

There are several sensitive wildlife resources identified as occurring or having the potential to occur within Project area and having the potential to be impacted from Project-related activities. These resources include common and special-status nesting birds, special-status reptiles and, special-status and common bats, San Francisco dusky-footed woodrats, special-status invertebrates, and migratory mammals (including special-status San Joaquin kit fox and American badger).

Mitigation measures and BMPs, as appropriate, for the various Action Alternatives to reduce the impacts to Wildlife Resources are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

4.6 AQUATIC RESOURCES

4.6.1 Introduction

This section describes the impacts on aquatic biological resources were qualitatively evaluated using an approach that links Project activities to direct and indirect effects on special-status aquatic species and their habitats. Effects on aquatic biological resources can be direct, as in the mortality of individual specimens (i.e., during construction), and indirect, as in effects that do not cause the immediate mortality of an individual, but that may reduce the habitat or eliminate the species over time.

4.6.2 No Action Alternative

Under the No Action Alternative, the Project would not be built, and no new land purchases or construction activities would occur. Flooding in the residential areas of Morgan Hill and San Martin would continue. The diversion channel in Reach 7A would not be constructed under the No Action Alternative. Under the No Action Alternative there would be no fish habitat improvement features installed.

No channel modification or improvements would be constructed. Structures (grade control structures and culverts) that could affect upstream migration of adult steelhead would not be installed within the Project area. As such, no impacts to upstream or downstream migrating adult steelhead due to construction-related activities would occur in the Project area.

No channel modification or improvements would be constructed. As such, no construction impacts to steelhead spawning habitat usage and quality, steelhead rearing habitat, and aquatic species due to construction would occur in the Project area.

Maintenance activities in the channel would be carried out according to SCVWD SMP (see description in Section 2.5.5 and Appendix B of this EIS). The environmental impacts for the SCVWD SMP were analyzed in a Final EIR, which was certified in January 2012. The SMP would continue under the No Action Alternative similar to the past 10 years. The SMP incorporated a wetland and riparian mitigation program, a series of resource protection policies, and BMPs to reduce environmental impacts from maintenance activities. Maintenance of the Upper Llagas Creek facilities would be conducted in accordance with the guidelines established in the SMP Update.

As discussed in Section 3.6.3, DO levels within Lake Silveira do not meet water quality objectives established by the Regional Water Quality Control Board (Central Coast Region) Water Quality Control Plan (Basin Plan) for the Llagas Creek watershed (RWQCB 2011) that state “for waters not mentioned by a specific beneficial use, DO concentration shall not be reduced below 5.0 mg/L at any time. Median values should not fall below 85 percent saturation as a result of controllable water quality conditions. Additionally, outflow from Lake Silveira causes higher water temperatures downstream in Reach 6, varying from 9–14°F greater than upstream of the lake in summer, in some cases exceeding water quality objectives established in the Basin Plan (RWQCB 2011) which states “at no time or place shall the temperature of any water be increased by more than 5°F above natural receiving temperature”. Warming within Lake Silveira raises downstream temperatures above optimal temperature range for juvenile steelhead (59–65°F). Daily average temperatures in late August exceeded 75°F, which are stressful and potentially lethal to rearing juvenile steelhead. The DO and temperature water quality effects under existing conditions are significant ongoing impacts to steelhead rearing.

Outside of the active channel, maintenance of access roads and the top of bank would occur as part of vegetation and sediment maintenance. On the maintenance roads, vegetation would be cleared as needed for access and to reduce fire hazard. Top of bank areas in all reaches would be maintained annually to facilitate access and observation and to reduce fire hazard.

BMPs for the No Action Alternative, including O&M activities are discussed and described in Chapter 5 and Appendix B of this EIS.

4.6.3 Action Alternatives

4.6.3.1 Tunnel Alternative (Applicant’s Proposed Action)

The Tunnel Alternative would provide an increased level of flood protection for urban areas, specifically: a 1-percent flood in Morgan Hill (Reaches 8, 7A, and 7B); 10 percent flood management for the semi-urban area around East Little Llagas Creek (Reach 14); and, avoid induced flooding elsewhere on Llagas Creek (Reaches 6, 5, and 4) due to upstream improvements. The components of the alternative include: Project wide channel improvements including deepening and widening, some limited planform re-alignment, excavation and construction of a diversion channel for flows from West Little Llagas Creek to Llagas Creek which would divert flows from entering East Little Llagas Creek, construction of permanent access roads on both banks within permanent easements for construction and maintenance access, construction of reinforced concrete boxes (culverts) and in-stream aquatic habitat enhancements to provide cover and rearing for fish in Reaches 4, 5, 6, and 7A; Reach 8 hydraulic structures including a 250-foot-long sediment trap and an inlet weir (diversion) structure, replacement of 2,400 feet of earthen channel with a 48-inch-diameter low flow RCP culvert, a 2,100-foot-long tunnel under Nob Hill and Nob Hill Terrace, and two 2,750-foot-long high flow bypass culverts conveying flow to the tunnel; Reach 7B hydraulic structures including two high flow bypass culverts conveying flow from the tunnel exit to West Little Llagas Creek; restoration of the remnant Llagas Creek channel and creation of a new wetland and riparian woodlands at Lake Silveira; and stream operation and maintenance activities. A detailed description of the construction features and activities, and maintenance activities are provided in Sections 2.5 and 2.7.

Construction activities, described in Section 2.6, including channel deepening and widening, installation of grade control structures, installation of box culverts/culvert replacements, a new mid-channel bar at the downstream end of Reach 5, installation of instream flow structures for aquatic habitat, and construction of a 2,100-foot-long tunnel, a sediment retention basin and inlet weir, a 2,400 foot reinforced concrete pipe culvert for low flows to existing creek, and restoration of the remnant Llagas Creek channel and creation of a new wetland and riparian woodlands at Lake Silveira) could potentially affect steelhead spawning if these activities occur during their during their spawning period. Steelhead could potentially migrate upstream from the Pacific Ocean through the Pajaro River from December to March during storms large enough to create hydrologic connectivity from the Pajaro River through Reaches 4, 5, and 6, and the Lake Silveira project element to spawning habitat in Llagas Creek upstream of Monterey Road to Chesbro Dam, or to spawning habitat within any of the Project reaches (Reaches 4 to 6) and within the Lake Silveira mitigation element. Construction would take place year round, but would occur to the extent feasible during the dry season, typically between May 1 and October 15, during which time adult steelhead are unlikely to be migrating upstream. During wet years, steelhead may migrate upstream either earlier than October 15 or later than May 1, during which times construction activities could impede upstream migration. The construction activities may still take place in the channel, even if the channel is not dry, by dewatering reaches. Dewatering would be limited to the areas of active construction and would ensure fish passage through Reach 6 and Lake Silveira on Llagas Creek, but could still prevent spawning if steelhead are diverted away from potential spawning habitat or damage or destroy pre-existing redds.

The channel configurations in Reaches 4, 5, and 6, which contain critical migration habitat for adult S-CCC steelhead, and the new mid-channel bar at the downstream end of Reach 5, could impede fish passage if the low-flow channel is too shallow for passage of adults; or if the low flow channel is too narrow, thereby increasing water velocity above a critical threshold for migration. Under the Tunnel Alternative, Reaches 4, 5, and 6 would be receiving winter flows from Reaches 7A, 7B, and 8 that under existing conditions would either flow into East Little Llagas Creek and eventually into Reach 14 or cause flooding adjacent to Reaches 7B and 8. Under the Tunnel Alternative, the winter flows would be contained within Reaches 7A, 7B, and 8, then routed through Reaches 4, 5, and 6, potentially increasing water velocity within the channel. The channels in Reaches 4, 5, and 6 would be properly sized for sediment transport and to allow for unimpeded fish passage, but increased flow may increase water velocity above a critical threshold that prevents steelhead adult migration. In general, adult steelhead require minimum depths of approximately 7 inches and maximum velocities of 8 feet per second to enable upstream migration (Bjornn and Reiser 1991). A low-flow channel, approximately 8 inches deep conveying approximately 2 cfs, would meander along the channel bottom within the bankfull channel, potentially deep enough for adult upstream migration. Smith (2007) noted that the low flow channel in the flood control channel in Llagas Creek downstream of the reservoir may allow smolt emigration at flows as low as 3 cfs, but is dry in most years by April. Smith (2007) also concluded that the biggest limiting factor for maintaining steelhead in Llagas Creek is regular emigration of smolts the dry reach below U.S. 101.

Channel widening for hydraulic improvement in Reaches 4, 5, and 6 would be limited to one bank, where possible, to preserve existing mature vegetation. The total top width of the modified channel would be approximately 125 feet, which is 30 to 60 feet wider than the existing channel. Channel depths would range up to approximately 14 feet, which is typically about 4 to 5 feet deeper than existing conditions. Vegetation maintenance in the flood conveyance channels would be performed to maintain the composite design roughness requirements (hydraulic roughness, or Manning's n-value). The existing composite hydraulic roughness in Reaches 4, 5, and 6 ranges from 0.055 (moderately dense stemmy grass, weeds, or tree seedlings; brushy moderately dense vegetation similar to 1 to 2-year-old willows in dormant season) to 0.070 (8 to 10-year-old willow or cottonwood trees inter- grown with weeds and brush) and would be maintained at or above 0.064 in all three reaches under the Tunnel alternative (Table 2.5-5). Each portion of the channel cross section will have an applied set of maintenance activities that will vary from reach to reach. On the bench, the bankfull bank (slope between bench and channel bottom) and the channel bottom, woody vegetation would be cleared from Reaches 4 and 5, management in Reach 6 would be similar to Reaches 4 and 5 with the additional provision to prevent the spread of willows on the bankfull bank. The improved slopes of the channel would be revegetated, using native species, consistent with requirements for maintaining hydraulic capacity.

A new mid-channel bar would be constructed within Reach 5 at the confluence with Reaches 4 and 14. The bar would split the flow, with the main channel flowing north of the bar and a smaller channel with less flow following the current channel configuration (to the south). The design could potentially affect spawning substrate through increased scour or deposition, which would reduce quantity or quality of spawning habitat. As noted in Chapter 2, channels would be designed to create a stable channel form (i.e., not aggrading or degrading) that would prevent scour and deposition, including through Reach 5 and the new mid-channel bar. The impact of the new mid-channel bar on S-CCC spawning habitat and usage would be less than significant.

Channel modifications in Reaches 5 and 6 could result in the excavation of up to 455,000 CY of material (Section 2.5.3). Reach 5 is dry most of the year, and contains little usable spawning habitat, while Reach 6 is perennial down to San Martin Avenue, fed by flows from Chesbro and Uvas Dams and contains the highest quality spawning habitat within the Project area. The excavation of gravel and cobble would be offset by returning the material to the channel. Construction activities could also potentially affect steelhead spawning if these activities result in the increase of fine sediment within potential spawning habitat. Greater volumes of fine sediment within spawning gravel will likely reduce eventual spawning success (Kondolf 2000). Survival to emergence of steelhead fry from redds begins to decrease at 20 percent embeddedness of the redd by fine sediment, and is completely restricted at 80 percent embeddedness (Bjornn and Reiser 1991; Kondolf 2000). As such, if construction activities cause an increase in fine sediment within potential spawning gravel, it could impact spawning habitat quality.

Several types of hydraulic structures would be installed within the Project area that could affect upstream migration of adult steelhead. Grade control structures would be installed in all reaches (two in Reach 4; two in Reach 5; 26 in Reach 6; seven in Reach 7A; four in Reach 7B; 1 in Reach 8; 21 in Reach 14, and one below Lake Silveira), culverts added or replaced in Reach 7B (two culverts added to existing triple culverts), and Reach 8 (replace one existing with larger designs). Llagas Creek from the Pajaro River to Chesbro Dam is identified as S-CCC steelhead critical habitat by NMFS (2006). Construction of grade control structures could limit access to critical habitat within (Reaches 4 through 6) and upstream (to Chesbro Dam) of the Project area. The existing fish ladder just downstream of Buena Vista Avenue would be removed.

High flow bypass box culverts would be installed. An inlet weir, sediment detention basin, low flow reinforced concrete pipe and 2,100-foot-long tunnel would be installed in Reach 8. Reaches 7A, 7B, 8, and 14 do not currently support S-CCC steelhead spawning or contain critical spawning habitat for S-CCC steelhead (NMFS 2005b; CDFW 2013), thus grade control structures, culverts, and other hydraulic features installed in these reaches would not affect spawning habitat. Within Reaches 4, 5, and 6, and Llagas Creek near Lake Silveira, which contain critical spawning habitat for S-CCC steelhead, hydraulic structures could affect spawning habitat if they cause scour that erodes spawning habitat or deposition that degrades spawning habitat. However, under the Tunnel Alternative, channels would be designed to create a stable channel form (i.e., not aggrading or degrading) that would prevent scour and deposition. The impact of hydraulic structures on S-CCC spawning habitat and usage would be less than significant.

Instream complexity features would be installed and maintained in Reaches 4, 5, 6, and 7A, and as part of the Lake Silveira project element. The complexity features are intended to assist with migration of anadromous fish during moderate to high flows by providing hydraulic cover. Further, the structures would provide escape cover for upstream migrating steelhead. The following structures would be installed and maintained in the Project area: clusters of log-root wad structures, stream boulders, triangular boulder clusters, and divide logs, wing deflectors, and groupings of large woody debris. Refer to Section 2.5.5.6 for the number and types of instream structures proposed for each reach (examples of all types of habitat structures are shown in Appendix M). These features would be maintained by the SCVWD to insure they continue to provide their designed environmental benefits. The greatest concentration of complexity features would be installed in Reach 6, as this is currently a perennial stream reach (down to San Martin Avenue) and likely contains the highest quality steelhead habitat in the Project area. The structures would provide resting places for upstream migrating adult steelhead where no resting places currently exist, improving migration success within the Project and through the Project area to potential spawning habitat in Llagas Creek below Chesbro Dam. These structures would provide a benefit to upstream migrating adult steelhead.

The complexity features are intended to assist with migration of anadromous fish during moderate to high flows by providing hydraulic cover. Further, the structures would provide escape cover for upstream migrating steelhead. These features would be maintained by the SCVWD to maintain their designed environmental benefits. The greatest concentration of complexity features would be installed in Reach 6, as this is currently a perennial stream reach (down to San Martin Avenue) and contains the highest quality steelhead habitat in the Project area. The structures are intended to provide resting places for upstream migrating adult steelhead, but could cause localized scour and deposition that creates spawning sites for S-CCC steelhead where none currently exist, likely improving spawning success within the Project. These structures would provide a benefit to S-CCC steelhead spawning habitat and usage.

The Lake Silveira mitigation element on Llagas Creek, upstream of Reach 6 and Reach 7, which is called out as mitigation for all of the action alternatives (see description in Section 2.5.6 and Section 5.3), would create approximately 3.5 acres of wetlands and 1.3 acres of riparian woodland by filling part of Lake Silveira, restoring flows to the abandoned channel, and by replanting and reseeding. An open channel flow split structure on Llagas Creek would apportion flows to the newly restored wetland and open water section and the rewatered Llagas Creek channel. A proposed short section of excavated pilot channel at the flow split structure would help establish a stable channel segment at the split leading into the rewatered abandoned channel segment. A new v-notch outlet would be installed at the lake outlet to tie the restored wetland and open water section of the lake back into Llagas Creek. Channel modifications as part of the Lake Silveira mitigation element, would maintain adult S-CCC steelhead upstream migration through Lake Silveira, but with the added opportunity of migrating through the original channel. However, both the split structure and v-notch outlet structure could limit access to habitat upstream and could be a significant impact. Mitigation measures as described in Chapter 5 would ensure that these hydraulic features are designed to allow fish passage following the fish passage criteria detailed in Anadromous Salmonid Passage Facility Design (NMFS 2008). As such, impacts from operation of the channel modifications and hydraulic features as part of the Lake Silveira project element on adult S-CCC steelhead upstream migration would be less than significant with mitigation.

The Lake Silveira could contain suitable spawning habitat; but is likely limited to Llagas Creek upstream and downstream of the lake. See Section 2.5.6 and Section 5.3 for a description of all the features related to the Lake Silveira element. The Lake Silveira mitigation element would likely provide suitable spawning and rearing habitat for S-CCC steelhead in the rewatered historic channel segment around the lake. However, there has been no quantification of habitat types available in the abandoned channel. Field observations of the inlet channel to the lake indicate that there are spawning sized gravels carried by Llagas Creek. As such, there is likely some spawning habitat in the existing Llagas Creek inlet channel to the lake, and potentially some limited spawning habitat in the outlet channel, as well as downstream of the lake, particularly through the perennially watered section of Reach 6. However, the natural transport and coarse sediment delivery to Reach 6 downstream of the current Lake Silveira, including spawning sized gravels, would have been substantially reduced since Lake Silveira was created in the 1980s. The lake probably captures nearly all gravels in transport from upstream. Consequently Lake Silveira would have effectively prevented the recruitment of new gravels and other coarse sediment supplies to the channel immediately downstream from the lake. The reestablishment of the abandoned channel would promote more natural gravel transport, around Lake Silveira, and could benefit S-CCC spawning habitat quality downstream.

Adult S-CCC steelhead do not spawn in Lake Silveira, so converting 4.8 acres of open water to wetland and riparian habitat would have no impact on spawning habitat usability and quality in the lake. The reestablishment rewatering of 1,980 feet of abandoned Llagas Creek channel would be allowed to form by scouring and natural formation of a stable channel. Long-term operation of the rewatered channel would potentially increase S-CCC steelhead spawning and rearing habitat availability and usage in Llagas Creek, as no spawning currently occurs in the dry abandoned channel. This would be a Project benefit. Short-term operation of the initial rewatering of the abandoned channel could potentially mobilize old fine sediments and organic material that may increase deposition of fine sediments deposit downstream (Reaches 4, 5, and 6), as the pilot channel naturally scours and with the transport of any fine sediments that have accumulated in the abandoned channel. This potential increase in deposition of fine sediments would likely last only as a first flush, so it would be temporary and would be flushed out of spawning and rearing areas during with the first high flow events. Given that the Llagas Creek channel downstream in Reach 6 would be disturbed (in Phase 2 construction after the Lake Silveira element is completed), for purposes of channel widening and deepening and that high flows will likely occur well before utilization of spawning and rearing areas by S-CCC steelhead, there would be no impact to spawning area habitat quality and usage downstream in Reaches 4, 5, and 6. There has been no quantification of potentially suitable spawning habitat in the abandoned channel, and there is no planned construction of spawning habitat as part of the Tunnel Alternative and the Lake Silveira element. The Lake Silveira element would have no short-term impact on S-CCC steelhead spawning habitat usage and quality.

Decreases in riparian canopy related to channel widening could increase water temperatures (by up to 5°F) in Reach 6, especially during low flow (either during seasonal low flow or during dry years) (Systech Engineering, Inc. 2004). Water temperatures under existing conditions may already limit juvenile steelhead within Reach 6. Systech Engineering, Inc. (2004) reported daily average summer water temperatures of 70-75°F in Reach 6 in 2000 and 2001; and Smith (2007) reported summer water temperatures of 68–79°F. Temperatures above 72°F are potentially stressful to juvenile steelhead, while temperatures above 77°F are potentially lethal (Bjornn and Reiser 1991). Reaches 4, 5, and 6 would be maintained with a similar type and density as under existing conditions (Table 2.5-5); but increased channel width may increase insolation of the water surface, thereby increasing water temperature.

Reaches 7A, 7B, and 8 may also potentially bring warm water from upstream into Reach 6. These reaches would be maintained to design roughness values that are lower than Reach 6: 0.038-0.084 (Reach 7A moderately dense stemmy grass, weeds, or tree seedlings; brushy moderately dense vegetation similar to 1 to 2-year-old willows in dormant season), 0.038-0.069 (Reach 7B, dense growth of flexible turf grass or weeds where depth of flow is at least two times height of vegetation; supple tree seedlings such as willow, cottonwood where average depth of flow is three times height of vegetation), and 0.035 (Reach 8) (Table 2.5-5). Systech Engineering Inc. (2004) found that flow from Reach 7 could increase average annual temperatures at the upstream end of Reach 6 by up to 2°F, depending on flow (greater temperature increases with greater flow). The benches that are part of the channel design also provide opportunities for natural recruitment of riparian vegetation, and if appropriate, for active plantings, which may increase shade over the channel. Even with BMPs, temperatures could increase from stressful (>72°F) to lethal (>75°F) during the summer rearing period for juvenile steelhead.

Construction activities that occur outside of the active channel are not expected to directly impact aquatic species, but may indirectly impact them through runoff of sediments or pollutants. Maintenance roads would be constructed along Reaches 4, 5, 6, and 7A, and the existing Reach 14 maintenance road would be relocated. Reach 7A would be constructed through agricultural fields.

Flood conveyance channels would be managed to provide adequate capacity for the design flow. The active channel would be regularly inspected for the build-up and removal of trash (non-living material) or other obstruction to flow. Sediment removal and vegetation maintenance are the two main activities that are periodically needed to maintain design flow capacity. Sediment removal and vegetation management generally would be conducted between June 15 and October 15, as outlined in Section 2.5.5. However, if the fall season remained dry, work could continue until the first significant rainfall event occurred. A significant rainfall event is defined as local rainfall of 0.5 inch or greater within the watershed over a 24-hour period (SCVWD 2011).

Sediment removal would be done in a manner that is sensitive to protection of aquatic resources. As vegetation develops within Project area channels, and woody debris and other fish habitat enhancements are installed, there is potential for sediments to locally deposit reducing flood conveyance capacity. At the confluence of Reaches 14, 4, and 5, the design includes a mid-channel bar that bifurcates the channel flow. This confluence site is designed for sediment accumulation to help reduce the need for sediment removal in downstream locations. It is anticipated that sediment removal at the confluence site would be less frequent than once every 10 years. Sediment management would be performed in an adaptive manner, identifying depositional patterns and tendencies and updating management techniques accordingly. Heavier sedimentation may occur after episodic events, such as wild fires and large flows. After such an event the Project should be inspected to identify and address large deposits that may impact channel capacity.

Vegetation maintenance in the flood conveyance channels shall be performed to maintain the composite design roughness requirements. Methods would include herbicide, hand pruning, hand removal, and mowing. The application of herbicide would occur instream and on bank bench areas, as well as on maintenance roads, along fence lines, and similar non-instream areas.

Maintenance at the Lake Silveira project element is expected to be relatively minor once vegetation begins to be established. Maintenance work would include sediment removal at the inlet structure, minor vegetation clearing around the inlet and outlet structures, and along the inlet of the channel to keep the flow split structure functioning. No maintenance would be performed for purposes of flood management.

Each portion of the channel cross section will have an applied set of maintenance activities that will vary from reach to reach. On the bench, the bankfull bank (slope between bench and channel bottom) and the channel bottom, woody vegetation would be cleared and excess sediment removed from Reaches 4 and 5, management in Reaches 6, 7A, and 7B, and would be similar to Reaches 4 and 5 with the additional provision to prevent the spread of willows on the bankfull bank. Reach 14 in-channel maintenance (clearance of woody vegetation, removal of excess sediments) would only occur on the channel bottom. Sediment maintenance would likely occur every 10 years and vegetation management would likely occur every 5 years.

Outside of the active channel, maintenance of access roads and the top of bank would occur as part of vegetation and sediment maintenance. On the maintenance roads, vegetation would be cleared as needed for access and to reduce fire hazard. Top of bank areas in all reaches would be maintained annually to facilitate access and observation and to reduce fire hazard.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.6.3.2 Natural Resources Conservation Service (NRCS) Alternative

The NRCS Alternative would be similar to the Tunnel Alternative with the notable exception that channel improvements would be made through Reach 8 instead of the construction of a tunnel and high flow conveyance structures as proposed under the Tunnel Alternative. Other differences to Reach 8 and Reach 7B under the NRCS would include:

- Widen and deepen approximately 3,000 feet of channel between West Dunne Avenue and Main Avenue to form a trapezoidal vegetated channel, a channel with two vertical walls, or a hybrid section (Figures 2.5-3, 2.5-4, 2.5-5, respectively), as appropriate depending upon the ROW available.

- Replace approximately 2,200 feet of the existing creek between Main Avenue and Wright Avenue with two 10-foot wide by 7- to 8-foot deep reinforced concrete box culverts following the existing stream alignment, but under Hale Avenue. Replace culverts at West Main Avenue and Wright Avenue (Table 2.6-1).

- Replace five additional existing undersized culverts with new culverts, 10 feet wide by 9 feet deep, at the following locations: 5th Street, 4th Street/Monterey Highway, 3rd Street, 2nd Street/Del Monte Avenue, and Warren Avenue.

- The existing culvert from Ciolino Avenue to West Dunne Avenue would be replaced with a 674-foot long box culvert that is 8 feet wide and 8 feet deep.

Due to the similarities between the NRCS and the Tunnel alternatives for Reaches 4, 5, 6, 7A, 7B, and 14, and for the Lake Silveira mitigation element, impacts would be the same for the NRCS Alternative, except that channel improvements would be made through Reach 8 instead of the construction of a tunnel and high flow conveyance structures as proposed under the Tunnel Alternative.

The construction approach for the NRCS Alternative would be the same throughout all of the Project reaches as previously described for the Tunnel Alternative, with the key differences in Reach 8 that 3,000 additional feet of channel would be widened and deepened with channel profiles appropriate for the ROW available and RCB culverts replacing the earthen channel of West Little Llagas Creek along Hale Avenue instead of a low flow RCP and high flow RCB culverts; and in Reach 7B that the existing culvert from Ciolino Avenue to West Dunne Avenue would be replaced along its existing alignment. Construction duration for the NRCS Alternative would be 5.5 years, with the construction lasting for about 36 months in Reach 8, which is the same as the time to construct Reach 8 of the Tunnel Alternative (Table 2.5.2). Construction activities would be the same as that described for the Tunnel Alternative, except that in Reach 8 more channel widening and deepening would occur, more grade control structures would be installed and that the tunnel under the Nob Hill Terrace neighborhood, and a sediment detention basin and weir near Wright Avenue and Hale Avenue would not be constructed. The construction fill and disposal material volumes for the NRCS Alternative are virtually the same as for the Tunnel Alternative, as shown in Table 2.5.3.

For the channel modifications proposed in Reach 8 under the NRCS Alternative, operation and maintenance impacts to upstream migrating adult steelhead, BMPs, and mitigation measures would be the same as described in the Tunnel Alternative as channel modifications in all other reaches (Reaches 4, 5, 6, 7A, 7B, and 14) and as part of the Lake Silveira project element would be the same as under the Tunnel Alternative. While S-CCC steelhead do not currently occur in Reach 8 (or adjacent Reaches 7A and 7B) other aquatic species (e.g., mosquitofish) may be present; although, no special-status aquatic species occur under existing conditions. Within and outside the active channel, operation and maintenance impacts to aquatic species, BMPs, and mitigation measures would be the same as described in the Tunnel Alternative. The operations and maintenance of channel modifications and hydraulic structures in Reach 8 would have a minimal adverse impact on aquatic species within and outside the active channel. Reach 8 or adjacent Reaches 7A and 7B do not currently support upstream migration of adult S-CCC steelhead or contain upstream migration critical habitat for adult S-CCC steelhead (NMFS 2005b; CDFW 2013). The channel modifications and hydraulic structures within Reach 8 would not create or allow upstream S-CCC steelhead migration. The operations and maintenance of channel modifications and hydraulic structures in Reach 8 would have no adverse impact on adult S-CCC steelhead upstream migration.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.6.3.3 Culvert/Channel Alternative

The Culvert/Channel Alternative would be similar to the Tunnel Alternative with the notable exception that the tunnel and high flow conveyance structures as proposed under the Tunnel Alternative would not be constructed in Reach 8. Channel Modifications in Reach 8 under the Culvert/Channel Alternative are most similar to those under the NRCS Alternative with the elimination of the need for channel deepening and widening through residential properties. Other modifications to Reach 8 would include:

- Realign an 800-foot segment of the double 10-foot-wide box culverts that, in the NRCS design, would be parallel to Hale Avenue through the Britton School athletic fields up to Del Monte Avenue;

- Continue the double box culvert under Del Monte Avenue approximately 900 feet to West 2nd Street; and

- From West 2nd Street to West Dunne Avenue, the same channel widening and deepening, along with culvert replacements at 2nd, 3rd, 4th, and 5th Streets as described for the NRCS Alternative would be performed in Reach 8. The upstream-most portion of the Culvert/Channel Alternative from Llagas Road to Wright Avenue would remain the same as the NRCS Alternative. All other reaches would have exactly the same design as previously described for the NRCS Alternative.

Due to the similarities between the Culvert/Channel and Tunnel Alternatives for Reaches 4, 5, 6, 7A, 7B, and 14, and for the Lake Silveira mitigation element, construction impacts are similar, except for realignment of an 800-foot segment of the double 10-foot-wide box culverts that, in the NRCS design, would be parallel to Hale Avenue through the Britton School athletic fields up to Del Monte Avenue and continuation of the double box culvert under Del Monte Avenue approximately 900 feet to West 2nd Street. From West 2nd Street to West Dunne Avenue, the same channel widening and deepening, along with culvert replacements at 2nd, 3rd, 4th, and 5th Streets as described for the NRCS Alternative, would be performed in Reach 8 under the Culvert/Channel Alternative. Channel modifications in all other reaches (4, 5, 6, 7A, 7B, and 14) and as part of the Lake Silveira element would be the same as under the Tunnel Alternative. The construction approach for the Culvert/Channel Alternative would be the same throughout all of the Project reaches, as previously described for the Tunnel Alternative; and construction duration would be 5.5 years, with the construction lasting for about 36 months in Reach 8, same as the Tunnel Alternative.

Construction activities, equipment, and crew size would be the same as that described for the Tunnel and NRCS alternatives (Table 2.5-4), except that in a segment of Reach 8, construction would occur through athletic fields and along Del Monte Road to West 2nd Street, rather than through a section of residential homes between West Main Avenue and West 2nd Street. The construction fill and disposal material volumes for the Culvert/Channel Alternative are virtually the same as for the Tunnel Alternative, as shown in Table 2.5-3.

For the channel modifications proposed in Reach 8 under the Culvert/Channel Alternative, operation and maintenance impacts to upstream migrating adult steelhead, BMPs, and mitigation measures would be the same as described in the Tunnel Alternative, as channel modifications in all other reaches (Reaches 4, 5, 6, 7A, 7B, and 14) and as part of the Lake Silveira mitigation element would be the same as under the Tunnel Alternative. Reach 8 (or adjacent Reaches 7A and 7B) do not currently support upstream migration of adult S-CCC steelhead or contain upstream migration critical habitat for adult S-CCC steelhead (NMFS 2005b; CDFW 2013). The construction of a culvert within Reach 8 would not create or allow upstream S-CCC steelhead migration. The culvert/channel would have no impact on adult S-CCC steelhead upstream migration, steelhead rearing habitat, and minimal adverse impact on aquatic species.

The construction fill and disposal material volumes for the Culvert/Channel Alternative are virtually the same as for the Tunnel Alternative, as shown in Table 2.5-3. While S-CCC steelhead do not currently occur in Reach 8 or adjacent Reaches 7A and 7B, other aquatic species (e.g., mosquitofish) may be present; although, no special-status aquatic species occur under existing conditions. Construction impacts within and outside the active channel to aquatic species, BMPs, and mitigation measures would be the same as described in the Tunnel Alternative. Construction of the culvert in Reach 8 would have no adverse impact on aquatic species.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.6.3.4 Reach 6 Bypass Alternative

The Reach 6 Bypass Alternative would be largely similar to the Tunnel Alternative with the notable exception that a high flow bypass channel would be constructed between Reach 6 of Llagas Creek and Reach 14 of East Little Llagas Creek. The bypass would be designed so that no improvements would be needed along Reach 6 or Reach 5 of Llagas Creek downstream of the proposed bypass. Reaches 8, 7A, 7B, and 4 would remain the same as that described for the Tunnel Alternative. The bypass would convey the future extra flow (i.e., new capacity) from Reaches 8, 7A, and 7B, directly to Reach 14. East Little Llagas Creek downstream of the bypass (Reach 14), would be designed to carry the extra flow from the upstream channel capacity. The existing flow capacity in Reaches 5 and 6 downstream from the bypass channel would continue to be maintained.

The proposed high flow bypass would start near the upstream end of Reach 6, about 0.5 mile downstream of the confluence of the proposed West Little Llagas Diversion (Reach 7A) with Llagas Creek Reach 6 and include a hydraulic control structure to divert flows greater than a 10-percent exceedance flood event into the bypass. The hydraulic control structure would include a trapezoidal-shaped weir and five 6-foot by 6-foot-individual working sluice gates at the entrance of the high flow bypass channel. For the 10-percent exceedance flood event, the five sluice gates would be fully opened. The weir and five gates would be designed to divert 1,200 ft3/sec from Reach 6 of Llagas Creek to Reach 14 of East Little Llagas Creek. Automatic control devices would be installed to operate gates to control the flow into the bypass channel and maintain existing flow condition in Reach 6.

Since Reach 5 and Reach 6 downstream of the Bypass would be maintained in its existing form, there would be no impacts to aquatic resources within these sections of Llagas Creek under the Reach 6 Bypass Alternative. Reach 6 upstream of the bypass would be modified as under the Tunnel Alternative. A bypass channel from Reach 6 to Reach 14 to convey flows above the 10-year recurrence interval, construction of a hydraulic control structure to divert flow into the bypass channel and Reach 6, and a tunnel in Reach 8 would be constructed instead of channel modifications proposed in the NRCS Alternative. The construction approach for the Reach 6 Bypass Alternative for Reaches 7A, 7B, and 8 would be the same as previously described for the Tunnel Alternative. Reach 14 construction would be similar to that in the other alternatives, but with a greater amount of channel widening and deepening. There would be no construction needed to widen the channel in Reach 6 below the bypass or in Reach 5.

Reach 4 flood conveyance improvements would be the same as described for the Tunnel Alternative. Three new bridges and additional culverts would require construction. Construction duration for the Reach 6 Bypass Channel segment would be 24 months, and the entire Reach 6 Bypass Alternative would require 5.5 years to complete the Project construction.

Construction activities, equipment, and crew size is shown in Table 2.5-4, and is nearly the same as that described for the Tunnel Alternative, except that the new bypass channel segment would require construction between Reach 6 to Reach 14. The construction fill and disposal material volumes for the Reach 6 Bypass Alternative are less than for the Tunnel Alternative, as shown in Table 2.5-3. Reach 6 downstream of the bypass and Reach 5 would not be modified under the Reach 6 Bypass Alternative and would not be impacted by construction. This Alternative would also require temporary roads and traffic detour routing on Murphy Avenue and on both northbound and southbound lanes of U.S. 101. The construction fill and disposal material volumes for the Reach 6 Bypass Alternative are less than for the Tunnel Alternative, as shown in Table 2.5-3. Reach 6 downstream of the bypass and Reach 5 would not be modified under the Reach 6 Bypass Alternative and would not be impacted by construction. S-CCC steelhead do not occur in and do not spawn in the Reach 6 Bypass Channel or Reach 14. Consequently, construction of the Reach 6 Bypass Channel and widening of Reach 14 would have no impact on S-CCC steelhead spawning habitat usage and quality. Construction impacts to S-CCC steelhead spawning habitat and usage, BMPs, and mitigation measures would be the same as described for Reaches 4, 7A, 7B, 8, the portion of Reach 6 upstream of the bypass, and the Lake Silveira mitigation element. These BMPs and mitigation measures would reduce adverse direct construction impacts on S-CCC steelhead spawning habitat usage and quality.

Additionally, under the Reach 6 Bypass Alternative, upstream migrating adult steelhead could potentially be more likely to enter Reach 14 during their upstream migration because of enhanced flow provided by the bypass. The fish entering Reach 14 would be forced to migrate up the reach and through the bypass channel, which is a trapezoidal channel without the low-flow, bankfull channel, or bench features added to other Project reaches under all other alternatives. A portion of Reach 14 would be a widened trapezoidal channel (also without low-flow, bankfull channel, or bench features added to other Project reaches), while the remaining portion would be similar to the design proposed in the Tunnel Alternative. Modifications to Reach 14 under the Reach 6 Bypass Alternative and under the Tunnel Alternative do not include instream flow structures that may provide hydraulic cover and velocity breaks for migrating steelhead. As such, upstream migrating adult steelhead entering the reach may be subject to high velocities that limit migration. Given that Llagas Creek downstream of Reach 6 may dry quickly due to percolation of surface water to the aquifer, the time period available for adults to reach spawning habitat is limited. Entering Reach 14 may impede migration, or cause delays in migration that causes adults to miss spawning opportunities.

Similarly, downstream migrating juvenile steelhead could potentially enter the bypass channel through the hydraulic diversion structure, instead of migrating downstream through Reach 6. The bypass channel is a trapezoidal channel without low-flow, bankfull channel, or bench features added to other Project reaches under all the alternatives, and may not allow migration if flows recede too rapidly, or if the channel is too shallow. A portion of Reach 14 would be a widened trapezoidal channel (also without low- flow, bankfull channel, or bench features added to other Project reaches), while the remaining portion would be similar to the design proposed in the Tunnel Alternative. Modifications to Reach 14 under the Reach 6 Bypass Alternative and under the Tunnel Alternative do not include instream flow structures that may provide hydraulic cover and velocity breaks for migrating steelhead. As such, downstream migrating juvenile S-CCC steelhead entering the bypass and reach may be stranded within the reach.

For the bypass channel proposed in Reach 6 under the Reach 6 Bypass Alternative, operation and maintenance impacts to S-CCC steelhead spawning habitat and usage, to upstream migrating adult steelhead, to S-CCC steelhead rearing habitat, to juvenile S-CCC steelhead downstream migration, and to aquatic species, would be the same as the Tunnel alternative for Reaches 4, 7A, 7B, 8, the portion of Reach 6 upstream of the bypass, and the Lake Silveira mitigation element. No instream complexity features would be added to Reach 5 or Reach 6 downstream of the Reach 6 Bypass. There would be no benefit to steelhead spawning habitat in these portions of Llagas Creek, unlike other build alternatives. The Reach 6 Bypass Channel and Reach 14 do not currently support S-CCC steelhead spawning or contain critical spawning habitat for S-CC C steelhead (NMFS 2005b; CDFW 2013). The construction of the Reach 6 Bypass Channel and widening of Reach 14 would not create S-CCC steelhead spawning habitat. The bypass and other potential infrastructure in Reach 6 would have no impact on S-CCC steelhead spawning habitat usage or quality, to upstream migrating adult steelhead, to S-CCC steelhead rearing habitat, to juvenile S-CCC steelhead downstream migration, and to aquatic species.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.6.4 Summary of Impacts to Aquatic Resources

South-Central California Coastal steelhead are the only sensitive aquatic resource that occurs within the Project area. Adverse impacts from construction of all Project Alternatives would be reduced with implementation of SCVWD BMPs. Implemented BMPs for the Project construction would be the same for all Project alternatives. Impacts from the operations and maintenance of all Project alternatives would be reduced with implementation of SCVWD BMPs and mitigation measures. Implemented BMPs and mitigation measures for the Project operations and maintenance would be the same for the Tunnel Alternative, the NRCS Alternative, and the Culvert Channel Alternative. Implemented BMPs and mitigation measures for the Project operations and maintenance of the Reach 6 Bypass Alternative would be the same as for all other Project Alternatives except with the implementation of two additional mitigation measures; Construction of Fish Screen and Fish Bypass Facility Upstream End of the Bypass Channel and Construction of Fish Exclusion Barrier at the Downstream End of Reach 14.

Mitigation measures and BMPs, as appropriate, for the various Action Alternatives to reduce the impacts to Aquatic Resources are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

4.7 AGRICULTURAL AND FOREST RESOURCES

4.7.1 Introduction

The potential impact of the various alternatives, including the No Action Alternative, on agricultural and forest resources is considered in this section. The focus of this section is on agricultural lands as the

project area is not forested and impacts to forest resources are not anticipated. There are no forestlands in the vicinity of the project area. The focus of this analysis is on how the various alternatives may affect agricultural lands in the vicinity of the project area. First, the impact of construction and the location of Project features on agricultural lands are assessed. Project features within the Project footprint may lead to conversion of agricultural lands. As such, an additional potential impact (location of Project features) is considered in this section, along with construction and operations and maintenance. Table 4.7-5 shows the approximate number of acres of Important Farmlands and Williamson Act Lands subject to permanent and temporary conversion by alternative. This calculation accounts for the overlap of Important Farmlands and Williamson Act Lands.

Table 4.7-5 Number of Acres of Williamson Act and Important Farmlands Subject to Conversion Under the Action Alternatives[1]

Classification	Alternative			
	Reach 6 Bypass[2]		All Other Action Alternatives[1]	
	Permanent	Temporary	Permanent	Temporary
Important Farmlands	39.6	17.3	50.0	19.0
Williamson Act Lands[2]	4.3	1.1	16.8	1.4
Lands Classified as Both Important Farmlands and Williamson Act Lands	0.4	0.2	5.1	0.4
Net Important Farmlands and Williamson Act Lands Subject to Conversion[3]	43.5	18.2	63.7	20.0

[1] Acreages were calculated by Cardno ENTRIX by overlaying Williamson Act and Important Farmlands Maps within the Project footprint.

[2] Calculated by taking total from Project footprint and removing lands from Reach 5 and portions of Reach 6 from the total. It should be noted that the location of the actual bypass also lies with lands designated as Prime Farmland.

[3] Does not include active croplands in areas not designated as Important Farmland and/or Williamson Act parcels.

The alternatives have the potential to permanently convert agricultural lands to non-agricultural use. Lands classified as Important Farmlands, such as Prime Farmland, Unique Farmland, or Farmland of Local and Statewide Importance, along with agricultural lands under Williamson Act contracts, are of particular interest for this analysis. Next, the implications of flooding on agricultural lands under the various alternatives are compared with the No Action Alternative. Potential impacts from periodic flooding events on agricultural lands are considered temporary; and, thus, would not directly lead to conversion of non-agricultural use. Regardless, all action alternatives would reduce the amount of Important Farmlands subject to flooding under a 1-percent flood scenario. The number of acres of important agricultural and Williamson Act flooded lands under a 1-percent flood scenario for the various alternatives is provided in Table 4.7-6. As noted above, Williamson Act Lands and other important agricultural lands are not mutually exclusive (e.g., Farmlands of Statewide Importance may also be enrolled in Williamson Act contracts).

Table 4.7-6 Acres of Williamson Act and Important Agricultural Lands Flooded Under 1-Percent Flood Scenario by Alternative[1,2]

Classification	Number of Acres	
	No-Action Alternative	All Other Alternatives
Williamson Act Lands[3]	569	228
Prime Farmland	860	294
Farmland of Statewide Importance	21	7
Unique Farmland	127	69
Farmland of Local Importance	39	21

[1] Acreages were calculated by Cardno ENTRIX by overlaying flood scenario maps with Williamson Act and Important Farmlands Maps.

[2] Calculations include only those lands north of Buena Vista Avenue.

[3] Williamson Act Lands are not mutually exclusive from the Important Farmlands (Prime, Statewide Importance, Unique and Local Importance) classifications.

4.7.2 No Action Alternative

Under the No Action Alternative, Prime Farmland, Unique Farmland, and Farmland of Statewide Importance would not change. No farmland conversions would occur; therefore, there would be no impact. However, the benefits of reduced flooding on agricultural lands under a 1-percent flood scenario would not be realized, as compared to the action alternative.

There would be no construction associated with this alternative; therefore, there would be no impact associated with other changes in the existing environment that could result in the conversion of farmland.

Maintenance and operational activities would continue under the SMP and would have no impact under this alternative.

BMPs for the No Action Alternative, including O&M activities are discussed and described in Chapter 5 and Appendix B of this EIS.

4.7.3 Action Alternatives

4.7.3.1 Tunnel Alternative (Applicant's Proposed Action)

The Tunnel Alternative with the tunnel feature has the least land use conversion through the urban reach of the Project area. However, as discussed in Section 3.8.3, lands zoned specifically for agriculture are primarily along Reaches 4, 7A.

About 20 acres of important agricultural lands within the Project footprint would be used during construction for related activities, such as temporary construction easements for access, equipment and material staging, and work. Construction activities may compact soils and potentially lead to soil loss and erosion. This impact would not be limited to the Important Farmlands, but to active croplands in the area too. The SCVWD would remove all construction equipment and clean any spills or equipment leaks on these agricultural lands. This conversion of agricultural lands would be temporary, but still constitutes a significant impact.

The Project footprint includes about 50 acres of Prime Farmland, Unique Farmland, or Farmland of Statewide and Local Importance; and these lands are subject to conversion to non-agricultural use under this alternative. These lands would be converted, as Project features described in Section 2.7.1 would replace these Important Farmlands. This impact is significant, because agricultural lands being removed from production cannot be replaced.

Some areas (about 1.4 acres) designated under the Williamson Act may be temporarily used for construction related activities. A small proportion (about 0.4 acre) of the Williamson Act parcels are also designated as Important Farmlands. Similar to Important Farmlands, these agricultural lands would be potentially impacted during construction due to soil compaction. These impacts would not just be limited to Williamson Act parcels, but also to other active croplands within the Project footprint. The conversion of these lands would be temporary and would be reduced with the incorporation of mitigation.

The Project footprint includes about 17 acres of lands designated under the Williamson Act subject to permanent conversion. It should be noted that 5 acres of the Williamson Act Lands in the Project footprint are the same as lands classified as Prime Farmland or Unique Farmland. Although there are only 17 acres within the Project footprint, there is also the possibility that the Project may decrease the acreage of existing Williamson Act Lands so as the lands no longer qualify; this would increase the number of acres subject to mitigation. The conversion of Williamson Act Lands and land zoned for agricultural use is a significant impact, because lands applied for agricultural use cannot be replaced.

The Tunnel Alternative would not be expected to lead to other changes that would result in further conversion of farmlands to non-agricultural use. This impact would occur if agricultural lands protected from flood by this alternative become attractive and available for future residential or commercial development. However, land use designation and changes to land use are not within the authority of SCVWD. Further, it is speculative to project the future, potential land-use changes based on a reduced flooding risk.

Periodic maintenance and the operation would utilize the existing and proposed maintenance access roads constructed as part of the Project.

No additional land would be required; therefore, the operations and maintenance of this alternative would not further convert farmland to non-agricultural use.

Operations and maintenance do not have an impact on Williamson Act contracts or existing zoning, because these activities do not require the alteration or conversion of these lands.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.7.3.2 Natural Resources Conservation Service (NRCS) Alternative

The primary feature of the NRCS Alternative is within Reach 8, which includes portions of Morgan Hill where the channel would be deepened and widened. However, Reach 8 is generally urbanized and the impacts to agricultural resources in the reach are minimal. Impacts within the other Project reaches would be the same as the Tunnel Alternative.

About 20 acres of important agricultural lands within the Project footprint would be used during construction for related activities, such as temporary construction easements for access and work. Construction activities may compact soils and potentially lead to soil loss and erosion. This impact would not be limited to the Important Farmlands, but to other active croplands in the area too. The SCVWD would remove all construction equipment and clean any spills or leaks from equipment on these agricultural lands. This conversion of agricultural lands would be temporary, but still constitutes an impact.

The Project footprint includes about 50 acres of Prime Farmland, Unique Farmland, or Farmland of Statewide and Local Importance; and these lands are subject to conversion to non-agricultural use under this alternative. These lands would be converted, as Project features discussed in Section 2.6.1 would replace these Important Farmlands. Construction under this alternative is not anticipated to further convert farmland to non-agricultural use.

About 1.4 acres, designated under the Williamson Act, may be temporarily used for construction related activities. Approximately 0.4 acre is also designated as other Important Farmlands. Similar to Important Farmlands, these agricultural lands would be potentially impacted during construction due to soil compaction. These impacts would not just be limited to Williamson Act parcels, but also to other active croplands within the Project footprint. The conversion of these lands would be temporary and would be reduced with the incorporation of mitigation.

The Project footprint includes about 17 acres of lands designated under the Williamson Act subject to permanent conversion. It should be noted that 5 acres of the Williamson Act Lands in the Project footprint are the same as lands classified as Prime Farmland or Unique Farmland. Although there are only 17 acres within the Project footprint, there is also the possibility that the Project may decrease the acreage of existing Williamson Act Lands so as the lands no longer qualify under county provisions discussed above; this would increase the number of acres subject to mitigation. The conversion of Williamson Act Lands and land zoned for agricultural use is an adverse impact, because lands applied for agricultural use cannot be replaced.

The NRCS Alternative would not be expected to lead to other changes that would result in further conversion of farmlands to non-agricultural use. This impact would occur if agricultural lands, protected from flood by this alternative, become attractive or available for future residential or commercial development. However, land use designation and changes to land use are not within the authority of SCVWD. Further, it is speculative to project the future, potential land-use changes based on a reduced flooding risk.

Operations and maintenance activities would not have an impact on Williamson Act contracts or existing zoning, because these activities do not require the alteration of these lands. The operations and maintenance of this alternative would not further convert farmland to non-agricultural use.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.7.3.3 Culvert/Channel Alternative

Potential impacts under the Culvert/Channel Alternative are expected to be similar to the Tunnel Alternative. The key features of this alternative include:

- Realign an 800-foot segment of the double 10-foot-wide box culverts that, in the NRCS design, would be parallel to Hale Avenue through the Britton School athletic fields up to Del Monte Avenue;
- Continue the double box culvert under Del Monte Avenue approximately 900 feet to West 2nd Street; and
- From West 2nd Street to West Dunne Avenue perform the same channel widening and deepening, along with culvert replacements at 2nd, 3rd, 4th, and 5th Streets as described for the NRCS Alternative for Reach 8.

Some important agricultural lands (about 20 acres) within the Project footprint would be used during construction for related activities, such as temporary construction easements for access and work. Construction activities may compact soils and potentially lead to soil loss and erosion.

This impact would not be limited to the Important Farmlands, but to active croplands in the area too. The SCVWD would remove all construction equipment and clean any spills or equipment leaks on these agricultural lands. This conversion of agricultural lands would be temporary, but still constitutes an adverse impact that would be reduced with mitigation.

The Project footprint includes about 50 acres of Prime Farmland, Unique Farmland, or Farmland of Statewide and Local Importance; and these lands are subject to conversion to non-agricultural use under this alternative. These lands would be converted, as Project features discussed in Section 2.8.1 would replace these Important Farmlands. This is an adverse impact because agricultural lands being removed from production cannot be replaced.

Some areas (about 1.4 acres) designated under the Williamson Act may be temporarily used for construction related activities. A small proportion (about 0.4 acre) are also designated as other Important Farmlands. Similar to Important Farmlands, these agricultural lands would be potentially impacted during construction due to soil compaction. These impacts would not just be limited to Williamson Act parcels, but also to other active croplands within the Project footprint. The conversion of these lands would be temporary and would be reduced with the incorporation of mitigation.

The Project footprint includes about 17 acres of lands designated under the Williamson Act subject to permanent conversion. It should be noted that 5 acres of the Williamson Act Lands in the Project footprint are the same as lands classified as Prime Farmland or Unique Farmland. Although there are only 17 acres within the Project footprint, there is also the possibility that the Project may decrease the acreage of existing Williamson Act Lands so as the lands no longer qualify; this would increase the number of acres subject to mitigation. The conversion of Williamson Act Lands and land zoned for agricultural use is an adverse impact, because lands applied for agricultural use cannot be replaced.

Similar to the NRCS Alternative, it would not be expected to lead to other changes that would result in further conversion of farmlands to non-agricultural use. This impact would occur if agricultural lands protected from flood by this alternative become attractive and available for future residential or commercial development. However, land use designation and changes to land use are not within the authority of SCVWD. Further, it is speculative to project the future, potential land-use changes based on a reduced flooding risk.

Periodic maintenance and the operation of the flood protection modifications would utilize the existing and proposed maintenance access roads; therefore, the operations and maintenance of this alternative would not further convert farmland to non-agricultural use. The operations and maintenance of this alternative would not further convert farmland to non-agricultural use Operations and maintenance do not have an impact on Williamson Act contracts or existing zoning, because these activities do not require the alteration of these lands.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.7.3.4 Reach 6 Bypass Alternative

The Reach 6 Bypass Alternative primary feature is the bypass at the upstream boundary of Reach 6 that would run east through open fields, continue under Murphy Avenue and U.S. 101, and connect to Reach 14. This alternative would not convert agricultural lands along Reach 5. The portion of Reach 6 within the Project footprint necessary to complete this alternative includes about 0.9 acre of Prime Farmland and no Williamson Act Lands. However, a substantial portion of the bypass west of U.S. 101 is designated as Prime Farmland. In total, this results in a reduction in the conversion of designated agricultural lands compared to the other action alternatives.

Some important agricultural lands (about 17 acres) within the Project footprint would be used during construction related activities, such as temporary construction easements for access and work. This is about 2 acres less than the other action alternatives. Construction activities may compact soils and potentially lead to soil loss and erosion. This impact would not be limited to the Important Farmlands, but to active croplands in the area too. The SCVWD would remove all construction equipment and clean any spills or leaks on these agricultural lands. This conversion of agricultural lands would be temporary, but still constitutes an adverse impact that would be reduced with mitigation.

The Project footprint for the Reach 6 Bypass Alternative includes about 40 acres of Prime Farmland, Unique Farmland, or Farmland of Statewide or Local Importance within the Project footprint; and these lands are subject to conversion to non-agricultural use under this alternative. Additionally, the portion of the bypass, west of U.S. 101, lies in large part within areas designated as Prime Farmland. These lands would be converted, as Project features described in Section 2.9.1 would replace these Important Farmlands. This is an adverse because agricultural lands being removed from production cannot be replaced. Construction under this alternative would not further convert farmland to non-agricultural use.

Similar to the other action alternatives, it would not be expected to lead to other changes that would result in further conversion of farmlands to non-agricultural use. This impact would occur if agricultural lands protected from flood by this alternative become attractive and available for future residential or commercial development. However, land use designation and changes to land use are not within the authority of SCVWD. Further, it is speculative to project the future, potential land-use changes based on a reduced flooding risk.

Some areas (about 1 acre) designated under the Williamson Act may be temporarily used for construction related activities. Similar to Important Farmlands, these agricultural lands would be potentially impacted during construction due to soil compaction. These impacts would not just be limited to Williamson Act parcels, but also to other active croplands within the Project footprint. The conversion of these lands would be temporary and would be reduced with the incorporation of mitigation.

The Project footprint for the Reach 6 Bypass Alternative includes about 4 acres of lands designated under the Williamson Act subject to permanent conversion. Although there are only 4 acres within the Project footprint, there is also the possibility that the Project may decrease the acreage of existing Williamson Act Lands so as the lands no longer qualify; this would increase the number of acres subject to mitigation.

The conversion of Williamson Act Lands and land zoned for agricultural use is an adverse impact, because lands applied for agricultural use cannot be replaced.

Periodic maintenance and the operation of the flood protection modifications would utilize the existing and proposed maintenance access roads; therefore, the operations and maintenance of this alternative would not further convert farmland to non-agricultural use. Operations and maintenance do not have an impact on Williamson Act contracts or existing zoning, because these activities do not require the alteration of these lands.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.7.4 Summary of Impacts to Agricultural and Forest Resources

In this section, impacts to agricultural and forest resources are considered. There are no forest resources in the project area and impacts to forest resources are not discussed. All of the action alternatives would lead to agricultural land conversion to non-agricultural use within the Project footprint. The Reach 6 Bypass Alternative would have the least amount of agricultural land conversion compared to the other alternatives because there would be no conversion of agricultural lands along Reach 5 and the amount of conversion along Reach 6 would be less.

Mitigation measures and BMPs, as appropriate, for the various Action Alternatives to reduce the impacts to Agricultural and Forest Resources are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

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4.8 LAND USE AND PLANNING

4.8.1 Introduction

In this section, existing land uses and zoning categories within the project area are reviewed for potential impacts or conflicts with aspects of the various alternatives.

In order to assess whether an alternative is likely to divide a community, in addition to evaluating construction and the operation of the various alternatives, the Project footprint is compared to existing conditions to determine if any existing, currently undivided, communities would be separated as a result of an alternative. Applicable policies and designations that focus on avoidance or mitigation of environmental effects are reviewed to determine if the Project would conflict with these policies or designations. Other sections of this EIS also consider land use changes and implications. Land Use changes to parks and recreational resources are considered in Section 4.15, Recreational Resources. Section 4.4, Botanical Resources, addresses changes in the riparian zones. Land use changes on agricultural lands are addressed in Section 4.7, Agricultural and Forest Resources. Potential changes to public services attributable to the Project are considered in Section 4.14, Utilities and Public Services, while the potential for change in housing is addressed in Section 4.16, Population and Housing. Also, issues pertaining to habitat conservation, including the tiger salamander, are discussed in Section 4.5, Wildlife Resources. Additionally, regulations and potential impacts related to air quality (Section 4.11), and noise (Section 4.12) are discussed in other sections of the report. In addition to impacts attributable to construction and operations and maintenance, consideration for changes to land use, as a result of new Project features within the Project footprint, are evaluated. Project features to be included within the Project footprint are described in Sections 2.5, 2.6, 2.7, 2.8, and 2.9.

Land use types within the Project footprint are shown in Tables 3.8-1 and 3.8-2. The data presented includes only those inundated areas that are north of Buena Vista Avenue. In general, the alternatives, less the No-Action Alternative, would improve flood protection, particularly in urbanized areas. The reduction of flooding in lands currently designated for agricultural is about 19.4 percent.

Table 4.8-5 Land Use Designations Flooded Under the Various Alternatives (Acres) [1,2,3]

River Reach	No Project Alternative	All other Alternatives	% Reduction
Agriculture	681	549	19.4
Residential [4]	1582	637	59.7
Commercial [5]	89	0	100
Industrial	61	0	100
Mixed Use	17	0	100
Open Space	371	1	99.7
Public Facilities	21	0	100
Major Gas and Electric Utilities	175	167	4.8

[1] Calculated by Cardno ENTRIX by overlaying flood scenarios on Land Use map.

[2] Does not include roads.

[3] Includes only lands north of Buena Vista Ave.

[4] Includes Rural Residential, Multi and Single Family Low and Medium Density Residential, and Residential Estate.

[5] Includes Commercial and Non-Retail Commercial.

Santa Clara County General Plan

The Santa Clara County General Plan, 1995–2010 (1994) defines land use planning issues within the county, explains relationships between various governmental entities, and describes planning policies within its jurisdiction. The plan also designates land uses for unincorporated portions of the county. The county defers to a local jurisdiction's (in this case, Morgan Hill's) General Plan for land use in incorporated areas. The policies and implementation measures (both countywide and specific to rural unincorporated areas) have application to the various alternatives considered in this analysis. In some cases, the statements and measures are paraphrased; these are found in Book B of the county's General Plan at: (http://www.sccgov.org/sites/planning/PlansPrograms/GeneralPlan/Documents/GP_Book_B.pdf).

San Martin Planning Area

San Martin is an unincorporated community between Morgan Hill and Gilroy within Santa Clara County and is designated by the General Plan as a "special planning area". Countywide policies and those specific to unincorporated areas apply in the San Martin area. Policy R-LU 114 states "…*San Martin shall remain a rural community, predominately non-urban and residential in nature*".

City of Morgan Hill General Plan

The City of Morgan Hill General Plan (2010a) includes applicable policies from the Public Health and Safety Element, Open Space and Conservation Element, and Community Development Element that pertain to lands under SCVWD's jurisdiction. The Morgan Hill General Plan incorporates policies from the Santa Clara Joint Area Plan (SCJAP), adopted in 1989. The plan was adopted by the county, along with the cities of Morgan Hill and Gilroy, to provide consistency related to community development and environmental management.

City of Gilroy

The southern portion of Reach 4 (approximately 42 acres, roughly 14 percent of the Project footprint) lies within the City of Gilroy's SOI, and may eventually be within the city's jurisdiction. Santa Clara LAFCO does consider goals and applicable policies of the city within the SOI (2003 policy document). In 2006, Santa Clara LAFCO (2006) reviewed the City of Gilroy's public services along with the city's SOI. The report suggests that both the county and the city call for a continuation of non-urban uses in these areas. Also, the City of Gilroy adopted the SCJAP in 1989; therefore, the policies related to flood prevention are similar to those shown for the City of Morgan Hill. In addition, Gilroy has policies and regulations specific to flooding risks. However, for the purpose of this analysis, the Project footprint and the area expected to be flooded under the various alternatives lies outside the city's current jurisdictional area; therefore, the county land use designations, zoning and policies still apply to this area. Consequently, the City of Gilroy's policies and regulations are not provided in detail in this section.

4.8.2 No Action Alternative

The No Action Alternative would not physically divide an established community, and there would be no construction of physical barriers that have the potential to divide portions of neighborhoods or communities.

There would be no construction activities associated with the No Action Alternative; therefore the construction impact is not applicable.

Periodic maintenance and operational activities would continue; however, these would not separate established communities. Ongoing operations under the No Action Alternative conflicts with at least two county policies: *Health and Safety Policy C-HS 34* and *Health and Safety Policy C-HS (i) 32*; and a City of Morgan Hill policy (General Plan 4i). To the extent that the Project would improve flood protection, the benefits of reduced flooding, under a 1-percent flood scenario, would not be realized; thus, the local agency goals and policies related to flood protection would not be realized. In contrast, the action alternatives are intended to address the goals of applicable flood protection policies. This impact is significant since it does not provide for flood protection which conflicts with local jurisdictions' policies designed to avoid an environmental effect.

BMPs for the No Action Alternative, including O&M activities are discussed and described in Chapter 5 and Appendix B of this EIS.

4.8.3 Action Alternatives

4.8.3.1 Tunnel Alternative (Applicant's Proposed Action)

The Tunnel Alternative would be consistent with but does not necessarily implement all Santa Clara County General Plan policies regarding health and safety, San Martin Planning Area policies related to floodway development and protection, the City of Morgan Hill General Plan policies related to public health and safety, flooding and open space and conservation, and the City of Gilroy policies and regulations specific to flooding risks.

This alternative would not divide established communities, as the Project generally follows existing creek beds (which already naturally divide communities), or will be underground and the factors that currently connect the communities, such as roads, sidewalks, and bridges, will not be permanently affected by construction under this alternative, therefore there is no impact.

Construction-related activities would occur temporarily within the Project footprint and would be consistent with local health and safety and environmental regulations. Lands impacted by construction would be restored after construction is completed. These activities are outlined in Sections 2.5.3 and 2.7.2 in the Project Description. Therefore, construction would result in no impact.

Construction of this alternative would affect lands designated and zoned for residential, commercial, and agricultural uses, among others, as indicated in Tables 3.8-1 and 3.8-3. As such, these areas would be permanently converted for the purposes of flood prevention. The conversion of these lands for this purpose is consistent with local health and safety and environmental regulations and policies listed in Section 4.8.1.

Periodic maintenance and long-term operations of the flood control improvements would utilize the existing and proposed maintenance access roads and channel improvements, which follow existing creek features; therefore, the operations and maintenance of this alternative would not divide established communities in the vicinity of the project area. The maintenance of the Tunnel Alternative would not conflict with existing policies and regulations. On the contrary, the flood protection provided by this plan would substantially reduce the number of acres of land subject to a 1-percent flooding event and, thus, the Project would be consistent with land use policies related to flood protection and public safety. The operations and maintenance of this alternative would be generally beneficial or no impact under NEPA. Permanent conversion of zoned lands for flood prevention would result in a beneficial impact or no impact under NEPA.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.8.3.2 Natural Resources Conservation Service (NRCS) Alternative

The NRCS Alternative would be consistent with, but does not necessarily implement, all Santa Clara County General Plan policies regarding health and safety, San Martin Planning Area policies related to floodway development and protection, the City of Morgan Hill General Plan policies related to public health and safety, flooding and open space and conservation, and the City of Gilroy policies and regulations specific to flooding risks. Potential impacts under the NRCS Alternative would be the same as the Tunnel Alternative; although, the Project footprint within Reach 8 is larger for this alternative.

Construction of the NRCS Alternative would not divide established communities, as the Project generally follows existing creek beds (which already naturally divide communities), or will be underground and the factors that currently connect the communities such as roads, sidewalks, and bridges, will not be permanently affected by construction under this alternative.

The Project footprint generally follows existing creek beds and this would not physically divide the established community; therefore, there is no impact.

Construction-related activities would occur temporarily within the Project footprint and would be completed consistent with local health and safety and environmental regulations. Areas impacted by construction would be restored after construction is completed. These activities are outlined in Sections 2.5.3 and 2.6.2 in the Project Description. Therefore, construction would result in no impact.

This alternative would affect lands designated and zoned for residential, commercial, and agricultural uses, among others, as indicated in Tables 3.8-1 and 3.8-3. As such, these areas would be permanently converted for the purposes of flood prevention. The conversion of these lands for this purpose is consistent with local health and safety and environmental regulations and policies listed in Section 4.8.1. Permanent conversion of zoned lands for flood prevention would result in a less-than-significant impact.

Periodic maintenance and long-term operations of the flood control improvements would utilize the existing and proposed maintenance access roads and channel improvements, which follow existing creek features; therefore, the operations and maintenance of this alternative would not divide established communities in the vicinity of the project area. The maintenance of the NRCS Alternative would not conflict with existing policies and regulations. On the contrary, the flood protection provided by this plan would substantially reduce the number of acres of land subject to a 1-percent flooding event and, thus, the Project would be consistent with land use policies related to flood protection and public safety. The operations and maintenance of this alternative would be beneficial or no impact under NEPA .

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.8.3.3 Culvert/Channel Alternative

The Culver/Channel Alternative would be consistent with, but does not necessarily implement, all Santa Clara County General Plan policies regarding health and safety, San Martin Planning Area policies related to floodway development and protection, the City of Morgan Hill General Plan policies related to public health and safety, flooding and open space and conservation, and the City of Gilroy policies and regulations specific to flooding risks. Potential impacts under the Culvert/Channel Alternative would be similar to the NRCS Alternative. However, the amount of lands subject to land use change would be reduced under this alternative for areas along Reach 8 compared to the NRCS Alternative but greater than the Tunnel Alternative, because there would be more land required for this alternative in Reach 8.

The Culvert/Channel Alternative would not divide established communities, as the Project generally follows existing creek beds (which already naturally divide communities), or will be underground and the factors that currently connect the communities, such as roads, sidewalks and bridges will not be permanently affected by construction under this alternative, therefore, there is no impact.

Construction-related activities would occur temporarily within the project footprint and would be completed consistent with local health and safety and environmental regulations. Areas impacted by construction would be restored after construction is completed. These activities are outlined in Sections 2.5.3 and 2.8.2 in the Project Description. Therefore, construction would result in no impact.

Construction of this alternative would affect lands designated and zoned for residential, commercial, and agricultural uses, among others, as indicated in Tables 3.8-1, and 3.8-3. As such, these areas would be permanently converted for the purposes of flood prevention. The conversion of these lands for this purpose is consistent with local health and safety and environmental regulations and policies listed in Section 4.8.1. Permanent conversion of zoned lands for flood prevention would result in a less-than-significant impact.

Periodic maintenance and long-term operations of the flood control improvements would utilize the existing and proposed maintenance access roads and channel improvements, which follow existing creek features; therefore, the operations and maintenance of this alternative would not divide established communities in the vicinity of the project area. The maintenance of the Culvert/Channel Alternative would not conflict with existing policies and regulations. On the contrary, the flood protection provided by this plan would substantially reduce the number of acres of land subject to a 1-percent flooding event and, thus, the Project would be consistent with land use policies related to flood protection and public safety. The operations and maintenance of this alternative would be beneficial.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.8.3.4 Reach 6 Bypass Alternative

The Reach 6 Bypass Alternative is consistent with, but does not necessarily implement, all Santa Clara County General Plan policies regarding health and safety, San Martin Planning Area policies related to floodway development and protection, the City of Morgan Hill General Plan policies related to public health and safety, flooding and open space and conservation, and the City of Gilroy policies and regulations specific to flooding risks. Potential impacts under the Reach 6 Bypass Alternative would be similar as the Tunnel Alternative. However, there will be no construction along Reaches 5 or 6 under this alternative; therefore, land use changes along these reaches would be reduced compared to other alternatives even when accounting for the lands that would need to be converted to build the Bypass from Reach 6 to Reach 14.

Similar to the Tunnel Alternative, this alternative would not divide established communities, as the Project generally follows existing creek beds (which already naturally divide communities), or would be underground and the factors that currently connect the communities, such as roads, sidewalks, and bridges, would not be permanently affected by construction under this alternative.

The Project footprint generally follows existing creek beds and this would not result in existing communities being disconnected. In fact, the area impacted by this alternative is reduced, because construction is not necessary along Reaches 5 and 6. A short, high-flow bypass would be constructed between Reach 6 to Reach 14 under Highway 101. However, this alternative would not physically divide the established community; therefore, there is no impact.

Construction-related activities would occur temporarily within the Project footprint and would be completed consistent with local health and safety and environmental regulations. Areas impacted by construction would be restored after construction is completed. These activities are outlined in Sections 2.5.3 and 2.9.2 in the Project Description. Therefore, construction would result in no impact.

This alternative would affect lands designated and zoned for residential, commercial, and agricultural uses, among others, as indicated in Tables 3.8-1 and 3.8-3. As such, these areas would be permanently converted for the purposes of flood prevention. However, land use changes would not be necessary along Reaches 5 and 6, as Project construction along these reaches is not required under this alternative.

Likely, the total conversion of lands would be less, as is shown in the table. The conversion of these lands for this purpose would be consistent with local health and safety and environmental regulations and policies listed in Section 4.8.1. Permanent conversion of zoned lands for flood prevention would result in a beneficial impact or no impact under NEPA.

Periodic maintenance and long-term operations of the flood protection modifications would utilize the existing and proposed maintenance access roads and channel improvements, which follow existing creek features; therefore, the operations and maintenance of this alternative would not divide established communities in the vicinity of the project area. The maintenance of the Reach 6 Bypass Alternative would not conflict with existing policies and regulations. On the contrary, the flood protection provided by this plan would substantially reduce the number of acres of land subject to a 1-percent flooding event and, thus, the Project would be consistent with land use policies related to flood protection and public safety. The operations and maintenance of this alternative would be beneficial.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.8.4 Summary of Impacts to Land Use and Planning

Although the action alternatives would require a conversion of land uses for the purposes of flood management, no significant impacts are identified and no mitigation is necessary. The least amount of land conversion would occur under the Reach 6 Bypass Alternative because of the tunnel in Reach 8 and the lack of improvements in Reaches 5 and 6 downstream of the bypass. A significant impact was identified under the No Action Alternative; the impact relates to local policies regarding flood management.

Mitigation measures and BMPs, as appropriate, for the various Action Alternatives to reduce the impacts to Land Use and Planning are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

4.9 CULTURAL RESOURCES

4.9.1 Introduction

This section describes the consequences of implementing the Project on cultural resources. Where impacts are identified, mitigation measures are proposed to reduce those impacts to less-than significant levels.

Cultural Resources in the Project APE (Area of Potential Effect)

Cardno ENTRIX conducted a records search and intuitive pedestrian survey of the Project to identify cultural resources for the Project (Cardno ENTRIX 2012). The survey was performed by an archaeologist and an architectural historian. Areas not inventoried as part of this effort included two staging areas that were inaccessible at the time of the fieldwork, one staging area which was only partially accessible, and areas previously surveyed as part of earlier projects in the Llagas Creek watershed. The investigations resulted in the identification of four previously identified prehistoric archaeological resources, which were identified during the records search: three located in Reach 4 and one located in Reach 14. Cardno ENTRIX was not able to relocate artifacts or other indications of human use or habitation at the four previously recorded prehistoric sites. DPR 523A Series form Continuation Sheet updates were completed for all four sites indicating observations made and areas visited during the relocation effort. Additionally, a bridge, constructed in 1925, resides in Reach 6 where Llagas Avenue crosses Llagas Creek. Bridge 37C0550 was found not eligible for the NRHP or the CRHR and is not listed as a historic or heritage resource under the City of Morgan Hill and Santa Clara County's General Plans.

The USACE - San Francisco District archaeologist conducted the cultural resources study in two phases. Phase I consisted of research of archaeological records and literature on file with the State of California and in the project files of the USACE office. Phase II consisted of an archaeological survey to identify and, as necessary, evaluate cultural resources for their eligibility for listing in the National Register of Historic Places (NRHP). The records search and survey was conducted to comply with Section 106 of the National Historic Preservation Act of 1966 (PL89-665, as amended) to consider the effects upon historic properties and historic properties eligible for listing in the National Register of Historic Places.

The USACE delineated the APE, defined as the geographical area within which a project may cause changes, directly or indirectly, in the character or use of historic properties located in the APE. The APE for this project is comprised of the six reaches, totaling approximately 12.7 miles, situated on the main branch of Llagas Creek, West Little Llagas Creek, and East Little Llagas Creek. It encompassed the stream channels and strips of land running parallel on both sides of the streams.

Although the cultural resource reports identified five sites "along" the streams in the APE, the USACE observed that no cultural materials from the sites extended in the footprint of the any of the Action Alternatives. Thus, it is reasonable to conclude that the APE does not contain prehistoric cultural resources, and an evaluation of NRHP eligibility of the sites is not necessary. The USACE previously coordinated with the Native American Heritage Commission and Native American Tribes and no additional information regarding cultural resources was revealed. Concurrent with this EIS, the USACE is consulting with the State Historic Preservation Officer (SHPO) to solicit and request comment on the findings and conclusions of the identification and evaluation efforts.

Paleontological Resources

Paleontology is defined as the science dealing with the life of past geological periods as known from fossil remains. Paleontological resources include fossil remains, as well as fossil localities and formations that have produced fossil material. Such locations and specimens are important nonrenewable resources.

NEPA offers protection for these sensitive resources and requires that they be addressed during the EIS process.

A search of the University of California Museum of Paleontology collections database did not identify any paleontological resources within the Project APE. The database search did identify paleontological resources in Santa Clara County, which indicates that the area may be sensitive for the presence of paleontological resources.

4.9.2 No Action Alternative

The No Action Alternative would have no construction and, therefore, construction related impacts on cultural resources within the Project APE are not applicable.

The No Action Alternative would have no impacts on cultural resources within the Project APE. However, continued flooding and degradation of the creek could expose previously unidentified cultural resources. Existing maintenance practices include standard BMPs for the discovery of previously unknown cultural resources.

The No Action Alternative would have no construction and, therefore, no impacts on known cultural resources within the Project APE.

There are no known cultural resources in areas that are currently maintained by the SCVWD for operations and maintenance activities. The No Action Alternative would have no impacts on known cultural resources within the Project APE; however, there is the potential to impact previously unidentified cultural resources in these areas during additional flooding, which may occur in the future under this alterative. Although flooding may occur, no cultural resources were observed on or near the banks of the creek. Therefore, any effect of flooding could result a less-than-significant impact to cultural resources known in the vicinity.

BMPs for the No Action Alternative, including O&M activities are discussed and described in Chapter 5 and Appendix B of this EIS.

4.9.3 Action Alternatives

4.9.3.1 Tunnel Alternative (Applicant's Proposed Action)

The Tunnel Alternative in Reach 8 would include construction of a tunnel within an area with no known cultural resources. Operations and maintenance under the Tunnel Alternative in Reach 8 would include a sediment detention basin that would require periodic sediment cleanout. In addition, road maintenance would need to occur along the access route, providing ingress and egress to the sediment detention basin.

Any ground disturbing activities associated with the Project have the potential to impact archeological resources, paleontological resources, and human remains. A cultural resources inventory of the entire Project

APE has not been completed. Known cultural resource sites in the portions of the Project APE inventoried are presented in Table 4.9-1.

Table 4.9-1 Cultural Resources adjacent to the Project APE

Site Number	Site Type	Reach
CA-SCL-400	Prehistoric-Lithic scatter, fire cracked rock	4
CA-SCL-401	Prehistoric-Lithic scatter, fire cracked rock	4
CA-SCL-403	Prehistoric-Lithic scatter, fire cracked rock	4
CA-SCL-452	Prehistoric-Habitation, possible midden soil, multiple artifact classes	14
Llagas Creek Bridge (Bridge 37C0550)	Historic-Transportation/Bridge	6

Construction of access roads, diversion channels, and utilities relocation for flood management could impact undiscovered cultural or paleontological resources or human remains. The SCVWD implements standard BMPs in the event that resources are uncovered during construction, which ensures that the Project would not result in a significant impact to cultural resources. Flood management would be beneficial to the preservation of unknown cultural resources by preventing future erosion.

Construction activities near known cultural resources could result in an unintentional damage to these resources if not adequately protected, which is a potentially significant impact. A Project mitigation measure requires that known resources be marked in the field and an archaeologist be on site during activities adjacent to these resources. Implementation of this measure would reduce the potential impact.

Operation and maintenance activities common to all alternatives and specific to the Tunnel Alternative are outlined in Chapter 2, Sections 2.5.5 and 2.7.5, respectively. Operation and maintenance activities that could result in ground disturbance include sediment removal and bank repair; however, neither of these activities generally occur in native soil. maintenance activities that may occur near known cultural resources would be required to comply with mitigation measures to reduce potential impacts to a less-than-significant level.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.9.3.2 Natural Resources Conservation Service (NRCS) Alternative

This alternative would widen and deepen the creek along Reach 8, resulting in increased possibility for encounters with unanticipated cultural resources.

Any ground disturbing activities associated with the Project have the potential to impact archeological resources, paleontological resources, and human remains. A cultural resources inventory of the entire Project

APE has not been completed. Known cultural resource sites in the Project APE are presented in Table 4.9-1.

Construction of access roads, diversion channels, and utilities relocation for flood management could impact undiscovered cultural or paleontological resources or human remains. The SCVWD implements standard BMPs in the event that resources are uncovered during construction, which ensures that the Project would not result in a significant impact to cultural resources. Flood management would be beneficial to the preservation of unknown cultural resources by preventing future erosion.

Construction activities near known cultural resources could result in an unintentional damage to these resources if not adequately protected, which is a potentially significant impact. Mitigation measures require that known resources be marked in the field and an archaeologist be on site during activities adjacent to these resources. Implementation of this measure would reduce the potential impact.

Operation and maintenance activities common to all alternatives and specific to the NRCS Alternative are outlined in Chapter 2, Sections 2.5.5 and 2.6.5, respectively. Operation and maintenance activities that could result in ground disturbance include sediment removal and bank repair; however, neither of these activities generally occur in native soil. Maintenance activities that may occur near known cultural resources would be required to comply with mitigation measures as described in Chapter 5 of this EIS to reduce potential impacts to a less-than-significant level.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.9.3.3 Culvert/Channel Alternative

This alternative would require a smaller ROW in Reach 8, reducing the amount of vegetation to be removed along the existing West Little Llagas channel and would allow easier maintenance access, relative to the Tunnel Alternative. Impact determinations for potential impacts to unidentified cultural resources caused by ground disturbing activities and impacts to known cultural resources are the same as for the Tunnel Alternative.

Any ground disturbing activities associated with the Project have the potential to impact archeological resources, paleontological resources, and human remains. A cultural resources inventory of the entire Project APE has not been completed. Known cultural resource sites in the Project APE are presented in Table 4.9-1.

Construction of access roads, diversion channels, and utilities relocation for flood management could impact undiscovered cultural or paleontological resources or human remains. The SCVWD implements standard BMPs in the event that resources are uncovered during construction, which ensures that the Project would not result in a significant impact to cultural resources. Flood management would be beneficial to the preservation of unknown cultural resources by preventing future erosion.

Construction activities near known cultural resources could result in an unintentional damage to these resources if not adequately protected, which is a potentially significant impact. A proposed mitigation measure requires that known resources be marked in the field and an archaeologist be present on site during activities adjacent to these resources. Implementation of this measure will reduce the potential impact.

Operation and maintenance activities common to all alternatives and specific to the Culvert/Channel Alternative are outlined in Chapter 2, Sections 2.5.5 and 2.8.5, respectively. Operation and maintenance activities that could result in ground disturbance include sediment removal and bank repair; however, neither of these activities generally occur in native soil. Maintenance activities that may occur near known cultural resources would be required to comply with mitigation measures to reduce potential impacts.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.9.3.4 Reach 6 Bypass Alternative

The Reach 6 Bypass Alternative would construct a high-flow bypass channel between Reach 6 of Llagas Creek and Reach 14 of East Little Llagas Creek. The bypass would be designed so that no flood capacity improvements would be needed along Reach 5 or Reach 6 of Llagas Creek downstream of the proposed bypass. Flood conveyance improvements for the upstream Project Reaches 8, 7A, and 7B, and for the downstream Reach 4 would remain the same as that described for the Tunnel Alternative. Operations and maintenance would be nearly the same as described for the Tunnel Alternative, with the exception of maintenance for the bypass channel hydraulic control structure in Reach 6.

Any ground disturbing activities associated with the Project have the potential to impact archeological resources, paleontological resources, and human remains. A cultural resources inventory of the entire Project APE has not been completed. Known cultural resource sites in the Project APE are presented in Table 4.9-1.

Construction of access roads, diversion channels, and utilities relocation for flood management could impact undiscovered cultural or paleontological resources or human remains. The SCVWD implements standard BMPs in the event that resources are uncovered during construction, which ensures that the Project would not result in a significant impact to these resources. Flood management would be beneficial to the preservation of unknown cultural resources by preventing future erosion.

Construction activities near known cultural resources could result in an unintentional damage to these resources if not adequately protected, which is a potentially significant impact. The proposed mitigation measure requires that known resources be marked in the field and an archaeologist be on site during activities adjacent to these resources. Implementation of this measure would reduce the potential impact.

Operation and maintenance activities common to all alternatives and specific to the Reach 6 Bypass Alternative are outlined in Chapter 2, Sections 2.5.5 and 2.9.5, respectively. Operation and maintenance activities that could result in ground disturbance including sediment removal and bank repair; however, neither of these activities generally occur in native soil. Maintenance activities that may occur near known cultural resources would be required to comply with mitigation measures as described in Chapter 5 of this EIS to reduce potential impacts.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.9.4 Summary of Impacts to Cultural Resources

All impacts to cultural resources can be reduced by implementing mitigation measures and BMPs as described in Chapter 5 of this EIS. The Tunnel Alternative and Reach 6 Bypass Alternative have less ground disturbance in Reach 8, thus are less likely to impact unknown cultural resources in that area of the Proposed Project compared to the NRCS and Culvert/Channel alternatives.

Mitigation measures and BMPs, as appropriate, for the various Action Alternatives to reduce the impacts to Cultural Resources are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

4.10 TRAFFIC AND CIRCULATION

4.10.1 Introduction

This section presents an analysis of traffic conditions is focused primarily on construction-related effects, such as road closures, detours, deterioration of road conditions related to construction and hauling, and interruptions in transit service. Operations and maintenance related traffic effects after construction is completed are also discussed and addressed.

The Tunnel Alternative and other action alternatives discussed below are not expected to cause a permanent increase in traffic, as they do not include any traffic-generating land uses. Maintenance operations would be widely dispersed and sporadic in nature, would not be regularly occurring, and maintenance would take place almost entirely from off-roadway maintenance roads that would be specifically built for access to the channel. Likewise, the action alternatives would not result in a permanent increase in parking demand. Traffic resulting from operations of the Project alternatives is estimated to be nominal, and no traffic-related impacts are forecasted to occur. Therefore, this traffic analysis evaluates potential impacts of temporary construction traffic resulting from the implementation of Project alternatives on the local circulation network, access, and safety.

The traffic and circulation analysis included examination of the following information:

- Transportation Study for the Llagas Creek Flood Control Improvements Project prepared by Alta Planning, May 9, 2013
- 65% Design Plans (SCVWD 2013)

For the action alternatives discussed below, this analysis assumes an excavation truck capacity of 12 cubic yards (CY).

The traffic analysis relies on construction vehicle trip estimates, as described in Table 4.10-2.

Table 4.10-2 provides a summary of the approximate number of truck trips per day during construction in an associated reach as it relates to disposal of excavated materials, which makes up the vast majority of the truck trips[2], as well as excavation crew and support/materials trips per day for all action alternatives, except the Reach 6 Bypass Alternative.

The table below shows quantities for the Tunnel Alternative. Excavation quantities for the NRCS, Tunnel, and Culvert/Channel alternatives are very similar; therefore, the Tunnel Alternative is used as a comparative benchmark in the tables below and encompasses approximate quantities for the NRCS, Tunnel, and Culvert/Channel action alternatives. For the NRCS and Culvert/Channel alternatives, excavation quantities and truck trips are the same in all reaches, with the exception of Reach 8. Refer to Table 2.5-3 for more detail on estimates of earthwork quantities for all action alternatives.

As shown in Table 4.10-2, the number of daily construction-related trips by reach ranges between a daily average of 42 and 258 trips per day.

[2] For purposes of this report, a “truck trip” is always identified and calculated numerically as two trips. There is one trip out from the Project site with a load of excavated material plus an additional, second return trip back to the Project site. As such, disposal of one dump truck load of material is reported here as two truck trips.

Table 4.10-2 Tunnel Alternative Total Average Daily Construction-Related Trips

Reach	Average Excavation Truck Trips per Day	Excavation Crew per Day	Excavation Crew Trips per Day	Support Crew/ Materials Deliveries per Day	Support Crew/ Materials Deliveries Trips per Day	Total Construction Trips per Day
4	120	2	4	5	10	134
5 and 6	90	3	6	15	30	126
7A	242	3	6	5	10	258
7B	40	2	4	10	20	64
8	18	2	4	10	20	42
14	56	2	4	5	10	70

Source: Alta Planning and Design (2013)

Table 4.10-3 Reach 6 Bypass Alternative Total Average Daily Construction-Related Trips

Reach	Average Excavation Truck Trips per Day	Excavation Crew per Day	Excavation Crew Trips per Day	Support Crew/ Materials Deliveries per Day	Support Crew/ Materials Deliveries Trips per Day	Total Construction Trips per Day
4	120	2	4	5	10	134
6	8	2	4	15	30	42
7A	242	3	6	5	10	258
7B	40	2	4	10	20	64
8	18	2	4	10	20	42
14	94	2	4	5	10	108

Source: Alta Planning and Design (2013)

Table 4.10-3 provides a summary of the approximate number of truck trips per day during construction for the Reach 6 Bypass Alternative. As shown in Table 4.10-3, the number of construction-related trips would be approximately 42 trips per day in Reach 6 to construct the bypass channel segment. There are no construction-related trips in Reach 5, because there is no construction in this reach. This would result in an overall reduction in truck trips for the Reach 6 Bypass Alternative in comparison to the other action alternatives.

Table 4.10-4 provides a summary of the average daily truck trips by construction year associated with disposal of excavated earth materials and with the additional labor crew and materials delivery trips for the Tunnel Alternative (and by extension the NRCS and Culvert/Channel alternatives). The average daily truck trips related to excavation disposal is broken down by year to determine the average number of daily truck trips needed to dispose of the excavated earth materials. Average daily truck trips are calculated based on the forecast soil disposal volume by reach, the duration of the construction period, and the anticipated year of construction by reach. For purposes of this analysis, it is assumed that a 12-CY dump truck capacity is used.

Table 4.10-4 Average Daily Truck Trips by Year—Tunnel Alternative

Reach	Construction Year					
	1	2	3	4	5	6
4	134	134	134			
5 and 6		126	126	126	126	126
7A	258	258				
7B			64	64		
8		42	42	42	42	
14		70	70			
Total	**392**	**630**	**436**	**232**	**168**	**126**

It is important to note the differences between Tables 4.10-2 and 4.10-4, which shows all the construction related truck trips that would occur in a given reach in a given year. Work does not happen in all reaches in all years, as the construction work is phased. Table 4.10-2 does not distinguish in which year work happens in each reach; rather it shows the calculation for the average daily truck trips whenever construction occurs in any particular reach.

As shown in Table 4.10-4, the daily trips by year range between 126 and 630 trips per day (see last row of table) for the Tunnel Alternative and, by extension, the NRCS and Culvert/Channel alternatives. The majority of the truck trips shown in Table 4.10-4 are forecasted to travel to Anderson Dam through an established haul route along Cochrane Road (discussed below); however, a portion of the total truck trips would not travel to Anderson Dam. Approximately 275,000 CY of material to be excavated from Reach 7A will be used for filling in Lake Silveira for purposes of wetland and riparian habitat mitigation, as discussed in Section 2.5.6 and Section 5.3 of this EIS. This 275,000 CY represents approximately 22,900 truckloads (using 12-CY truck capacity) or 45,800 truck trips (22,900 truckloads x 2 trips per load = 45,800). Over the 290-day duration of the Reach 7A construction period, between Years 1 and 2, this represents an average of about 158 truck trips per day that will be routed to Lake Silveira rather than to Anderson Dam. The total number of truck trips to Anderson Dam over the 6-year construction period would be 223,866.

Table 4.10-5 provides a summary of the excavation truck trips for the Reach 6 Bypass Alternative by year to determine the average daily number of trips.

Table 4.10-5 Average Daily Truck Trips by Year—Reach 6 Bypass Alternative

Reach	Construction Year					
	1	2	3	4	5	6
4	134	134	134			
6		42	42	42	42	
7A	258	258				
7B			64	64		
8		42	42	42	42	
14		108	108			
Total	**392**	**584**	**390**	**148**	**84**	

As shown in Table 4.10-5, the daily trips by year ranges between 84 and 584 trips per day (excluding that there will be no trips in Year 6) for the Reach 6 Bypass Alternative. The majority of these trips are forecast to travel to Anderson Dam, through the established haul route along Cochrane Road. As discussed above, approximately 158 trips per day between construction Years 1 and 2 would not travel to Anderson Dam from Reach 7A, but would instead travel to Lake Silveira to be used for purposes of developing wetland and riparian habitat, as discussed in Section 2.5.6 and Section 5.3 of this EIS.

Traffic Control Plan

In order to minimize impacts of construction-related traffic and staging on existing daily vehicle traffic and area road use, a construction Traffic Control Plan will be prepared as part of the Project to address construction traffic routes, construction equipment staging, construction vehicle parking, lane closures and blockages, detours, maintenance of access to residences and businesses, transit access, public notification, and maintenance of emergency vehicle access during construction. This plan will be reviewed and approved by Caltrans, the City of Morgan Hill Public Works Department, and County of Santa Clara Roads and Airports Department prior to any construction- or site-preparation activities. Elements of the Traffic Control Plan would include, but not be limited to, the following:

- *Full and Partial Street Closure Advance Notice*. Advance notice shall be given to the local agency public works department staff to coordinate planned full and partial closures of roadways. Closures notices will be provided with 2 weeks' notice, and planned detour routes will be established in advance of the notice. The notification should be consistent with the BMPs (Appendix C) as included in the SCVWD, Best Management Practices Handbook, Revision A, May 22, 2008.

- *Designated Access Routes*. Appropriate construction vehicle routes from each Project reach to U.S. 101 have been identified and discussed. Vehicle and haul routes will be confirmed with local agencies prior to the start of excavation. All traffic traveling from the highway would use the major arterial roadways.

- *Maximum Speed Limits*. Maximum speed limits will be identified for trucks and heavy equipment traveling to Project reach segments located within residential neighborhoods.

- *Weekend Construction*. Within Morgan Hill city limits, construction activities shall be limited to the hours of 7:00 a.m. to 8:00 p.m. Monday through Friday, 9:00 a.m. to 6:00 p.m. on Saturday, and prohibited on Sundays and holidays (per local ordinance). Construction may occur in the evenings during some circumstances.

- *Limited Travel during Commute Times*. Construction vehicles will avoid, to the extent feasible, the peak commute hours of 7:00 to 9:00 a.m. and 3:00 to 6:00 p.m.

- *Pedestrian and Bicycle Access*. Bicycle and pedestrian access along all roadways affected by Project construction shall be maintained during construction to the maximum extent feasible.

- *Fencing and Barricades*. Construction areas will be blocked off from vehicle, pedestrian, and bicycle traffic by such measures as temporary barriers or fencing.

- *Lane Closure/Blockage Timing*. Lane closures will be limited to non-commute times, to the extent feasible, such as the peak commute hours of 7:00 to 9:00 a.m. and 3:00 to 6:00 p.m.

- *Lane Closure/Blockage Monitor*. Determine locations where a public safety monitor or flagperson is needed during lane closures/blockages to regulate vehicle, pedestrian, and bicycle traffic through the construction zone.

- *Signage*. Warning signage will be visible during construction to alert motorists of potential lane closures/blockages and detours and to alert pedestrians and bicyclists of any safety hazards along the road.

- *Lane Closure Detour Plans*. For construction activities that will result in full or partial lane closures, the SCVWD contractor shall submit a detailed detour plan to the local agency for review and approval. The local agency public works department will be responsible for approving detour routes, time periods, and locations of signage (such as changeable message signs) Detour plans will be developed where roadways must be completely closed to motor vehicle traffic. Detour plans shall include alternate routes for motorists, transit vehicles, emergency vehicles, bicyclists, and pedestrians.

- *Agency Traffic-Related Permits*. Permits will be obtained from local agencies and Caltrans for traffic detours required for construction activities.

- *Local Business Access*. Full pedestrian access to businesses along Monterey Road will be maintained at all times during construction. Signage should direct patrons to alternate parking locations on side streets.

- *Crew Parking*. For construction within downtown Morgan Hill, policies will be developed for parking construction crew vehicles offsite, such as at a local shopping center and carpooling to the Project area, to limit vehicles parked within the staging area.

- *Phone Number for Complaints*. The SCVWD, or appropriate designee, shall post at least one sign during active construction that includes the name and telephone number of the staff person the public may contact to register complaints about construction traffic or access. The SCVWD shall ensure that a written record of all such complaints is kept and that the problems registered by the public are investigated and resolved within 1 week of receiving the complaints.

- *Transit Access*. VTA bus access shall be provided along Project area roadways at all times during construction. VTA will be notified of the time and duration of planned lane closures at least 1 week in advance of such closures. A public safety monitor will be present during all lane closures to ensure bus access through the area.

- *Emergency Vehicle Access*. Emergency vehicle access shall be provided along Project area roadways at all times during construction. The local fire and police departments (Morgan Hill Police Department and Santa Clara County Fire Department) will be notified of the time and duration of planned lane closures, at least 1 week in advance, of such closures. A public safety monitor will be present during all lane closures to ensure emergency vehicle access through the area.

Caltrans requires preparation of a Transportation Management Plan (TMP) whenever closures are planned on freeway facilities to minimize motorist delay and provide public notification regarding closures and impacts. The Traffic Control Plan would be prepared to be compliant with Caltrans TMP requirements if impacts to U.S. 101 are anticipated. The TMP identifies times allowed for closure and details regarding notification of the public, including a public awareness campaign.

4.10.2 No Action Alternative

Under the No Action Alternative, the Project would not be built, and no new land purchases or construction activities would occur. Flooding in the residential areas of Morgan Hill and San Martin would continue. Storm runoff would continue through the West Little Llagas Creek, East Little Llagas Creek, and Llagas Creek channel reaches. The bypass channel in Reach 7A would not be constructed under the No Action Alternative, and channel bank erosion and widening would likely continue. Maintenance of the Upper Llagas Creek facilities would be conducted in accordance with the guidelines established in the SMP Update 2012–2022 (SCVWD 2011).

No channel modification or improvements would be constructed; therefore, no impacts would occur as a result of construction.

Existing maintenance activities established by the SCVWD include a SMP. The SMP established procedures for routine maintenance of stream channels involving sediment removal, vegetation management, bank protection, and associated minor activities.

Instream sediment removal and bank protection work is carried out from June 15 to October 30, or the first significant rainfall (0.5 inch of rain in a 24-hour period) after October 15, whichever occurs first.

Sediment removal, bank stabilization, vegetation management, and minor maintenance and repairs are typical SMP activities that require the use of maintenance equipment. In the past, sediment maintenance has occurred only in Reach 14 and near the Church Pond inlet in Reach 6; although, sediment maintenance could occur in other locations in the future. Maintenance equipment is transported to and from maintenance sites and moved once projects are completed. Equipment is not stored permanently at maintenance sites. Nearly all maintenance occurs along existing SCVWD maintenance roads located at the top of channel banks or through planned access roads down the banks to the channel bottom. Maintenance activities rarely occur from public roadways and, therefore, would not interfere with traffic patterns. Mobilization and demobilization of equipment from public roadways to SCVWD maintenance roads may briefly interfere with access to residences and businesses; however, SMP activities are temporary and intermittent and would not affect traffic loads on the local street system.

The SCVWD performs routine maintenance activities within the Project area, conducted in accordance with the SCVWD's established BMPs under the SMP (2011). BMPs are implemented to reduce the impacts.

The nearest Congestion Management Program (CMP) facilities to the Project area are U.S. 101 and State Route 152. No channel modification or improvements would be constructed under the No Action Alternative; therefore, no construction- related impacts to CMP facilities would occur.

Existing maintenance activities established by the SCVWD include the SMP, which established procedures for routine maintenance of stream channels involving sediment removal, vegetation management, bank protection, and associated minor activities. As mentioned above, the nearest CMP facilities to the Proposed Project are U.S. 101 and State Route 152. Most of the Project area runs parallel to U.S. 101. Maintenance vehicles may use U.S. 101 to travel to access maintenance sites; however, maintenance work would be intermittent and for short durations. The SMP is implemented to maintain the structural and functional integrity of SCVWD facilities and to maintain existing flow capacity. During the dry season, when SMP activities are implemented, maintenance vehicles and construction equipment are needed to conduct the maintenance work. Maintenance work typically occurs only a few days each year in a given area, and the trucks and equipment primarily use existing maintenance roads that are off of the public roadways to access the channel. Consequently, maintenance activities do not create substantial traffic on public roads that would interfere with emergency vehicle access. In addition, SMP maintenance activities do not conflict with policies and adopted plans or programs supporting alternative transportation.

Instream sediment removal and bank protection work is carried out from June 15 to October 30, or the first significant rainfall (0.5 inch of rain in a 24-hour period) after October 15, whichever occurs first. Sediment removal, bank stabilization, vegetation management, minor maintenance, and repairs are typical SMP activities that require the use of maintenance equipment. In the past, sediment maintenance has occurred only in Reach 14 and near the Church Pond inlet in Reach 6; although, sediment maintenance could occur in other locations in the future. Maintenance equipment is transported to and from maintenance sites and moved once projects are completed. Equipment is not stored permanently at maintenance sites. Nearly all maintenance occurs along existing SCVWD maintenance roads located at the top of channel banks or through planned access roads down the banks to the channel bottom. Maintenance activities rarely occur from public roadways and, therefore, would not interfere with traffic patterns. Mobilization and demobilization of equipment from public roadways to SCVWD maintenance roads may briefly interfere with access to residences and businesses; however, SMP activities are temporary and intermittent and would not affect traffic loads on the local street system.

Under the No Action Alternative, the current magnitude and frequency of flooding would still occur, which would periodically increase the potential need for emergency vehicles and which can result in interference and inadequate emergency access during flooding events. Therefore, impacts to emergency vehicle access would be significant. In addition, under the No Action Alternative, the current magnitude and frequency of flooding would still occur during storm events, which may result in interference with public transit, bicycle, and pedestrian facilities in the Project area; therefore, impacts would be significant. Finally, since no channel modification or improvements would be constructed; therefore, no impacts related to inadequate emergency access and no impacts related to interference with alternative transportation policies and plans would occur as a result of construction. In conclusion, under the No Action Alternative there would be no traffic related impacts, including no damage to existing roads would occur as a result of construction.

BMPs for the No Action Alternative, including O&M activities are discussed and described in Chapter 5 and Appendix B of this EIS.

4.10.3 Action Alternatives

4.10.3.1 Tunnel Alternative (Applicant's Proposed Action)

The key feature of the Tunnel Alternative is to use an underground concrete tunnel instead of channel widening and deepening proposed through Reach 8 in downtown Morgan Hill. The tunnel would be constructed under the Nob Hill Terrace neighborhood, and a sediment detention basin would be constructed in the 600 feet of channel between Wright Avenue and Hillwood Lane with an 18-foot-wide maintenance/access road for maintenance access to the sediment detention basin.

Construction duration for the Tunnel Alternative would be 6 years, with construction lasting for about 36 months, with the last 3 years required for the mitigation plantings establishment period. Under the Tunnel Alternative, a total of 1,618,200 CY of soil would be excavated and disposed, with 1,343,200 CY hauled offsite (after accounting for 275,000 CY to be used at Lake Silveira for mitigation purposes) for storage and later use at Anderson Dam. Construction of the Tunnel Alternative would require loading approximately 111,933 trucks for a roundtrip to Anderson Dam over the 3-year construction life of the Project. Since a truck trip actually requires a roundtrip, one outbound to the dam and one return trip to the Project site to obtain another load, this is considered two trips for each load or 111,933 x 2 = 223,866 truck trips (with a 12 CY truck capacity).

The tunnel would be excavated toward the south from the Hale Avenue Portal work area toward Del Monte Avenue near Dunne Avenue. The Project would use conventional mining equipment and methods to excavate the tunnel, namely roadheaders, excavators, and controlled detonations. Portions of the tunnel would have a small amount of cover between the top of the tunnel and the street. At these locations, it would be necessary to inject grout into the loose soil to bind the soil together, which would allow the tunnel to be excavated without causing surface settlement. The three areas to be pre-grouted are Hale Avenue southeast of Warren Avenue (250 feet), the intersection of Nob Hill Terrace and Del Monte Avenue (180 feet on Nob Hill Terrace and 70 feet on Warren Avenue), and Del Monte Avenue (approximately 150 feet north of Dunne Avenue for a length of 70 feet). The equipment used for pre-grouting is a drill rig truck and a grouting truck.

Overall, the Tunnel Alternative would not result in any permanent traffic impacts, as no existing roadways will be altered, no new public roadways will be developed, and there is no additional traffic added to local roadways, since this is a flood-management Project.

However, construction activities are anticipated to interfere with local traffic patterns in the Project area. Construction activities in all reaches that are anticipated to interfere with local traffic patterns include temporary road closures, traffic delays due to construction vehicle access, temporary loss of parking, and construction activities, including material hauling and disposing. Construction activities will take place Monday through Friday from 7:00 a.m. to 8:00 p.m. and Saturdays from 9:00 a.m. to 6:00 p.m. Temporary road closures and construction related impacts for the Tunnel Project are discussed below by reach.

Temporary Road Closures

Construction of specific segments of the Tunnel Project would take place on public roadways, which could require temporary closures of roadway lanes. Construction may require complete street closure, or partial closure of some lanes. Below is description of temporary road closures that would occur for the Tunnel Alternative by reach:

- Roadways with temporary closures due to Reach 4 construction may include Masten Avenue, Rucker Avenue, and Buena Vista Avenue.

- Reach 5 construction activities are expected to occur without closing local roadways, as Reach 5 does not intersect roadways, with the exception of U.S. 101. The U.S. 101 bridges that pass over Reach 5 are not expected to be impacted during construction activities.

- Roadways with temporary closures due to Reach 6 construction may include Llagas Avenue, San Martin Avenue, and Church Avenue.

- Roadways with temporary closures due to Reach 7A construction may include La Crosse Drive, Watsonville Road, and Middle Avenue.

- Roadways with temporary closures due to Reach 7B construction may include Dunne Avenue, Ciolino Avenue, Spring Avenue, Cosmo Avenue, Edes Avenue, Del Monte Avenue, Edmundson Avenue, and La Crosse Drive.

- Roadways with temporary closures due to Reach 8 construction may include Hale Avenue, Wright Avenue, Main Avenue, and Warren Avenue.

- Roadways with temporary closures due to Reach 14 construction may include San Martin Avenue and Church Avenue.

Closure of travel lanes along local roadways for construction activities would have the potential to disrupt local business and residential access and would represent a temporary, significant impact to local traffic and circulation during construction. With implementation of the Traffic Control Plan as part of the Project and with implementation of traffic mitigation measures and BMPs as described in Chapter 5 of this EIS, which involves maintaining access to local residences and business, impacts would be reduced with mitigation.

Construction Vehicle Access

Several types of vehicles would be involved in construction activities along Llagas Creek that could interfere with local traffic patterns. These include the following:

- Excavation trucks are those used to transport excavated materials out of a particular reach. Excavation trucks will collect material for distribution to Anderson Dam where the earth materials will be stored for later reuse in another project. The northern reaches for the Proposed Project will be able to access Anderson Dam using the Cochrane Road overpass without accessing U.S. 101; excavation in other reaches would need to utilize U.S. 101. Approximately 80 percent of soil excavated from Reach 7A is scheduled for disposal at Lake Silveira, located near southern end of Reach 7A just west of Monterey Road.

- Construction and hauling support trips are primarily local trips by road ready vehicles and trips for hauling of heavy equipment to the site. The local trips are ordinarily within a particular reach, or at most, to an adjacent reach. The equipment hauling trips typically originate from two sources: northern Santa Clara County or from nearby rental businesses within south Santa Clara County.

- Crew trucks are vehicles needed to transport workers to and from the work site on a daily basis.

Construction crews may travel to and from multiple locations; but, likely, will come from urbanized communities to the north or south of the work site. Parking for construction workers would be provided within SCVWD ROW and approved staging areas only.

Access and use of the local street system by construction vehicles, described above, will also result in traffic impacts. A description of traffic impacts from the Tunnel Alternative to the existing traffic load and local street system is broken down by reach from south to north, as discussed below.

Reach 4

Construction of Reach 4 involves widening and deepening of the existing channel, resulting in a cross section with a low-flow channel, bankfull channel, benches, and engineered banks. All-weather maintenance/access roads would be provided along Reach 4 on both sides of the creek. The road surface would be located at the top of bank for winter flood management, maintenance, and inspection activities. Access to the maintenance roads would be at Masten Avenue, Rucker Avenue, Buena Vista Avenue, and Denio Avenue. Approximately 2.3 acres of vacant land along Masten Avenue and No Name Uno near the U.S. 101 interchange on the south side of the channel, as well as 4.6 acres in an agricultural field at the end of Denio Avenue just north of Buena Vista Avenue on the south side of the channel, would be used as staging areas during Reach 4 construction.

As shown in Table 4.10-2, Reach 4 construction-related trips total to 134 daily trips per day during construction, which would be dispersed over multiple area roadways. Construction staff trips would occur during the early morning and early afternoon, before peak traffic periods, while excavation, materials delivery, and support staff trips would occur periodically throughout the workday. The Average Daily Traffic (ADT) volumes for U.S. 101 from Masten Avenue to State Route 152 are 98,000 ADT (Table 3.10-1). The addition of an average of 134 daily trips for construction Years 1, 2, and 3, as shown in Table 4.10-4, is a very small additional percentage of traffic and is not expected to affect local traffic patterns. Therefore, the addition of Reach 4 construction-related trips to the local roadway network would be considered less than significant.

The preferred haul route between U.S. 101 and Reach 4 is provided via Masten Avenue to the U.S. 101 ramps. Alternate haul routes, which require local approval, include use of Rucker Avenue, Buena Vista Avenue, a portion of Masten Avenue between Columbet Avenue and

Center Avenue, and No Name Uno (frontage just east of U.S. 101). If all the forecast construction-related daily trips for each reach were added to U.S. 101, the percent change would be less than 1 percent. This nominal addition to existing traffic along U.S. 101 would occur throughout the day; and conservatively assumes construction of all reaches occurs concurrently (which is not the case as construction occurs in phases) and that all trips travel in the same direction. If distribution to the north, south, or west were included, along with timing of reach construction, then the percent change on U.S. 101 would be lower. Therefore, the addition of Reach 4 construction-related trips to the regional roadway network (U.S. 101) would be considered less than significant.

Reach 5 and Reach 6

Construction of Reach 5 involves widening and deepening the existing channel, resulting in a cross section with a sinuous low-flow channel, bankfull channel, benches, and engineered banks. All-weather maintenance/access roads would be provided along Reach 5 on both sides of the creek. The road surface would be located at the top of bank for winter flood management, maintenance, and inspection activities. Access to the maintenance roads would be at Kannely Lane and Lena Avenue. Reach 5 construction activities are not planned to affect local or regional roadways, as no local roadways cross Reach 5 and U.S. 101 crosses Reach 5 with existing bridge structures. Permits may be required from Caltrans for construction activities below the U.S. 101 bridges serving northbound and southbound traffic.

Construction of Reach 6 is similar to that of Reach 5. Access to the maintenance roads would be at Llagas Avenue, Kimble Court, East San Martin Avenue, Church Avenue, and Murphy Avenue.

As shown in Table 4.10-2, Reaches 5 and 6 construction-related trips total to 126 daily trips, which are expected to be dispersed over multiple area roadways. Construction staff trips would occur during the early morning and early afternoon prior to peak traffic periods, while excavation, materials delivery, and support staff trips would occur periodically throughout the workday.

The preferred haul route between U.S. 101 and Reaches 5 and 6 is provided via Masten Avenue and Llagas Avenue to San Martin Avenue to the U.S. 101 ramps. ADT volumes for this portion of U.S. 101 are 109,000 ADT (Table 3.10-1). The addition of approximately 126 daily trips for construction Years 2 through 6, as shown in Table 4.10-4, is a very small increase and would not affect local traffic patterns. This is a nominal addition to local roadways and to the regional U.S. 101 road network. The additional traffic to U.S. 101 conservatively assumes that all trips travel in the same direction. If distribution to the north, south, or west were included, and if timing of reach construction were included, then the percent change on U.S. 101 would be lower. Therefore, the addition of Reaches 5 and 6 forecast construction-related trips to the regional roadway network (U.S. 101) would be considered less than significant.

On the west side of the channel, 0.13 acre of SCVWD-owned lands at the Church Avenue percolation ponds on the west side of the channel; 1.4 acres in an agricultural field at the southeast corner of San Martin Avenue and Kimble Court on the east side of the channel; and 7.0 acres in an agricultural field between Llagas Avenue and the Union Pacific railroad tracks at Monterey Road, on the north side of the channel, opposite the Nature Quality Inc., food-processing facility with 0.38 acre for an access road from an adjoining parcel will all be used as staging areas for Reaches 5 and 6. No traffic related impacted are anticipated from the use the staging areas for Reach 5 and Reach 6, because the use of staging areas are temporary in nature and construction vehicles and equipment would be moved to and from staging areas as needed intermittently.

The onsite parking provided for the food processing company (Nature Quality) in Reach 6 would be affected by the proposed widening of Llagas Creek, requiring relocation of some facility parking spaces. Construction would result in temporary loss or modification of existing parking supply to accommodate excavation, construction vehicles, and equipment.

Reach 7A

Reach 7A is a proposed new channel to divert flows from West Little Llagas Creek. Reach 7A involves construction of a newly excavated channel and widening and deepening the existing diversion channel just upstream of Watsonville Road. The Reach 7A channel would have features similar to Reaches 4, 5, and 6. Existing roads would provide shared access for maintenance, where possible. Access to the maintenance roads would be at Middle Avenue, Watsonville Road, La Via Azul Court, and La Crosse Drive. Seven acres along Middle Avenue, south of Monterey Road, would be used as a staging area during construction for Reach 7A.

Approximately 80 percent of soil excavated from Reach 7A is scheduled for disposal at Lake Silveira, located near southern end of Reach 7A just west of Monterey Road. The remaining 20 percent of excavated soil would be disposed of at Anderson Dam. The preferred haul route between U.S. 101 and Reach 7A is provided via Watsonville Road to Monterey Road to San Martin Avenue to the U.S. 101 ramps.

As shown in Table 4.10-2, Reach 7A construction-related trips total to 258 daily trips that would be dispersed over multiple area roadways. Reach 7A construction is anticipated to take place in construction Years 1 and 2, as shown in Table 4.10-4 and would add approximately 258 daily trips over each of those 2 years; and is, therefore, not expected to affect local traffic patterns. Construction staff trips would occur during the early morning and early afternoon, prior to peak traffic periods, while excavation, materials delivery, and support staff trips would occur periodically throughout the workday. The ADT volumes for local roadways range from 112,000 along U.S. 101 to 9,900 on Watsonville Road (Table 3.10-1).

If all of the forecast construction-related daily trips for each reach were added to U.S. 101, the percent change would be nominal (between 0.2 to 2 percent depending on the roadway). This forecast of nominal addition to U.S. 101 would occur throughout the day; and conservatively assumes that construction of all reaches would occur concurrently and that all trips would travel in the same direction. If distribution to the north, south, or west were included, and if timing of reach construction were included, then the percent change on U.S. 101 would be lower. Therefore, the addition of Reach 7A forecast construction-related trips to the regional roadway network (U.S. 101) would be reduced.

The SCVWD has a maintenance easement along the roadway section that is also the West Little Llagas Creek Trail (Reaches 7A and 7B). The trail provides opportunities for walking, biking, and other trail related activities. The trail runs along the creek from Spring Avenue (about 0.25 mile south of downtown) through Watsonville Road. The trail is on both sides of the channel from La Crosse Drive south to Watsonville Road. This multi-use paved path surface would be replaced by an aggregate surfaced maintenance road that would be constructed on the improved bank. Additionally, the existing pedestrian bridge over West Little Llagas Creek just upstream from Watsonville Road would be removed. However, all the Action Alternatives described proposed to replace this existing bridge crossing with clean fill where the existing trail can be restored. Improvements for public use as a future trail and/or bike path would be subject to an agreement between the SCVWD and the City of Morgan Hill (City). Per the Joint Use Agreement between the City and SCVWD, the trail cannot “unreasonably interfere” the SCVWD goal of using these lands for flood protection; therefore, the trail was always potentially subject to modification. Such a future improvement would require a separate action and approval from this Project. The opportunity for the City to re-surface the proposed aggregate maintenance road is not foreclosed by the proposed construction and, therefore, remains supportive of the City’s policies in regards to trails and bikeways as alternative forms of transportation. Additionally, there are other alternative routes for pedestrians in the area, and the temporary or permanent loss of a single pedestrian facility in an area where other alternative pedestrian pathways exist would be a less than significant impact.

Reach 7B

Construction activities and features for Reach 7B are similar to those described for Reaches 4, 5, and 6. One acre of vacant land along La Jolla Drive at Via Navoana, upstream from Watsonville Road on the south side of the channel, would be used as a staging area during construction for Reach 7B.

Temporary closure of Ciolino Avenue is planned for construction activities related to Reach 7B. Ciolino Avenue is a two-lane undivided roadway approximately 950 feet in length (between Del Monte Avenue and Monterey Road). Ciolino Avenue serves commercial and residential properties and is a low traffic-volume roadway. However, the temporary detour of Ciolino Avenue traffic, due to construction activity from Reach 7B, would be considered a temporary significant impact. With implementation of the Traffic Control Plan and traffic mitigation measures, which involves maintaining access to local residences and businesses, impacts would be reduced with mitigation.

In Reach 7B, the Tunnel Project construction would avoid the downtown Morgan Hill area, reducing the need for road closures near businesses. Temporary road closures in Reach 8 would be reduced in the Tunnel Alternative and would likely only include Hale Avenue, Wright Avenue, Main Avenue, and Warren Avenue.

As shown in Table 4.10-2, Reach 7B forecast construction-related trips total to 64 daily trips, which would be dispersed over multiple area roadways. Reach 7B construction is anticipated to take place in construction Years 3 and 4, as shown in Table 4.10-4, and would add approximately 64 daily trips over each of those 2 years and is, therefore, not expected to affect local traffic patterns. Construction staff trips would occur during the early morning and early afternoon avoiding peak traffic, while excavation, materials delivery, and support staff trips would occur periodically throughout the workday. ADT volumes for local roadways range from 112,000 along U.S. 101 to 6,580 along Dunne Avenue. Therefore, the addition of Reach 7B forecast construction-related trips to the local roadway network would be reduced.

The preferred haul route between U.S. 101 and Reach 7B is provided via Cosmo Avenue to Monterey Road to Tennant Avenue Road to the U.S. 101 ramps. If all the forecast construction-related daily trips for each reach were added to U.S. 101, the percent change would be less than 1 percent. This forecast of nominal addition to U.S. 101 would occur throughout the day; and conservatively assumes that construction of all reaches would occur concurrently and that all trips would travel in the same direction. If distribution to the north, south, or west were included, and if timing of reach construction were included, then the percent change on U.S. 101 would be lower. Therefore, the addition of Reach 7B forecast construction-related trips to the regional roadway network (U.S. 101) would be reduced.

The West Little Llagas Creek Trail described above continues in Reach 7B between Edes Court and La Crosse Drive on the south side of the channel where the planned maintenance road and pathway would overlap at a couple of locations. Where this occurs, the path would be modified such that the SCVWD maintenance road and pathway would be a shared use facility and the path would be unpaved. During construction the pathway may not be safe or available for access. Other pedestrian access is available in the area via sidewalks along surface streets, which would allow for continued access. Additionally, with implementation of BMPs as part of the Project, impacts would be reduced.

Reach 8

Approximately 1.4 acres of vacant land at the site of the PG&E substation, on the southwest of the intersection of Hale Avenue and East Main Avenue on the west side of the channel, would be used as a staging area during construction for Reach 8. This staging site would be the main location for equipment and materials needed to construct the portal inlet and tunnel for the Tunnel Alternative.

As shown in Table 4.10-2, Reach 8 construction-related trips total to 42 daily trips, which would be dispersed over multiple area roadways. Construction staff trips would occur during the early morning and early afternoon while excavation, materials delivery, and support staff trips would occur periodically through the workday. Reach 8 construction is anticipated to take place in construction Years 2 through 5, as shown in Table 4.10-4, and would add approximately 42 daily trips over each of those 4 years and is therefore, not expected to affect local traffic patterns. Hale Avenue is a two-lane undivided roadway serving residential and institutional land uses in the vicinity of Reach 8. Hale Avenue in the Project vicinity currently accommodates approximately 6,200 vehicles per day, as identified in the City of Morgan Hill General Plan Circulation Update (2009). ADT volumes along Reach 8 where a tunnel would replace channel widening and deepening from the NRCS Alternative range between 6,130 ADT along Main Avenue and 125,000 ADT along U.S. 101. Therefore, the addition of Reach 8 forecast construction-related trips to the regional roadway network would be reduced.

Temporary closures of Hale Avenue, Wright Avenue, Main Avenue, and Warren Avenue are planned for construction activities related to Reach 8. Since closures would be temporary and intermittent during construction activities, the traffic operations on the roadway would be affected, causing a substantial impact to traffic load and capacity on the road. Therefore, the temporary detour of Hale Avenue traffic due to Reach 8 construction activity is a temporary, significant impact on the local roadway network. With implementation of the Traffic Control Plan and traffic mitigation measures as described in Chapter 5, access would be maintained to the extent possible and public noticing and safety measures, as well as detours would be required to be posted and impacts would be reduced.

Temporary lane closures along Hale Avenue and Main Avenue for construction activities could also affect local transit service provided by VTA for fixed route Bus Line 68. Fixed route Bus Line 68 operates at roughly 15-minute headways during peak morning and afternoon times. While at least one travel lane would be open in each direction, traffic congestion would cause delays along segments where lane closures are in effect. This would be a temporary, significant impact. Implementation of the Traffic Control Plan includes provisions for maintaining transit access during construction. VTA would be notified of the time and duration of planned lane closures in advance of such closures. A public safety monitor would be present during all lane closures to ensure bus access through the area.

The preferred haul route between U.S. 101 and Reach 8 is provided via Hale Avenue to Tilton Avenue, to Monterey Road to Cochrane Road. If all of the forecast construction-related daily trips for each reach were added to U.S. 101, the percent change would be less than 1 percent. This forecast of nominal addition to U.S. 101 would occur throughout the day, and conservatively assumes construction of all reaches would occur concurrently, and all trips would travel in the same direction. If distribution to the north, south, or west were included, and if timing of reach construction were included, then the percent change on U.S. 101 would be lower. Therefore, the addition of Reach 8 forecast construction-related trips to the regional roadway network (U.S. 101) would be reduced.

Temporary lane closures along Hale Avenue and Main Avenue for construction activities could affect local transit service provided by VTA for fixed route Bus Line 68. Fixed route Bus Line 68 operates at roughly 15-minute headways during peak morning and afternoon times. While at least one travel lane would be open in each direction, traffic congestion would cause delays along segments where lane closures are in effect. This would be a temporary, significant impact. The Traffic Control Plan includes provisions for maintaining transit access during construction. VTA would be notified of the time and duration of planned lane closures in advance of such closures. A public safety monitor would be present during all lane closures to ensure bus access through the area.

During construction, temporary road closures and increased truck traffic may obstruct safe access in the Project area, resulting in a temporary significant impact. Impacts would be reduced by maintaining access to local businesses and residences through the implementation of BMPs, which would ensure public safety, including pedestrian safety and provide safe access in the Project area.

Lack of access to residences and businesses during construction activities may occur and would be a temporary significant impact; however, access would be maintained to the extent possible through mitigation measures. With implementation of mitigation measures discussed in Chapter 5 of this EIS, impacts would be reduced.

The Tunnel Alternative would partially avoid the Morgan Hill Plaza Shopping Center parking lot in Reach 8 as opposed to the NRCS and Culvert/Channel alternatives (discussed in their respective sections); however the Project construction alignment would affect the rear parking area behind the shopping center. Construction would result in temporary loss or modification of existing parking supply and potentially loading areas during construction for the Tunnel Alternative.

Reach 14

Reach 14 construction features and activities are similar to Reaches 4, 5, 6, and 7B. Access to the maintenance roads would be at Sycamore Avenue, East San Martin Avenue, and Church Avenue. Approximately 3.3 acres of vacant SCVWD-owned land, east of the southern end of Kannely Lane on the west side of the channel and 5.9 acres of vacant land at the northern intersection of Sycamore Avenue and San Martin Avenue, would be used as staging areas during construction for Reach 14.

As shown in Table 4.10-2, Reach 14 forecast construction-related trips total to 70 daily trips, which would be dispersed over multiple area roadways. Construction of Reach 14 is anticipated to take place in construction Years 2 and 3, as shown in Table 4.10-4, and would add approximately 70 daily trips on average over those 2 years; and is, therefore, not expected to affect local traffic patterns. Construction staff trips would occur during the early morning and early afternoon while excavation, materials delivery, and support staff trips would occur periodically throughout the workday. ADT volumes are 109,000 ADT along U.S. 101 and 970 ADT along Sycamore Avenue in the northern portion of Reach 14. Therefore, the addition of Reach 14 forecast construction-related trips to the local roadway network would be reduced.

The preferred haul route between U.S. 101 and Reach 14 is provided via Sycamore Avenue to Center Avenue to Foothill Avenue to San Martin Avenue to the U.S. 101 ramps. If all the forecast construction- related daily trips for each reach were added to U.S. 101, the percent change would be less than 1 percent. This forecast of nominal addition to U.S. 101 would occur throughout the day; and conservatively assumes construction of all reaches would occur concurrently and all trips would travel in the same direction. If distribution to the north, south, or west were included, and if timing of reach construction were included, then the percent change on U.S. 101 would be lower. Therefore, the addition of Reach 14 forecast construction-related trips to the regional roadway network (U.S. 101) would be reduced.

Cochrane Road

Cochrane Road would be used primarily for access to Anderson Dam vicinity where excavation materials are anticipated to be disposed.

The U.S. 101/Cochrane Road interchange is constructed with a partial cloverleaf configuration. Traffic signals accommodate traffic volumes at the interchange ramp junction with Cochrane Road. Cochrane Road is a four-lane divided roadway (with raised median) just east of U.S. 101, and narrows to a two-lane divided roadway (with painted median) east of Mission Avenida. Cochrane Road east of San Rafael Street transitions to a two-lane undivided roadway. Cochrane Road serves retail and commercial land uses near U.S. 101 and transitions to residential land uses east of Mission Avenida. Approximately 12 residential properties have direct driveway access to Cochrane Road between Avenida Mission and Malaguerra Avenue. The daily traffic volume capacity on Cochrane Road likely varies between 20,000 and less than 10,000 daily vehicles.

The combined effect of excavation trips by year would contribute up to 630-daily truck trips added to Cochrane Road as soil is disposed at Anderson Dam (see Table 4.10-4). The peak daily excavation truck trips occurs in Year 2 of construction, with lower truck trips added to local roadways. Accounting for approximately 10 percent of excavation trips traveling to Lake Silveira directly from Reach 7A excavation instead of to Anderson Dam, then approximately 474 daily truck trips are forecast to be added to Cochrane Road in other construction years. The addition of construction vehicle trips to Cochrane Road likely can be accommodated from a traffic capacity perspective; however, a temporary traffic impact is expected where the predominant land use is residential. While the roadway can likely accommodate the increase in traffic volumes, residents would view the additional truck trips on the roadway as an impact from non-compatible vehicles (dump trucks). The traffic volume increase is small in terms of percentage increase, but the effect on context would likely be an impact to the community. Therefore, impacts from the addition of construction-related trips to Cochrane Road would be a temporary, significant impact.

The Tunnel Alternative would have potentially significant impacts associated with the temporary closure of Ciolino Avenue in Reach 7B, Hale Avenue in Reach 8, and from additional truck traffic on Cochrane Road. These impacts would be reduced through the preparation of the Traffic Control Plan and implementation of traffic mitigation measures as described in Chapter 5 of this EIS.

The nearest Congestion Management Program (CMP) facilities to the Proposed Project are U.S. 101 and State Route 152. There would be a minor increase in traffic along and near U.S. 101 as demonstrated in the reach discussions. For example, in Reach 4, ADT volumes for U.S. 101 from Masten Avenue to State Route 152 are 98,000 ADT (Table 3.10-1). The addition of approximately 134 daily trips for construction Years 1, 2, and 3, as shown in Table 4.10-4 is not expected to affect local traffic patterns. Similar increases of less than a couple of percent to existing traffic volumes are discussed throughout the reach. These increases to existing ADT volumes are negligible.

During construction, temporary road closures and increased truck traffic would apply to the Tunnel Alternative and may impede emergency access in the Project area, resulting in a temporary significant impact. By maintaining access to local businesses and residences and with implementation of the Traffic Control Plan, which includes a provision for emergency vehicle access so that emergency vehicle access would be provided along project area roadways at all times during construction, impacts would be reduced to less-than-significant levels. Additionally, as part of the Traffic Control Plan, the local fire and police departments (Morgan Hill Police Department and Santa Clara County Fire Department) would be also notified of the time and duration of planned lane closures in advance, and a public safety monitor would be present during all lane closures to ensure emergency vehicle access through the area.

The following is a description of potential conflicts with alternative transportation facilities and associated policies by reach. Construction in Reaches 4, 5, 6 and 14 would not result in conflicts with alternative transportation facilities. The General Plan for the City of Morgan Hill promulgates the following policies with regard to supporting walking trails and bikeways as alternative transportation facilities:

- *Policy 18l*. Coordinate trails, parks, and recreation facilities with a citywide bikeways system to include bicycle paths, lanes, and routes.
- *Policy 7h*. Where feasible, implement the bikeways system concurrent with adjacent development. Establish priorities for bikeways implementation based on improving safety and enhancing both commute and recreational cycling. These priorities shall be considered in directing resources and efforts to obtain funding for implementation. Priorities shall be regularly reviewed and updated as implementation proceeds. Current priorities for implementation of the bikeways plan include the following:
    - Live Oak High School Access
    - Little Llagas Creek Trail
    - Santa Teresa and Monterey Highway Corridor Improvements
    - East West Connection to Coyote Creek Trail
- *Policy 7p*. Promote extension of bicycle paths in conjunction with flood control efforts

Travel of trucks and other heavy construction equipment on local roads could cause damage to pavement from long-term hauling over 3 years and construction activities. The later 3 years of construction involve the mitigation plantings establishment period where it is expected light duty trucks will be utilized to inspect, maintain, and establish the mitigation plantings. Impacts on roadway facilities could also occur, as a result of loading and maneuvering of oversize and heavy vehicles. Impacts to roadways related to construction activities might be significant, but with implementation of the mitigation measures described in Chapter 5, impacts would be reduced.

After construction of the Tunnel Alternative, maintenance of stream channels, such as sediment removal, vegetation management, and associated minor activities, would occur. Traffic volumes from equipment and personnel accessing the channel to perform maintenance would be far less, temporary and intermittent compared to construction levels. Sediment removal, vegetation management, and minor maintenance and repairs are typical maintenance activities that require the use of heavy equipment. In the past, sediment maintenance has occurred only in Reach 14 and near the Church Pond inlet in Reach 6. Sediment maintenance could occur in other locations in the future, but the Project contains design features that encourage any sediment to collect in a part of Reach 6 and near the confluence of Reaches 4, 5, and 14, as well as in Reach 8. Maintenance equipment is transported to and from maintenance sites and moved once projects are completed. Equipment is not stored permanently at maintenance sites. Nearly all maintenance would occur from maintenance roads to be constructed located at the top of channel banks or through planned access roads down the banks to the channel bottom. Maintenance activities would rarely occur from public roadways; and, therefore, would not regularly interfere with traffic patterns. Mobilization and demobilization of equipment from public roadways to SCVWD maintenance roads may briefly interfere with access to residences and businesses; however, maintenance activities are temporary and intermittent and would not affect traffic loads on the local street system.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.10.3.2 Natural Resources Conservation Service (NRCS) Alternative

The NRCS Alternative would provide flood management for urban areas, specifically the following: a 1-percent flood in Morgan Hill (Reaches 8, 7A, and 7B); 10-percent flood management for the semi-urban area around East Little Llagas Creek (Reach 14); and avoid induced flooding elsewhere on Llagas Creek (Reaches 6, 5, and 4) due to upstream improvement.

The NRCS Alternative has similar impacts to traffic and circulation as the Tunnel Alternative. The NRCS Alternative does not include the construction of the tunnel within Reach 8 as with the Tunnel Alternative. However, the NRCS Alternative requires excavation of materials along West Little Llagas Creek from approximately West Main Street to Ciolino Avenue. As a result, the net result is that the NRCS Alternative will have slightly less material to be excavated, so with less expected truck trips. Though the NRCS Alternative has slightly less truck trips, the NRCS Alternative would impact more of the higher volume road with the urbanized downtown section of the City of Morgan Hill. So, traffic and circulation impacts would be greater or negligible as compared to the Tunnel Alternative.

Under the NRCS Alternative, 1,626,600 CY of earth materials from excavation would be disposed of (1,355,500 bank cubic yards [bcy][3] x 1.2 for soil expansion factor after excavation from in-situ = 1,626,600 CY), with 275,000 CY to be hauled from Reach 7A to nearby Lake Silveira for habitat restoration, leaving approximately 1,351,600 CY to be hauled offsite for disposal and storage at Anderson Dam. Construction of the NRCS Alternative would require loading approximately 112,633 trucks for a roundtrip to Anderson Dam over the 3-year construction life of the Project. Since a truck trip requires a roundtrip, one outbound to the dam, and one return trip to the Project site to obtain another load, this is considered two trips for each load, or 112,633 x 2 = 225,266 truck trips with a 12 CY truck capacity. Phase 1 of the Project would include construction of the bypass channel in Reach 7A and the channel improvements in Reach 4. During Phase 2, channel construction would be sequenced from downstream, starting in Reach 5 to upstream, to avoid induced flooding.

Temporary road closures would likely be necessary under the NRCS Alternative at West 2nd, 3rd, 4th, and 5th Streets, and along Monterey Road in downtown Morgan Hill and through the Morgan Hill Plaza Shopping Center parking lot (between West Dunne Avenue and Ciolino Avenue). Construction for the NRCS Alternative is expected to last for 6 years, with the last 3 years involving the mitigation plantings establishment period.

The NRCS alternative would not result in any permanent traffic impacts as no existing roadways would be altered, no new roadways would be developed, and there is no additional traffic added since this is a flood-management Project. However, construction activities under the NRCS Alternative are anticipated to temporarily interfere with local traffic patterns including temporary road closures, traffic delays due to construction vehicle access, and construction activities including material hauling and disposing. Construction would take place Monday through Friday from 7:00 a.m. to 8:00 p.m. and Saturdays from 9:00 a.m. to 6:00 p.m. As compared to the Tunnel Alternative, the NRCS Alternative would involve similar traffic in Reach 7B and Reach 8, as described in the Tunnel Alternative.

Reach 8

For the NRCS Alternative, Reach 8 involves channel widening and deepening through downtown Morgan Hill. Approximately 1.4 acres of vacant land at the site of the Pacific Gas and Electric Company (PG&E) substation, on the southwest of the intersection of Hale Avenue and East Main Avenue on the west side of the channel (APN# 767-05-001), would be used as a staging area during construction for Reach 8.

[3] BCY is "bank cubic yards," which is a measure of volume of sediment in-situ. The BCY expands by a factor of 1.2x when it is excavated and placed into dump trucks for off-site hauling.

Traffic and congestion impacts to this reach for the NRCS Alternative are slightly different than the Tunnel Alternative as discussed previously and as shown in Table 4.10-2. The Reach 8 forecast construction-related trips and Average Daily Trip (ADT) volumes are as described. As shown in Table 4.10-2, Reach 8 construction-related trips total to 42 daily trips, which would be dispersed over multiple area roadways. ADT volumes for local roadways near Reach 8 range from 125,000 ADT along U.S. 101 to 6,210 ADT along Hale Avenue. Construction in Reach 8 is anticipated to take place in construction Years 2 through 5, as shown in Table 4.10-4, and would add approximately 42 daily trips over each of those 4 years; which is a very small percentage of the local ADT and, therefore, would not affect local traffic patterns. Construction staff trips would occur during the early morning and early afternoon avoiding peak traffic, while excavation, materials delivery, and support staff trips would occur periodically throughout the workday.

Hale Avenue is a two-lane undivided roadway serving residential and institutional land uses in the vicinity of Reach 8. Hale Avenue in the Project vicinity currently accommodates approximately 6,200 vehicles per day, as identified in the City of Morgan Hill General Plan Circulation Update (2009). Temporary closure of Hale Avenue is planned for construction activities related to Reach 8. Since Hale Avenue would be intermittent during the temporary construction activities, the traffic operations on the roadway would be affected, causing a substantial impact to traffic load and capacity on the road. The temporary detour of Hale Avenue traffic due to Reach 8 construction activity is a temporary, significant impact. With implementation of the Traffic Control Plan and the mitigation measures as described in Chapter 5 of this EIS, which involve coordinating and maintaining access to local residences and business, impacts would be reduced.

The preferred haul routes for the NRCS Alternative are the same as the Tunnel Alternative.

After construction, the operations and maintenance (O&M) activities associated with the NRCS Alternative would be greater than those O&M activities described in the Tunnel Alternative within Reach 8. Instead of the O&M of the proposed tunnel within Reach 8, the NRCS would instead require O&M activities along West Little Llagas Creek between West Main Street and Ciolino Avenue within the City of Morgan Hill. After construction of the NRCS Alternative, maintenance of stream channels such as sediment removal, vegetation management and associated minor activities would occur. Traffic volumes from equipment and personnel accessing the channel to perform maintenance would be far less, temporary and intermittent compared to construction levels, but would occur within the City of Morgan. These Reach 8 O&M activities associated with the NRCS Alternative are not required under the Tunnel Alternative.

Reach 7B

Traffic and congestion impacts to this reach for the NRCS Alternative are similar to the Tunnel Alternative as discussed previously and as shown in Table 4.10-2. The Reach 7B forecast construction-related trips, Average Daily Trip (ADT) volumes would be similar on the local roadways. The preferred haul routes for the NRCS Alternative are the same as the Tunnel Alternative.

After construction, the operations and maintenance (O&M) activities associated with the NRCS Alternative would be similar to the O&M activities described in the Tunnel Alternative within Reach 7B.

Reach 7A

Traffic and congestion impacts to this reach for the NRCS Alternative are similar to the Tunnel Alternative as discussed previously and as shown in Table 4.10-2. The Reach 7A forecast construction-related trips, Average Daily Trip (ADT) volumes would be similar on the local roadways. The preferred haul routes for the NRCS Alternative are the same as the Tunnel Alternative.

After construction, the operations and maintenance (O&M) activities associated with the NRCS Alternative would be similar to the O&M activities described in the Tunnel Alternative within Reach 7A.

Reaches 4, 5, 6, and 14

Traffic and congestion impacts to these reaches would be the same as described in the Tunnel Alternative. The forecast construction-related trips, Average Daily Trip (ADT) volumes for these Project reaches would be same in these reaches as described in the Tunnel Alternative. The preferred haul routes are the same for this Alternative as the Tunnel Alternative for these reaches.

After construction, the operations and maintenance (O&M) activities associated with this Alternative would be the same for these reaches as described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.10.3.3 Culvert/Channel Alternative

The key feature of the Culvert/Channel Alternative is elimination of the need for channel deepening and widening through residential properties, as proposed for the NRCS Alternative between West Main Avenue and West 2nd Street in Reach 8. The construction approach for the Culvert/Channel Alternative would be the same throughout all Project reaches as previously described for the NRCS Alternative. Construction duration for the Culvert/Channel Alternative would be 6 years, with construction lasting for about 36 months, with a 3 year post construction mitigation plant establishment period, same as the NRCS Alternative. Construction activities, equipment, and crew size would be the same as that described for the NRCS Alternative, except that in a segment of Reach 8; construction would occur through athletic fields and along Del Monte Road to West 2nd Street, rather than through a section of residential homes between West Main Avenue and West 2nd Street. Road closures would likely be necessary under the Culvert/Channel Alternative at West 2nd, 3rd, 4th, and 5th streets, and along Monterey Road in downtown Morgan Hill and through the Morgan Hill Plaza Shopping Center parking lot (between West Dunne Avenue and Ciolino Avenue).

Reach 8

Traffic and congestion impacts to this reach for the Culvert/Channel Alternative are similar to the Tunnel Alternative as discussed previously and as shown in Table 4.10-2. The Reach 8 forecast construction-related trips, Average Daily Trip (ADT) volumes would be similar on the local roadways. Under the Culvert/Channel Alternative, 1,629,600 CY of earth materials from excavation would be disposed (1,358,000 bcy x 1.2 for soil expansion factor after excavation from in-situ = 1,629,000 CY) with 275,000 CY to be hauled from Reach 7A nearby for use at Lake Silveira, leaving approximately 1,354,600 CY to be hauled offsite for disposal and storage at Anderson Dam. Construction of the Culvert/Channel Alternative would require loading approximately 112,833 trucks for a roundtrip to Anderson Dam over the 6-year life of the Project, nearly the same as for the NRCS Alternative. Since a truck trip requires a roundtrip, one outbound to the dam, and one return trip to the Project site to obtain another load, this is considered two trips for each load, or 112,833 x 2 = 225,766 truck trips with a 12 CY truck capacity. The preferred haul routes for the Culvert/Channel are the same as the Tunnel Alternative.

After construction, the operations and maintenance (O&M) activities associated with the Culvert/Channel Alternative would be similar to those O&M activities described in the Tunnel Alternative within Reach 8.

Reach 7B

Traffic and congestion impacts to this reach for the Culvert/Channel Alternative are similar to the Tunnel Alternative as discussed previously and as shown in Table 4.10-2. The Reach 7B forecast construction-related trips, Average Daily Trip (ADT) volumes would be similar on the local roadways. The preferred haul routes for the Culvert/Channel are the same as the Tunnel Alternative.

After construction, the operations and maintenance (O&M) activities associated with the Culvert/Channel Alternative would be similar to the O&M activities described in the Tunnel Alternative within Reach 7B.

Reach 7A

Traffic and congestion impacts to this reach for the Culvert/Channel Alternative are similar to the Tunnel Alternative as discussed previously and as shown in Table 4.10-2. The Reach 7A forecast construction related trips, Average Daily Trip (ADT) volumes would be similar on the local roadways. The preferred haul routes for the Culvert/Channel Alternative are the same as the Tunnel Alternative.

After construction, the operations and maintenance (O&M) activities associated with the Culvert/Channel Alternative would be similar to the O&M activities described in the Tunnel Alternative within Reach 7A.

Reaches 4, 5, 6, and 14

Traffic and congestion impacts to these reaches would be the same as described in the Tunnel Alternative. The forecast construction-related trips, Average Daily Trip (ADT) volumes for these Project reaches would be same in these reaches as described in the Tunnel Alternative. The preferred haul routes are the same for this Alternative as the Tunnel Alternative for these reaches.

After construction, the operations and maintenance (O&M) activities associated with this Alternative would be the same for these reaches as described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.10.3.4 Reach 6 Bypass Alternative

Reach 6 Bypass Alternative construction involves construction of a high-flow bypass channel between Reach 6 of Llagas Creek and Reach 14 of East Little Llagas Creek. The bypass would eliminate the need for construction and improvements along Reach 6 downstream of the proposed bypass channel (which is approximately 0.5 mile downstream from Monterey Highway) or Reach 5 downstream of the proposed bypass.

Under the Reach 6 Bypass Alternative, 1,196,400 CY of earth materials from excavation would be disposed with 275,000 CY to be hauled from Reach 7A nearby for Llagas Creek restoration at Lake Silveira, leaving approximately 921,400 CY to be hauled offsite for disposal and storage at Anderson Dam. Construction of the Reach 6 Bypass Alternative would require loading approximately 76,783 trucks for a roundtrip to Anderson Dam over the 5-year life of the Project, which is less than the other action alternatives. Since a truck trip requires a roundtrip, one outbound to the dam and one return trip to the Project site to obtain another load, this is considered two trips for each load, or 76,783 x 2 = 153,566 truck trips with a 12-CY truck capacity.

The Reach 6 Bypass Alternative would not result in any permanent traffic impacts once construction is completed, as it will not alter, reduce or add roads, and would not generate new additional sources of traffic in association with the flood-management Project. However, construction activities are anticipated to interfere with local traffic patterns and with traffic along U.S. 101 due to detours related to construction of bridges to accommodate the Reach 6 bypass channel as shown in Table 4.10-3. Construction activities that are anticipated to interfere with local traffic patterns include temporary road closures, traffic delays due to construction vehicle access, and construction activities including material hauling and disposing. Impacts related to the Reach 6 Bypass Alternative would be very similar to the Tunnel Alternative in all Project reaches, discussed above, with the exception of Reaches 5, 6, and 14 as described below.

Reaches 5, 6 and 14

Construction of the Reach 6 Bypass Alternative requires building three new bridges on existing roadways in Reaches 5 and 6 serving local and regional traffic: at Murphy Avenue, and U.S. 101 southbound and northbound (see Figures 2.9-3, 2.9-4, and 2.9-5). Construction of the bridges would require diversion of traffic onto a temporary roadway around the construction zone. The temporary roadway diversions would require extensive permitting and design coordination with Santa Clara County and Caltrans.

Staging of construction activities is planned through construction of a temporary bypass for both northbound and southbound U.S. 101 traffic. The temporary bypass would be localized to the area of construction and would not divert traffic onto the local circulation system. A temporary bypass would be constructed adjacent U.S. 101, and traffic would be realigned during an overnight and/or weekend closure. Caltrans will likely require the U.S. 101 realignment to accommodate high-speed travel while the bridges are constructed. Upon re-opening of U.S. 101, after diversion of traffic onto the bypass, U.S. 101 traffic would travel through the construction zone with nominal delays. The total number of days for the two-phase construction of U.S. 101 bridges for the Reach 6 Bypass is approximately 250 days, with traffic diverted on the temporary bypass for 90–180 days, depending on the direction of travel. Upon the completion of the bridge construction, an overnight and/or weekend closure would again occur to return traffic to the mainline freeway, utilizing the new bridges as they pass over the Reach 6 Bypass.

Caltrans requires preparation of a TMP whenever closures are planned on freeway facilities to minimize motorist delay and provide public notification regarding closures and impacts. The Traffic Control Plan will be prepared to be compliant with Caltrans TMP requirements. The TMP identifies times allowed for closure and details regarding notification of the public, including a public awareness campaign. While closure of U.S. 101 to construct the detour routes would be facilitated through the TMP, the closures of the U.S. 101 would remain a temporary impact for overnight and/or weekend closures when traffic is rerouted onto a temporary freeway alignment for northbound and southbound traffic. The construction of the two new bridges for Reach 6 Bypass will not close U.S. 101 for the entirety of the 250-day construction duration, as closures would be limited to overnight and/or weekend closures. Since U.S. 101 would be temporarily closed, related to staging of the bypass, a temporary impact is forecast to occur for overnight and/or weekend closures of U.S. 101.

Construction of the Reach 6 Bypass Alternative would not require any construction in Reach 5 and would require construction in a portion of Reach 6 for the bypass channel itself. A portion of Reach 14, downstream of the Reach 6 bypass confluence with Reach 14 would have to be excavated greater in width than the other Action Alternatives. Therefore, Reach 14 related truck trips would be greater, Reach 6 (including the Bypass), would be very similar in related truck trips as the other Action Alternatives. Therefore, excavation quantities and disposal-related truck trips would only be slightly reduced relative to the other Action Alternatives within these reaches.

Construction staff trips would occur during the early morning and early afternoon, avoiding peak traffic while excavation, materials delivery, and support staff trips would occur periodically throughout the workday. Temporary rerouting of traffic on Murphy Avenue for construction of a new bridge would be necessary for construction activities related to the Reach 6 Bypass Alternative. Murphy Avenue is a two-lane undivided roadway serving residential, agricultural, and industrial land uses. Murphy Avenue, in the vicinity of the bypass, extends to Middle Avenue on the north and San Martin Avenue on the south. The temporary detour of Murphy Avenue traffic due to Reach 6 Bypass Alternative construction activity is a temporary, significant impact on the local roadway network. With implementation of a Traffic Control Plan and mitigation measures, access would be maintained to the extent possible and public noticing and safety measures, as well as detours would be required to be posted. Impacts would be reduced with mitigation. The preferred haul route between U.S. 101 and Reach 6 Bypass Alternative is provided via Llagas Avenue and Sycamore Canyon to San Martin Avenue to the U.S. 101 ramps. ADT Volumes in this area are 109,000 along U.S. 101 and 10,600 on Monterey Road. If all the forecast, construction-related daily trips for each reach were added to U.S. 101, the percent change would be less than 1 percent. This forecast of nominal addition to U.S. 101 would occur throughout the day, and conservatively assumes that construction of all reaches would occur concurrently, and that all trips would travel in the same direction. If distribution to the north, south, or west were included, and if timing of reach construction were included, then the percent change on U.S. 101 would be lower.

Temporary rerouting of traffic on U.S. 101 for construction of three new bridges is planned for construction activities related to the Reach 6 Bypass Alternative. Therefore, the temporary detour of U.S. 101 traffic due to Reach 6 Bypass Alternative construction activity is a temporary, significant impact on the regional roadway network (U.S. 101). A Traffic Control Plan would be prepared and implemented to maintain access, to the extent possible, and provide public noticing and safety measures. However, given the extent of use of U.S. 101 as part of a regional commute network and the likelihood of slow-downs for the detour over an extended 0.75-year period, this impact is significant and unavoidable.

Reaches 7A, 7B and 8

Traffic and congestion impacts to these reaches would be the same as described in the Tunnel Alternative. The forecast construction-related trips, Average Daily Trip (ADT) volumes for these Project reaches would be same in these reaches as described in the Tunnel Alternative. The preferred haul routes are the same for this Alternative as the Tunnel Alternative for these reaches.

After construction, the operations and maintenance (O&M) activities associated with this Alternative would be the same for these reaches as described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.10.4 Summary of Impacts to Traffic and Circulation

The Tunnel Alternative and the Reach 6 Bypass Alternative would not require construction on a portion of West Little Llagas Creek through downtown Morgan Hill which would result in less construction-related interference in Reach 8 with commercial and residential areas as compared with the NRCS and Culvert/Channel alternatives.

The potential environmental concerns related to traffic and circulation identified for the Project reaches would primarily occur during the construction phase and would involve interference with local traffic patterns. Activities, such as heavy equipment access, construction-related traffic, truck trips related to proposed disposal of fill in the vicinity of Anderson Dam, deterioration of local roads, temporary detours on U.S. 101 (Reach 6 Bypass Alternative only), and temporary impacts to parking spots at the Morgan Hill Plaza Shopping, all have the potential for temporary significant impacts as they relate to all action alternatives. The Reach 6 Bypass Alternative will require temporary detours on U.S. 101 for bridge construction which would remain a significant impact to traffic and circulation.

Mitigation measures and BMPs, as appropriate, for the various Action Alternatives to reduce the impacts to Traffic and Circulation are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

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4.11 AIR QUALITY AND GREENHOUSE GASES

4.11.1 Introduction

During construction activities, the Project would cause criteria and GHG emissions from the combustion of fossil fuels (i.e., gasoline and diesel) used to operate off-road equipment, portable equipment, and vehicles in the vicinity of Morgan Hill and San Martin located in southern Santa Clara County. In addition, fugitive dust (as PM10 and PM2.5) would be generated by earthmoving tasks. This section evaluates Project emissions to determine overall effects of the four variants—Tunnel Alternative, NRCS Alternative, Culvert/Channel Alternative, or Reach 6 Bypass Alternative—in relation to established thresholds of significance.

As described in Section 3.11, operation of off-road equipment, on-road vehicles, and portable equipment would result in emissions of criteria pollutants (NOX, VOC, CO, SOX, PM10, PM2.5) and GHGs (CO2, CH4, N2O) in engine exhaust and fugitive dust (PM10 and PM2.5) from earthmoving tasks. Preliminary lists of equipment and estimated usage were established and are shown in Appendix K, Table 4.11-h. Emission calculations (Appendix K, Tables 3.11-h, -i, -j) were performed for the year 2017 using the most recent (2008)2 emission factors and algorithms published by the South Coast Air Quality Management District (SCAQMD)3 and the USEPA (2011b, 2012b, 2012c). For the 6-year Project, construction is expected to require about 5 to 8 months of planned work activities annually during the dry season (generally mid-March through mid-November) depending on the reaches being altered in any given year (phase). Deviations from this schedule would not affect the air quality analysis, because it is based on maximum daily emissions (pounds per day) and total Project emissions (tons), which would remain unchanged.

Estimated criteria air pollutants and greenhouse gas emissions of the four variants— NRCS Alternative; Tunnel Alternative; Culvert/Channel Alternative; and Reach 6 Bypass Alternative—are shown in Tables 4.11-11 through 4.11-21 for peak daily, average annual, and Project total timeframes. Total emissions for the alternatives are compared side-by-side in Tables 4.11-17 and 4.11-21. Peak daily criteria emissions are evaluated with respect to BAAQMD thresholds of significance in Tables 4.11-11, 4.11-12, and 4.11-13; no other numeric thresholds for criteria pollutants or GHGs apply to the Project. Note that for evaluation purposes, the NRCS and Culvert/Channel alternatives would have approximately the same activity levels; therefore, approximately the same emissions.

[2] On a preliminary basis, 2017 is possibly the earliest year that maximum activity levels could occur, i.e., Years 2 or 3 of the Project.

[3] BAAQMD does not publish its own emission factors per se; the SCAQMD off-road factors are based on federal standards pursuant to 40 CFR 89.112; SCAQMD on-road factors are based on 40 CFR 86 et seq. vehicle category standards; the SCAQMD factors are output from CARB's OFFROAD and EMFAC applications which reference the above cited regulations, respectively. These are the same emission factors used in the statewide general-purpose land-use model CalEEMod (California Emissions Estimator Model) which has been officially adopted by air districts including BAAQMD.

Table 4.11-10 Significance Thresholds for Criteria Pollutants - BAAQMD (2010)

Applicability	VOC	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Operation, tons/year	10	CAAQS [1]	10	40 [2]	15	10
Operation, pounds/year	20,000	CAAQS [1]	20,000	80,000 [2]	30,000	20,000
Operation, pounds/day	54	CAAQS [1]	54	—	82	54
Construction, pounds/day	54	CAAQS [1]	54	—	82 [3]	54 [3]

[1] No violation of CAAQS for CO (9 ppmv for 1 hour, 20 ppmv for 8 hours)
[2] PSD, annual only; no applicable BAAQMD threshold for SO (attainment).
[3] For construction projects, applies to exhaust emissions only, BMPs required for fugitive dusts
[4] Since the Project does not meet the definition of a land use development project, stationary source project, or planning activity, no GHG thresholds apply. There are no GHG thresholds for construction-related emissions from mobile and portable sources used in building stationary or nonstationary source projects.
[5] BAAQMD nonattainment pollutants to which CEQA thresholds apply are ozone (as VOC and emissions), PM And $PM_{2.5.}$Sources: BAAQMD 2012b, 2010c (see note 4), 40 CFR 51.166

Table 4.11-11 Estimated Peak Daily Criteria Emissions for Project with NRCS or Culvert/Channel Alternatives

Project Phase	VOC lbs/day	CO lbs/day	NO_X lbs/day	SO_X lbs/day	C-PM_{10} lbs/day	C-$PM_{2.5}$ lbs/day	F-PM_{10} lbs/day	F-$PM_{2.5}$ lbs/day
Year 1	13	72	88	0.2	5	4	21	3
Year 2	38	210	260	0.5	14	12	62	8
Year 3	38	207	257	0.5	13	12	62	8
Year 4	19	104	128	0.3	7	6	31	4
Year 5	19	104	128	0.3	7	6	21	3
Year 6	7	36	44	0.1	2	2	10	1
Peak Day	**38**	**210**	**260**	**0.5**	**14**	**12**	**62**	**8**
Significance	**LTS**	**LTS**	**S**	**—**	**LTS**	**LTS**	**—**	**—**

Culvert/Channel Alternative same as NRCS Alternative (estimated emissions are the same)
"C" prefix denotes combustion byproduct particulate matter; "F" prefix denotes fugitive dust particulate matter
LTS = Less than significant; S = Significant; LTSM = Less than significant with mitigation; *B = beneficial under NEPA Sources: SCAQMD 2008, USEPA 2011b

Table 4.11-12 Estimated Peak Daily Criteria Emissions for Project with Tunnel Alternative

Project Phase	VOC lbs/day	CO lbs/day	NO_X lbs/day	SO_X lbs/day	C-PM_{10} lbs/day	C-$PM_{2.5}$ lbs/day	F-PM_{10} lbs/day	F-$PM_{2.5}$ lbs/day
Year 1	13	72	88	0.2	5	4	21	3
Year 2	44	242	303	0.6	16	15	64	9
Year 3	44	240	300	0.6	16	14	64	9
Year 4	25	136	171	0.3	9	8	33	5
Year 5	25	136	171	0.3	9	8	23	3
Year 6	7	36	44	0.1	2	2	10	1
Peak Day	**44**	**242**	**303**	**0.6**	**16**	**15**	**64**	**9**
Significance	**LTS**	**LTS**	**S**	**—**	**LTS**	**LTS**	**—**	**—**

"C" prefix denotes combustion byproduct particulate matter; "F" prefix denotes fugitive dust particulate matter
LTS = Less than significant; S = Significant; LTSM = Less than significant with mitigation; *B = beneficial under NEPA Sources: SCAQMD 2008, USEPA 2011b

Table 4.11-13 Estimated Peak Daily Criteria Emissions for Project with Reach 6 Bypass Alternative

Project Phase	VOC lbs/day	CO lbs/day	NO_X lbs/day	SO_X lbs/day	C-PM_{10} lbs/day	C-$PM_{2.5}$ lbs/day	F-PM_{10} lbs/day	F-$PM_{2.5}$ lbs/day
Year 1	13	72	88	0.2	5	4	21	3
Year 2	40	221	277	0.5	15	13	55	8
Year 3	40	219	274	0.5	14	13	55	8
Year 4	21	115	145	0.3	8	7	24	4
Year 5	21	115	145	0.3	8	7	14	2
Year 6	7	36	44	0.1	2	2	10	1
Peak Day	**40**	**221**	**277**	**0.5**	**15**	**13**	**55**	**8**
Significance	**LTS**	**LTS**	**S**	**—**	**LTS**	**LTS**	**—**	**—**

"C" prefix denotes combustion byproduct particulate matter; "F" prefix denotes fugitive dust particulate matter
LTS = Less than significant; S = Significant; LTSM = Less than significant with mitigation; *B = beneficial under NEPA Sources: SCAQMD 2008, USEPA 2011b

Table 4.11-14 Estimated Average Annual Criteria Emissions for Project with NRCS or Culvert/Channel Alternatives

Project Phase	VOC	CO	NO_X	SO_X	C-PM_{10}	C-$PM_{2.5}$	F-PM_{10}	F-$PM_{2.5}$
	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
Year 1	1.0	5.6	6.8	0.01	0.4	0.3	1.4	0.2
Year 2	3.1	17.1	21.2	0.04	1.1	1.0	4.5	0.6
Year 3	3.2	17.2	21.4	0.04	1.1	1.0	4.6	0.6
Year 4	1.7	9.5	11.8	0.02	0.6	0.6	2.5	0.3
Year 5	1.7	9.5	11.8	0.02	0.6	0.6	1.8	0.2
Year 6	0.7	3.6	4.4	0.01	0.2	0.2	0.9	0.1
Highest Year	**3.2**	**17.2**	**21.4**	**0.04**	**1.1**	**1.0**	**4.6**	**0.6**

"C" prefix denotes combustion byproduct particulate matter; "F" prefix denotes fugitive dust particulate matter
LTS = Less than significant; S = Significant; LTSM = Less than significant with mitigation; *B = beneficial under NEPA Sources: SCAQMD 2008, USEPA 2011b

Table 4.11-15 Estimated Average Annual Criteria Emissions for Project with Tunnel Alternative

Project Phase	VOC	CO	NO_X	SO_X	C-PM_{10}	C-$PM_{2.5}$	F-PM_{10}	F-$PM_{2.5}$
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr
Year 1	1.0	5.6	6.8	0.01	0.4	0.3	1.4	0.2
Year 2	3.7	20.1	25.2	0.05	1.3	1.2	4.7	0.7
Year 3	3.7	20.3	25.3	0.05	1.3	1.2	4.7	0.7
Year 4	2.3	12.5	15.7	0.03	0.8	0.8	2.7	0.4
Year 5	2.3	12.5	15.7	0.03	0.8	0.8	1.9	0.3
Year 6	0.7	3.6	4.4	0.01	0.2	0.2	0.9	0.1
Highest Year	**3.7**	**20.3**	**25.3**	**0.05**	**1.3**	**1.2**	**4.7**	**0.7**

"C" prefix denotes combustion byproduct particulate matter; "F" prefix denotes fugitive dust particulate matter
Sources: SCAQMD 2008, USEPA 2011b

Table 4.11-16 Estimated Average Annual Criteria Emissions for Project with Reach 6 Bypass Alternative

Project Phase	VOC tons/yr	CO tons/yr	NO_X tons/yr	SO_X tons/yr	C-PM_{10} tons/yr	C-$PM_{2.5}$ tons/yr	F-PM_{10} tons/yr	F-$PM_{2.5}$ tons/yr
Year 1	1.0	5.6	6.8	0.01	0.4	0.3	1.4	0.2
Year 2	3.5	19.2	24.0	0.05	1.3	1.2	4.2	0.6
Year 3	3.5	19.3	24.1	0.05	1.3	1.2	4.3	0.6
Year 4	2.1	11.6	14.5	0.03	0.8	0.7	2.2	0.3
Year 5	2.1	11.6	14.5	0.03	0.8	0.7	1.5	0.2
Year 6	0.7	3.6	4.4	0.01	0.2	0.2	0.9	0.1
Highest Year	**3.5**	**19.3**	**24.1**	**0.05**	**1.3**	**1.2**	**4.3**	**0.6**

"C" prefix denotes combustion byproduct particulate matter; "F" prefix denotes fugitive dust particulate matter
Sources: SCAQMD 2008, USEPA 2011b

Table 4.11-17 Estimated Total Criteria Emissions for All Project Alternatives

Project Options	VOC tons	CO tons	NO_X tons	SO_X tons	C-PM_{10} tons	C-$PM_{2.5}$ tons	F-PM_{10} tons	F-$PM_{2.5}$ tons
NRCS or Culvert/Channel	11.5	62.7	77.4	0.15	4.0	3.7	16.5	2.2
Tunnel Alternative	13.7	74.7	93.2	0.18	4.9	4.5	17.2	2.4
Reach 6 Bypass	12.9	71.3	88.9	0.17	4.7	4.3	15.5	2.2

"C" prefix denotes combustion byproduct particulate matter; "F" prefix denotes fugitive dust particulate matter
LTS = Less than significant; S = Significant; LTSM = Less than significant with mitigation; *B = beneficial under NEPA Sources: SCAQMD 2008, USEPA 2011b

Table 4.11-18 Estimated GHG Emissions for NRCS or Culvert/Channel Alternatives

Project Phase	CO_2 MT/yr	CH_4 MT/yr	N_2O MT/yr	CO_2e MT/yr
Year 1	1,084	0.1	0.0	1,097
Year 2	3,380	0.3	0.1	3,422
Year 3	3,406	0.3	0.1	3,449
Year 4	1,893	0.1	0.1	1,917
Year 5	1,893	0.1	0.1	1,917
Year 6	714	0.1	0.0	723
Highest Year	**3,406**	**0.3**	**0.1**	**3,449**

1 metric tonne (MT) = 1,000 kilograms or 2,204.6 pounds
Culvert/Channel Alternative same as NRCS Alternative (estimated emissions are the same) Sources: SCAQMD 2008, USEPA 2012b

Table 4.11-19 Estimated GHG Emissions for Tunnel Alternative

Project Phase	CO_2	CH_4	N_2O	CO_2e
	MT/yr	MT/yr	MT/yr	MT/yr
Year 1	1,084	0.1	0.0	1,097
Year 2	3,977	0.3	0.1	4,027
Year 3	4,003	0.3	0.1	4,054
Year 4	2,491	0.2	0.1	2,522
Year 5	2,491	0.2	0.1	2,522
Year 6	714	0.1	0.0	723
Highest Year	**4,003**	**0.3**	**0.1**	**4,054**

1 metric tonne (MT) = 1,000 kilograms or 2,204.6 pounds
Sources: SCAQMD 2008, USEPA 2012b

Table 4.11-20 Estimated GHG Emissions for Reach 6 Bypass Alternative

Project Phase	CO_2	CH_4	N_2O	CO_2e
	MT/yr	MT/yr	MT/yr	MT/yr
Year 1	1,084	0.1	0.0	1,097
Year 2	3,808	0.3	0.1	3,855
Year 3	3,834	0.3	0.1	3,882
Year 4	2,321	0.2	0.1	2,350
Year 5	2,321	0.2	0.1	2,350
Year 6	714	0.1	0.0	723
Highest Year	**3,834**	**0.3**	**0.1**	**3,882**

1 metric tonne (MT) = 1,000 kilograms or 2,204.6 pounds
Sources: SCAQMD 2008, USEPA 2012b

Table 4.11-21 Estimated Total GHG Emissions for All Project Alternatives

Project Phase	CO_2	CH_4	N_2O	CO_2e
	MT/yr	MT/yr	MT/yr	MT/yr
NRCS or Culvert/Channel Alternative	12,386	0.9	0.4	12,543
Tunnel Alternative	14,777	1.1	0.5	14,962
Reach 6 Bypass Alternative	14,179	1.0	0.5	14,354

1 metric tonne (MT) = 1,000 kilograms or 2,204.6 pounds
Culvert/Channel Alternative same as NRCS Alternative (estimated emissions are the same) Sources: SCAQMD 2008, USEPA 2012b

Table 4.11-22 Screening Health Risk Assessment for Excavation Activity

DPM Screen Parameter	Units	Reach 7A	Reach 7B	Reach 8
Onsite Emission Rate	lb/day	0.526	0.351	0.526
	g/sec	2.76E-03	1.84E-03	2.76E-03
Receptor Distance	meters	20	20	10
Modeled Hourly Concentration	μg/m^3	2.478	1.652	5.588
Corrected Annual Concentration	μg/m^3	0.248	0.165	0.559
Unit Risk Value (70-year MEI)	(μg/m^3)$^{-1}$	3.00E-04	3.00E-04	3.00E-04
Activity Duration	days	5	12	20
Annual MEI Correction	fraction	2.0E-04	4.7E-04	7.8E-04
Cancer Risk	probability	1.5E-08	2.3E-08	1.3E-07
	per million	0.01	0.02	0.13
Regulatory Threshold	per million	10	10	10
	significance	LTS	LTS	LTS

DPM = diesel particulate matter (PM_{10})
70-year maximally exposed individual = 25,550 days = 613,200 hours
LTS = less than significant; S = significant
Sources: NOAA 2008, USEPA 1992, USEPA 2011c, OEHHA 2009, WC 2013, BAAQMD 2012b, 2010c

DPM is considered a toxic (carcinogenic) air contaminant in California (17 CCR Subchapter 7, Section 93000). Table 4.11-22 presents the results of a screening-level HRA for DPM (as C-PM10) using conservative methodology for maximum excavation activity levels and timeframes. For the modeled point sources (i.e., mid-size diesel-powered excavating machines), release parameters for the engine exhaust pipes (stacks) were determined (i.e., height, diameter, temperature, and exit velocity), taking into account that the machines would most likely be operating in the channels (depressions), which reduces overall release height by several feet, roughly parallel with the surrounding receptors (5 feet or 1.5 meters). For two or three machines operating in combination, depending on location, the similar stacks were merged into one equivalent stack, pursuant to USEPA modeling guidance (1992). This was done to facilitate the screening procedure, provide additional conservatism, and eliminate small differences in dispersion, which would have little effect on overall results.

The screening version, AERSCREEN of the AERMOD dispersion model developed by USEPA (2011c), was used to determine worst-case ambient concentrations of emissions. For DPM, an organic air toxic with published emission factors and unit risk values (OEHHA 2009), cumulative cancer risk was determined for the nearest sensitive receptors, 33 to 66 feet (10 to 20 meters) away from excavations in Reaches 7A, 7B, and 8 for maximum working periods of 5, 12, and 20 days, respectively. Thus, the 70-year (613,200 lifetime hours) unit risk value for DPM was corrected to reflect these actual lengths of time (120 hours, 288 hours, and 480 hours, respectively). AERSCREEN predicts "worst-case" 1-hour, 3-hour, 8-hour, 24-hour, and annual concentrations—without the need for site-specific hourly meteorological data—that are equal to or greater than generated by AERMOD; however, the degree of conservatism varies depending on the application. Appendix K, Tables 3.11-d and 3.11-k contain calculation templates and dispersion modeling outputs.

4.11.2 No Action Alternative

Under the No Action Alternative, no construction activity would occur and therefore, no emissions of criteria pollutants (NOX, VOC, CO, SOX, PM10, PM2.5) and no emissions of GHGs (CO2, CH4, N2O) in engine exhaust or fugitive dust (PM10 and PM2.5) from earthmoving tasks would occur. In addition, since no construction would occur and no odors would be emitted.

Under the No Action Alternative, maintenance to clear sediment and debris within the existing creekbed, described in Section 2.5.5,, would be higher than the other alternatives; however, emissions would not be in excess of applicable daily significance thresholds shown in Table 4.11-10. In addition, emissions would not be in excess of applicable daily significance thresholds shown in Table 4.11-22. Maintenance with the no action alternative would cause very small incremental amounts of GHG emissions. However, no new odors would be emitted.

BMPs for the No Action Alternative, including O&M activities are discussed and described in Chapter 5 and Appendix B of this EIS.

4.11.3 Action Alternatives

4.11.3.1 Tunnel Alternative (Applicant's Proposed Action)

The key feature of the Tunnel Alternative is to use an underground concrete tunnel instead of channel widening and deepening proposed through Reach 8 in downtown Morgan Hill. The tunnel would be constructed under the Nob Hill Terrace neighborhood, and a sediment detention basin would be constructed in the 600 feet of channel between Wright Avenue and Hillwood Lane with an 18-foot-wide maintenance/access road for maintenance access to the sediment detention basin. Construction duration for the Tunnel Alternative would be 6 years, with construction lasting for about 36 months in Reach 8.

Refer to Tables 4.11-12, 4.11-15, 4.11-19, and 4.11-22. Under the Tunnel Alternative, seasonal construction activity would occur over the course of 6 years in the Project area. Emissions of criteria pollutants (NOX, VOC, CO, SOX, PM10, PM2.5) in engine exhaust and fugitive dust (PM10 and PM2.5) from earthmoving tasks would occur as a result of the construction activity. Also emitted would be DPM as PM10 in diesel engine exhaust.

As shown in Tables 4.11-12 and 4.11-15, the Project would have a limited potential to incrementally contribute to existing regional violations of state and federal air quality standards (i.e., nonattainment) in the Project vicinity (i.e., SFBAAB) for O3, PM10, and PM2.5 , as discussed in 3.11.3 Environmental Setting, primarily through diesel engine exhaust and fugitive dust emissions during construction activities. However, incremental impacts would be small, temporary, and would permanently cease upon Project completion.

Except for peak daily NOX emissions comprising onsite and offsite mobile sources, no applicable quantitative emissions thresholds would be exceeded in BAAQMD. Due to geographic dispersion and effective onsite fugitive dust mitigation measures, no local ambient air quality violations would occur solely due to Project emissions for any other pollutant, including CO, PM10, and PM2.5. Daily NOX emission thresholds would be exceeded using fleet-average equipment and BMPs. However, BMPs and mitigation measures, as described above and incorporated into emissions estimates, would nevertheless reduce the impact by about 15 to 20 percent compared to uncontrolled emissions. Therefore, the impact from NOX emissions would be significant due to the sizes and quantities of diesel- powered equipment and vehicles used on a daily basis, which exceed the mitigating capacity of BMPs and measures.

As shown in Table 4.11-12, except for NOX, none of the significance thresholds shown in Table 4.11-10 would be exceeded by the Project, neither daily nor annually, as applicable. Mitigation measures as described in Chapter 5, would not be able to fully reduce NOX emissions to below the significance threshold. However, except for NOX, since emissions would be controlled with BMPs and emissions are short-term in nature, they would not be cumulatively considerable and would, thus, be less than significant.

As discussed in Source Specific Regulations, the use of newer, less polluting Tiers 1, 2, 3, and 4 engines in most fleet construction equipment used onsite is a mitigating factor for combustion emissions of NOX, VOCs, CO, PM10, and PM2.5. California ultra-low sulfur diesel fuel, with a maximum sulfur content of 15 ppm by weight, would be used in all diesel-powered equipment to minimize SO2 and particulate emissions. However, since fleet-average Tiered emission standards and California ultra-low sulfur diesel fuel are the current baseline for the state, their use does not comprise mitigation, per se.

The Project would not conflict with the 2010 Clean Air Plan issued by BAAQMD (2012a), because general construction activity related emissions (i.e., temporary sources) are accounted for in the emission inventories included in the plan. Therefore, impacts on air quality plan objectives would be less than significant.

General estimated basin-wide construction-related emissions are included in BAAQMD's emission inventories (which, in part, form the basis for the air quality plans cited above) and are not expected to prevent attainment or maintenance of the O3, particulate matter, and CO standards within the Bay Area. Therefore, construction impacts related to air quality plans for these pollutants would be less than significant, and no mitigation measures would be required, since they are presently estimated and accounted for in BAAQMD's emission inventories.

The Tunnel Alternative would result in a small temporary incremental contribution to a cumulative effect for several criteria pollutants for which the SFBAAB is in nonattainment under an applicable federal or state ambient air quality standard (i.e., O3, PM10, and PM2.5).

DPM contains substances that are suspected carcinogens, along with pulmonary irritants and hazardous compounds, which may affect sensitive receptors such as young children, senior citizens, or those susceptible to respiratory disease. Where construction activity occurs in proximity to long-term sensitive receptors, there could be a potential for unhealthful exposure of those receptors to diesel exhaust, including residential receptors.

The Project sites are located in populated suburban areas. Several residential dwellings are in very close proximity to the watercourses, typically in Reaches 7A, 7B, and 8, approximately 33 to 66 feet (10 to 20 meters). The nearest schools within 1,000 feet (305 meters) of the Project area are Burnett Elementary School, St. Catherine's School, Britton Middle School, Oakwood Elementary School, and Gwinn Elementary School. The Centennial Senior Center is also within 1,000 feet of the creek. Nearby parks include Galvan Park, Britton Field, Morgan Hill Community Park, and Paradise Park. There are no hospitals proximate to Project sites.

In order to assess the potential impacts of Project construction activities upon proximate sensitive receptors, a screening-level HRA for DPM was performed using conservative methodology for maximum (intensive) excavation activity levels and timeframes, as described in Section 4.11.4.2. Conservative methodology overestimates impacts, thus, actual impacts would be lower than shown in Table 4.11-22.

Table 4.11-22 shows the results of the screening HRA. The 2010 BAAQMD cumulative cancer risk threshold of 10-5 (10 in a million) would not be exceeded in the vicinity of the excavations at the closest sensitive receptors or in the neighboring areas. For Reaches 7A, 7B, and 8, respective cumulative risk values are 0.01, 0.02, and 0.13 in a million, which are far below the threshold. This is due to (1) the short-term temporary nature of the mobile sources (days, not years), and (2) the relatively small size of the mobile sources (mid-size excavating machines) compared to permanent industrial stationary sources.

Due to the relatively small scale of the proposed construction activity in any one location, its short-term temporary nature, and its large overall footprint in the Project area, the exposure of sensitive receptors to substantial pollutant concentrations would be less than significant. BAAQMD control measures for diesel exhaust would be implemented as a BMP in combination with the fugitive dust controls as described in Chapter 5. The Project would not expose sensitive receptors to substantial pollutant concentrations and the impact would be reduced.

California ultra-low sulfur diesel fuel with a maximum sulfur content of 15 ppm by weight would be used in all diesel-powered equipment, which minimizes emissions of sulfurous gases (SO_2, hydrogen sulfide, carbon disulfide, and carbonyl sulfide). Therefore, no objectionable odors are anticipated from construction activities due to the use of diesel-powered equipment and vehicles.

Since excavation work may encounter odorous materials, such as decaying organic matter (plants, wood, leaves, etc.), a possibility exists that such odorous material could cause a nuisance as described in Section 4.11.3.5. A Project BMP is designed to prevent such a nuisance from affecting a considerable number of persons. The Tunnel Alternative would not create objectionable odors affecting a considerable number of persons; therefore, the impact would be reduced with implementation of BMPs.

Under the Tunnel Alternative, seasonal construction activity would occur over the course of 6 years in the Project area. Emissions of GHGs (CO_2, CH_4, N_2O) in engine exhaust would occur as a result of the construction activity. As shown in Tables 4.11-19 and 4.11-21, construction emissions would be about 4,000 metric tonnes CO_2 e in the highest year, and a cumulative total of about 15,000 metric tonnes CO_2 e occurring over the course of 6 years. These emissions would be temporary and would permanently cease upon Project completion, although GHGs can persist in the atmosphere for indefinite lengths of time. Compared to national, statewide, and Bay Area GHG inventories shown in Table 4.11-6, mitigated construction emissions would comprise about 0.00006, 0.0008, and 0.005 percent of these respective inventories on an annual basis. In Santa Clara County (Tables 4.11-8 and 4.11-9), Project emissions would be about 0.02 percent of the countywide annual total, and 0.05 percent of the mobile source sector within the county. These GHG emissions are well within USEPA limits of precision of -2 to +5 percent for fossil fuel combustion (USEPA 2012b) and are thus negligible in context.

Due to its small temporary scale and GHG mitigations, the Project would not individually affect the environment or impede the state’s ability to meet its 2020 GHG emission reduction goal; thus, the individual impact would be less than significant with implementation of BMPs, and the incremental cumulative impact would not be considerable.

On a statewide basis, agencies in California are in the process of implementing strategies to reduce GHG emissions pursuant to the Global Warming Solutions Act of 2006, which requires that California reduce its statewide GHG emissions to 1990 levels by 2020. Assembly Bill 32 required CARB to develop the Scoping Plan (2008) in coordination with the California Energy Commission’s Climate Action Team (2010). The Scoping Plan defines a comprehensive set of measures to achieve the mandated emissions level. Key approaches for reducing GHG emissions to 1990 levels by 2020 include:

Expanding and strengthening existing energy efficiency programs as well as building and appliance standards.

Achieving a statewide renewable electricity standard of 33 percent.

Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system.

Establishing targets for transportation-related greenhouse gas emissions for regions throughout California, and pursuing policies and incentives to achieve those targets.

Adopting and implementing measures to reduce transportation sector emissions, including California's Clean Car Standards, goods movement measures, and the Low Carbon Fuel Standard.

Creating targeted fees, including a public goods charge on water use, fees on high global warming potential gases, and a fee to fund the administrative costs of the state's long-term commitment to AB 32 implementation.

Due to its small scale and temporary status, the Project would not conflict with state and local plans, policies, or regulations aimed at curbing GHG emissions.

Under the Tunnel Alternative, operations and maintenance would be the same as described in Section 2.7.5. Compared to construction activities, maintenance emissions would be small and intermittent, mainly from on-road service vehicles (e.g., pickup trucks, dump trucks), small off-road equipment (e.g., mini-excavators, Bobcats™), portable equipment (e.g., wood chippers), and hand-held equipment (e.g., chainsaws, brush/grass cutters). As such, maintenance would not cause an exceedence of applicable daily significance thresholds shown in Table 4.11-10, would not cause an exceedence of applicable significance thresholds shown in Table 4.11-22, would cause very small incremental amounts of GHG emissions, but no new odors would be generated. The Applicant would be responsible for maintaining all Project features, such as the channel, tunnel, piping, culverts, roads, fences, and grade control structures consistent with SCVWD guidelines as applicable including work conducted from Hillwood Lane through Llagas Road within Morgan Hill. This would include vegetation and sediment removal needed to maintain adequate flow capacity of the channel and culverts. The maintenance methods and activities are described in Section 2.7.5.

General estimated basin-wide maintenance-related emissions are included in BAAQMD's emission inventories. Therefore, maintenance impacts would be less than significant, and no mitigation measures would be required, since they are presently estimated and accounted for in BAAQMD's emission inventories.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.11.3.2 Natural Resources Conservation Service (NRCS) Alternative

Compared to the Tunnel Alternative, estimated daily NOX emissions from fuel combustion would be about 14 percent lower, while fugitive dust emissions would be about 4 percent lower. However, since estimated emissions for the NRCS Alternative would be in the same quantitative range as the Tunnel Alternative and no BAAQMD thresholds would be exceeded except daily NOX, NEPA impact determinations, BMPs, and mitigation measures are the same as for the Tunnel Alternative. Thus, there is no significant difference in emissions impacts between the NRCS and Tunnel Alternatives. Therefore, please refer to the discussion on the Tunnel Alternative for the emissions impacts related to the NRCS Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.11.3.3 Culvert/Channel Alternative

Compared to the Tunnel Alternative, estimated daily NOX emissions from fuel combustion would be about 14 percent lower, while fugitive dust emissions would be about 4 percent lower. However, since estimated emissions for the Culvert/Channel Alternative would be in the same quantitative range as the Tunnel Alternative and no BAAQMD thresholds would be exceeded except daily NOX, CEQA impact determinations, BMPs, and mitigation measures are the same as for the Tunnel Alternative. Thus, there is no significant difference in emissions impacts between the Culvert/Channel and NRCS/Tunnel Alternatives. Therefore, please refer to the discussion on the Tunnel Alternative for the emissions impacts related to the Culvert/Channel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.11.4.5 Reach 6 Bypass Alternative

Compared to the Tunnel Alternative, estimated daily NOX emissions from fuel combustion would be about 9 percent lower, while fugitive dust emissions would be about 12 percent lower. The Reach 6 Bypass avoids the need for extensive excavation and earthmoving work in Reaches 5 and 6, thus, the bulk of emissions associated with these activities in other alternatives (i.e., Tunnel, NRCS, or Culvert/Channel) would not occur. As a result, aggregated NOX emissions for the Bypass would be about 26 pounds per day less than excavation and earthmoving work in Reaches 5 and 6. However, since estimated emissions for the Reach 6 Bypass

Alternative would be in the same quantitative range as the Tunnel Alternative and no BAAQMD thresholds would be exceeded except daily NOX, NEPA impact determinations, BMPs, and mitigation measures are the same as for the Tunnel Alternative. Thus, there is no significant difference in emissions impacts between the Reach 6 Bypass and the Tunnel Alternative. Therefore, please refer to the discussion on the Tunnel Alternative for the emissions impacts related to the Reach 6 Bypass Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.11.4 Summary of Impacts to Air Quality and Greenhouse Gases

The No Action Alternative would not result in any construction activity; therefore, no construction emissions and no construction impacts. Except for peak daily NOX emissions, which would exceed the BAAQMD significance threshold of 54 pounds per day, all construction impacts would be less than significant for the Tunnel, NRCS, Culvert/Channel, and Reach 6 Bypass alternatives whether criteria pollutants, DPM, or GHGs in engine exhaust or fugitive dust from earthmoving tasks. No other applicable daily significance thresholds shown in Tables 4.11-10 and 4.11-22 would be exceeded.

Consistent with BAAQMD guidelines, standard BMPs adopted by the Applicant (SCVWD) and mitigation measures as described in Chapter 5 of this EIS are incorporated into the alternatives analysis (Project design). As implemented, these BMPs and mitigation measures would reduce diesel exhaust emissions by about 15 to 20 percent overall compared to uncontrolled emissions; however, these practices and measures would not be able to reduce peak daily NOX emissions below 54 pounds per day. Notwithstanding significance, these emissions would be temporary and permanently cease upon completion of Project construction.

Long-term operations and maintenance would not result in significant new emissions of criteria pollutants, DPM, or GHGs in engine exhaust or fugitive dust from earthmoving tasks, which would cause an exceedence of applicable daily significance thresholds shown in Tables 4.11-10 and 4.11-22. In the context of significance thresholds, future maintenance activity would be essentially the same as existing maintenance, albeit with some changes; therefore, there would be no substantive changes in emissions and no substantive changes in impacts.

Mitigation measures and BMPs, as appropriate, for the various Action Alternatives to reduce the impacts to Traffic and Circulation are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

4.12 NOISE

4.12.1 Introduction

This section identifies applicable noise and vibration regulations and analyzes potential impacts associated with the implementation of the alternatives. Specifically, this section analyzes the potential noise and vibration impacts stemming from the proposed flood risk management and improvements in the project area, relative to applicable noise and vibration criteria and the existing ambient noise environment.

Construction activities are described in Chapter 2. Construction activity proposed for the Project alternatives would be considered short-term, occurring over some portion of the entire construction period (approximately 6 years). Construction would take place year-round and depending on the alternative, would include tunnel construction, existing channel improvements (excavation and grading to deepen and widen), excavation and construction of diversion channel, construction of permanent access roads, and installation of reinforced concrete boxes, as well as the development of Lake Silveira mitigation (see Chapter 2, Section 2.5.6 and Section 5.3 for further details on the Lake Silveira mitigation element). In-channel work would occur, to the extent feasible, during the dry season, typically between May 1 and October 15, when flows are low or, in most reaches, the channel is dry. Revegetation and work in upland areas adjacent to the creek channel could occur outside the dry season. Construction is assumed to take place Monday through Friday from 7:00 a.m. to 8:00 p.m. with the potential for construction work in the evenings until 10:00 p.m.; in emergencies, it could be later, and on Saturdays from 9:00 a.m. to 6:00 p.m., as necessary for certain activities. All construction activities within residential areas, including work hours, would be governed by local noise ordinances (the City of Morgan Hill and the County of Santa Clara), but generally would be limited to weekdays.

The use of construction equipment to accomplish any of the Proposed Project alternatives would result in noise in the Project area, i.e., construction zone. Table 4.12-7 shows typical noise levels for common construction equipment that have been identified for use in the Project (see Chapter 2, Section 2.6.2, NRCS Alternative). A few pieces of specialty equipment for other alternatives have been included, such as a drill rig, paving breaker (jackhammer), pile driver, and vibratory roller.

Table 4.12-7 Typical Noise Levels for Proposed Construction Equipment (at 50 feet)

Equipment	L_{MAX} (dBA)
Pile Driver	101
Paving Breaker (Jackhammer)	89
Jumbo 2-boom Diesel Drill Rig	89
Grader	85
Scraper	84
Compactor	83
Dozer	82
Spader	82
Cement Pump Truck	81
Crane	81
Excavator	81
Vibratory Roller	80
Static Roller	80
Concrete Truck	79
Front End Loader	79
Wheel Loader	79
Air Compressor	78
Backhoe	78
Paver	77
Dump Truck	76
Flat Bed Truck	74
Water Tanker	74
Hydroseeder	74
Pick-up Trucks	74
Tractor Crawler	40

Source: FHA 2006a,b

The source-noise levels shown in Table 4.12-7, which are normally measured at 50 feet, are used to determine the noise levels at nearby sensitive receptors by attenuating 6 dB for each doubling of distance for point sources of noise such as operating construction equipment. Noise levels at the nearest receptors for each reach were analyzed on a worst-case basis, using the equipment with the highest noise level expected to be used at the nearest receptor along the reach.

Some of the construction equipment listed in Table 4.12-7 would also produce ground borne vibration. The pieces of equipment proposed for the Project that would produce the highest vibration levels are listed in Table 4.12-8.

Table 4.12-8 Typical Vibration Levels for Proposed Construction Equipment (at 25 feet)

Equipment	Inches/second PPV
Vibratory Pile Driver	0.644
Vibratory Roller	0.210
Dozer	0.089
Flat Bed Truck	0.076
Paving Breaker	0.035

Source: FTA 2006a,b

The source vibratory levels shown in Table 4.12-7, which occur at 25 feet, are used to determine the vibration levels at nearby sensitive receptors by dividing the source PPV (point peak velocity/peak particle velocity) value by the distance to the receptor. Vibration levels at the nearest receptors for each reach were analyzed on a worst-case basis, using the equipment with the highest vibratory level expected to be used at the nearest receptor along each reach.

Maintenance activities associated with any of the action alternatives are those procedures needed to maintain channel flood capacity, such as sediment and vegetation management such as culverts; debris removal, minor maintenance; and additionally maintenance of the Lake Silveira inlet and outlet structures and structural facilities, (see Chapter 2, Section 2.5.6 and Chapter 5, Section 5.3 for further details on the Lake Silveira element). Maintenance activities proposed for the Project are considered long-term and, therefore, are recognized for purposes of the impact analysis as a permanent activity, even though maintenance does not occur on a continuous basis, but rather occurs relatively infrequently and intermittently since it is performed as- needed, typically for a few days every year. Mowing, for example, is necessary once or twice per year for 1 or 2 days in a given area. Maintenance activities listed below (also see Section 2.5.5 of this EIS) are necessary to help to maintain flood conveyance capacity, protect flood-related infrastructure, and to thereby reduce potential flood damage. These maintenance activities intermittently occur under current baseline conditions (see the No Action Alternative below).

Noise-generating equipment would be required for use during maintenance, including mounted flail and disc mowers, weed/grass trimmers, chain saws, and trucks for vegetation maintenance, and excavators or backhoes and dump trucks for sediment maintenance. Minor maintenance would include excavators and graders, dump trucks, along with smaller-scale equipment. Table 4.12-9 shows typical noise levels for the maintenance equipment that has been identified for use in the Project. It should be noted that noise from some of the equipment proposed for maintenance, such as mowers and weed-eaters, would likely not be discernible over typical residential noise sources. This is because the type of landscape equipment used and the type of noise generated for vegetation maintenance associated with the Project is not distinguishable from the type of landscape maintenance generated noise in residential areas. However, noise from graders, backhoes, excavators, and trucks would be very different from landscape equipment generating noise, and as such would be much more discernible in residential areas.

Table 4.12-9 Typical Noise Levels for Proposed Maintenance Equipment (at 50 feet)

Equipment	L_{MAX} (dBA)
Weed/Grass Trimmer	96
Disc Mower	91
Flail Mower	90
Grader	85
Chain Saw	84
Excavator	81
Backhoe	78
Dump Truck	76
Haul Truck	74

Source: FHA 2006a,b; USEPA 1974

The use of heavy equipment to accomplish the Proposed Project maintenance activities would result in noise in the Project area. The source noise levels shown in Table 4.12-9, which occur at 50 feet, are used to determine the noise levels at nearby sensitive receptors by attenuating 6 dB for each doubling of distance for point sources of noise such as operating heavy equipment. Noise levels at the nearest receptors for each reach were analyzed on a worst-case basis, using the equipment with the highest noise level expected to be used at each receptor.

Some of the maintenance equipment would also produce ground borne vibration. The pieces of equipment proposed for Project maintenance that would produce some of the highest vibration levels are listed in Table 4.12-10. The source vibratory levels, which occur at 25 feet, are used to determine the vibration levels at nearby sensitive receptors by dividing the source PPV value by the distance to the receptor. Vibration levels at the nearest receptors for each reach were analyzed on a worst-case basis, using the equipment with the highest vibratory level expected to be used at each receptor.

Table 4.12-10 Typical Vibration Levels for Proposed Maintenance Equipment (at 25 feet)

Equipment	Inches/second PPV
Excavator	0.044
Backhoe	0.044
Grader	0.044
Haul/Dump Truck	0.076

Source: FTA 2006a,b; ATS 2013

4.12.2 No Action Alternative

As discussed in Chapter 2, Section 2.4, No Action Alternative, the Project would not be built, and no new land purchases or construction activities would occur under this alternative. People would not be exposed to noise levels in excess of standards as there would be no construction activity, and therefore there would be no impact.

Maintenance activities would occur in accordance with the updated SMP, which addresses bank stabilization, sediment removal, vegetation management, and minor maintenance. Implementation of the SMP renewal project began in late 2012 and is re-authorized for the next 10 years. Activity under the SMP would fall under two general categories: regularly-scheduled work occurring in the same place and the same manner with a predictable frequency; and other routine work not on a regular annual schedule, but done as the need arises. In the Project area, SCVWD maintenance staff conduct annual inspections of fee-owned and easement areas. Following inspections, SCVWD staff evaluates what work should be conducted.

In-stream sediment removal and bank protection work is carried out from June 15 to October 30, or the first significant rainfall after October 15, whichever occurs first. Typical maintenance activities include the following:

- Channel debris clearing;
- Stream bank protection;
- Structural element maintenance;
- Minor maintenance;
- Sediment management; and,
- Vegetation management.

Maintenance under the No Action Alternative would be considered long-term because it will periodically occur over a 10-year-time period, consistent with the duration of the SMP. It is also considered intermittent because maintenance activity would be performed on an as-needed basis, typically for a few days in a given locale each year, but with a frequency that would be unknown and unplanned, and that could vary each year.

Noise levels during maintenance activity could still result in noise above standards for the jurisdictions along all reaches. Maintenance activity under the No Action Alternative would be considered long-term but would be intermittent because it is as-needed, typically for a few days every year in a given area.

Maintenance activity would include the use of both mechanized equipment and hand tools. Use of hand tools would not affect the existing noise environment with the exception of vehicles bringing maintenance workers to and from the site. Maintenance worker vehicles would not be expected to result in a perceptible increase in noise over vehicles already used for ongoing maintenance under the SMP. Mechanized equipment would be expected to increase noise in the Project area during the use of the equipment.

Although maintenance activities would likely occur during daytime hours, noise could still be considered substantially disruptive to residents. However, periods of intrusive noise exposure would be intermittent and generally temporary and would represent existing conditions. Noise from maintenance activity could vary significantly on a day-to-day basis, and is dependent on how many pieces of equipment are operating simultaneously. The noise levels shown in Table 4.12-11 represent a worst-case scenario for the closest receptors (all residential), using the loudest piece of equipment, a grader, at 85 dBA at 50 feet (see Table 4.12-7) and reducing noise by 6 dB for every doubling of distance. Residential and non- residential receptors further away would experience lower noise levels due to attenuation by distance. Such worst-case scenarios would likely exist only for short periods at any particular residence on a given day. Landscape-type equipment for vegetation maintenance is not considered because the noise levels generated from this type of equipment would not be discernible over typical residential landscaping noise sources. This is because the type of landscape equipment used and the type of noise generated for vegetation maintenance associated with the Project is not distinguishable from the type of landscape maintenance generated noise in residential areas. However, noise from graders, backhoes, excavators, and trucks would be very different from landscape equipment generating noise, and as such would be much more discernible in residential areas.

Table 4.12-11 shows the estimated noise levels at the closest receptors along the reaches that would be affected under the No Action Alternative. The following thresholds were identified for determining an exceedence of noise standards:

- Noise levels of 75 dBA measured at the lot line in the City of Morgan Hill (for Reaches 5, 6, 7A, 7B, 8, and 14); or
- Noise levels of 80 dB at the residential property line in the County of Santa Clara (for Reach 4).

Based on the thresholds, the nearest residences along all reaches would exceed corresponding noise standards. It should be noted that noise standards are in dB for Santa Clara County rather than the

A-weighted dBA (see Section 3.12), however, 89 dBA would still exceed an 80-dB standard. Noise levels from maintenance may exceed noise standards. Although work would be intermittent, likely occurring for a few days every year, it would be a significant unavoidable impact due to exceedance of the applicable standards. SCVWD will implement the following BMPs to minimize the impacts to the nearby residences, but noise levels may still exceed standards.

Table 4.12-11 Maintenance Noise at Nearest Residential Receptors by Reach (No Action Alternative)

Reach	Distance from Proposed Maintenance Activity	Source Level at 50 feet (dBA)[1]	Noise Level at Receptor (dBA)
4	40 feet	85	89
5	100 feet	85	79
6	50 feet	85	85
7A	50 feet	85	85
7B	40 feet	85	89
8	25 feet	85	91
14	85 feet	85	81

[1] Equipment with the loudest noise levels, used to demonstrate the worst-case scenario, is a grader.

Table 4.12-12 Maintenance Noise at Nearest Non-Residential Receptors by Reach (No Action Alternative)

Receptor	Reach	Distance and Direction	Source Level at 50 feet (dBA)[1]	Noise Level at Receptor (dBA)
St Louise Regional Hospital	4	4,500 feet south	85	48
South County Retirement Home	6	750 feet east	85	63
Pacific Hills Manor/Morgan Hill Villa	8	1,500 feet west	85	56
Britton Middle School	8	50 feet east	85	85
Crossroads Christian Center School	8	400 feet east	85	67
Oakwood School	7A	250 feet east	85	72
San Martin/Gwinn Elementary School	6	650 feet west	85	63
Paradise Valley Elementary School	7B	900 feet west	85	60
PA Walsh Elementary School	8	950 feet west	85	60
Kiddie Academy of Morgan Hill	7A/7B	1,150 feet east	85	59
Stratford School Morgan Hill	8	900 feet north	85	60
Rucker Elementary School	5	3,300 feet west	85	49
Galvan Park	8	200 feet west	85	73
Morgan Hill Community Park/Dog Park	7B	800 feet west	85	61
Paradise Park	7B	1,100 feet west	85	59

[1] Equipment with the loudest noise levels, used to demonstrate the worst-case scenario, is a grader.

As discussed in Chapter 2, Section 2.4, No Action Alternative, the Project would not be built, and no new land purchases or construction activities would occur under this alternative. People would not be exposed to excessive ground borne vibration as there would be no construction activity, and therefore there would be no impact.

As discussed in Section 4.12.2, under the No Action Alternative, maintenance activities would occur in accordance with the updated SMP, which addresses bank stabilization, sediment removal, vegetation management, and minor maintenance. Vibration levels during maintenance activity could still result in vibration above standards for the jurisdictions along all reaches. Maintenance activity under the No Action Alternative would be considered long-term but would be intermittent because it is as-needed, typically for a few days every year in a given area. Mechanized equipment would be expected to increase vibration in the Project area during the use of the equipment. Although maintenance activities would likely occur during daytime hours, vibration could still be considered substantially disruptive to residents. However, periods of intrusive vibration exposure would be intermittent and generally temporary. Vibration from maintenance activity could vary significantly on a day-to-day basis, and is dependent on how many pieces of equipment are operating simultaneously. The vibration levels shown in Table 4.12-13 represent a worst-case scenario. Such worst-case scenarios would likely exist only for short periods at any particular residence on a given day.

Maintenance activity would be expected to use the equipment listed in Table 4.12-8. Based on the activities that would be expected for the No Action Alternative, the equipment with the greatest vibratory levels that may be used often during activity would be an excavator, backhoe, or grader which would produce vibration levels of 0.044 inch per second PPV at a distance of 25 feet. Table 4.12-13 shows the estimated vibration levels at each receptor along the reaches that would be maintained under the No Action Alternative. Vibration levels at each receptor were determined by taking the source PPV level for the most vibratory equipment proposed to demonstrate worst-case scenario (0.044 inch per second PPV for an excavator, backhoe, or grader at 25 feet), and extrapolating for the distance and attenuation, relative to 25 feet, for each receptor. For example, the nearest receptor along Reach 5 is located 100 feet away. One hundred feet divided by 25 feet equals 4; therefore 0.044 inch per second PPV divided by 4 equals 0.011 inch per second PPV at the receptor 100 feet away). Due to attenuation by distance similar to noise, receptors further from the equipment and activity would experience lower vibration levels. Section 3.12.4.1 indicated the following thresholds for determining generation of excessive vibration:

- Vibration levels of 0.5 and 0.1 inch per second PPV for structural damage and annoyance, respectively, for construction activities.

Based on the thresholds, none of the nearest residences along any reach with proposed No Action Alternative maintenance would experience vibration levels in excess of state standards for either structural damage or annoyance.

Table 4.12-13 Maintenance Vibration at Nearest Residential Receptors by Reach (No Action Alternative)

Reach	Distance	Source Level at 25 Feet (PPV)[1]	Vibration Level at Receptor (PPV)
4	40 feet	0.044	0.0285
5	100 feet	0.044	0.011
6	50 feet	0.044	0.022
7A	50 feet	0.044	0.022
7B	40 feet	0.044	0.0278
8	25 feet	0.044	0.044
14	85 feet	0.044	0.013

[1] Equipment with the greatest vibration levels, used to demonstrate the worst-case scenario, is an excavator, backhoe, or grader.

There are five airports in Santa Clara County, including Reid-Hillview Airport, Mineta San Jose International Airport, Palo Alto Airport of Santa Clara County, Moffett Federal Airfield, and South County Airport of Santa Clara County (South County). The airport closest to the Project is South County, 180 feet from Reach 6 and 0.3 mile from Reach 14. South County is operated by the county and is open to the public. On average, there are 117 aircraft operations per day on the single runway at this airport (Air Nav 2013).

The No Action Alternative would require a workforce to temporarily/intermittently spend time near the airport when working on Reaches 5, 6, and 14, but there would be no introduction of a permanent population in the vicinity of the airport. As shown in Table 4.12-4 previously, the average noise level during 24-hour noise measurements along Reach 6 was 55.4 dB, with primary sources of noise during that time noted as airport and traffic. The average noise levels along Reach 14, measured over 24 hours, was 63.6 dB, with the primary noise source noted as traffic. As such, the No Action Alternative would not expose people residing or working in the Project area to excessive airport-related noise levels. Therefore, impacts would be less than significant for maintenance activities. As discussed in Chapter 2, Section 2.4, No Action Alternative, the Project would not be built, and no new land purchases or construction activities would occur under this alternative. The No Action Alternative would not have construction activities that would expose people to excessive noise levels from a public airport. Therefore, no impact would occur.

There are no private-use airports in Santa Clara County. Therefore, there would be no excessive noise levels from private airstrips in the area and subsequently no impact from excessive noise levels to maintenance workers.

BMPs for the No Action Alternative, including O&M activities are discussed and described in Chapter 5 and Appendix B of this EIS.

4.12.3 Action Alternatives

4.12.3.1 Tunnel Alternative (Applicant's Proposed Action)

As discussed in Chapter 2, Description of Alternatives, the Tunnel Alternative would provide an increased level of flood protection for urban and semi-urban areas and would also protect agricultural land. All reaches would be deepened and widened. Construction proposed for Reach 8 for the tunnel would result in increased noise levels from the use of equipment specifically for the portal intake and tunnel and from blasting. The following sections analyzing noise impacts consider the predominant and representative noise-generating construction activities.

The type of construction with the greatest noise contributions proposed for the Tunnel Alternative is the tunnel, which would be excavated using conventional mining equipment and methods to excavate, specifically roadheaders, excavators, and controlled detonations. Controlled detonations would be used in sections of harder rock, to fracture the rock for the roadheader or excavator. Controlled detonation would be performed by drilling small holes in a specified pattern in the rock face, packing them with small amounts of explosive and primer and detonating the explosives using a specified time delay between successive detonations. The detonations would sound like a short succession of thunder generally lasting a few seconds. Controlled detonation methods would adhere to stringent state and federal safety requirements and would also be conducted in accordance with local noise ordinances. Typically, less than 20 pounds of explosives per delay would be used. A Blasting Plan would be prepared for the Project to provide guidelines for the safe use and storage of blasting materials that may be used during construction, and would also provide measures to reduce noise, including the following:

- Drill multiple, small charge holes rather than fewer larger holes;
- Retain soil 3 to 4 feet above blasting material before detonation;
- Use blast mats and timing delays;
- Blast small horizontal and vertical areas rather than large areas;
- Stem blast holes with dense sand;
- Direct charges away from the direction of sensitive receptors; and
- Place physical barriers between the detonation site and the nearest receptors.

See Section 3.18, Hazards and Hazardous Materials, for further detail on the Blasting Plan.

Due to the intensity, duration, and proximity of construction activities to the nearby residences, two temporary sound barriers (e.g., walls, sound-absorbing blankets) would be installed along some of the work area boundaries. These sound barriers would be designed to provide a minimum 10-dBA (decibel) reduction in noise. The final design of the sound barrier would be determined by the contractor to achieve the Project's noise performance standards. The barrier is assumed to be approximately 20 feet high.

Other construction activities for the Tunnel Alternative would include channel improvements (e.g., excavation to deepen and widen existing channels), excavation and construction of diversion channel, construction of permanent access roads, and installation of reinforced concrete boxes. Although construction activities would occur mostly during daytime hours, noise could still be considered substantially disruptive to residents due to the distance between the activity and the receptors. However, periods of intrusive noise exposure would be temporary. Noise from construction activity could vary significantly on a day-to-day basis, and is dependent on how many pieces of equipment are operating simultaneously. The noise levels shown in Table 4.12-14 represent a worst-case scenario, with the use of the loudest equipment which is a pavement breaker/jackhammer (89 dBA at 50 feet) along Reaches 4, 5, 6, 7B, and 14, a drill rig (89 dBA at 50 feet) along Reach 8, and a grader (85 dBA at 50 feet) along Reach 7A. Noise levels would reduce 6 dB for every doubling of distance away from the noise source. Such worst-case scenarios would likely exist only for short periods at any particular residence on a given day.

Table 4.12-14 Construction Noise at Nearest Residential Receptors by Reach (Tunnel Alternative)

Reach	Distance	Source Level at 50 Feet (dBA)[1]	Noise Level at Receptor (dBA)
4	40 feet	89	92
5	100 feet	89	84
6	50 feet	89	89
7A	50 feet	85	85
7B	40 feet	89	90
8	25 feet	89	95
14	85 feet	89	84

[1] Equipment with the highest noise levels, used to demonstrate the worst-case scenario, is a breaker/jackhammer along Reaches 4, 5, 6, 7B, and 14, a drill rig along Reach 8, and a grader along Reach 7A.

Construction activity would be expected to use equipment listed in Table 4.12-7, which is further differentiated by reach in Chapter 2, Description of Alternatives, Table 2.5-4. Table 4.12-14 shows the estimated noise levels at the nearest receptor along each reach which correspond to the loudest piece of equipment proposed for each reach that would be affected under the Tunnel Alternative, as best represented by the most predominant type of construction activities including channel improvements (excavation and grading of existing channel reaches to widen and deepen), excavation and construction of diversion channel, construction of permanent access roads, installation of reinforced concrete boxes, and demolition/removal of buildings and structures. As discussed in Chapter 2, Description of Alternatives, some residences may be removed or relocated under the Tunnel Alternative; however the nearest receptors may not be those identified for removal/relocation and could remain during construction activity and be exposed to the noise generated. The following thresholds were identified for determining an exceedence of noise standards:

- Noise levels of 75 dBA measured at the lot line in the City of Morgan Hill (for Reaches 5, 6, 7A, 7B, 8, and 14); or
- Noise levels of 80 dB at the residential property line in the County of Santa Clara (for Reach 4).

Based on the thresholds, the nearest residences along all reaches would exceed corresponding noise standards, and impacts would be significant for construction of tunnel, channel improvements, excavation and construction of diversion channel, construction of permanent access roads, installation of reinforced concrete boxes, and demolition/removal of buildings and structures. Impacts would be less than significant for relocation of utilities. It should be noted that noise standards are in dB for Santa Clara County rather than the A-weighted dBA (see Section 3.12.1), however, 92 dBA would still exceed an 80- dB standard.

Noise levels from construction equipment would be more than 5 dBA over existing noise levels. Therefore, impacts associated with noise standards exceedance for construction activities would remain significant. Construction of sound barriers between noise sources and sensitive receptors was considered, but rejected as infeasible by the SCVWD due to the large scale of the construction activity covering a distance of nearly 13.5 miles and the fact that the construction would be constantly moving along the channel reaches requiring barriers to be set up, taken down, and moved along with the work. Installing barriers, removing them, and re-erecting the barriers in new places would have its own effects on noise, visual, and biotic resources. It should also be noted, City of Morgan Hill Municipal Code Chapter 18.48.040 D.1.d exempts public works projects from noise standards and indicates the public works director shall set construction hours for these types of projects. However, even though noise from the Project generated in Morgan Hill would be exempt from the applicable standards, the nearest residences along Reaches 5, 6, 7A, 7B, 8, and 14 would experience noise levels that would be significant.

Under the Tunnel Alternative, operational activities would be limited to typical maintenance procedures, including minor maintenance, and specific tunnel maintenance procedures such as excavating the sediments in the detention basin at the upstream boundary of the Project in Reach 8 and accessing the box culverts for maintenance in Reach 8, either through major access points with removable panels; through smaller hatches; or through manways. Operational activity proposed for the Project would be considered long-term but would be intermittent because it is performed as-needed, typically for a few days every year. Maintenance activities are discussed in Section 4.12.1.

Maintenance activity would include the use of both mechanized equipment and hand tools. Use of hand tools would not affect the existing noise environment with the exception of vehicles bringing maintenance workers to and from the site. Maintenance worker vehicles would not be expected to result in a perceptible increase in noise over vehicles already used for ongoing maintenance, as described under the No Action Alternative. Mechanized equipment would be expected to increase noise in the Project area during the use of the equipment.

However, periods of intrusive noise exposure would be intermittent and generally temporary and similar to existing conditions as described under the No Action Alternative. Noise from maintenance activity would vary on a day-to-day basis, and is dependent on how many pieces of equipment are operating simultaneously. The noise levels shown in Table 4.12-15 represent a reasonable worst-case scenario used for maintenance for the closest receptors (all residential), using the loudest piece of equipment, a grader, at 85 dBA at 50 feet (see Table 4.12-7) and reducing noise by 6 dB for every doubling of distance. Residential and non-residential receptors further away would experience lower noise levels due to attenuation by distance. Table 4.12-12 under the No Action Alternative shows the noise levels that would be expected during maintenance activity at the non-residential receptors, which would be the same for the Tunnel Alternative. Such conditions (or noise levels) would likely exist only for short periods at any particular residence on a given day. Landscape-type equipment for vegetation maintenance is not considered because noise from this equipment would not be discernible over typical residential landscaping and vegetation maintenance noise sources. This is because the type of landscape equipment used and the type of noise generated for vegetation maintenance associated with the Project is not distinguishable from the type of landscape maintenance generated noise in residential areas. However, noise from graders, backhoes, excavators, and trucks would be very different from landscape equipment generating noise, and as such would be much more discernible in residential areas.

Table 4.12-15 Operation and Maintenance Noise at Nearest Residential Receptors by Reach (Tunnel Alternative/Applicant's Proposed Action)

Reach	Distance	Source Level at 50 Feet (dBA)[1]	Noise Level at Receptor (dBA)
4	40 feet	85	89
5	100 feet	85	79
6	50 feet	85	85
7A	50 feet	85	85
7B	40 feet	85	89
8	25 feet	85	91
14	85 feet	85	81

[1] Equipment with the highest noise levels, used to demonstrate the worst-case scenario, is a grader.

Table 4.12-15 shows the estimated noise levels at each receptor along the reaches that would be affected under the Tunnel Alternative. As discussed in Chapter 2, Description of Alternatives, some residences may be removed or relocated under the Tunnel Alternative; however, the nearest receptors may not be those identified for removal/relocation and could be present during maintenance activity and be exposed to the noise generated.

The following thresholds were identified for determining an exceedence of noise standards:

- Noise levels of 75 dBA measured at the lot line in the City of Morgan Hill (for Reaches 5, 6, 7A, 7B, 8, and 14); or
- Noise levels of 80 dB at the residential property line in the County of Santa Clara (for Reach 4).

It should be noted that noise standards are in dB for Santa Clara County rather than the A-weighted dBA (see Section 3.12), however, 89 dBA would still exceed an 80-dB standard. Based on the thresholds, the nearest residences along all reaches would exceed corresponding noise standards. Although maintenance activities would be intermittent, infrequent, and similar to activities currently occurring, impacts would be significant due to the exceedances.

Controlled detonation would be performed by drilling small holes in a specified pattern in the rock face, packing them with small amounts of explosive and primer and detonating the explosives using a specified time delay between successive detonations. The detonations would sound like a short succession of thunder generally lasting a few seconds. Controlled detonation methods would adhere to stringent state and federal safety requirements and would also be conducted in accordance with local noise ordinances. Typically, less than 20 pounds of explosives per delay would be used. A Blasting Plan would be prepared for the Project to provide guidelines for the safe use and storage of blasting materials that may be used during construction, and would also provide measures to reduce vibration, including:

- Strict management of blast design;
- Use of proper charge size and detonation sequence in accordance with the scaled-distance (SD) factor guidelines provided by the OSMRE; and
- Use of seismograph equipment to monitor PPV levels at nearby receptors; and
- Cessation of blasting activity and modification of blasting plan if PPV levels exceed all applicable regulations.

See Section 3.18, Hazards and Hazardous Materials, for further detail on the Blasting Plan.

Vibration levels associated with blasting are site-specific and are dependent on the amount of explosive used, soil conditions between the blast site and the receptor, and the elevation where blasting would take place (specifically, the below surface elevation where bedrock would be encountered). Blasting below the surface, as is proposed for the Project, would produce lower vibration levels at a receptor due to additional attenuation provided by distance and transmission through soil and rock. The use of controlled detonations for blasting and adherence to the Blasting Plan would result in less than significant impacts as blasting vibration levels would be below state and federal requirements. However, impacts would be significant based on vibration levels produced by construction equipment (see further discussion below).

Other construction activities for the Tunnel Alternative would include channel improvements, excavation and construction of diversion channel, construction of permanent access roads, and installation of reinforced concrete boxes. Although construction activities would mostly occur during daytime hours, vibration could still be considered substantially disruptive to residents. However, periods of intrusive vibration exposure would be intermittent and generally temporary. Vibration from construction activity could vary significantly on a day-to-day basis, and is dependent on how many pieces of equipment are operating simultaneously. The vibration levels shown in Table 4.12-16 represent a worst- case scenario. Vibration levels at each receptor were determined by taking the source PPV level for the most vibratory equipment proposed to demonstrate worst-case scenario (0.644 inch per second PPV for the pile driver at 25 feet along Reach 8, and 0.210 inch per second PPV for a vibratory roller at 25 feet along all other reaches), and extrapolating for the distance and attenuation, relative to 25 feet, for each receptor. For example, the nearest receptor along Reach 5 is located 100 feet away. One hundred feet divided by 25 feet equals 4; therefore 0.210 inch per second PPV divided by 4 equals 0.053 inch per second PPV at the receptor 100 feet away). Due to attenuation by distance similar to noise, receptors further from the equipment and activity would experience lower vibration levels. Such worst-case scenarios would likely exist only for short periods at any particular residence on a given day.

The following thresholds were identified for determining generation of excessive vibration:

> Vibration levels of 0.5 and 0.1 inch per second PPV for structural damage and annoyance, respectively, for construction activities.

Based on the thresholds, none of the nearest residences along any reach would experience vibration levels in excess of state standards for structural damage, with the exception of receptors along Reach 8, but residences along Reaches 4, 6, 7A, 7B, 8, and 14 would experience vibration levels that exceed state standards for annoyance resulting in a significant impact for channel improvements, excavation and construction of diversion channel, construction of permanent access roads, and installation of reinforced concrete boxes.

Table 4.12-16 Construction Vibration at Nearest Residential Receptors by Reach (Tunnel Alternative)

Reach	Distance	Source Level at 25 Feet (PPV)[1]	Noise Level at Receptor (PPV)
4	40 feet	0.210	0.131
5	100 feet	0.210	0.053
6	50 feet	0.210	0.105
7A	50 feet	0.210	0.105
7B	40 feet	0.210	0.131
8	25 feet	0.644	0.644
14	85 feet	0.210	0.062

[1] Equipment with the highest vibration levels, used to demonstrate the worst-case scenario, is a vibratory roller.

Under the Tunnel Alternative, operational activities would be limited to typical maintenance procedures, including specific tunnel maintenance procedures such as excavating the sediments in the detention basin at the upstream boundary of the Project in Reach 8 and accessing the box culverts for maintenance in Reach 8, either through major access points with removable panels; through smaller hatches; or through manways. Operational activity proposed for the Project would be considered long-term but would be intermittent because it is performed as-needed, typically for a few days every year in a given location. Maintenance activities are discussed in Section 4.12.2.

Maintenance activity would include the use of both mechanized equipment and hand tools. Use of hand tools would not affect the existing vibration levels with the exception of vehicles bringing maintenance workers to and from the site. Maintenance worker vehicles would not be expected to result in a perceptible increase in vibration over vehicles already used for ongoing maintenance under the SMP. Mechanized equipment would be expected to increase vibration in the Project area during the use of the equipment.

Although maintenance activities would likely occur during daytime hours, vibration could still be considered substantially disruptive to residents. However, periods of intrusive vibration exposure would be intermittent and generally temporary. Vibration from maintenance activity could vary significantly on a day-to-day basis, and is dependent on how many pieces of equipment are operating simultaneously. The vibration levels shown in Table 4.12-17 represent a worst-case scenario. Such worst-case scenarios would likely exist only for short periods at any particular residence on a given day. Noise from maintenance activity would vary on a day-to-day basis, and the noise levels shown in Table 4.12-18 represent a worst-case scenario. Such worst-case scenarios would likely exist only for short periods at any particular residence on a given day.

Maintenance activity would be expected to use the equipment listed in Table 4.12-8. Based on the activities that would be expected for the Tunnel Alternative, the equipment with the greatest vibratory levels that may be used often during activity would be an excavator, backhoe, or grader, which would produce vibration levels of 0.044 inch per second PPV at a distance of 25 feet. Table 4.12-17 shows the estimated vibration levels at each receptor along the reaches that would be maintained under the Tunnel Alternative. Vibration levels at each receptor were determined by taking the source PPV level for the most vibratory equipment proposed to demonstrate worst-case scenario (0.044 inch per second PPV for an excavator, backhoe, or grader at 25 feet), and extrapolating for the distance and attenuation, relative to 25 feet, for each receptor. For example, the nearest receptor along Reach 5 is located 100 feet away. One hundred feet divided by 25 feet equals 4; therefore 0.044 inch per second PPV divided by 4 equals 0.011 PPV at the receptor 100 feet away). Due to attenuation by distance similar to noise, receptors further from the equipment and activity would experience lower vibration levels.

The following thresholds were identified for determining generation of excessive vibration:

- Vibration levels of 0.5 and 0.1 inch per second PPV for structural damage and annoyance, respectively, for construction activities.

Based on the thresholds, none of the nearest residences along any reach would experience vibration levels in excess of state standards for either structural damage or annoyance from maintenance. Impacts would be less than significant.

Table 4.12-17 Maintenance Vibration at Nearest Residential Receptors by Reach (Tunnel Alternative)

Reach	Distance	Source Level at 25 Feet (PPV)[1]	Noise Level at Receptor (PPV)
4	40 feet	0.044	0.028
5	100 feet	0.044	0.011
6	50 feet	0.044	0.022
7A	50 feet	0.044	0.022
7B	40 feet	0.044	0.028
8	25 feet	0.044	0.044
14	85 feet	0.044	0.013

[1] Equipment with the highest vibration levels, used to demonstrate the worst-case scenario, is an excavator, backhoe, or grader.

While the construction period would be a total of six years, construction activity in any location would be temporary since construction work would be spread out over the entire construction footprint and would not result in permanent increases in ambient noise levels. Impacts would be less than significant for construction of tunnel, channel improvements, excavation and construction of diversion channel, construction of permanent access roads, installation of reinforced concrete boxes, and relocation of structures and utilities. Noise from the tunnel construction along Reach 8 could reach higher levels based on the type of equipment proposed, but would still be temporary, and not result in a permanent increase in ambient noise levels. Maintenance activity would be expected to use the equipment listed in Table 4.12-9. Based on the activities proposed for the Tunnel Alternative, the equipment with the loudest operating noise level that would be used often during activity would be a grader, which would produce noise levels of 85 dBA at a distance of 50 feet. Table 4.12-18 shows the estimated noise levels at each receptor along the reaches that would be affected under the Tunnel Alternative.

Section 3.12.3 discusses the existing ambient conditions along the reaches. Table 4.12-18 compares the existing noise levels based on the noise measurements collected in 2011 along each reach with the expected noise levels for maintenance under the Tunnel Alternative.

The following thresholds were identified for determining a substantial permanent noise increase:

- Permanent increase of 5 dBA L_{EQ} as a result of Project operation based on ambient noise levels.

Based on the threshold of a 5-dBA L_{EQ} increase, all of the nearest residences would experience short- term, temporary increase in noise levels above 5 dBA L_{EQ} during maintenance work. It should be noted that noise standards are in dBA L_{EQ} and are compared to values in dBA. As discussed in Section 3.12, L_{EQ} is a calculated single level for a specified duration, which contains the same energy as all of the varying sounds over the measurement period. While not identical to an average, especially when noise fluctuations are great, the L_{EQ} is widely used to represent an average noise level over some period of time. Because of the substantial increase in noise (22.1 dBA and greater) it is clear that noise level increases would exceed a 5-dBA increase. However, based on the intermittent nature of the activity, and the infrequency (a few days every year) the operations and maintenance noise would not be permanent.

Table 4.12-18 Estimated Noise Levels for Operation and Maintenance Activities Compared with Existing Noise Levels (Tunnel Alternative/Applicant's Proposed Action)

Reach	Distance	Existing Noise Levels L_{EQ} (dBA)[1]	Noise Level at Receptor (dBA)	Change in Noise Level (dBA)
4	40 feet	60.4	89	+27.6
5	100 feet	52.2	79	+26.8
6	50 feet	60.1	85	+24.9
7A	50 feet	46.3	85	+38.7
7B	40 feet	50.3	89	+37.7
8	25 feet	56.9	91	+34.1
14	85 feet	58.9	81	+22.1

[1] Existing noise levels from 2011 noise measurements converted from dB, as measured, to dBA using average frequency of 500 Hz.

Although construction activities would occur mostly during daytime hours, noise could be considered disruptive to residents due to the distance between the activity and the receptors. However, periods of increased noise exposure would be temporary. Noise from construction activity would vary significantly on a day-to-day basis, and is dependent on how many pieces of equipment are operating simultaneously. The noise levels shown in Table 4.12-19 represent a worst-case scenario. Such worst-case scenarios would likely exist only for short periods at any particular residence on a given day.

Section 3.12.3 discusses the existing ambient conditions along the reaches. Table 4.12-19 compares the existing noise levels based on the noise measurements collected in 2011 along each reach with the expected noise levels for construction under the Tunnel Alternative. Construction activity would be expected to use equipment listed in Table 4.12-7. Table 4.12-14 shows the estimated noise levels at each receptor along the reaches that would be affected under the Tunnel Alternative. As discussed in Chapter 2, Description of Alternatives, some residences may be removed or relocated under the Tunnel Alternative; however, the nearest receptors may not be those identified for removal/relocation and could remain during construction activity and be exposed to the noise generated.

The following thresholds were identified for determining a substantial temporary noise increase:

- Temporary increase of 5 dBA L_{EQ} as a result of Project construction based on ambient noise levels.

Table 4.12-19 Estimated Noise Levels for Construction Activities Compared with Existing Noise Levels (Tunnel Alternative/Applicant's Proposed Action)

Reach	Distance	Existing Noise Levels L_{EQ} (dBA)[1]	Construction Noise Level at Receptor (dBA)	Change in Noise Level (dBA) from Existing
4	40 feet	60.4	92	+31.6
5	100 feet	52.2	84	+31.8
6	50 feet	60.1	89	+27.9
7A	50 feet	46.3	85	+38.7
7B	40 feet	50.3	90	+39.7
8	25 feet	56.9	95	+38.1
14	85 feet	58.9	84	+25.1

[1] Existing noise levels from 2011 noise measurements converted from dB, as measured, to dBA using average frequency of 500 Hz.
[2] Construction noise levels from Table 4.12-14.

Based on the threshold of a 5-dBA L_{EQ} increase, all of the nearest residences along each reach would experience an increase in noise levels above 5 dBA L_{EQ} during construction work, resulting in significant impacts for construction of tunnel, channel improvements, excavation and construction of diversion channel, construction of permanent access roads, installation of reinforced concrete boxes, and demolition/removal of buildings and structures. It should be noted that noise standards are in dBA L_{EQ} and are compared to values in dBA. As discussed in Section 3.12.1, L_{EQ} is a calculated single level for a specified duration, which contains the same energy as all of the varying sounds over the measurement period. While not identical to an average, especially when noise fluctuations are great, the L_{EQ} is widely used to represent an average noise level over some period of time. Because of the substantial increase in noise (25.1 dBA and greater) it is clear that noise level increases would exceed a 5-dBA increase. It should be noted, City of Morgan Hill Municipal Code Chapter 18.48.040 D.1.d exempts public works projects from noise standards and indicates the public works director shall set construction hours for these types of projects. However, even though noise from the Project generated in Morgan Hill would be exempt from the applicable standards, the nearest residences along Reaches 5, 6, 7A, 7B, 8, and 14 would experience noise levels otherwise considered significant. Impacts would be less than significant for relocation of utilities.

The only airport adjacent to the Project is South County Airport, 180 feet from Reach 6 at its closest point and 0.3 mile from Reach 14. The Tunnel Alternative would require a workforce to temporarily/intermittently spend time near the airport when working on Reaches 5, 6, and 14, but there would be no introduction of a permanent population in the vicinity of the airport. As shown in Table 4.12-4 previously, the average noise level during 24-hour noise measurements along Reach 6 was 55.4 dB, with primary sources of noise during that time noted as airport and traffic. The average noise levels along Reach 14, measured over 24 hours, was 63.6 dB, with the primary noise source noted as traffic. As such, the Tunnel Alternative would not expose people working on construction in the Project area to excessive airport-related noise levels. Therefore, impacts would be less than significant for construction of tunnel, channel improvements, excavation and construction of diversion channel, construction of permanent access roads, installation of reinforced concrete boxes, and relocation of structures and utilities.

The Tunnel Alternative would require a workforce to temporarily/intermittently spend time near the airport when working on Reaches 5, 6, and 14, but there would be no introduction of a permanent population in the vicinity of the airport. As shown in Table 4.12-4 previously, the average noise level during 24-hour noise measurements along Reach 6 was 55.4 dB, with primary sources of noise during that time noted as airport and traffic. The average noise level along Reach 14, measured over 24 hours, was 63.6 dB, with the primary noise source noted as traffic. As such, the Tunnel Alternative would not expose people working on maintenance in the Project area to excessive airport-related noise levels.

There are no private-use airports in Santa Clara County and there would be no impact to workers involved in from construction of tunnel, channel improvements, excavation and construction of diversion channel, construction of permanent access roads, installation of reinforced concrete boxes, and relocation of structures and utilities.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.12.3.2 Natural Resources Conservation Service (NRCS) Alternative

As discussed in Chapter 2, Description of Alternatives, the NRCS Alternative would provide an increased level of flood protection for urban and semi-urban areas and would also protect agricultural land. All reaches would be deepened and widened. As compared with the Tunnel Alternative, the NRCS Alternative would have a larger Project footprint in Reach 8, a larger amount of required right of way, would require a greater amount of vegetation to be removed and increased excavation would be needed along the existing West Little Llagas channel. It would increase the extent of utilities to be relocated and culvert replacements, which would subsequently result in greater construction-related interference with commercial and residential areas. However, the NRCS Alternative would not include any tunnel construction and therefore would not include any of the noise generating construction, such as blasting/detonation activities associated with the tunnel construction as described previously in the Tunnel Alternative.

The most prevalent and representative noise generating equipment used in the construction activities for the NRCS Alternative, as identified in previous Table 4.12-7, would include channel improvements, excavation and construction of diversion channel, construction of permanent access roads, and installation of reinforced concrete boxes. Although construction activities would occur mostly during daytime hours, noise could still be considered substantially disruptive to residents due to the distance between the activity and the receptors. However, periods of intrusive noise exposure would be temporary. Noise from construction activity could vary significantly on a day-to-day basis, and is dependent on how many pieces of equipment are operating simultaneously. The noise levels shown in Table 4.12-20 represent a worst-case scenario with the use of the loudest equipment which is a grader (85 dBA at 50 feet) along Reach 7A and a pavement breaker/jackhammer (89 dBA at 50 feet) along the other reaches. Noise levels would reduce 6 dB for every doubling of distance away from the noise source. Such worst-case scenarios would likely exist only for short periods at any particular residence on a given day.

Table 4.12-20 Construction Noise at Nearest Residential Receptors by Reach (NRCS Alternative)

Reach	Distance	Source Level at 50 Feet (dBA)[1]	Noise Level at Receptor (dBA)
4	40 feet	89	92
5	100 feet	89	83
6	50 feet	89	89
7A	50 feet	89	85
7B	40 feet	89	90
8	25 feet	89	95
14	85 feet	89	84

[1] Equipment with the highest noise levels, used to demonstrate the worst-case scenario, is a grader along Reach 7A, and a pavement breaker/jackhammer along the other reaches.

Construction activity would be expected to use equipment listed in Table 4.12-7, which is further differentiated by reach in Chapter 2, Description of Alternatives, Table 2.5-4. Table 4.12-20 shows the estimated noise levels at the nearest receptor along each reach which correspond to the loudest piece of equipment proposed for that reach that would be affected under the NRCS Alternative, used for channel improvements, excavation and construction of diversion channel, construction of permanent access roads, installation of reinforced concrete boxes, and demolition/removal of buildings and structures. As discussed in Chapter 2, Description of Alternatives, some residences may be removed or relocated under the NRCS Alternative; however the nearest receptors may not be those identified for removal/relocation and could remain during construction activities and be exposed to the noise generated.

Table 4.12-21 Operation and Maintenance Noise at Nearest Residential Receptors by Reach (NRCS Alternative)

Reach	Distance	Source Level at 50 Feet (dBA)[1]	Noise Level at Receptor (dBA)
4	40 feet	85	89
5	100 feet	85	79
6	50 feet	85	85
7A	50 feet	85	85
7B	40 feet	85	89
8	25 feet	85	91
14	85 feet	85	81

[1] Equipment with the highest noise levels, used to demonstrate the worst-case scenario, is a grader.

Table 4.12-21 shows the estimated noise levels at each receptor along the reaches that would be affected under the NRCS Alternative. As discussed in Chapter 2, Description of Alternatives, some residences may be removed or relocated under the NRCS Alternative; however, the nearest receptors may not be those identified for removal/relocation and could be present during maintenance activity and be exposed to the noise generated.

Table 4.12-22 Construction Vibration at Nearest Residential Receptors by Reach (NRCS Action Alternative)

Reach	Distance	Source Level at 25 Feet (PPV)[1]	Noise Level at Receptor (PPV)
4	40 feet	0.210	0.131
5	100 feet	0.210	0.053
6	50 feet	0.210	0.105
7A	50 feet	0.210	0.105
7B	40 feet	0.210	0.131
8	25 feet	0.210	0.210
14	85 feet	0.210	0.062

[1] Equipment with the highest vibration levels, used to demonstrate the worst-case scenario, is a vibratory roller.

Construction vibrations to nearby residents are similar to that described under the Tunnel Alternative, and Table 4.12-22. shows the worst-case scenario for vibration.

Table 4.12-23 Estimated Noise Levels for Operation and Maintenance Activities Compared with Existing Noise Levels (NRCS Alternative)

Reach	Distance	Existing Noise Levels L_{EQ} (dBA)[1]	Noise Level at Receptor (dBA)	Change in Noise Level (dBA)
4	40 feet	60.4	89	+27.6
5	100 feet	52.2	79	+26.8
6	50 feet	60.1	85	+24.9
7A	50 feet	46.3	85	+38.7
7B	40 feet	50.3	89	+37.7
8	25 feet	56.9	91	+34.1
14	85 feet	58.9	81	+22.1

[1] Existing noise levels from 2011 noise measurements converted from dB, as measured, to dBA using average frequency of 500 Hz.

Table 4.12-23 compares the existing noise levels based on the noise measurements collected in 2011 along each reach with the expected noise levels for The noise levels shown in Table 4.12-24 represent a worst-case scenario with the loudest piece of equipment operating, a grader (85 dBA at 50 feet) along Reach 7A and a pavement breaker/jackhammer (89 dBA at 50 feet) along the other reaches. Such worst-case scenarios would likely exist only for short periods at any particular residence on a given day.

Table 4.12-24 compares the existing noise levels based on the noise measurements collected in 2011 along each reach with the expected noise levels for construction under the NRCS Alternative. Construction activity would be expected to use equipment listed in Table 4.12-7. Table 4.12-20 shows the estimated noise levels at each receptor along the reaches that would be affected under the NRCS Alternative. As discussed in Chapter 2, Description of Alternatives, some residences may be removed or relocated under the NRCS Alternative; however, the nearest receptors may not be those identified for removal/relocation and could remain during construction activity and be exposed to the noise generated.

Table 4.12-24 Estimated Noise Levels for Construction Activities Compared with Existing Noise Levels (NRCS Alternative)

Reach	Distance	Existing Noise Levels L_{EQ} (dBA)[1]	Construction Noise Level at Receptor (dBA)[2]	Change in Noise Level (dBA) from Existing
4	40 feet	60.4	92	+31.6
5	100 feet	52.2	83	+30.8
6	50 feet	60.1	89	+28.9
7A	50 feet	46.3	85	+38.7
7B	40 feet	50.3	90	+39.7
8	25 feet	56.9	95	+38.1
14	85 feet	58.9	84	+25.1

[1] Existing noise levels from 2011 noise measurements converted from dB, as measured, to dBA using average frequency of 500 Hz.
[2] Construction noise levels from Table 4.12-20.

Noise and vibration impacts associated with the NRCS Alternative would be similar to the Tunnel Alternative. However, vibrations associated with the Tunnel Alternative in Reach 8 would result in higher vibrations than the NRCS Alternative. Refer to Table 4.12-16 (Tunnel Alternative) compared to Table 4.12-22 (NRCS Alternative). For all reaches, other than Reach 8, the impacts are similar, including impacts from operation and maintenance activities.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.12.3.3 Culvert/Channel Alternative

The Culvert/Channel Alternative, described in Chapter 2, Description of Alternatives, is similar to the NRCS Alternative, although channel deepening and widening through residential properties would be eliminated in Reach 8 as a results of alterations proposed for existing culverts.

Construction activities for the Culvert/Channel Alternative would include channel improvements, excavation and construction of diversion channel, construction of permanent access roads, installation of reinforced concrete boxes, and removal/demolition of buildings and structures. Although construction activities would occur mostly during daytime hours, noise could still be considered substantially disruptive to residents due to the distance between the activity and the receptors. However, periods of intrusive noise exposure would be temporary. Noise from construction activity could vary significantly on a day-to- day basis, and is dependent on how many pieces of equipment are operating simultaneously. While channel deepening and widening is eliminated in Reach 8, a pavement breaker/jackhammer (89 dBA at 50 feet) is still proposed for use for removal/demolition of buildings and structures, which is the same as the

NRCS Alternative. Such worst-case scenarios would likely exist only for short periods at any particular residence on a given day.

Construction activity would be expected to use equipment listed in Table 4.12-7, which is further differentiated by reach in Chapter 2, Description of Alternatives, Table 2.5-4. Table 4.12-20 shows the estimated noise levels at each receptor along the reaches which correspond to the loudest piece of equipment proposed for that reach that would be affected under the Culvert/Channel Alternative. As discussed in Chapter 2, Description of Alternatives, some residences may be removed or relocated under the Culvert/Channel Alternative; however the nearest receptors may not be those identified for removal/relocation and could remain during construction activity and be exposed to the noise generated.

Noise and vibration impacts associated with the Culvert\Channel Alternative would be similar to the NRCS Alternative, including impacts from operation and maintenance activities. See the previous discussion on the Tunnel and NRCS Alternatives as the impacts would be similar, except there would be no tunnel work that is associated with the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.12.3.4 Reach 6 Bypass Alternative

As discussed in Chapter 2, Description of Alternatives, the Reach 6 Bypass Alternative would provide an increased level of flood protection for urban and semi-urban areas, would protect agricultural land, and would construct a high flow bypass channel between Reach 6 of Llagas Creek and Reach 14 of East Little Llagas Creek. The bypass would be designed so that no flood capacity improvements would be needed along Reach 6 or Reach 5 of Llagas Creek downstream of the proposed bypass. Flood conveyance improvements for the upstream reaches would remain the same as that described for the Tunnel Alternative. Reach 14 would undergo greater channel widening and culvert modification under this alternative. It would also include construction of hydraulic gates in Reach 6 for the bypass channel, three bridges near U.S. 101, and new maintenance roads.

Construction activities for the Reach 6 Bypass Alternative would include tunnel construction (as described under the Tunnel Alternative), bridge and hydraulic structure construction, channel improvements, excavation and construction of diversion channel, construction of permanent access roads, and installation of reinforced concrete boxes. Although construction activities would occur mostly during daytime hours, noise could still be considered substantially disruptive to residents due to the distance between the activity and the receptors. However, periods of intrusive noise exposure would be temporary and plans would be implemented such as the blasting plan, described under the Tunnel

Alternative (Section 4.12.3.2) to reduce noise levels. Noise from construction activity could vary significantly on a day-to-day basis, and is dependent on how many pieces of equipment are operating simultaneously. The noise levels shown in Table 4.12-25 represent a worst-case scenario with the use of the loudest equipment which is a pile driver (101 dBA at 50 feet) for Reaches 6 and 8, and a pavement breaker/jackhammer (89 dBA at 50 feet) along Reaches 4, 7A, 7B, and 14. Noise levels would reduce 6 dB for every doubling of distance away from the noise source. Such worst-case scenarios would likely exist only for short periods at any particular residence on a given day.

Construction activity would be expected to use equipment listed in Table 4.12-7, which is further differentiated by reach in Chapter 2, Description of Alternatives, Table 2.5-4. Table 4.12-25 shows the estimated noise levels at the nearest receptor along each reach which correspond to the loudest piece of equipment proposed for each reach that would be affected under the Reach 6 Bypass Alternative. As discussed in Chapter 2, Description of Alternatives, some residences may be removed or relocated under the Reach 6 Bypass Alternative; however the nearest receptors may not be those identified and could remain during construction activity and be exposed to the noise generated.

Table 4.12-25 Construction Noise at Nearest Residential Receptors by Reach (Reach 6 Bypass Alternative)

Reach[1]	Distance	Source Level at 50 Feet (dBA)[2]	Noise Level at Receptor (dBA)
4	40 feet	89	92
6 (Bypass)	50 feet	101	101
7A	50 feet	89	89
7B	40 feet	89	90
8	25 feet	101	107
14	85 feet	89	84

[1] Reach 5 not included in table as no improvements would be needed along Reach 5 downstream of the proposed bypass.
[2] Equipment with the highest noise levels, used to demonstrate the worst-case scenario, is a pile driver for Reach 6 and 8, and a pavement breaker/jackhammer for all other reaches.

Noise impacts associated with the Reach 6 Bypass Alternative would be similar to the Tunnel Alternative. However, noise impacts for the Reach 6 Bypass Alternative within the Reach 6 project limits would be higher than the noise impacts associated with the Tunnel Alternative. Refer to Table 4.12-15 (Tunnel Alternative) compared to Table 4.12-25 (Reach 6 Bypass Alternative). For all reaches, other than Reach 8, the impacts are similar, including impacts from operation and maintenance activities.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.12.4 Summary of Impacts to Noise

Construction of the Project would result in temporary noise and vibration impacts adjacent to active work areas. Even with proposed mitigation, impacts would remain significant, primarily due to the limited distance from the work areas to the nearest sensitive receptors, for construction and operations and maintenance under all action alternatives for exceedance of noise standards, for construction under all action alternatives for ground borne vibration, and for construction of all action alternatives for temporary noise increases. All other applicable impacts would be less than significant.

Mitigation measures and BMPs, as appropriate, for the various Action Alternatives to reduce the impacts to Noise are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

4.13 AESTHETIC RESOURCES

4.13.1 Introduction

This section evaluates potential impacts on visual resources (aesthetics) from implementation of the alternatives identified for the Project.

This visual assessment relies partly on the visual assessment methodology established by the Federal Highway Administration (FHWA) as described in the FHWA Visual Assessment Methodology manual. The aesthetic value of an area is a measure of its visual character and quality, combined with the viewer response to the area (Federal Highway Administration 1988). Viewer response is a combination of viewer exposure and viewer sensitivity. Viewer exposure is a function of the number of viewers, number of views seen, distance of the viewers, and viewing duration. Viewer sensitivity relates to the extent of the public’s concern for a particular viewshed. These terms and criteria are described in detail below.

Impacts related to aesthetics are determined by comparing existing visual conditions to Project conditions by Project alternatives during construction and operations and maintenance. Impacts are evaluated based on implementation of constructions and operation and maintenance activities for each alternative as a whole rather than by individual reaches. Viewers in the area primarily include local residents, recreational users, merchants, and visitors in the urban areas, such as Morgan Hill, and passing motorists.

Viewer Groups and Viewer Responses

Viewer groups in the vicinity of the Project area and their sensitivity to visual changes are characterized below. Viewers in the Project area include motorists traveling on roads that intersect or parallel the Upper Llagas Creek and West and East Little Llagas creeks. Additionally, the key observation points, described in Figures 3.13-1a–h, which visual simulations located along Upper Llagas Creek would also be affected by changes in the visual environment. Motorists typically view the area only for short periods, but recreational users and residents would experience the views for longer periods. Viewer groups who have visual access to the Project area were divided into the categories of residents, workers, and motorists, described in more detail below.

Residents

Residents are individuals whose homes are in proximity to the Project area. Viewer sensitivity is moderately high amongst residents, because they are likely to value their local visual resources highly, appreciate the visual experience, and be more sensitive to changes in views.

Workers

Workers are individuals whose place of employment is in proximity to the Project area, or who may come into contact with construction and maintenance locations as part of their work activities (e.g., delivery persons). Viewer sensitivity is moderate among workers.

Motorists

Motorists use roadways at varying speeds; normal highway and roadway speeds differ based on the traveler's familiarity with the route and roadway conditions (e.g., presence/absence of rain). Single views typically are of short duration, except on straighter stretches where views last slightly longer. Motorists who frequently travel these routes generally possess low to moderate visual sensitivity to their surroundings. The passing landscape becomes familiar to these viewers, and their attention typically is not focused on the passing views but on the roadway, roadway signs, and surrounding traffic. Motorists who travel local routes for sightseeing purposes generally possess a higher visual sensitivity to their surroundings, because they are likely to respond to the natural environment with higher regard and as a holistic visual experience.

Viewer sensitivity is moderately low among most roadway travelers anticipated to view Upper Llagas Creek in this area. The passing viewshed becomes familiar to frequent viewers; further, at standard roadway speeds, views are of short duration and roadway users are fleetingly aware of surrounding traffic, road signs, their immediate surroundings within the automobile, and other visual features.

Project Assumptions

The following analysis on potential impacts to aesthetics from the implementation of the Project, and alternatives assumes the following:

- The primary issue related to aesthetics during construction would be vegetation removal. Riparian corridors can be viewed from a distance since they contain stands of tall trees and, therefore, views are afforded by the public at a distance and from a wider viewing area.

- The analysis primarily considers aesthetics related impacts from public views. Physical channel improvements, such as widening and deepening, would not be very visible from public viewing points with the exception of very few areas, such as bridges along the alignments of the Project alternatives. Views from bridges and trails may be from those in cars, bikes, and pedestrians who would only have brief and transient viewing opportunities either while driving, walking, or biking on these bridges or trails. Therefore, channel modifications are not considered a primary visual change from implementation of Project alternatives.

- Post construction would involve revegetation efforts. After construction is complete, the area will appear less dense due to vegetation removal; however, after the planted trees and other vegetation mature over time, the area will likely exceed pre-Project densities.

- The primary issue related to aesthetics during operations and maintenance would be vegetation management

For this analysis, the construction period for the Project includes active construction, as well as implementation and 5 years of monitoring that may be required after construction for elements, such as re-vegetation and restoration. During the operations period, maintenance activities related to aesthetics will primarily center around the need for vegetation management, which is anticipated to have more of a visual aspect to it than other maintenance activities, therefore, the operations and maintenance discussion focus primarily on vegetation management activities.

4.13.2. No Action Alternative

Under the No Action Alternative, the Project would not be built, and no new land purchases or construction activities would occur. Flooding in the residential areas of Morgan Hill and San Martin would still continue. Storm runoff would continue through the West Little Llagas Creek, East Little Llagas Creek, and Llagas Creek channel reaches. The bypass channel in Reach 7A would not be constructed under the No Action Alternative, and channel bank erosion would likely continue.

There would be no construction involved with the No Action Alternative; therefore, no construction- related impacts would occur.

The No Action Alternative assumes that existing maintenance activities established by the SCVWD, which include a SMP, would continue. The SMP establishes procedures for routine maintenance of stream channels involving sediment removal, vegetation management, bank protection, and associated minor activities.

Vegetation management is the primary component of the SMP that may affect visual resources in the Project area. Vegetation has the ability to restrict hydraulic capacity and impede flow conveyance, and create fire hazards due to high fuel loads. Non-native vegetation may also have negative ecological impacts as it can out-compete more desirable native species, resulting in habitat alteration and reduced biodiversity. Vegetation management activities include pruning, hand removal, herbicide, mowing, and discing activities.

Impacts related to vegetation management include changes in visual character from thinning of vegetation from activities, such as pruning, discing, mowing, herbicide use, and vegetation removal, as part of the SMP. Maintenance activities would result in less-than-significant impacts.

There would be no construction involved with the No Action Alternative; therefore, no construction- related impacts would result.

Vegetation management is the primary component of the SMP that may affect visual resources in the Project area. Impacts related to vegetation management include changes in visual character from thinning of vegetation from activities, such as pruning, discing, mowing, herbicide use, and vegetation removal, as part of the SMP. There are no designated scenic resources along the Upper Llagas Creek alignments subject to this Project. There is no construction involved with the No Action Alternative; therefore, no construction-related impacts would result.

Vegetation management is the primary component of the SMP that may affect visual resources in the Project area. Impacts related to vegetation management include changes in visual character from thinning of vegetation from activities, such as pruning, discing, mowing, herbicide use, and vegetation removal, as part of the SMP. Implementation of the SMP does not conflict with local plans and policies related to visual and aesthetic resources, therefore, continued implementation of the No Action Alternative is anticipated to have no conflicts with local plans or policies. There is no construction involved with the No Action Alternative; therefore, no construction-related impacts would result. Continued implementation of the SMP under the No Action Alternative would have no impacts related to new sources of light and glare since maintenance is done during the daytime hours and lighting is not typically required to perform these activities.

BMPs for the No Action Alternative, including O&M activities are discussed and described in Chapter 5 and Appendix B of this EIS.

4.13.3 Action Alternatives

4.13.3.1 Tunnel Alternative (Applicant's Proposed Action)

The SCVWD considered and developed the Tunnel Alternative, because there was an opportunity to reduce the Project footprint associated with the NRCS Alternative in Reach 8. Within Reach 8, the Tunnel Alternative would require a smaller ROW; reduce the amount of vegetation to be removed along the existing West Little Llagas channel; reduce the extent of utilities to be relocated; reduce the culvert replacements required, which would result in less construction-related interference with commercial and residential areas. Additionally, the existing channel would remain through downtown Morgan Hill. The channel will contain a sediment basin/weir structure that would allow low flows to continue through the existing creek that goes through downtown Morgan Hill. The high flows would be diverted through the new tunnel through the Nob Hill area. The Tunnel Alternative would be the same throughout the Project reaches, as described in Chapter 2.

Construction of the Tunnel Alternative has the potential to degrade the existing visual character and quality of the Project area and surroundings for viewer groups; because construction would require staging of materials and large construction equipment, physical reshaping of channels and the removal of large quantities of vegetation within the construction footprint as demonstrated in Figures 3.13-1a and Figures 3.13-1c–h. Overall, approximately 65 percent of the trees within the Project construction limits are proposed for removal. The proposed tree removals would change the visual character of each reach immediately following tree removals. Trees would be removed in phases, since construction of all reaches would not happen simultaneously. The tree removals would create more filtered and broader views through fewer trees, which in some areas are currently more narrowed and focused along the channel corridor by the number and density of the existing larger mature vegetation.

The proposed tree removals would change the visual character of each reach immediately following tree removals. Trees would be removed in phases, since construction of all reaches would not happen simultaneously. The tree removals would create more filtered and broader views through fewer trees, which in some areas are currently more narrowed and focused along the channel corridor by the number and density of the existing larger mature vegetation.

It is anticipated that immediately after tree removals and prior to full establishment after revegetation, the area would appear less densely vegetated and the tree canopy would be reduced. This change would be short term and temporary in that revegetation and establishment of replanted trees may take years to reach pre-Project densities; but would eventually recover, thereby changing the general visual character and quality of all reaches within the Project area. Therefore, the overall visual character would temporarily change with the thinning of vegetation and tree canopy across all reaches; however, this change is expected to be temporary.

The view simulation (Figure 3.13-1f) in Reach 4 provides an example that illustrates that although mature trees would be removed in some areas, overall many areas of the riparian corridor would eventually be more vegetated than prior to the Project because of revegetation, which is proposed for mitigation, including areas that were previously minimally covered. The view simulation (Figure 3.13-1g) in Reach 14 also illustrates the more dense cover after revegetation. Over the long-term, revegetation would allow for recovery and growth of disturbed and removed vegetation, which in turn would allow for improved visual character after construction in areas visible to viewer groups.

The temporary presence of construction equipment in the Project area and in staging areas, in addition to construction personnel, would temporarily change the general visual character and/or impede views of the creek during construction activities. Removal of structures related to channel widening and realignment during construction, as discussed in Table 2.5-1, would change the general visual character in all reaches where removal or relocation is necessary. Removal of structures involves all reaches, except Reach 7A and Reach 8 for the Tunnel Alternative. However, structure removal would be kept to a minimum and only select structures are slated for removal or relocation. Removal and relocation of structures would not dramatically affect the visual character of the Project area since there are very few proposed for removal as compared to the existing structures in the area and, therefore, impacts would be less than significant.

New access roads are proposed to be constructed along most reaches. Clearing and grubbing of vegetation (as necessary) prior to road construction would constitute a slight visual change to viewers in the area; however, the roads are flat and linear and not easily visible throughout all reaches. Therefore, impacts would be less than significant.

New temporary staging areas would also constitute new visual features along the Project reaches. Staging areas would contain staged construction equipment and materials not typically there. Staging areas would be used both during the duration of construction during both daytime and nighttime. Staging areas are anticipated, however, to be temporary in nature and not contribute to a permanent change in visual character in the Project area.

The permanent changes to visual character include channel widening, vegetation removal, additional access roads, and removal/relocation of structures within the Project footprint along most of the reaches, with the exception of Reach 8. For example, in Figure 3.13-1c, which depicts Spring Avenue looking northwest in Reach 7B, the visual character changes from a more urban impression to a more formalized water feature with the channel being re-routed and a new access road being located along the channel. Vegetation would also be cleared and an existing structure would be removed, opening up the area to views, as well. The general visual character would change slightly, as the viewer's focus would be a water feature as compared to existing conditions. The visual quality also would generally improve, since the site is more open and clear and the new focus of the site would be a water feature. Overall visual changes to the Project would be increased visual quality, while at the same time involving a general change to visual character. Views to the site can be obtained from Spring Avenue and from local residences. Similar changes are expected for most other reaches for the Tunnel Alternative.

Overall, with the combination of tree removal, removal and relocation of structures, and general construction activity, the visual character and quality would substantially change during construction, and impacts during construction would be temporary and significant. However, after construction has been completed and the proposed revegetation plantings have become established, long-term impacts would be less than significant.

The Tunnel Alternative would result in reduced visual impacts compared to the NRCS and Culvert/Channel alternatives as it relates to commercial and residential areas in Reach 8 due to the subsurface construction of a tunnel while leaving the existing creek channel in its current configuration through downtown Morgan Hill. Construction activities under the Tunnel Alternative would result in reduced disturbance along the existing West Little Llagas Creek channel. Another feature that is part of the Tunnel Alternative, but not included in the NRCS Alternative, is the construction of a sediment basin/weir structure at Wright Avenue and Hale Avenue in Reach 8. Figure 3.13-1a shows a visual simulation of the proposed sediment basin/weir structure in Reach 8. Currently, there is a detention basin as part of the adjacent housing development on the site of the proposed sediment detention basin for the Tunnel Alternative. The Tunnel Alternative would involve construction of a sediment basin/weir structure, and a maintenance access road on top of the side-slopes of the detention basin. The channel and detention basin would be located in an area that could be viewed by travelers on Hale Road and adjacent residences. The general visual character of the area in Reach 8 would not substantially change since it would still remain in use as part of the water course with associated features, as shown in Figure 3.13-1a.

Overall, with the combination of tree removal, removal and relocation of structures, and general construction activity the visual character and quality of the area during construction has the potential to substantially change; and impacts during construction would be temporary and significant. However, after construction has been completed and with implementation of the mitigation measures as discussed in Chapter 5 of this EIS, which includes re-vegetation of the Project area, long-term impacts would be less than significant.

During the operations phase of the Tunnel Alternative, the primary visual changes would involve the permanent change in visual character of the area due to the flood control improvements along all reaches. Once the Project is constructed, over time vegetation density would increase and flexibility of woody riparian species may decrease as the vegetation matures and becomes well established. This would cause the hydraulic roughness of the channel to increase beyond that originally designed, necessitating thinning or removal of vegetation to maintain the reduction of flood risk. During routine maintenance activities, such as vegetation management, there would be visual changes from removal of vegetation required as part of flood risk management. However, these changes would be intermittent and site specific. Additionally, large trees would not be removed as part of the maintenance program. Therefore, impacts from maintenance would be less than significant.

The lack of modification to the existing creek channel, as compared to the NRCS and Culvert/Channel alternatives where channel widening and deepening, as well as culvert replacement would occur, would result in decreased visual impacts in Reach 8, because the existing vegetation would remain and no construction would occur through a very visibly accessible area in downtown Morgan Hill. No maintenance is proposed for the existing creek channel in Reach 8, thereby reducing long-term visual impacts to the area as compared to the NRCS and Culvert/Channel alternatives.

The proposed sediment basin in Reach 8 would function to capture sediments from the drainage upstream of the Project, thereby reducing the need to conduct sediment maintenance in downstream reaches, including the culverts and tunnel sections in Reach 8. To maintain the function of the basin, it would periodically need to be excavated and the removed sediments would be end-hauled off-site. The basin would be a new feature in Reach 8 and would be located next to existing residences. A smaller detention basin is being constructed in this area as part of new residential development adjacent to Reach 8. The Tunnel Alternative would require enlarging the existing detention basin, which would be a visual impact for residences that have views of the detention basin in the area. However, the creek would not be a new visual feature in the area and the visual character would generally remain the same and impacts would be less than significant.

There are no designated scenic vistas or view corridors in the Project area. The Project area is flat and views primarily consist of rolling hills and agricultural lands to the east and views of the Santa Cruz Mountains to the west. Site-specific views of the creek from public access areas, such as trails are provided along the Upper Llagas Creek corridor. The Tunnel Alternative would result in lessened construction-related effects to commercial and residential areas in Reach 8 as compared to the NRCS and Culvert/Channel alternatives.

Construction of the Tunnel Alternative would involve tree removals, channel widening, channel realignment, staging of materials and large construction equipment, and other flood improvement activities, which may change the general appearance of Upper Llagas Creek at public viewing points (Figures 3.13-1a and Figures 3.13-1c- h). A revegetation plan would be implemented to revegetate and restore the creek corridor to natural conditions. While the revegetated areas recover from Project construction, they may temporarily appear sparsely vegetated and bare; however, as the plants and trees mature, the overall long-term change would remain in line with the visual character of Upper Llagas Creek corridor. The Project will not obstruct or block any scenic vista or view corridor that is designated on local plans; therefore, no impacts would occur from construction of the Project.

During routine maintenance activities, such as vegetation management, there may be visual changes from removal of vegetation required as part of flood risk management. However, these changes would be intermittent and site specific. Additionally, large trees would not be removed as part of the maintenance program and no designated scenic vistas or view corridors would be blocked by the operations; therefore, no impacts would occur related to obstructing view corridors.

In terms of policies related to aesthetics, those that are relevant to the Project, are primarily associated with protection and minimizing disturbances to creek corridors to maintain aesthetic values. Staging of materials and equipment would change the visual character of the creek corridor; but this impact would be short-term during construction and, therefore, would not create a permanent conflict with local policies.

The City of Gilroy's Policy 6.03 (U.S. 101 Landscaping and View Protection) states that projects within the city should work with Caltrans and the county to provide additional landscaping along the U.S. 101 ROW to enhance its attractiveness, recognizing that it is the primary "visitor-serving" traffic artery in the planning area. Also, encourage new developments facing U.S. 101 to provide landscape screening and to protect and enhance existing views of farmland and surrounding hills. The nearest portions of Reach 4, which parallel U.S. 101, are approximately 0.25 mile away and within the City of Gilroy's SOI[1]. Views of Reach 4 along U.S. 101 may be obscured because of the distance from passing motorists whose views are also transient in nature. The existing composite roughness characteristics of the channel (n-values) would not substantially change in those reaches where there is some riparian vegetation, particularly Reaches 4, 5, and 6 (see Table 2.5-5 and Figure 3.13-1f). This indicates that the overall change in vegetative cover and character would be small. Therefore, impacts would be less than significant.

The City of Morgan Hill states in Policy 14a that the city should enhance the visual integrity of the gateways to the city, such as Monterey Road south of Watsonville Road, which falls within Reach 7A. Policy 14b also states that the city should protect the visual integrity of the scenic gateways to the South County.

Some native shrubs and hardwood trees would be removed to allow for channel widening on one side of the channel leaving one natural bank. These excavated areas would be revegetated using native species. Revegetation is discussed in Section 3.4, Botanical Resources.

West Little Llagas Creek Trail (Reaches 7A and 7B) lies on land owned by SCVWD. Section 3.15.3, Recreation Resources, discusses the trail in additional detail. The West Little Llagas Trail would be replaced by the maintenance road, which would decrease the visual sensitivity of the area by reducing opportunities for public access. Revegetation would allow for recovery and growth of disturbed and removed species, which in turn would allow for improved visual character in areas visible from scenic

[1] SOI refers to "boundaries for all agencies within its jurisdiction, indicating the physical boundary and service area each agency is expected to serve". (Santa Clara County 2006)

roads and gateways identified by the cities of Morgan Hill and Gilroy. As the vegetation recovers after implementation of the revegetation plan, as shown in Figure 3.13-1d for Reach 7B, the disturbed areas may appear sparsely vegetated and bare. However, in the long term, revegetation would return the general visual character of the Upper Llagas creek corridor and the removal of the trail would decrease the visual sensitivity over the short term and, therefore, impacts would be reduced.

The Tunnel Alternative would result in fewer construction-related effects to commercial and residential areas in Reach 8 compared with the other alternatives since a portion of the existing creek channel within the downtown portion of the City of Morgan Hill would not be modified.

Overall, operations and maintenance activities would comply with local policies related to protection of visual resources and with the implementation of BMPs as described in Chapter 5 and Appendix B of this EIS. No conflicts with local policies would occur during operations and maintenance of the Tunnel Alternative.

Maintenance activities related to vegetation management, such as thinning, pruning, and small tree removal, would affect the visual character of the riparian corridor. However, the effect would be minor in nature since views from passing motorists are considered of lower visual sensitivity and the overall view of the riparian corridor would remain intact since maintenance activities would not occur every year, but approximately every five years (except for Reach 6, which may need to occur annually since there is perennial water and the likelihood of increased vegetation growth due to the presence of perennial water) and are generally site specific in nature. Vegetation maintenance would not include aggressive vegetation removal or removal of large trees along large stretches of creek.

Construction would take place Monday through Friday from 7:00 a.m. to 8:00 p.m. and Saturdays 9:00 a.m.to 6:00 p.m., but with the potential for construction work in the evenings until 10:00 p.m. outside of residential areas, although in rare instances, could be later. Construction activities are not anticipated to result in new sources of light or glare during the daytime. Nighttime construction may be required to avoid interruptions during peak traffic periods on heavily used roads or to address utilities relocation when utilized less in the evenings. Temporary lighting may be used when necessary; however, this would be temporary in nature. Additionally, illumination beyond the immediate work area will be minimized and all required lights would be shielded and pointing downward to control light beyond the immediate work area. Construction of new bridges at Watsonville Road and West Middle Avenue would not result in new lighting along bridges in areas where lighting did not previously exist. Therefore, no operations related impacts would occur. Maintenance activities would occur during daytime hours and would not result in new sources of light or glare in the Project area. No impacts would occur.

Construction activities to unearth the buried existing bridges at Watsonville Road and West Middle Avenue would not result in new lighting at these locations where lighting did not previously exist. Therefore, no operations related impacts would occur. Maintenance activities would occur during daytime hours and would not result in new sources of light or glare in the Project area; therefore, no impacts would occur.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.13.3.2 Natural Resources Conservation Service (NRCS) Alternative

The NRCS Alternative would include widening and deepening the channel in all Project reaches.

Construction of the NRCS Alternative has the potential to degrade the existing visual character and quality in downtown Morgan Hill with the proposed improvements along West Little Llagas is Reach 8. For other reaches construction would require staging of materials and large construction equipment and the removal of large quantities of vegetation within the construction footprint as demonstrated in Figures 3.13-1b through 3.13-1h. Tree removal for the NRCS Alternative would be the same as in the Tunnel Alternative with the exception of Reach 8. In Reach 8, the NRCS Alternative would involve removal of additional trees found along 2,775 feet of the existing West Little Llagas Creek channel where above- ground construction would take place, which would be avoided by the Tunnel Alternative. Overall, approximately 65 percent of the trees within the Project construction limits are proposed for removal.

The NRCS Alternative would result in increased visual impacts compared to the Tunnel Alternative as it relates to commercial and residential areas in Reach 8. Construction of the NRCS Alternative would result increased disturbance along the existing West Little Llagas Creek channel. Another feature that is not included in the NRCS Alternative is the construction of a sediment basin/weir structure at Wright Avenue and Hale Avenue in Reach 8. The general visual character of the area in Reach 8 as shown in Figure 3.13.1b would be substantially changed as part of the NRCS Alternative since existing West Little Llagas Creek, downstream of West Main Avenue through downtown City of Morgan Hill would require widening and hardscape to meet the project objective of providing 1-percent flood protection.

There are no designated scenic vistas or view corridors of importance within the Project area. Construction of the NRCS Alternative would involve tree removals, channel widening, channel realignment, staging of materials and large construction equipment, and other flood improvement activities, which may change the general appearance of Upper Llagas Creek at public viewing points (Figures 3.13-1b–h). A revegetation plan would be implemented to revegetate and restore the creek corridor to natural conditions. While the revegetated areas recover from NRCS construction, they may temporarily appear sparsely vegetated and bare; however, as the plants and trees mature, the overall long-term change would remain in line with the visual character of Upper Llagas Creek corridor. The NRCS Alternative would not obstruct or block any scenic vista or view corridor that is designated on local plans. Therefore, no impacts would occur from construction of the NRCS Alternative.

After construction, the operations and maintenance (O&M) activities associated with the NRCS Alternative would be greater than those O&M activities described in the Tunnel Alternative within Reach 8. After construction of the NRCS Alternative, maintenance of modified West Little Llagas Creek through downtown City of Morgan Hill would require periodic sediment removal, vegetation management, and associated minor maintenance activities to maintain the required hydraulic capacity to meet the project objective of providing 1-percent flood protection. These O&M activities would have temporary visual impacts until the vegetation growth returned. These Reach 8 O&M activities associated with the NRCS Alternative are not required under the Tunnel Alternative.

Impacts to Aesthetic Resources for the remaining project reaches (4, 5, 6, 7a, 7b, and 14) for the NRCS Alternative are similar to the Tunnel Alternative as described and discussed previously. In addition, after construction, the operations and maintenance (O&M) activities within these remaining project reaches (4, 5, 6, 7a, 7b, and 14) associated with the NRCS Alternative would be similar to the O&M activities described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.13.3.3 Culvert/Channel Alternative

The SCVWD considered and developed the Culvert/Channel Alternative, because there was an opportunity to reduce the Project footprint associated with the NRCS Alternative in Reach 8. This alternative would require a smaller ROW; reduce the amount of vegetation to be removed along the existing West Little Llagas channel; and would allow easier maintenance access, relative to the NRCS Alternative. The key feature of the Culvert/Channel Alternative is elimination of the need for channel deepening and widening through residential properties, as proposed for the NRCS Alternative between West Main Avenue and West 2nd Street in Reach 8.

The Culvert/Channel Alternative would result in lessened construction-related effects to aesthetics in residential areas in Reach 8 than the NRCS Alternative, because of the installation of the culverts would occur through athletic fields and along Del Monte Road to West 2nd Street, rather than through a section of residential homes between West Main

Avenue and West 2nd Street. For other project reaches, visual simulations are shown in Figures 3.13-1b–h.

For most reaches, once the Project is constructed, over time vegetation density would increase and flexibility of woody riparian species would decrease as the vegetation matures and becomes well established. This would cause the hydraulic roughness of the channel to increase beyond that originally designed, necessitating thinning, or removal of vegetation to maintain the reduction of flood risk. During routine maintenance activities, such as vegetation management, there would be visual changes from removal of vegetation required as part of flood risk management. However, these changes would be intermittent and site specific. Additionally, large trees would not be removed as part of the maintenance program.

In Reach 8, there would be reduced removal of vegetation for the Culvert/Channel Alternative; therefore, reduced visual impacts overall from this alternative, since no maintenance is proposed in the areas that would not require vegetation removal. Therefore, impacts from maintenance would be less than significant.

The Culvert/Channel Alternative would result in lessened construction-related effects to creek corridor views in residential areas in Reach 8. An 800-foot segment of the double 10-foot-wide box culverts in the NRCS design would be realigned parallel to Hale Avenue through the Britton School athletic fields up to Del Monte Avenue and continuing the double box culvert under Del Monte Avenue approximately 900 feet to West 2nd Street.

From West 2nd Street to West Dunne Avenue the same channel widening and deepening, along with culvert replacements at 2nd, 3rd, 4th, and 5th streets, as described for the NRCS Alternative, would be performed in Reach 8. The upstream-most portion of the Culvert/Channel Alternative from Llagas Road then along Hale Avenue would remain the same as the NRCS Alternative. All other reaches would have exactly the same design, as previously described for the NRCS Alternative. Since there are no designated scenic resources in the NRCS Project area, no impacts would occur.

The Culvert/Channel Alternative would result in lessened construction-related effects aesthetics in residential areas in Reach 8. With implementation of mitigation measures as described in Chapter 5 of this EIS, impacts would be less than significant. Overall, operations and maintenance would comply with local policies related to protection of visual resources and with the implementation of the BMPs, listed below. Impacts related to conflicts with local policies would occur during operations and maintenance of the Culvert/Channel Alternative would be less than significant. Construction would take place primarily Monday through Friday from 7:00 a.m. to 8:00 p.m. and Saturdays 9:00 a.m.to 6:00 p.m., but with the potential for construction work in the evenings until 10:00 p.m. outside of residential areas, although in emergencies, it could be later. Construction activities are not anticipated to result in new sources of light or glare during the daytime. Nighttime construction may be required to avoid interruptions during peak traffic periods on heavily used roads or to address utilities relocation when utilized less in the evenings, temporary lighting may be used when necessary; however, this would be temporary in nature. Additionally, with incorporation of mitigation measures, illumination beyond the immediate work area will be minimized and all required lights would be shielded and pointing downward to control light beyond the immediate work area. With implementation of mitigation measures as described in Chapter 5 of this EIS, impacts would be less than significant.

Impacts to Aesthetic Resources for the remaining project reaches (4, 5, 6, 7a, 7b, and 14) for the Culvert/Channel Alternative are similar to the Tunnel Alternative as described and discussed previously. In addition, after construction, the operations and maintenance (O&M) activities within these remaining project reaches (4, 5, 6, 7a, 7b, and 14) associated with the Culvert/Channel Alternative would be similar to the O&M activities described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.13.3.4 Reach 6 Bypass Alternative

The Reach 6 Bypass Alternative would construct a high-flow bypass channel between Reach 6 of Llagas Creek and Reach 14 of East Little Llagas Creek. The bypass would be designed so that no flood capacity improvements would be needed along Reach 6 or Reach 5 of Llagas Creek downstream of the proposed bypass. Additionally, in Reach 8, through the City of Morgan Hill, the Project would be exactly the same as the Tunnel Alternative. Flood conveyance improvements for the upstream Project Reaches 7A and 7B and for the downstream Reach 4 would remain the same as that described for the NRCS Alternative. Reach 14 would also be wider and deeper compared to other alternatives.

Impacts are similar to the Tunnel Alternative, except along the existing channel in Reach 5 and most of Reach 6, which would require no construction; and, therefore, no tree removals in either reach. However, there would be additional construction of a new bypass channel, which would connect Reach 6 to Reach 14 by passing under Murphy Avenue and then under U.S. 101 with new bridges. However this proposed bypass area is currently an undeveloped, open field that has low visual sensitivity, because the viewers are commuters and non-recreational travelers along U.S. 101 or along Murphy Avenue. The constructed earthen bypass channel banks would be vegetated, but the channel itself would be dry most of the time, except during rainfall events that briefly generate high flow runoff. Although the empty field would hold a new channel feature, the aesthetic character would not substantially change, as the landscape would remain earthen, natural materials, the same viewshed would remain intact (nothing would obstruct existing views) and the landscape would remain pastoral in character. As such, the visual quality to the area would not be negatively affected, because it would not be out of context with the existing surrounding visual character. Visual simulations depicting most Project reaches for the Reach 6 Bypass Alternative are demonstrated in Figures 3.13-1a and Figures 3.13-1c–h. Figure 3.13-1f depicts both the existing setting and the visual simulation with channel modifications in Reach 5. Since no modifications are proposed in Reach 5 for the Reach 6 Bypass Alternative, this existing view would remain the same as shown in the top photograph of this figure. With implementation of mitigation measures as described in Chapter 5 of this EIS, impacts would be reduced.

During operations and maintenance of the Reach 6 Bypass Alternative, no channel modifications would occur in Reach 5 and portions of Reach 6. Therefore, long-term visual effects, as a result of Project operations and maintenance would be less along those reaches compared with the Tunnel Alternative (Applicant's Proposed Action).

Maintenance activities, such as vegetation management would still occur along Reach 5 and portions of 6. With regards to the new bypass channel proposed for construction under this alternative, it would be dry most of the year and revegetation would primarily involve grasses and low-growing xeric shrubs, which would require minimal maintenance. The maintenance associated with the newly constructed channel segments would result in periodic and temporary reduction in the density of vegetation to maintain channel capacity; however, these changes would be subtle and would not degrade the overall visual quality of the Project area. Impacts are less than significant.

The Reach 6 Bypass Alternative would, however, result in less construction-related visual effects in Reach 5 and most of Reach 6, although construction of the bypass channel would introduce new construction not proposed under the Tunnel Alternative. There would be additional construction-related visual effects due to construction of a new Bypass channel under Murphy Avenue and U.S. 101 to connect Reach 14 to Reach 6. There are no designated scenic vistas or view corridors in the Project area. Therefore, no impacts will occur to designated scenic vistas or view corridors. During operations and maintenance of the Reach 6 Bypass Alternative, no channel modifications would occur in Reach 5 and a portion of Reach 6; therefore, related effects on visual resources would be reduced along those reaches. Other than vegetation maintenance, operations would not alter the view or impact the visual quality of the Project area. The existence of a new bypass under U.S. 101 would be a new permanent visual change in the area. Additionally, a tunnel would be constructed similar to the Tunnel Alternative in Reach 8, which would reduce visual impacts from above-ground locations compared to channel deepening and widening that would occur under the NRCS Alternative.

Maintenance activities, such as vegetation management, would still occur along Reach 5 and portions of 6 and 8. The bypass channel would be dry most of the year, so revegetation would primarily consist of grasses and xeric shrubs, which would require minimal maintenance. Maintenance would result in periodic and temporary reduction in the density of vegetation to maintain channel capacity; however, these changes would be subtle and would not degrade the overall visual quality of the Project area. Additionally, there are no designated scenic vistas or view corridors in the Project area; therefore, no impacts would occur.

The Reach 6 Bypass Alternative would result in a reduced construction footprint, since there is no construction in Reach 5 and most of Reach 6 but would result in additional construction of a new Bypass connection under Murphy Avenue and U.S. 101 to connect Reach 14 to Reach 6. Construction activities would not conflict with local plans and policies on protecting visual and aesthetic resources with implementation of mitigation measures as discussed in Chapter 5 of this EIS, impacts would be less than significant.

For operations and maintenance of the Reach 6 Bypass Alternative, no channel modifications would occur in Reach 5 and most of Reach 6; therefore, visual related effects would not occur along those reaches. Maintenance activities, such as vegetation management, would still occur along the existing segments of channel in Reach 5 and portions of 6, where no construction would occur under this alternative. The Reach 6 Bypass Channel would be dry most of the year, so revegetation would primarily consist of grasses and xeric shrubs, which would require minimal maintenance. Where new construction occurs under this alternative, maintenance would result in periodic and temporary reduction in the density of vegetation to maintain channel capacity; however, these changes would be subtle and would not change the overall visual character or quality of the Project area.

Impacts to Aesthetic Resources for the remaining project reaches (4, portion of 6, 7a, 7b, 8 and portion of 14) for the Reach 6 Bypass Alternative are similar to the Tunnel Alternative as described and discussed previously. In addition, after construction, the operations and maintenance (O&M) activities within these remaining project reaches (4, portion of 6, 7a, 7b, 8 and portion of 14) associated with the Reach 6 Bypass Alternative would be similar to the O&M activities described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.13.4 Summary of Impacts to Aesthetic Resources

Mitigation measures and BMPs, as appropriate, for the various Action Alternatives to reduce the impacts to Aesthetic Resources are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS. Although impacts are less than significant for each of the Alternatives, the level of impacts vary in intensity and extent as summarized below.

No Action Alternative

No construction is proposed as part of the No Action Alternative. Continued implementation of the maintenance activities as part of the SMP would not have long-term aesthetic impacts. No significant aesthetics related impacts would occur as a result of implementing the No Action Alternative.

Tunnel Alternative (Applicant's Proposed Action)

Aesthetics impacts from the Tunnel Alternative would involve tree removals, channel widening, channel realignment, staging of materials and large construction equipment, and other flood improvement activities, which would change the general appearance of Upper Llagas Creek at public viewing points. However, construction activities would be temporary and disturbed areas would be revegetated according to a revegetation plan. This would be implemented to revegetate and restore the creek corridor to natural conditions. Immediately after tree removals, and prior to full establishment after initial revegetation efforts, the Project area would appear less densely vegetated and the tree canopy would be reduced. This change would be temporary, but revegetation and establishment of replanted trees would take place following tree removals, and in the long term vegetation would eventually reach pre-Project densities.

Maintenance activities after construction would be subtle and would not change the overall visual character or quality of the Project area.

Overall aesthetic impacts would be less than the NRCS Alternative in that there would be no modifications to the channel in Reach 8 through downtown Morgan Hill with construction of a tunnel, which has high public viewing opportunities.

NRCS Alternative

Aesthetics impacts would be similar to the Tunnel Alternative but would be increased with the proposed channel improvements in Reach 8. The proposed tree removals, as part of construction for all action alternatives, would change the visual character and visual quality of each reach and would be considered a significant impact since more than half of the existing trees within the construction limits would be removed.

As compared to the other alternatives, the NRCS Alternative would have the most visual impacts from construction and operations and maintenance since channel modifications are proposed for every reach.

Culvert/Channel Alternative

The Culvert/Channel Alternative would have impacts very similar to the NRCS Alternative, except that through a portion of Reach 8, the amount of vegetation to be removed along the existing West Little Llagas channel near downtown City of Morgan Hill would be reduced, thereby, reducing the extent of impacts compared to the NRCS Alternative. The Culvert/Channel Alternative would result in more aesthetics impacts than the Tunnel Alternative and the Reach 6 Bypass Alternative due to the longer length of channel modifications in Reach 8 near downtown.

Reach 6 Bypass Alternative

The Reach 6 Bypass Alternative is most similar to the Tunnel Alternative, but requires the construction of a new bypass channel under U.S.101, which would involve construction and operations related visual effects in the bypass channel area. However, the bypass channel area has low visual quality and visual sensitivity since it is part of an urbanized area near a busy interstate freeway. Additionally, there would be no construction in Reach 5 and portions of Reach 6; and a tunnel would be constructed in Reach 8, leaving the existing creek channels in these reaches unmodified. The Reach 6 Bypass Alternative would reduce the overall need for vegetation removal and channel modifications and would have the least amount of aesthetic related impacts as compared to the other alternatives.

4.14 UTILITIES AND PUBLIC SERVICES

4.14.1 Introduction

In this section, the focus is on how utilities and public services may be affected by the various alternatives; and this section will not focus on the potential for the Project to increase growth and, therefore, increase demand for the various utilities.

The Project is not expected to increase demand for utility or public services, as an increase in population attributable to the various alternatives is not anticipated (Section 3.16 and Section 4.16, Population and Housing). Therefore, the focus of the analysis is on how the Project may affect the utilities infrastructure. Potential impacts to utilities due to ground disturbing activity, such as construction, are assessed. The various alternatives are also analyzed to assess the potential effect on public services in the Project area. Also, the potential for the alternatives to impact the delivery of public services, such as increasing the overall emergency response times, is considered; although, the net change in timing would vary depending on location, type of emergency, weather, and time of day. For the purpose of comparing the alternatives' impacts on solid waste facilities,

Table 4.14-2 shows the estimate of net disposal volume of materials associated with excavation by alternative. The SCVWD will comply with all regulations associated with the management of solid waste under all alternatives.

Table 4.14-2 Disposal Volumes by Alternative in Bank Cubic Yards (bcy) [1]

No Action Alternative		NRCS Alternative	Tunnel Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
Disposal (bcy)	0	1,339,500	1,332,500	1,342,000	986,030

[1] Table shows disposal (total excavation less the estimated amount to be used on-site for fill). More detailed data is shown in the Project Description.

4.14.2 No Action Alternative

The No Action Alternative, in general, is not expected to lead to direct impacts to public services and/or utilities within the Project area. However, compared to the action alternatives, this alternative does subject urbanized portions of Morgan Hill (Reaches 7A, 7B, and 8) to increased flood risk. Flooding, in turn, may disrupt or damage existing infrastructure, including utilities.

No construction would occur; therefore, the No Action Alternative would not damage or displace any utility infrastructure, and no impact would result.

Maintenance activities would continue as under existing conditions. However, future flooding of the creek could damage or disrupt utility services and other infrastructure (DWR and USACE 2013), as there is no additional protection from 100-year flooding. This can be especially damaging in a populated area where the concentration of commercial and residential areas is greater and more utility infrastructure is present. Under existing conditions, a substantial portion of the urbanized portion of Morgan Hill, including areas in and around downtown, is susceptible to flooding under the 100-year flood scenario. Under this scenario, existing utility infrastructure would likely be damaged during an extreme flood event and would constitute a significant impact.

No construction would occur; therefore, the No Action Alternative would not impact landfill capacity. Maintenance activities would continue as under existing conditions. The No Action Alternative would have no new impact on landfill capacity. With no construction there would be no impact on public services. Maintenance would continue under the existing SMP. There would be no impact to public services.

BMPs for the No Action Alternative, including O&M activities are discussed and described in Chapter 5 and Appendix B of this EIS.

4.14.3 Action Alternatives

4.14.3.1 Tunnel Alternative (Applicant's Proposed Action)

A network of underground and overhead utility lines providing water, gas, electricity, telecommunications (including fiber-optic lines), sewer, water, and stormwater drainage, among other utilities identified in Section 2.4.4, exists within the Project area. The construction of the Tunnel Alternative would require the abandonment and/or relocation of some of the utility lines within the Project footprint. These utilities would be protected in place if they were not removed. Prior to construction, other utilities would be relocated to maintain service levels currently provided. Sewer lines and storm drainage facilities may be relocated prior to construction. Seven wells, not operated by SCVWD, are within 500 feet of the Project area. There is the possibility that wells providing water for households, industrial, or agricultural users within or near the Project footprint could be impacted by interruption to their water service. The interruption of water service attributable to construction activities is a potentially significant impact but would be reduced with mitigation.

The construction and excavation under this alternative is expected to produce about 1.33 million bcy of spoil (see Table 2.5-3). To the extent possible, excavated materials would be used on-site where fill or soil materials are needed and for existing or planned projects where fill is necessary. For example, fill would be needed at Lake Silveira and the majority of materials would be delivered to Anderson Dam for later use in a SCVWD earthquake retrofit project, Section 2.5.3.3 provides additional detail about use of excavated materials and quantities. A small portion of construction-related earth materials, that may not be suitable for use in the Anderson Dam retrofit project, would go to local landfills. The exact amount going to the landfill would depend on the construction specifications for both the Proposed Project and the Anderson Dam Project neither of which has been defined at the time. Currently, landfills serving Santa Clara County have sufficient capacity to accept the remaining amount of non-reusable spoil that assumed to be transferred to a landfill as there will be 46,814,938 tons of surplus capacity in the year 2020, assuming a middle growth scenario (Cal Recycle 2013). Assuming 10 percent of total Project-generated excavation spoils, about 130,000 bcy (162,000 tons) would go to a landfill, the waste input from the Tunnel Alternative would be 0.3 percent of the space available and, therefore, the impact is less than significant.

Construction of the Project would not require the construction of additional public service facilities or impact existing physical resources used to deliver these public services. The Project would not substantively increase permanent population, increase the demand for protective service, education facilities or services, and would not be growth inducing because the Project would not substantively increase permanent population, increase the demand for protective service, education facilities or services, and would not be growth inducing (Section 3.16, Population and Housing). However, construction activities would be in the proximity of electric utility lines and underground pipelines. Even with the implementation of safety procedures, construction activities increase the probability of rupture and even an explosion especially if natural gas lines were damaged. If this were to occur, demand for emergency services, including police and fire, would likely be needed. Additionally, potential temporary road closures associated with Project construction have the possibility of increasing response times for emergency services, including police and fire. Both of these factors would result in a significant impact on public services but would be reduced with mitigation.

The operations and maintenance of the Tunnel Alternative would not damage or displace existing utility infrastructure, would not impact public services in the Project area, because no operations would be interfering with utilities or emergency services due to the availability of maintenance roads after construction. The operations and maintenance of the Tunnel Alternative would not impact landfills, because the amount of waste would be minimal because the channel design will be more stable than existing conditions and historically maintenance has been infrequent as described in Section 2.3. Sediment maintenance has occurred as frequent as once every 4–10 years and vegetation would be chipped or composted landfills serving Santa Clara County currently have sufficient capacity.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.14.3.2 Natural Resources Conservation Service (NRCS) Alternative

The activities, impacts, and mitigation measures under the NRCS Alternative are expected to be similar to the Tunnel Alternative. However, this alternative would result in a greater impact to utilities compared to the Tunnel Alternative, because the Project footprint is larger within Reach 8.

The construction and excavation under this alternative is expected to produce about 1.34 million bcy of spoil (see Table 2.5-3). To the extent possible, excavated materials would be used on-site where fill or soil materials are needed and for existing or planned projects where fill is necessary.

Impacts to Utilities and Public Services are similar to the Tunnel Alternative as described and discussed previously. In addition, after construction, the operations and maintenance (O&M) activities would be similar to the O&M activities described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.14.3.3 Culvert/Channel Alternative

The impacts and mitigations under the Culvert/Channel Alternative are expected to be similar to the Tunnel Alternative, although the Project footprint is reduced within Reach 8. Additionally, this alternative would place a box culvert below a school field, so below ground utilities, if any, in the vicinity of the ball fields may be impacted.

The construction of the Culvert/Channel Alternative would not impact public services in the Project area. The Project would not require the construction of additional public service facilities or impact existing physical resources used to deliver these public services, the Project would not substantively increase permanent population, increase the demand for protective service, education facilities or services and would not be growth inducing (Section 3.16, Population and Housing). The Project would temporarily limit access to the ball fields, adjacent to Britton Middle School; however, this is not anticipated to impact the school itself. The impact to the ball fields is addressed in detail in Section 4.15, Recreation Resources

The construction and excavation under this alternative is expected to produce about 1.34 million bcy of spoil (see Table 2.5-3). To the extent possible, excavated materials would be used on site where fill or soil materials are needed and for existing or planned projects where fill is necessary.

Impacts to Utilities and Public Services, not described above, are similar to the Tunnel Alternative as described and discussed previously. In addition, after construction, the operations and maintenance (O&M) activities would be similar to the O&M activities described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.14.3.4 Reach 6 Bypass Alternative

The impacts and mitigation measures under the Reach 6 Bypass Alternative are expected to be similar to the Tunnel Alternative. However, compared with the Tunnel Alternative, there is no construction along Reach 5 and limited construction along Reach 6, so that utilities along these reaches, and the potential extent of related impacts would be less compared with the Tunnel Alternative. For example, six wells along Reach 6, potentially impacted under the other alternatives, would not be affected under this alternative; three of these wells are SCVWD-owned while the other three are water supply/irrigation wells. Therefore, there are four wells, not owned by SCVWD, potentially impacted under this alternative.

A network of underground and overhead utility lines providing water, gas, electricity, telecommunications (including fiber-optic lines), sewer, water, and stormwater drainage, among other utilities, exists within the Project area. Construction conducted under this alternative would require the abandonment and/or relocation of some of the utility lines within the Project footprint. However, the amount of utilities removed under this alternative would be less than under the Tunnel Alternative. These utilities would be protected in place if they were not removed. Prior to construction, other utilities would be relocated to maintain service levels currently provided. There is the possibility that wells providing water for households, industrial, or agricultural users within or near the Project footprint could be impacted by interruption to their water service. The interruption of water service attributable to construction activities is a potentially significant impact. Potential impacts to utilities would be mitigated through the implementation of mitigation measures described in Chapter 5 of this EIS, which requires the replacement of affected wells.

The construction and excavation under this alternative is expected to produce less than 0.99 million bcy of spoil (see Table 2.5-3). To the extent possible, excavated materials would be used onsite where fill or soil materials are needed and for existing or planned projects where fill is necessary.

Impacts to Utilities and Public Services, not described above, are similar to the Tunnel Alternative as described and discussed previously. In addition, after construction, the operations and maintenance (O&M) activities would be similar to the O&M activities described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.14.4 Summary of Impacts to Utilities and Public Services

Two less-than-significant impacts with proposed mitigations were identified for each of the action alternatives. The first impact relates to the potential for wells to be decommissioned as a result of Project construction. The mitigation requires replacement with operating wells. Second, a significant impact was identified in relation to potential utility rupture associated with Project construction and the possibility that public services, such as police and fire, may be impacted due to delays in response time. The impact is reduced to less than significant with mitigation by requiring the development of an emergency response plan and notification.

Mitigation measures and BMPs, as appropriate, for the various Action Alternatives to reduce the impacts to Utilities and Public Services are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

4.15 RECREATION RESOURCES

4.15.1 Introduction

This section assesses if the alternatives have the potential to physically impact existing recreational resources in the Project area, such as parks or trails located within the Project footprint, which may be impacted by construction.

Impacts attributable to construction activities, such as potentially diminishing access to recreational opportunities, are considered. For this analysis, the proximity of the Project footprint to recreational resources is considered; and if a park or other recreational resource is within the footprint, the potential for an impact exists. Therefore, an additional impact category (Location of Project Features) is added for each action alternative to account for areas where there is the possibility of Project features permanently replacing existing features such as, in this case, parklands or trails.

In general, the park facilities within the Project footprint are along Reaches 7A, 7B, and 8. A facility impacted by the Project may negatively affect the users' experience or result in users choosing to visit another facility in the region and potentially adversely impact the outlying locations. Impacts to the West Little Llagas Creek Trail is considered in light of the Joint Use Agreement between the City of Morgan Hill and the SCVWD.

Lake Silveira would be partially filled as part of Project and be converted into wetlands. This would change the conditions at the lake; however, Lake Silveira is not currently a sanctioned recreation facility and access is only provided informally. Changes at Lake Silveira are not discussed in the impact analysis for each alternative, as the changes would be the same under each action.

4.15.2 No Action Alternative

This alternative would not affect recreational resources within the Project area. The only concern would be recreational resources within the City of Morgan Hill would be at a greater risk of damage due to flooding compared with the action alternatives; however, any impact would be temporary.

There will not be any construction activities under the No Action Alternative and, thus, the alternative would not disrupt access to recreational resources in the Project area.

Periodic maintenance activities, conducted with implementation of SCVWD BMPs, would continue along streamside trails and, at times, trail access would be temporarily affected as maintenance occurs under the existing SMP. Maintenance activities under the No Action Alternative would not permanently disrupt access to recreational resources in the Project area; therefore, due to short-term interruptions the impact would be less than significant. There is the possibility that recreational facilities could be inundated as a result of flooding. This impact would be temporary and is not likely to physically deteriorate recreational resources. The potential impact is less than significant.

There would not be construction activities under the No Action Alternative and, thus, the alternative would not result in the displacement of potential recreational users.

Maintenance activities under the No Action Alternative would not result in the displacement of potential recreational users. However, there is the possibility that park and trail users could be displaced from areas within the flood inundation zone as a result of flooding. This impact would be temporary and is not likely to physically deteriorate other existing recreational resources. Therefore, the impact would be less than significant.

BMPs for the No Action Alternative, including O&M activities are discussed and described in Chapter 5 and Appendix B of this EIS.

4.15.3 Action Alternatives

4.15.3.1 Tunnel Alternative (Applicant's Proposed Action)

Construction activities associated with the Tunnel Alternative would create temporary impacts to recreation resources due to noise, visual quality issues, or traffic attributable to construction related activities. Additionally, this alternative has the potential to impact parklands and trails if construction occurs on or around these facilities given the proximity of the Project to recreational facilities along Reaches 7A, 7B, and 8.

The West Little Llagas Creek Trail, on land owned by SCVWD, would be inaccessible during times of construction. However, the trail currently operates under a Joint Use Agreement that states that the purpose of the trail is secondary to flood management activities and the understanding is the trail could be affected by these activities. Also, use of maintenance roads, although unpaved, would be available after the Project construction is complete. This alternative also has the potential to impact parklands if construction occurs on or around these facilities given the proximity of the Project to recreational facilities along Reaches 7A, 7B, and 8. Parklands that are both not owned by SCVWD and in close proximity to the Project footprint, include the Centennial Recreation Center, Galvan Park, and the Britton ball fields. The possibility exists that Project construction would impact these parklands and constitutes a significant impact. These impacts would be reduced to less than significant with the incorporation of mitigation discussed in Chapter 5 of this EIS.

Recreational facilities (Centennial Recreation Center and Galvan Park) are very close to the Project footprint, as are the ballpark fields adjacent to Britton Middle School; however, recreational facilities, not under the jurisdiction of the SCVWD, would not be permanently converted to non-recreational uses. The West Little Llagas Creek Trail is also within the Project footprint. The paved trail and landscaping would be removed, as flood management activities would occur in these areas. Although after construction, maintenance roads could continue to provide access for recreational trail users in and around Llagas Creek. Given the possibility that the trail would be converted to an aggregate base road, this would have a significant impact to recreational resources. However, the impact would be reduced to the less than significant with the incorporation of mitigation measures as discussed in Chapter 5 of this EIS.

During the Draft EIS Notice of Intent (NOI) comment period, the USACE received a letter National Park Service, dated October 23, 2015 (See Appendix A), requesting this EIS analyze and address any potential impacts to the Juan Bautista de Anza National Historic Trail. The Applicant (SCVWD) has discussed with and held previous meetings with the County of Santa Clara Parks and the City of Morgan Hill staffs regarding future trails within Reaches 7A, 7B, and Reach 8 for the proposed project in accordance with the planning, design, and preparation of this EIS. The Applicant's Proposed Action is consistent with both the County's and City's Master Plans regarding Recreation Trails within the project area and will not impact any portion of the Juan Bautista de Anza National Historic Trail. The Applicant's Proposed Action does not include the construction of any recreation trails, but the Proposed Action may support future recreation trails constructed by the County and/or City, or other authorized party, subject to proper approvals from the various governing and jurisdictional agencies.

Periodic maintenance activities would lead to short periods where the maintenance roads used as trails are inaccessible, as occurs under the existing SMP. The operations and maintenance of this alternative would have a less-than-significant impact on recreational resources due to these short-term and temporary interruptions in recreation availability.

Visitors may choose to visit other recreational opportunities in the region to avoid the temporary impact due to construction. However, the region has ample regional recreational opportunities and the impact to facilities outside of the Project footprint would not expected to be significant.

Recreationists visiting other locations due to changes in the Project footprint are expected be minimal, because the main feature to change is the West Little Llagas Trail would be unpaved. Furthermore, there are ample regional recreational opportunities, as described in Section 3.15.3 and shown on Figure 3.15-1. The amount of additional use, if any, at outlying recreational areas would be negligible compared to the available area for recreation. Therefore, the impact would be less than significant.

The operations and maintenance of this alternative would require periodic closures to trails. However, these closures would be temporary and be incorporated with trail management-related BMPs. Therefore, the impact to recreational resources would be less than significant and would not require mitigation.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.15.1.3 Natural Resources Conservation Service (NRCS) Alternative

Construction activities associated with the NRCS Alternative would create temporary impacts to recreation resources due to noise, visual quality issues, or traffic attributable to construction related activities. Additionally, this alternative has the potential to impact parklands and trails if construction occurs on or around these facilities given the proximity of the Project to recreational facilities along Reaches 7A, 7B, and 8. This alternative would widen and deepen the creek along Reach 8.

Impacts to Recreation Resources are similar to the Tunnel Alternative as described and discussed previously. In addition, after construction, the operations and maintenance (O&M) activities would be similar to the O&M activities described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.15.1.4 Culvert/Channel Alternative

In general, the impacts and mitigation measures under the Culvert/Channel Alternative, would be similar as under the Tunnel Alternative, with the exception that the impact to the ballpark fields near Britton Middle School would likely be more substantial and of a longer duration to account for burying the culvert under the field. Therefore, the Culvert/Channel Alternative would have greater impacts to Recreation Resources than the other Action Alternatives.

The City of Morgan Hill Parks and Recreation Department offers to the public a softball program with a significant amount of players and teams enrolled in this program each year. However, currently most games are scheduled at their Community Park near Monterey Road, located off of Edmundson Avenue. However, teams utilize these ballpark fields near Britton Middle School for games and as a practice site. The Culvert/Channel Alternative would require the City to play additional games at other sites, specifically Community Park and likely reduce the available fields available for opportunities to practice. Finding other locations while this Alternative is under construction through the ballpark fields near Britton Middle School would be a temporary impact.

Impacts to Recreation Resources, not described above, are similar to the Tunnel Alternative as described and discussed previously. In addition, after construction, the operations and maintenance (O&M) activities would be similar to the O&M activities described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.15.1.5 Reach 6 Bypass Alternative

The impacts and mitigation measures under the Reach 6 Bypass Alternative would be similar as under the Tunnel Alternative, because the recreational facilities are located on reaches that would undergo the same construction activities for both alternatives. There are no recreational facilities in the footprint or adjacent to the Reach 6 bypass channel.

Impacts to Recreation Resources are similar to the Tunnel Alternative as described and discussed previously. In addition, after construction, the operations and maintenance (O&M) activities would be similar to the O&M activities described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.15.4 Summary of Impacts to Recreation Resources

Impacts to recreational resources under all of the action alternatives were identified in association with construction, and location of Project features with all action alternatives having similar impacts, except for the Culvert/Channel Alternative, where the impacts will be greater due to impacts to the recreation fields near Britton Middle School.

Mitigation measures and BMPs, as appropriate, for the various Action Alternatives to reduce the impacts to Recreation Resources are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

4.16 POPULATION AND HOUSING

4.16.1 Introduction

In this section, the potential impacts of the various alternatives are assessed related to population and housing.

The implications to population and housing resources are evaluated for each of the alternatives are considered. The analysis also includes potential impacts due to both construction and operations and maintenance activities. For population growth, the anticipated new long-term employment opportunities are the focus of the analysis. Most of the new construction related employment would be filled by existing construction workers within Santa Clara County and its adjacent counties (see Section 3.17.3.1 and Table 4.17.11). For the purpose of analyzing population growth, these jobs have been assumed to be filled by individuals new to the region. Long-term operations and maintenance employment opportunities would be filled by existing employees performing existing SMP work. Based on the information presented in Chapter 2 (see Tables 2.5-2 and 2.5-4), Table 4.16-4a lists the maximum annual construction employment by alternative. For population and housing, the potential displacement of housing and individuals living in the Project footprint is the focus of the analysis. Table 4.16-4b lists the number of residences to be moved or removed by alternative.

Table 4.16-4a Project-related construction employment (Maximum/year) [1,2]

Construction Year	No Action Alternative	Tunnel Alternative	NRCS Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
1	0	107	107	107	107
2	0	261	245	245	261
3	0	256	240	240	256
4	0	159	143	143	201
5	0	112	96	96	154
6	0	48	48	48	0

[1] Excavation and non-excavation construction occupations.
[2] These estimates reflect maximum annual construction employment, because Table 2.5-4 counts the same employee in each reach where the employee is required regardless if construction phases are overlapping and the same employee may work in multiple reaches simultaneously. While these estimates do not include the laborers required for the Lake Silveira portion of the Project (estimates have not been developed at this time), labor needs for construction and restoration activities are expected to be a small fraction of the construction labor required for the channel widening/deepening and infrastructure modifications portion and would not vary among the action alternatives.

Table 4.16-4b Residential Structures Located Within Project Footprint

Reach	No Action Alternative	Tunnel Alternative	NRCS Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
4	0	0	0	0	0
5	0	0	0	0	0
6	0	2	2	2	2
7A	0	0	0	0	0
7B	0	1	1	1	1
8	0	0	9	4	0
14	0	0	0	0	0
Total by Action	**0**	**3**	**12**	**7**	**3**

4.16.2 No Action Alternative

The No Action Alternative would not result in changed conditions related to housing and population in the Project area. As it is, population has been growing steadily within the general vicinity of the Project regardless of the existing flood management conditions. It appears that population growth within the Project area is influenced more by employment opportunities linked to the Silicon Valley rather than risk associated with flooding. Therefore, the No Action Alternative is not expected to induce population growth and would not displace housing or people within the Project area, and there is no impact.

Stream maintenance would continue under the SCVWD's SMP. Since this is an ongoing program and no new workers would be needed to continue this work there would be no impact to population and housing under this alternative. In addition, maintenance activities would not displace housing, because the removal of homes is not necessary to complete these activities.

BMPs for the No Action Alternative, including O&M activities are discussed and described in Chapter 5 and Appendix B of this EIS.

4.16.3 Action Alternatives

4.16.3.1 Tunnel Alternative (Applicant's Proposed Action)

The Tunnel Alternative is anticipated to employ a maximum of approximately 260 construction workers, 157 per year on average.

The number of workers who may relocate to the area is not expected to induce substantial population growth (see section 3.16.1 for workforce information). Many of the workers would likely already live in the general vicinity of the Project (see Section 3.17.3.1 and Table 3.17.11). Even if all 260 workers and their family members moved into the Project area, the population growth would be less than 1 percent of the 2010 population in the combined Morgan Hill, Gilroy, and San Martin area. One aspect of the Project is to reduce the area subject to flood, suggesting that additional areas may be open to residential development. However, the amount of land potentially protected by the Project is relatively small compared to the undeveloped or existing agricultural lands in south Santa Clara County. Additionally, population growth in the region is driven more by regional factors, such as job creation in the Silicon Valley. Therefore, this alternative is not expected to induce substantial population growth and therefore there is no impact.

This alternative is expected to displace three residences and, subsequently, the residents within the households. Two of the residences are currently owned by the Applicant (SCVWD) where the tenants are continuously advised of the Project status as to when the tenants will be required to find additional housing. Local General Plans (Housing Elements) call for the maintenance of the existing housing stock, suggesting that removing households could be an impact. However, the total number of impacted residences represents less than 0.1 percent of the total households in the combined Morgan Hill, Gilroy, and San Martin area. The owner of the residence not owned by the Applicant would be compensated at fair market value for their property and would be able to acquire a replacement residence.

Since Project-related operations and maintenance would be similar to the ongoing program, no new workers would be needed. Further, the operations and maintenance of the Project under the Tunnel Alternative is not expected to induce substantial population growth nor is this Alternative expected to displace existing housing or people, because housing will not be removed with these actions; resulting in no impact.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.16.3.2 Natural Resources Conservation Service (NRCS) Alternative

The NRCS Alternative would result in the displacement of individuals who live in 12 residences, including the tenants of 2 residences currently owned by the Applicant. This is more than the other action alternatives.

The NRCS Alternative is anticipated to employ a maximum of approximately 245 construction workers, 147 per year on average.

Impacts to Population and Housing, not described above, are similar to the Tunnel Alternative as described and discussed previously. In addition, after construction, the operations and maintenance (O&M) activities would be similar to the O&M activities described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.16.3.3 Culvert/Channel Alternative

Impacts under the Culvert/Channel Alternative would generally be the same as the Tunnel Alternative, but 7 residences would be removed. This is less than the NRCS Alternative but more the Tunnel Alternative and the Reach 6 Bypass Alternative. The Culvert/Channel Alternative would employ a maximum of approximately 245 construction workers, 147 per year on average.

Impacts to Population and Housing, not described above, are similar to the Tunnel Alternative as described and discussed previously. In addition, after construction, the operations and maintenance (O&M) activities would be similar to the O&M activities described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.16.3.4 Reach 6 Bypass Alternative

The impacts under the Reach 6 Bypass Alternative are expected to be the same as the Tunnel Alternative, since this alternative would displace three residences due to construction. The Reach 6 Bypass Alternative would employ a maximum of approximately 260 construction workers, 163 per year on average.

Impacts to Population and Housing, not described above, are similar to the Tunnel Alternative as described and discussed previously. In addition, after construction, the operations and maintenance (O&M) activities would be similar to the O&M activities described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.16.4 Summary of Impacts to Population and Housing

One less-than-significant impact was identified for each of the action alternatives. The less-than- significant impact is associated with the removal of residences, and the subsequent displacement of the residents due to construction of the various proposed Project features. The Tunnel Alternative and the Reach 6 Bypass Alternative would result in the displacement of individuals who live in three residences which is less than the NRCS (12 residences) and Culvert/Channel (7 residences) Alternatives.

Mitigation measures and BMPs, as appropriate, for the various Action Alternatives to reduce the impacts to Population and Housing are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

4.17 SOCIOECONOMIC RESOURCES

This section analyzes potential impacts of the Proposed Project on social and economic (socioeconomic) resources within the Project area. Impacts to specific components of socioeconomic characteristics including population, housing, land use, recreation, and public utilities are addressed in other section of the EIS. Impacts to employment, income, taxes, and similar socioeconomic factors associated with each of the Project alternatives are identified and assessed in this section relative to the existing condition of the potentially affected socioeconomic resources. A set of criteria is developed for evaluating the significance of each impact.

4.17.1 Introduction

Impacts on socioeconomics resources were evaluated by determining whether and how Project activities and features are likely to affect stocks, flows, and values of social and economic assets in the Project area and comparing any changes to existing conditions of those parameters. Effects on socioeconomic resources can be direct, as in reductions in the stock of available housing, and indirect, as in the cost of housing, which can increase over the long-term if population growth continues but the housing stock is not replaced or if future development is constrained by the Project. While quantifiable metrics and estimates were formed for parts of the evaluation, constraints on data availability, and detail of available data resulted in a mostly qualitative analysis using the application of economic theory and principles.

It is important to understand that some features of the Project can accrue beneficial impacts to socioeconomic resources. An economic analysis of flood protection benefits prepared by the USACE in 1982 estimated annual flood damage reduction on the order of $2 to 2.5 million in present value dollars. The valuation is based on avoided property damage or destruction, and avoided destruction or damage to businesses including commercial agriculture. It is likely an understatement of the value of the project given the substantial population growth and changes in land use patterns in the Project area since the time of the USACE study. Expenditures on construction labor, materials, and supporting goods and services from businesses within the Project area will stimulate the local economy. While the dollar amounts of these beneficial impacts are not quantified in this study, it can be concluded that these benefits will not accrue under the No Action Alternative.

4.17.2 No Action Alternative

There would be no impact from construction. No construction activity would occur; thus, there would be no demand for short-term labor housing. No acquisitions would be necessary to secure Project ROW; thus, there is no potential to deplete the housing stock to the point of causing a housing shortage. Flood capacity in the upper reaches would remain unchanged and intermittent flood events would continue to occur. There is no evidence suggesting substantial portions of the housing stock have been destroyed during past flood events without replacement; thus, there is no basis to conclude continued flooding would create a housing shortage. This is particularly true given the population growth and housing development experienced in the area over in spite of flooding. However, it is worth noting, the largest flood on record was a 33-year flood event in 1955 before the recent flooding in 2008 thought to be a 60-year event (flood damages were been finalized).

Without construction and associated acquisitions for Project right of way, there is no potential for physical loss of real property. Although intermittent flood events would continue, there is no evidence of substantial physical loss of real property during historical flooding (although property damage has occurred). However, without the Project, properties in the upper reaches would remain in the flood plain and will continue depressed property values relative to those of similar properties outside of the flood plain (Bin and Polasky 2004; MacDonald, Murdoch, and White 1987). No original study was conducted for this EIS to quantify the dollar amount of property value diminution of properties located within the flood plain along the upper reaches.

There would be no impact from construction as no construction would occur and therefore no construction jobs would be supported. No spending on goods, services, and raw materials by construction laborers and the Project would occur and, thus, no jobs or income would be indirectly supported. Flood capacity would remain unchanged and intermittent flooding would occur. While businesses have closed during previous flood events, no data support that historical flooding has substantially reduced employment or income within the Project area[2].

[2] Reports indicate business in an around downtown Morgan Hill shuttered for days during recent flooding during 2008 and 2009

The impact from no construction would be significant and unavoidable. Even though no construction would occur, no structures are in the Project right of way, and there is no potential to close businesses, flood capacity would remain unchanged and intermittent flooding would continue. Evidence from recent flooding suggests that business operations in an around Reach 8 were closed, preventing the sale of goods and services in the interim. Closure or destruction of businesses, including crop loss, will continue without increased flood protection.

In addition, since no construction activity would occur and no existing residential, commercial, and agricultural structures would be acquired, there would be no potential for reductions in taxable sales revenue or taxable property values. However, flood capacity would remain unchanged and intermittent flood events would continue. Properties in the upper reaches would remain in the flood plain, experiencing depressed property values relative to similar properties outside the flood plain. Flooding would continue to result in forgone sales tax revenue, as businesses in and around the upper reaches would continue to shutter due to encroaching flood waters.

The nature of existing operations and maintenance of Upper Llagas Creek and its tributaries is such that there is no potential to deplete the housing stock, not anticipated to induce population growth, no potential for substantial loss of real property for substantial reductions in employment or income, no potential for displacement of substantial disruption of business operations, and no potential for reductions in the supply of fiscal resources. It is assumed existing operations are optimal and the existing channel adequately maintained. Therefore, flood capacity of the existing channel is expected to be the source of continued intermittent flooding, rather than operations and maintenance.

BMPs for the No Action Alternative, including O&M activities are discussed and described in Chapter 5 and Appendix B of this EIS.

4.17.3 Action Alternatives

4.17.3.1 Tunnel Alternative (Applicant's Proposed Action)

As described in Section 3.16, Population and Housing, Table 4.16-4b, the 3 residences within the Project right of way for this alternative represent a very small percentage of overall housing stock in the communities of Morgan Hill, San Martin and Gilroy (a combined value of 25,365 units as of 2010). In addition, the vacancy rate of these communities (2.6% for the combined areas as of 2010) indicates that there are an estimated 653 available units; therefore, the loss of 3 units would not substantially affect the vacancy rate.

Construction labor would be expected to be sourced locally within the Project area or in nearby population centers within a reasonable daily commute, or to locate in extended-stay lodging facilities. The demand for Project construction labor for the Tunnel Alternative would vary over the

(SCVWD 2010). This may have resulted in reduced income for hourly employments and some level of reduced spending within the economy, but not likely a substantial reduction when taken in the context of Morgan Hill generally or the rest of the Project area.

estimated 6-year construction period, averaging approximately 157 laborers annually and approximately 260 at peak construction during year 2 (see Table 4.16-4a)[3]. This includes construction laborers, foremen, managers, superintendents, office staff, skilled construction machinery operators, carpenters, road workers, landscapers, arborists, and truck drivers. The San Jose-Sunnyvale-Santa Clara MSA employs relevant Project construction labor occupations anywhere from 27 to 102 percent of the national average (BLS 2011b)[4]. However, this would partly be a function of industry characteristics and labor demand in the region and does not necessarily identify a labor shortage.

Table 4.17.11 displays estimates of the Project construction labor force in the Project area and nearby population centers well within the range of a typical daily commute[5]. In total, there are 1,629 persons in the Project area employed in a construction labor occupation considered relevant for the Project; 127 employed in truck driving occupations considered relevant to the Project and 164 employed in other occupations considered relevant to the Project. Within 40 miles one-way from the Project area, there are an additional 15,371 persons employed in relevant construction occupations, 1,974 employed in relevant truck driving occupations, and 2,568 employed in other relevant occupations. At its peak, the Project would require approximately 11 percent of the relevant construction labor force within the Project area and just 1 percent of the relevant construction labor force within the Project area and nearby population centers. Similarly, the Project would require 40 percent of the relevant truck driving labor force and 23 percent of the relevant labor force in other occupations in the Project area, while requiring only 3 percent of the relevant truck driving labor force and 1 percent of the relevant labor force in other occupations in the Project area and nearby population centers. The current and future utilization of the existing labor force is unknown. Further, data show that employment in occupations relevant to Project construction in the San Jose-Sunnyvale-Santa Clara MSA is expected to increase between 2010 and 2020, with annual increases ranging from 1 to 3 percent. Taking these facts together, there is not likely to be labor shortages within the Project area by meeting demand for Project labor, and certainly not when considering the labor force in nearby population centers[6].

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[3] This estimate and those for following action alternatives should be viewed as an upper-bound on estimated construction labor required at any time during the Project, as they do not explicitly account for the same employee working to fill the same job requirement in multiple reaches simultaneously when construction phases overlap (see notes in Table 4.16-4a). This estimate does not include the laborers required for the Lake Silveira portion of the Project, as estimates have not been developed at this time. However, labor needs for Lake Silveira construction and restoration activities are expected to be a small fraction of the labor required for the channel widening/deepening and infrastructure modifications, and would not vary by action alternative.

[4] Occupations listed in the work crew estimate provided RMC Water and Environment correspond to Bureau of Labor Statistics Occupational Category Codes: 11-9021, 37-3011, 43-6014, 47-1011, 47-2031, 47-2061, 47-2071, 43-2073, 47-4051, and 53-3032. The percentages reflect the range of location quotients reported by the Bureau of Labor Statistics for these individual occupational categories.

[5] San Jose, CA, Salinas, CA, and Hollister, CA range from 16 to 39 miles one-way (32 to 78 miles round-trip) to the cities/communities within the Project area. San Jose is closest to Morgan Hill at 22 miles and furthest from Gilroy at 32 miles.

[6] Each of the calculated proportions is an upper bound. First, the analysis uses the peak labor requirement, not the average annual labor. Second, the number of workers required for the Project used for the calculation is not the number of unique individuals, because the data reported in Table 2.4-4 does not identify unique individuals but rather job requirements in each reach, regardless of

Table 4.17.11 Estimates of the Project Construction Labor Force in the Project area and Nearby Population Centers

	Number Employed in Occupations Considered Relevant for the Proposed Project Area		
	Construction	Truck Driving	Other
Project Area			
Morgan Hill	533	42	82
San Martin	188	31	11
Gilroy	908	54	71
Subtotal	*1,629*	*127*	*164*
Nearby Population Centers			
San Jose	13,135	1,658	2,350
Hollister	522	59	38
Salinas	1,715	257	180
Subtotal	*15,371*	*1,974*	*2,568*
Total	**17,001**	**2,101**	**2,732**

Source: U.S. Census Bureau, 2007-11 American Community Survey; Bureau of Labor Statistics, May 2011 Occupational Employment Survey.

Although the degree of Project labor in-migration is unknown, it is not expected to create a housing shortage. For the purpose of making this determination, it was assumed all laborers at peak construction and their families relocate into the Project area. At the average family size of 3.3, this would amount to an influx of approximately 860 people, requiring approximately 260 housing units[7]. This potential worst-case demand could be readily accommodated in the existing Project area housing stock, which has about 650 vacant housing units[8].

Increased flood capacity resulting from Project construction would not induce population growth to the point of causing a housing shortage. Population growth in the Project area is determined more by job opportunities in the Silicon Valley in northern Santa Clara County and the relative affordability of housing in the Project area. The population of the Project area has increased substantially in recent decades, despite intermittent flooding and in particular the severe floods of 1997 and 1998, after which the population continued to grow substantially (Section 3.15.3.1; Table 3.16-1, Population Trends for Communities in the Vicinity of Project area). Further, flood protection created by the Project would largely protect existing residential land use (60%) and land designated as open space (20%). As a result, the potential for additional housing

whether one individual may work in multiple reaches simultaneously during the Project.

[7] 261 laborers at peak construction each having the average family size of 3.3 persons is 861 persons total. At the average family size per housing unit, 3.3, the number of housing units required is the same as the number of laborers, 261.

[8] This analysis does not account for the incremental Project labor required for the Lake Silveira portion of the Project. Although estimates of labor requirements for Lake Silveira are not available at this time, it is not expected that Lake Silveira will contribute to a housing shortage. As the aforementioned analysis shows the vacant housing units in the Project area could absorb more than double the in-migration of labor required for the channel widening/deepening and infrastructure modifications portion of the Project.

development within and around Reaches 8, 7A, and 7B is limited (Section 3.8 and Section 4.8, Land Use; Table 4.8-5, Land Use Designations Flooded under the Various Alternatives (Acres); Figure 3.8-1a, Land Use in the Project Vicinity). Even if undeveloped land were developed as a result of flood protection, the number of housing units added would by nature determine the population growth that could be supported.

Acquisition of Project right of way would displace 43 structures; 3 residential homes, 11 greenhouses, 21 outbuildings, and 5 structures of unknown type (see Table 2.5-1). In addition, some amount of currently undeveloped land that is zoned for residential use or conversion to higher density residential use would not be available for development over time. The affected structures and presently undeveloped acreage comprise a very small portion of real property in the Project area. The SCVWD would obtain property appraisals and compensate affected owners in an amount reflecting fair market value of the property.

Potential impacts to property values associated with construction activities would be less than significant. Construction activities would not be expected to substantially reduce the quantity of real property in the Project area. Staging areas for construction activities are completely within SCVWD right of way. In theory, construction activities could reduce property values if indirect effects, such as noise, traffic, or air quality degradation, are sufficient to reduce the demand for occupancy. Changes in these parameters would not be expected to substantially reduce property values in the Project area, because Project construction would be temporary and dynamic throughout the Project area. Further, evidence suggests these parameters are not major determinants in the demand for housing or business location decisions, as temporary infrastructure construction projects are commonplace throughout the San Francisco Bay Area where property values are driven mainly by supply of housing and the demand created by income generated by employment in the area and where hundreds of thousands of business locate.

The long-term increased flood capacity resulting from the Project would be beneficial to property values. Although this study has not determined the dollar value of this benefit, the entire area in and around Reaches 8, 7B, and 7A would be virtually removed from the 1-percent flood extent. As with other infrastructure and public safety improvements, reductions in flood risk to existing residential property can increase property values over the long-term. In addition, property ownership costs associated with insurance supplements paid to the FEMA would likely be reduced (Public Scoping Meeting 2012).

Reductions in flood risk can reduce constraints on developable land, and if developed over the long term, property values in the area are likely to increase. Increased investment in business and industry can also raise property values in the Project area.

Construction would have a beneficial impact on employment and income levels. Although complete details on Project labor requirements are unknown at this time, it is estimated construction will directly support approximately 157 jobs (on average) and associated income. During construction, laborers in the area would spend money within the local economy. This direct spending ripples backward through industry sectors within the local economy, indirectly supporting jobs and income and inducing spending and hiring. The benefits may be incremental if the laborers spending money would otherwise not be fully employed, or if they commute into the Project area from nearby population centers. Additionally, raw materials and support services of an unknown sum necessary for construction would be sourced with local businesses, if available. This spending would support local jobs and provide income to local proprietors that would circulate through the economy.

The impact level associated with increased flood capacity would be considered beneficial, assuming that reductions in flood risk spur investment and economic growth in Morgan Hill. This conclusion is based on the recognition of flood protection as one of the determining factors in the future economic development of Morgan Hill. It is noted that this study forms no formal economic model of employment to determine whether any increases in economic growth would exist and the level of employment supported.

Acquisition of Project right of way would displace 11 greenhouses in San Martin and Gilroy near Reaches 4 (1 greenhouse), 6 (9 greenhouses), and 14 (1 greenhouse). At over $80 million annually, greenhouse nursery production is the highest gross value crop in Santa Clara County. While these displacements are not expected to be substantially disruptive of business within the Project area as a whole, they could result in substantial disruptions to individual operations and owners. Relocation efforts, complying with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, would ensure the business operations are not significantly affected and owners are appropriately compensated for the disruption during relocation. Any business closure associated with relocation would be temporary. There is no additional mitigation required beyond compliance with the Act.

However, to mitigate impacts to greenhouse corps, besides compensating the owners for their land, for the improvements (greenhouse structures and any appurtenances) within the required project right of way, compensation is also be granted for the loss of the crops/plants in their growing cycle is beyond a year. For crops with a year or less growing cycle, included in the acquisition process, the Applicant will issue the owner a permit to allow the owner operate and maintain their greenhouse until the crops/plants have been harvested.

Total productive crop acreage in the Project footprint subject to permanent conversion was approximately 21 acres in 2013 (see Table 3.7-4, Summary of Crops Grown in Project Footprint Subject to Permanent Conversion (2013)). As noted in Section 3.7.1, Agricultural and Forestry Resources, this estimate does not include organic crops, fallow acreage, crops otherwise not treated with pesticides, or multiple crops within a season. However, even with these caveats, this acreage represents only a fraction of 1 percent of the $260.8 million value of agricultural production in Santa Clara County during 2012[9]. The displacement of productive agricultural acres and associated assets are not expected to be substantially disruptive of agricultural business within the Project area as a whole; however, they could result in substantial disruptions to individual agricultural operations and owners. The SCVWD will compensate the affected landowners for conversion of crop acreage.

Potential short-term impacts to local businesses due to construction activities would be less than significant. A qualitative analysis is provided here, because estimates of lost operational hours over the course of the Project have not been quantified for this study. Direct sources of business disruption can include utility relocation, which forces shutdown or partial shutdown of an operation, resulting in reduced production or patronage. Potential indirect impacts include reduced distribution capabilities or patronage induced by traffic, noise, road closures, and detours. Specific examples of business disruption could include:

- Location of a staging area on 0.38 acre near the Nature Quality Inc., food-processing plant, where construction traffic would be located near the plant.
- Utility relocation at the Nature Quality Inc., food-processing plant, requiring parking structures to be relocated.
- Worker vehicle and construction equipment (traffic) near businesses.

The BMPs as described in Chapter 5 of this EIS includes features that would help mitigate unintended consequences of Project traffic on local business[10].

The potential long-term impacts to local businesses associated with increased flood capacity would be beneficial. Historical flooding in and around Reaches 8, 7B, and 7A have caused businesses to shut- down and prevented access to those remaining open. The dollar value associated with this impact has not been determined for this study. However, flood protection is recognized as one of the determining factors in the quality and pace of future economic development in downtown Morgan Hill (City of Morgan Hill 2009).

The potential impacts to local fiscal resources (primarily, property tax revenue and sales tax revenue) due to the acquisition of Project right of way would be minor in the context of the overall socioeconomics Project area. Approximately 300-acre of land would be changed in use as a result

[9] Assumes county average value per acre.

[10] Item 1 states "*Work will be staged and conducted in a manner that maintains two-way traffic flow on public roadways in the vicinity of the work site. If temporary lane closures are necessary, they will be coordinated with the appropriate jurisdictional agency and scheduled to occur outside of peak traffic hours (7:00–10:00 a.m. and 3:00–6:00 p.m.) to the maximum extent practicable. Any lane closures will include advance warning signage, a detour route and flaggers in both directions*".

of project construction see Table 3.8-1. This total acreage within the Project footprint comprises 2 percent of acreage within the boundaries of the cities/communities forming the socioeconomics Project area. No substantial reduction in sales tax revenue would be expected, as the displaced population would be very small relative to the Project area as is the total amount of taxable sales, which could potentially be relocated out of the Project area.

Potential impacts to local fiscal resources associated with the demand for Project construction labor would have no impact on property tax revenue and beneficial impact on sales tax revenue. Project labor would be expected to be sourced locally within the Project area or at most within an acceptable daily commute. The Tunnel Alternative, even under the worst case assumption of relocation, laborers would occupy available vacant units within the Project area, which are currently being assessed for property taxes, irrespective of the vacancy rates. Project construction workers would also spend money on food and other services, thus, increasing sales tax revenue. Construction would require raw materials and other services. A portion of these materials would be purchased from local business and industry to the extent possible. This increased spending, as a result of non-labor construction activities, could increase sales tax revenue.

The potential long-term impacts to local fiscal resources associated with increased flood protection would be beneficial. Increased flood protection would benefit both property and sales tax revenue through support of increase of property values, reductions in business interruption (closure), and support of economic growth initiatives for downtown Morgan Hill.

Operation and maintenance (O&M) activities (Chapter 2, Alternatives Analysis and Project Description) are not expected to result in loss of real property or expected to result in the closure of any businesses, particularly given their nature and location with the stream channel. Operations and maintenance of the Project is a necessary component of achieving and maintaining increased flood protection created by the Project, resulting in a beneficial impact. In addition, O&M activities associated with the Project would not cause substantial reduction in the supply of property and sales tax revenue. No new permanent workers would be required to operate the Project, and routine maintenance activities would be relatively short in duration; therefore, operation and maintenance activities would not impact employment, income levels, or demand for housing.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.17.3.2 Natural Resources Conservation Service (NRCS) Alternative

Potential impacts of the NRCS Alternative are similar to the Tunnel Alternative, except that more acres of urban land would be required for flood protection; and 9 more residential homes (all within Reach 8) would be acquired, for a total of 12, compared to the Tunnel Alternative. Potential impacts to businesses and employment would be the same as for the Tunnel Alternative, as the same number of greenhouses and other structures would be displaced. Although construction duration would not differ from the Tunnel Alternative, the NRCS Alternative would require approximately 10 fewer construction workers per year on average (147 workers) compared to the Tunnel Alternative (157 workers). Further, peak construction for the NRCS Alternative would be 245 workers, compared to 261 workers for the Tunnel Alternative.

As in the Tunnel Alternative, construction would have no impact. Although 9 more residential homes would be acquired than in the Tunnel Alternative (12 instead of 3), the total number of homes acquired for the NRCS Alternative amounts to a fraction of 1 percent of the existing housing stock (as of 2010) and the same number of vacant units would remain to absorb any potential long-term construction employment. While the duration of construction is the same as in the Tunnel Alternative, even fewer construction workers would be required for the NRCS Alternative. Taken together, this indicates even less of a possibility that in-migration of construction labor would occur to a degree resulting in a housing shortage than in the Tunnel Alternative.

As in the Tunnel Alternative, the impact from construction would be less than significant. The NRCS Alternative would be displace 49 structures, 6 more than in the Tunnel Alternative, but property owners would be compensated the fair market value. Potential impacts to property values associated with construction activities would be similar to the Tunnel Alternative, as the nature of construction activities under the NRCS Alternative are similar to that of the Tunnel Alternative and of the same duration. The long-term increased flood capacity resulting from the Project would be beneficial to the same degree as in the Tunnel Alternative, as the NRCS Alternative achieves the same end result in terms of increased flood protection.

As in the Tunnel Alternative, construction would have a beneficial impact on employment and income levels, although to a slightly lesser degree. While duration of Project construction is the same, the NRCS Alternative would require fewer workers per year on average than the Tunnel Alternative. At this time, there is insufficient information about the expenditures of raw materials within the local economy to determine whether the beneficial impact of expenditures on construction under the NRCS Alternative would differ in degree relative to the Tunnel Alternative.

As in the Tunnel Alternative, the impact from construction would be less than significant. The NRCS Alternative would displace the same number of greenhouses (commercial agricultural operations) and same amount of productive crop acreage as the Tunnel Alternative. Any displacement or acquisitions would be done under the guidelines of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.

Potential direct (e.g., staging areas, utility relocation) and indirect (e.g., traffic) impacts to local businesses, including production agricultural operations due to construction activities are more than in the Tunnel Alternative, due to the avoidance of work through downtown Morgan Hill in the Tunnel Alternative.

The potential long-term impacts to local businesses associated with increased flood capacity are beneficial to same degree as that of the Tunnel Alternative, as the NRCS Alternative achieves the same end result in terms of increased flood protection.

The long-term impact on the property tax base is somewhat greater than under the Tunnel Alternative, as 12 instead of 6 residential homes would be acquired under the NRCS Alternative. The same number of greenhouses would be acquired under the NRCS and Tunnel Alternatives.

Under worst case housing demand in-migration of construction labor would occupy existing housing, thus, having no impact on the property tax base. While the duration of construction is the same, the NRCS Alternative would require fewer construction workers per year on average than the Tunnel Alternative, thus the beneficial impact on sales tax revenue through expenditures within the local economy would be somewhat less than in the Tunnel Alternative. At this time it cannot be determined whether the beneficial impact of expenditures on construction would differ in degree from the Tunnel Alternative.

The potential long-term impacts to local fiscal resources associated with increased flood protection would be beneficial to the same degree as in the Tunnel Alternative, as the NRCS Alternative achieves the same end result in terms of increased flood protection.

Impacts to Socioeconomic Resources, not described above, are similar to the Tunnel Alternative as described and discussed previously. In addition, after construction, the operations and maintenance (O&M) activities would be similar to the O&M activities described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.17.3.3 Culvert/Channel Alternative

Potential impacts of the Culvert/Channel Alternative are similar to the Tunnel Alternative, except that more acres of urban land would be required for flood protection; and 4 residential homes within Reach 8 would be displaced compared to none in the Tunnel Alternative. Potential impacts to businesses and employment would be the same as for the Tunnel Alternative, as the same number of greenhouses and other structures would be displaced. Although construction duration would not differ from the Tunnel Alternative, the Culvert/Channel Alternative would require approximately 10 fewer construction workers per year on average (147 workers) compared to the Tunnel Alternative (157 workers). Further, peak construction for the Culvert/Channel Alternative would be 245 workers, compared to 261 workers for the Tunnel Alternative.

As in the Tunnel Alternative, construction would have no impact. Although four more residential homes would be acquired than in the Tunnel Alternative (7 instead of 3), the total number of homes acquired for the Culvert/Channel Alternative amounts to a fraction of 1 percent of the existing housing stock (as of 2010) and the same number of vacant units would remain to absorb any potential long-term construction employment. While the duration of construction is the same as in the Tunnel Alternative, even fewer construction workers would be required for the Culvert/Channel Alternative. Taken together, this indicates even less of a possibility that in-migration of construction labor would occur to a degree resulting in a housing shortage than in the Tunnel Alternative.

As in the Tunnel Alternative, the impact from construction would be less than significant. The Culvert/Channel Alternative would displace 47 structures, 4 more than in the Tunnel Alternative, but property owners would be compensated the fair market value. Potential impacts to property values associated with construction activities would be similar to the Tunnel Alternative, as the nature of construction activities under the Culvert/Channel Alternative are similar to that of the Tunnel Alternative and of the same duration. The long-term increased flood capacity resulting from the Project would be beneficial to the same degree as in the Tunnel Alternative, as the Culvert/Channel Alternative achieves the same end result in terms of increased flood protection.

As in the Tunnel Alternative, construction would have a beneficial impact on employment and income levels, although to a slightly lesser degree. While duration of Project construction is the same, the Culvert/Channel Alternative would require fewer workers per year on average than the Tunnel Alternative. At this time, there is insufficient information about the expenditures of raw materials within the local economy to determine whether the beneficial impact of expenditures construction under the Culvert/Channel Alternative would differ in degree relative to the Tunnel Alternative.

As in the Tunnel Alternative, the impact from construction would be less than significant. The Culvert/Channel Alternative would displace the same number of greenhouses (commercial agricultural operations) and convert the same productive crop acreage as the Tunnel Alternative. Any displacement or acquisitions would be done under the guidelines of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.

The potential long-term impacts to local businesses associated with increased flood capacity would be beneficial to same degree as that of the Tunnel Alternative, as the Culvert/Channel Alternative achieves the same end result in terms of increased flood protection.

The long-term impact on the property tax base would be somewhat greater than in the Tunnel Alternative (Applicant's Proposed Action), as 47 structures would be acquired under the Culvert/Channel Alternative. Under worst case housing demand in-migration of construction labor would occupy existing housing, thus, having no impact on the property tax base. While the duration of construction is the same, the Culvert/Channel Alternative would require fewer construction workers per year on average than the Tunnel Alternative, thus the beneficial impact on sales tax revenue through expenditures within the local economy would be somewhat less than in the Tunnel Alternative. At this time it cannot be determined whether the beneficial impact of expenditures on construction would differ in degree from the Tunnel Alternative.

The potential long-term impacts to local fiscal resources associated with increased flood protection would be beneficial to the same degree as in the Tunnel Alternative, as the Culvert/Channel Alternative achieves the same end result in terms of increased flood protection.

Impacts to Socioeconomic Resources, not described above, are similar to the Tunnel Alternative as described and discussed previously. In addition, after construction, the operations and maintenance (O&M) activities would be similar to the O&M activities described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.17.3.4 Reach 6 Bypass Alternative

Potential impacts of the Reach 6 Bypass Alternative would be similar to the Tunnel Alternative. The Reach 6 Bypass Alternative would require a shorter overall construction duration than the Tunnel Alternative (5 years instead of 6 years); and the bypass segment and Reach 14 construction would span 3 years (730 days total) instead of spanning 2 years in the other action alternatives (345 days total). In addition, there would be no construction required in Reaches 5 and 6. However, as discussed in Section 3.10, this alternative would also necessitate significant highway construction on U.S. 101 to facilitate the flow diversion to Reach 14; this long-term construction element would likely result in substantial traffic impacts and business disruption, both locally and regionally, although businesses would not close as a result of induced traffic.

As in the Tunnel Alternative, construction would have no impact. The same number of residential homes (3) will be acquired similar to the Tunnel Alternative. The duration of construction is shorter than in the Tunnel Alternative. Taken together, this indicates even less of a possibility that in-migration of construction labor would occur to a degree resulting in a housing shortage than in the Tunnel Alternative.

As in the Tunnel Alternative, the impact from construction would be less than significant. The Reach 6 Bypass Alternative would displace 12 structures, 31 fewer than in the Tunnel Alternative. Potential impacts to property values associated with construction activities would be similar to the Tunnel Alternative, as the nature of construction activities under the Reach 6 Bypass Alternative would be similar to that of the Tunnel Alternative, although shorter in duration. The long-term increased flood capacity resulting from the Project would be expected to be beneficial to the same degree as in the Tunnel Alternative, as the Reach 6 Bypass Alternative achieves the same end result in terms of increased flood protection.

As in the Tunnel Alternative, the impact of construction would be less than significant. Substantial construction near U.S. 101 would result in traffic conditions that ultimately act as deterrent to those in the greater San Francisco Bay Area who would normally travel south on U.S. 101 to shop at the Gilroy Premium Outlets or dine at restaurants in downtown Morgan Hill. The degree to which employment and income would be impacted depends on reactions to reductions in patronage and the actual degree of reduced spending in the local and regional economy. The impact would be temporary and U.S. 101 would be restored following the 250-day construction period to construct new bridges for the bypass channel. There would be no closures of any lanes or interchanges on U.S. 101 during the period when the detour would be in place to allow construction of the new bridges. Consequently, there would be no impact on access to businesses from U.S. 101, so that the impacts on jobs and income would be less than significant.

The Reach 6 Bypass Alternative would displace 9 fewer greenhouses (2 instead of 11) (commercial agricultural operations) than the Tunnel Alternative. Any displacement or acquisitions would be done under the guidelines of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970. Given that substantially fewer greenhouses would be required to be acquired, the impacts to local farming operations would be smaller under the Reach 6 Bypass Alternative than under the Tunnel Alternative. The same amount of productive crop acreage as under the Tunnel Alternative would be converted for Project ROW, thus the impact to commercial crop production would be the same as in the Tunnel Alternative.

Potential direct (e.g., staging areas, utility relocation) impacts to local businesses would likely be the same as under the Tunnel Alternative.

The potential for indirect impacts to local business resulting from traffic induced by Project construction are substantially greater than in the Tunnel Alternative. A unique feature of the Reach 6 Bypass Alternative would be the need to construct bridges over U.S. 101. Constructing the bridges would take 250 days and require temporary traffic detour roads. The traffic detour roads would be expected to cause delays and congestion along U.S. 101. This would be a temporary and significant impact on the regional roadway network (Alta Planning and Design 2013: Section 4.3.1.3). These conditions would act as a deterrent to consumers who travel south from the greater San Francisco Bay Area. Particular attractions for non-resident consumers include downtown Morgan Hill and the Gilroy Premium Outlets (City of Morgan Hill 2013b; Simon Malls 2012). Business disruption would not be sustained over the long-term, as U.S. 101 would be restored once bridge construction would be complete within 9 months; and no business would close as a result of induced traffic on U.S. 101. As discussed above, interchange access on and off U.S. 101 would be maintained through the Project area. The impact is less than significant.

The long-term impact on the property tax base would be less than under the Tunnel Alternative, as 12 instead of 43 structures would be acquired under the Reach 6 Bypass Alternative.

Considering the worst case housing demand in-migration of construction labor would occupy existing housing; thus, having no impact on the property tax base. While the duration of construction is shorter, the Reach 6 Bypass Alternative would require more construction workers per year on average than the Tunnel Alternative, thus it cannot be determined whether the beneficial impact on sales tax revenue through expenditures within the local economy would differ in degree from the Tunnel Alternative. At this time it cannot be determined whether the beneficial impact of expenditures on construction would differ in degree from the Tunnel Alternative.

The potential for substantial short-term business interruption as a result of traffic delays stemming from construction of bridges for U.S. 101 as part of the bypass would be a less than significant impact on sales tax revenue, as no businesses would close.

The potential long-term impacts to local fiscal resources associated with increased flood protection would be beneficial to the same degree as in the Tunnel Alternative, as the Reach 6 Bypass Alternative achieves the same end result in terms of increased flood protection.

Impacts to Socioeconomic Resources, not described above, are similar to the Tunnel Alternative as described and discussed previously. In addition, after construction, the operations and maintenance (O&M)

activities would be similar to the O&M activities described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.17.4 Summary of Impacts to Socioeconomic Resources

The No Action Alternative would impose a significant and unavoidable impact on socioeconomic resources because intermittent flooding of Upper Llagas Creek would continue in the absence of the Project, resulting in sustained business closures and property damages.

The action alternatives would result in less than significant impacts to socioeconomic resources within the Project area. A few of the specific Project features would result in beneficial impacts to many of the area's socioeconomic resources, particularly the end product of increased flood protection.

Mitigation measures and BMPs, as appropriate, for the various Action Alternatives to reduce the impacts to Socioeconomic Resources are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

4.18 HAZARDS AND HAZARDOUS MATERIALS

This section describes the existing environment and assesses potential impacts related to hazards and hazardous materials for the Project. Potential hazards addressed in this section include issues related to hazardous materials in soil and groundwater, releases of hazardous materials during construction, fires, and interference with an adopted emergency response or emergency evacuation plan.

Information on potential soil and groundwater contamination hazards in the Project area was drawn primarily from a Hazardous Materials Assessment Report titled *Draft Memorandum Presenting Findings of Hazardous Materials Assessment Reports Review for Upper Llagas Creek Flood Protection Project*, prepared by Weiss Associates (Weiss), dated November 15, 2011. Weiss compiled existing conditions information on hazards and hazardous materials in the Project area based on review of Phase I Environmental Site Assessment (Phase I ESA) reports, Phase II Environmental Site Assessment (Phase II ESA) reports, and database searches.

4.18.1 Introduction

The potential environmental concerns identified in the Project area include pesticides and fertilizers, nitrates, fecal coliform, potentially hazardous chemicals, petroleum hydrocarbons, heavy metals, naturally-occurring asbestos, asbestos-containing building materials, lead-based paint, and polychlorinated biphenyl-(PCB)-containing lighting fixtures.

This section describes potential hazards and hazardous materials by Project reach, as described in Chapter 2. In general, the following potential Constituents of Concern (COCs) were identified for all reaches:

- Pesticides and fertilizers from prior or ongoing agricultural activities;
- Asbestos and lead-based paint from buildings constructed prior to 1978; and
- Naturally-occurring asbestos in soil.

The analysis for this section considered the potential for adverse impacts on public health and safety as a result of hazardous materials exposure, vector-borne diseases, and wildland fire. Risks were evaluated qualitatively based on available information.

SCVWD has performed assessments of the environmental conditions of properties within the Project area in accordance with its Hazardous Substance Liability Assessment (HSLA) guidance, which requires HSLAs for any project that requires acquisition of a new property (Weiss 2011). The following assessments have been performed and are cited as in the Weiss assessment (2011):

- Summary Level 1 Hazardous Materials Investigation performed by SCVWD for Reaches 4, 5, 6A, 7A, and 8, was conducted in August 1997 (SCVWD 1997) to identify property conditions along the entire Project area.
- Phase II ESA performed in August 1997 in Reach 7A to assess the potential for recognized environmental conditions associated with agricultural use in the area, a junk yard, a manure pile, and a release of petroleum hydrocarbons to soil and groundwater identified during the Phase I HSLA performed by the SCVWD in August 1997 (Kleinfelder 1997, amended in November and December 1997).
- Phase I ESA performed in September 2002 to support property acquisition in Reaches 4 and 7B (Piers 2002a).
- Phase I ESA performed in November 2002 to support property acquisition in Reaches 5 and 6 (Piers 2002b).
- Phase I ESA performed in April 2003 in Reach 8 (Piers 2003a).
- Phase I ESA performed in December 2004 in Reaches 4, 5, 6, and 7B (Piers 2003b).
- Phase II ESA performed in August 2004 in Reaches 4, 5, 6, and 7B (Piers 2003b).
- Phase II ESA performed in August 2004 of selected parcels in Reaches 4 and 5 per recommendations of Phase I assessments to assess the presence of pesticides, coliform, and nitrate in soils (Piers 2004).

- Phase II ESA for Reach 7A performed in August 2004 to review the potential for recognized environmental conditions associated with agricultural use for the area that SCVWD allowed after the completion of earlier assessments (LAS 2004).
- Phase I ESA performed in February 2005 in Reach 14 of parcels owned by SCVWD for the purpose of identifying environmental concerns prior to construction related to the Project in this location (Piers 2005).

Outstanding Phase I ESA Recommendations

Weiss reviewed all completed Phase I ESAs. Actions recommended in the completed Phase I ESA reports (and those actions that are recommended in Phase II, discussed below) will be performed by SCVWD where permission is obtained from current property owners. The Phase I actions generally fall into the following categories:

- Additional site reconnaissance to determine the locations of hazardous materials that may impact soil and groundwater such as pesticide use or storage areas and oil stains.
- Assessment of pesticide impacts due to agricultural uses of parcels within the Project area.
- Assessment of asbestos and lead-based paint in buildings constructed prior to 1978 that may be demolished.
- Assessment and/or closure of utility-related structures such as transformers, water wells, ponds, and septic tanks located in or near the Project area.

Phase II Investigations

Weiss also reviewed Phase II investigations conducted in areas of Reaches 4, 5, 7A, 7B, and 14. These investigations evaluated the presence of the following contaminants:

- Fecal coliform in Reach 4.
- Pesticides in Reaches 4, 5, 7A, and 7B.
- Nitrate in Reach 7A.
- PCBs and SVOCs in Reaches 7A and 7B.
- VOCs in Reaches 5, 7A, and 7B.
- Perchlorate in Reach 14.

No samples were collected in Reaches 6, 8, or 14. Per Weiss (2011), the results of Phase II ESA performed in the areas of Reaches 4, 5, 7A, and 7B indicate the following:

- Known hazardous materials releases occurred at sites within and adjacent to the Project area.
- Dieldrin, endosulfan, 4,4'-DDE, and heptachlor are present in soil and groundwater above screening levels from application of pesticides and herbicides on parcels that were actively cultivated as orchards or for row crops.
- Arsenic, chromium, cobalt, nickel, and vanadium are present in soil and groundwater at concentrations exceeding screening levels. These metals are thought to be naturally occurring.
- Animal grazing or manure piles have led to nitrate contamination in groundwater beneath Reach 7A.
- Building and utility structures (septic tanks, wells, and transformers) that may contain hazardous materials (PCBs, lead-based paint, and asbestos) are located in the Project area.

Soil borings were collected in Reach 6 in September of 2013 by Pacific Geotechnical Engineering to assess the historic landfill that overlaps the current SCVWD right-of-way for Llagas Creek.

Outstanding Phase II Environmental Site Assessments

Additional Phase II ESAs will be conducted as property is acquired, and prior to the start of excavation as called out in the Weiss report, including:

- Additional investigation will be conducted to determine if residual pesticides are present in soils and groundwater at Reaches 6, 8, and 14.
- Buildings that may contain asbestos and lead-based paint were identified in all reaches, surveys will be conducted to determine the presence of asbestos or lead-based paint in the buildings.
- An investigation will be performed for soil stains and potential oil release to soil as identified in Reaches 4, 5, and 7B.
- Additional investigation into potential contamination from utility structures, septic tanks, and leach fields will be conducted in Reaches 4, 6, and 8.
- The Olin site, located between Reach 7B and U.S. 101, was identified as a source of perchlorate contamination in regional groundwater and may have impacted groundwater within the Project area. Groundwater will be evaluated for perchlorate contamination in the Project area.

4.18.2. No Project Alternative

Under the No Project Alternative, the Project would not be built, and no new land purchases or construction activities would occur. Flooding in the residential areas of Morgan Hill and San Martin would continue. Storm runoff would continue through the West Little Llagas Creek, East Little Llagas Creek, and Llagas Creek channel reaches. The bypass channel in Reach 7A would not be constructed under the No Project Alternative, and channel bank erosion and widening would likely continue. Maintenance of the Upper Llagas Creek facilities would be conducted in accordance with the guidelines established in the SCVWD SMP Update 2012–2022 (SCVWD 2011b). Impacts from hazards and hazardous materials from this maintenance would be less than significant.

Operations of the flood management system through passive flow of water do not involve the transport, use, or disposal of hazardous materials. Existing maintenance activities conducted by the SCVWD are completed under the SMP. The SMP established procedures for routine maintenance of stream channels involving sediment removal, vegetation management, bank protection, and associated minor activities.

Instream sediment removal and bank protection work is carried out from June 15 to October 30, or the first significant rainfall (0.5 inch of rain in a 24-hour period) after October 15, whichever occurs first. Typical maintenance activities that may involve hazards or hazardous materials include sediment removal

and bank stabilization; vegetation management; and minor maintenance, as described below.

Sediment Removal and Bank Stabilization

Sediment removal and bank stabilization activities would require the use of fuels and lubricants for maintenance equipment. These hazardous materials would be transported to and from maintenance sites and removed once projects were completed. Hazardous materials would not be stored permanently at maintenances sites. However, if hazardous materials were released into water or soil during refueling or maintenance activities, contamination and harm to people or the environment could result.

Workers could encounter illegally dumped waste, and ground excavation activities and bank repairs could disturb previously unknown contamination. Potential hazardous materials used as part of sediment removal and bank stabilization activities implemented near schools (Table 3.18-2) would include fuels and oils associated with the use of heavy equipment. Improper storage or use of these materials could pose a risk to human health if accidental releases occurred.

Maintenance activities involving ground disturbance, such as sediment removal and bank stabilization, could potentially expose asbestos and release it into the environment. With implementation of the BMPs as described in Chapter 5, these potential impacts to SMP activities discussed below would be reduced to levels less than significant.

Vegetation Management

The SMP vegetation management activities would also include the use of fuels and lubricants. In addition, the activities would include the application of herbicides to areas including instream and bank bench areas. The use, transport, or accidental spills of hazardous materials could potentially harm people or wildlife if released into the ground or water.

Vegetation management activities would include the application of herbicides. Improper use or storage of herbicides near schools could pose a potential risk to children who may be exposed. Vegetation management activities for the SMP would potentially include mowing, discing, and flaming activities. Without cautious equipment use, such activities performed near dry vegetation could cause uncontrolled fires.

Minor Maintenance

Minor maintenance would potentially involve the use of hazardous materials during the use of heavy equipment for grading or sediment removal. No channel modification or improvements would be constructed; therefore, no hazards or hazardous materials impacts would occur as a result of construction.

Maintenance activities could involve the use of heavy equipment and subsequent use of hazardous materials (i.e., fuels, oil). Children could potentially be exposed to these materials if an accidental release occurred near a school. No channel modification or improvements would be constructed; therefore, no hazards or hazardous materials impacts would occur as a result of construction.

All SMP activities, such as sediment removal activities, could potentially disturb known existing contaminated sites. Furthermore, portions of the Project area may contain naturally-occurring asbestos.

Although operations and maintenance under the No Action Alternative may be performed within 2 miles of San Martin Airport, these activities would not interfere with airport operations, would not involve the use of any equipment that would affect aircraft utilizing the airport, and would not result in a substantial safety hazard to people residing or working in the vicinity of the airport. The impacts would be less than significant.

The SMP activities could involve temporary road or lane closures, as well as traffic that could potentially interfere with emergency response.

Under the No Action Alternative, no improvements would be made to creeks in the Project area to minimize known flooding risks. Flooding in the residential areas of Morgan Hill and San Martin would continue and may potentially impede emergency response or evacuation efforts during flooding events. The unimproved operations of the existing flood management system would result in an impact that would be significant.

The SMP activities are not likely to create standing water that would foster mosquitoes or interfere with current and future Santa Clara Vector Control District (SCVCD) abatement efforts. Impacts would be less than significant.

Other SMP Activities

Other SMP activities could involve ground disturbance and, therefore, have the potential to disturb contaminated sites. However, by implementing the BMPs, listed below, if potential contaminants were found during SMP activities, the area would be treated as if a hazardous spill had occurred and any ground-disturbing activities, including disturbance of previously undiscovered contamination, would be handled in a manner that would protect human health and the environment. The impact would be less than significant.

Maintenance activities would potentially require the use of heavy equipment to stabilize the channel banks, remove sediments, perform grading, and/or alter animal habitats. The use of heavy equipment near dry vegetation could present a potential wildland fire threat. Through implementation of SMP BMPs, flaming equipment may be used cautiously and maintenance activities would be performed in a way to minimize the potential for the creation of wildland fires. The SCVWD would obtain the required burn permit or authorization from applicable city or county fire marshals before using flaming equipment. The impact would be less than significant.

BMPs for the No Action Alternative, including O&M activities are discussed and described in Chapter 5 and Appendix B of this EIS.

4.18.3 Action Alternatives

4.18.3.1 Tunnel Alternative (Applicant's Proposed Action)

The key feature of the Tunnel Alternative is to use an underground concrete tunnel instead of channel widening and deepening proposed through Reach 8 in downtown Morgan Hill. The tunnel would be constructed under the Nob Hill Terrace neighborhood, and a sediment detention basin would be constructed in the 600 feet of channel between Wright Avenue and Hillwood Lane with an 18-foot-wide maintenance/access road for maintenance access to the sediment detention basin.

Construction activities for channel improvements, a diversion channel, permanent access roads, RCBs, and relocation of structures and public service facilities would require the use of hazardous substances, such as vehicle fuels, lubricants, and solvents in construction equipment and vehicles, and herbicides to clear vegetation for certain locations. Impacts of improper storage and handling could be significant, including spills, releases and exposure of workers and the general public to toxins and carcinogens. However, hazardous and potentially hazardous materials used in construction would be transported, stored, and handled in a manner consistent with all relevant regulations and guidelines, including those recommended and enforced by the DOT and Santa Clara County Department of Environmental Health.

During tunnel construction, blasting would be used as a construction method. Typically, less than 20 pounds of explosives per delay would be used. A Blasting Plan would be prepared for this alternative to provide guidelines for the safe use and storage of blasting materials including within the vicinity of 0.25 mile of an existing school. The nearest schools to blasting activities are PA Walsh School on West Main Avenue and Britton School on West Central Avenue near the intersection of Monterey Road. The Blasting Plan is intended to help ensure the safety of construction personnel, the public, nearby facilities, and sensitive resources, such as schools. The Blasting Plan would include, but not be limited to, the following elements:

- Proposed blasting activity;
- Blasting procedures;
- Blasting contractor qualification;
- Applicable federal, state, and local regulations;
- Blasting monitoring;
- Noise, vibration, and fly-rock mitigation;
- Safety during blasting; and
- Storage and disposal of explosives.

The SCVWD incorporates standard BMPs related to the transport, use, and disposal of hazardous materials to ensure these impacts are not significant.

Construction workers or the public could be exposed to the hazardous substances, including those discussed above, through accidental disturbance during Project construction, potentially constituting a significant impact. Construction activities, in particular, excavation and other ground-disturbing tasks, would have significant potential to expose workers and the public to hazardous materials, unless appropriate precautions are taken. Such exposure could represent a significant public health impact. Implementation of mitigation measures as described in Chapter 5 of this EIS will reduce potential effects associated with exposure of hazardous materials during excavation to a less-than-significant level.

Uncontaminated excavated soils may be reused within the Project area for fill materials. Excess material may be stockpiled at Anderson Dam for reuse on a future project. In the event of an unanticipated discovery of potentially impacted soils or groundwater, mitigation measures as described in Chapter 5 of this EIS would be implemented, which requires evaluation of soils for reuse.

Buildings and structures within the project construction footprint potentially identified for demolition (see Section 2.5.2, Table 2.5-1) could contain asbestos or lead, which is a potentially significant impact. The SCVWD will conduct surveys for asbestos and lead in building prior to demolishing or moving structures. Implementation of mitigation measures as described in Chapter 5 of this EIS would reduce the potential impact to a -less-than- significant level.

In the event of an unanticipated discovery of NOA, the SCVWD will comply with the BAAQMD ATCM, which regulates NOA emissions (Section 3.18.1) and would implement mitigation measures requiring preparation of an asbestos dust plan to ensure that there are not significant impacts from naturally occurring asbestos.

Because construction would require the use and transport of a variety of hazardous substances, including vehicle fuels and lubricants, paving media, paints, solvents, etc., there would be some potential for exposure to hazardous materials for students, school employees, and the public. However, all hazardous materials would be handled, stored, and used in a manner consistent with relevant regulations and guidelines. This would reduce risks related to the use of hazardous materials in proximity to school campuses to a level consistent with the current standard of care.

Weiss identified sites, including several Leaking Underground Storage Tank (LUST) cleanup sites, listed on hazardous materials databases (Table 3.18-1) and located within or near the Project area. Construction activities near these sites have the potential to create significant hazards to the public or the environment if they are released during Project construction and impacts would be significant. With implementation of mitigation measures as described in Chapter 5 of this EIS, impacts related to potential releases from construction on a site with known hazardous materials is less than significant.

San Martin Airport is located within 2 miles of Reaches 4, 5, 6, 7A, and 14. However, Project construction activities would not interfere with airport operations, would not involve the use of any equipment that would affect aircraft utilizing the airport, and would not result in a substantial safety hazard risk to people residing or working in the vicinity of the airport. The impacts would be less than significant.

The presence of construction equipment and vehicles, worker activities, and materials storage would have the potential to impede emergency access to the Project sites and/or interfere with emergency evacuation plans. To ensure that Project construction does not impede emergency response or evacuations, the SCVWD will develop and implement a project specific traffic control plan (as part of the Project) for each site, including a requirement to maintain emergency access to/through the site.

Section 4.10, Traffic and Circulation provides details on the elements required in the plan. With the development of the traffic control plan and implementation of mitigation measures as described in Chapter 5 of this EIS, the impact is less than significant.

During construction there could be the potential for standing water to accumulate that could breed mosquitoes. The contractor would be required to employ “work site housekeeping” measures to prevent the accumulation of standing water throughout the Project area. To limit the potential for mosquitoes to breed, implementation of mitigation measures as described in Chapter 5 of this EIS would reduce this impact.

The use of construction equipment, in particular equipment with internal combustion engines, gasoline- powered tools, and equipment or tools that produce a spark, fire, or flame—in grassland and woodland areas could pose a fire risk. Some Project elements would be constructed in areas that could pose wildfire risks under dry conditions. Portions of Reaches 7A, 7B, and 8 are located less than 1 mile from a very high fire hazard severity zone in a local area of responsibility. With the implementation of BMP’s and mitigation measures as described in Chapter 5 of this EIS, which incorporates fire prevention measures into construction activities, the impact is less than significant.

The principal concern relative to disease vectors relates to the potential for the Project to create or expand the potential for mosquito breeding in the Project area. During construction, contractors would be required to employ “work site housekeeping” to prevent the accumulation of standing water on construction sites.

With the implementation of mitigation measures as described in Chapter 5 of this EIS, operation and maintenance would not result in a significant increase in mosquito breeding; therefore, the impact would be reduced to less than significant.

Operations and Maintenance (O&M)

Much like construction, periodic activities required to maintain the new Project elements would require the use of vehicle fuels and lubricants and could require solvents, paints, paving media, and other

substances. The SCVWD incorporates standard BMPs related to the transport, use, and disposal of hazardous materials to ensure these impacts are not significant.

The SCVWD will comply with the BAAQMD ATCM, which regulates NOA emissions (Section 3.18.1).

During operations and maintenance activities, described in Section 2.7.5, the SCVWD will conduct an online database search for known contaminated sites in the Project area consistent with mitigation measures prior to ground disturbing activities and will inform neighbors of impending work. Mitigation measures as described in Chapter 5 of this EIS will be implemented if hazardous materials are encountered during work. These measures would reduce potential impacts to less-than-significant levels.

Pesticides and herbicides may be used in maintenance activities related to vegetation management. BMPs would minimize the potential for impacts related to exposure to contaminants associated with pesticide and herbicide use.

Maintenance activities within 0.25 miles of schools would carry similar risks (although, generally on a lesser scale) as for construction. Impacts related to the generation of hazardous emissions or handling of hazardous or acutely hazardous materials,, substances, or waste within 0.25 miles of an existing or proposed school are anticipated to be less than significant with implementation of BMPs an mitigation measures as described in Chapter 5 of this EIS.

O&M activities that involve ground disturbance, such as sediment removal, and are located near identified hazardous materials sites would have the potential to create hazards to the public or the environment. Impacts would be significant levels without BMPs and implementation of mitigation measures as during construction.

Maintenance activities that have the potential to affect public roads would require implementation of BMP’s and mitigation measures as described in Chapter 5 of this EIS, thereby reducing potential impacts. During operations, the Tunnel Alternative would provide an increased level of flood protection for urban areas, specifically: a 1-percent flood in Morgan Hill (Reaches 8, 7A, and 7B); 10-percent flood management for the semi-urban area around East Little Llagas Creek (Reach 14); and avoid induced flooding elsewhere on Llagas Creek (Reaches 6, 5, and 4) due to upstream improvements. Due to increased flood protection from operation and maintenance activities, the impact of the Tunnel Alternative on implementation of Emergency Response or Evacuation Plans would be beneficial because less flood induced emergencies would occur, and the use of maintenance roads in all reaches of the Project area would eliminate potential interference with other emergency responses.

Although O&M activities may be performed within 2 miles of San Martin Airport, these activities would not interfere with airport operations, would not involve the use of any equipment that would affect aircraft utilizing the airport, and would not result in a substantial safety hazard to people residing or working in the vicinity of the airport. The impacts would be less than significant.

The Tunnel Alternative would include operation and maintenance of a new sediment detention basin in Reach 8, which could increase the opportunity for standing water to accumulate and potentially increase mosquito breeding. The proposed sediment detention basin is designed and intended to function in a manner that would collect sediments but allow water to quickly drain out of the detention basin following rainfall-runoff events. However, as sediments collect in the detention basin it is possible that small residual pools of water could develop and could be retained for a period of time following runoff, providing mosquito breeding habitat. SCVWD will implement mitigation measures, which requires the preparation of a mosquito and vector control plan to reduce the potential impact to a less-than-significant level.

The potential for fire risk would also be true for maintenance activities, although to a lesser degree, because fewer pieces of equipment and vehicles would typically be involved. However, impacts would be reduced to a less than significant level with implementation of BMP's.

Impacts to Hazards and Hazardous Materials are similar to the Tunnel Alternative as described and discussed previously. In addition, after construction, the operations and maintenance (O&M) activities would be similar to the O&M activities described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.18.3.2 Natural Resources Conservation Service (NRCS) Alternative

See Section 3.18.3.1 for a discussion of hazards and hazardous materials impacts under the Tunnel Alternative, which would also apply to the NRCS Alternative. The difference between the NRCS Alternative and the Tunnel Alternative is the NRCS Alternative would implement channel widening and deepening throughout downtown Morgan Hill in Reach 8 without the construction of a tunnel and a sediment detention basin.

Unlike the Tunnel Alternative, a Blasting Plan would not be required for this alternative to provide guidelines for the safe use and storage of blasting materials including within the vicinity of 0.25 mile of an existing school. In addition, there would not be a sediment detention basin constructed within Reach 8. However, there would be small pools constructed in Reach 7A for aquatic habitat (a feature applicable to all action alternatives), which may retain water because the groundwater table is shallow at the downstream end of this reach. The pools incorporated in Reach7A could contribute to mosquito habitat. With the implementation of mitigation measures as described in Chapter 5 of this EIS, operation and maintenance would not result in a significant increase in mosquito breeding; therefore, the impact would be reduced to less than significant.

Impacts to Hazards and Hazardous Materials, not described above, are similar to the Tunnel Alternative as described and discussed previously. In addition, after construction, the operations and maintenance (O&M) activities would be similar to the O&M activities described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.18.3.3 Culvert/Channel Alternative

See Section 3.18.3.1 for a discussion of hazards and hazardous materials impacts under the Tunnel Alternative, which would also apply to the Culvert/Channel Alternative except without the sediment detention basin. In Reach 8, the Culvert/Channel Alternative would require a smaller right of way, reduce the amount of vegetation to be removed along the existing West Little Llagas channel, and would allow easier maintenance access. The key feature of the Culvert Alternative is elimination of the need for channel deepening and widening through residential properties, between West Main Avenue and West 2nd Street in Reach 8.

Impacts to Hazards and Hazardous Materials are similar to the Tunnel Alternative as described and discussed previously. In addition, after construction, the operations and maintenance (O&M) activities would be similar to the O&M activities described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.18.3.4 Reach 6 Bypass Alternative

The construction and maintenance BMPs and necessary mitigation for the Reach 6 Bypass Alternative would be the same as those previously described under the Tunnel Alternative.

The Reach 6 Bypass Alternative would construct a high-flow bypass channel between Reach 6 of Llagas Creek and Reach 14 of East Little Llagas Creek. The bypass would be designed so that no flood capacity improvements would be needed along Reach 6 or Reach 5 of Llagas Creek downstream of the proposed bypass. Additionally, in Reach 8, through the City of Morgan Hill, the Project will be exactly the same as the Tunnel Alternative. Flood conveyance modifications for the upstream Project Reaches 7A and 7B and for the downstream Reach 4 would remain the same as that described for the Tunnel Alternative.

Impacts to Hazards and Hazardous Materials are similar to the Tunnel Alternative as described and discussed previously. In addition, after construction, the operations and maintenance (O&M) activities would be similar to the O&M activities described in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.18.4 Summary of Impacts to Hazard and Hazardous Materials

All the Action Alternatives have similar impacts to Hazard and Hazardous Materials, except the NRCS and Culvert/Channel Alternatives do not include the preparation of a Blasting Plan as required for the tunnel construction identified in the Tunnel and Reach 6 Bypass Alternatives. All the Action Alternatives have the potential environmental concerns related to hazards and hazardous materials identified for the Project reaches which include the discovery of pesticides and fertilizers, nitrates and fecal coliform, potentially hazardous chemicals, petroleum hydrocarbons, heavy metals, and naturally-occurring asbestos during excavation activities; the exposure to asbestos-containing building materials, lead-based paint, and PCB- containing lighting fixtures in moving or demolishing structures in the Project footprint; use of diesel, solvents, oil, and herbicides during construction and maintenance; creation of mosquito breeding grounds; and potential fire hazards. With the implementation of BMPs and mitigation measures, the potential impacts from these concerns can be reduced.

Mitigation measures and BMPs, as appropriate, for the various Action Alternatives to reduce the impacts to Population and Housing are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

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4.19 ENVIRONMENTAL JUSTICE

4.19.1 Introduction

This section describes the environmental justice implications of the Project in the Project area, including an analysis of communities of concerns for both minority and low-income characteristics and the disproportionate distribution of negative effects on communities of concern.

A community of concern was defined as a 2010 Census Tract intersected by the Project that had a:

a. U.S. Census designated poverty percentage statistically significantly higher than the average for all Census Tracts in Santa Clara County, California ($P<0.05$) or a poverty rate greater than 50 percent.

-or-

b. Hispanic population percentage statistically significantly higher than the average for all Census Tracts in Santa Clara County, California ($P<0.05$) or a Hispanic population greater than 50 percent.

The aggregate of all Census Tracts in Santa Clara County represents the reference population in this analysis and was chosen because of California's high minority population and uneven distribution, as well as the localized nature of this Project. Therefore, each Census Tract intersected by the Project was compared to the average of all tracts in the county.

Table 4.19-1, below, summarizes the Hispanic and low-income characteristics of each Census Tract intersected by the Project and the average for all Census Tracts in Santa Clara County.

Table 4.19-1 Summary of Project Area Demographic Characteristics

Demographic Characteristic	Tract 5123.07 (Reach 7A and portion of 7B)	Tract 5123.13 (majority portion of Reach 7B)	Tract 5123.14 (Reach 8)	Track 5124.01 (Reaches 4, 5, and 14, and portion of Reach 6)	Tract 5124.02 (portion of Reach 6 and all of Reach 6 Bypass)	Avg. of all Tracts in Santa Clara County
% Low-Income	1.2	19.2	24.6	9.6	6.6	**9.4**
% Hispanic	23.5	55.3	48.3	43.1	40.7	**26.1**

Source: U.S. Census Bureau 2010b; U.S. Census Bureau 2011a

Tract 5123.14, which corresponds to Reach 8, has a population of low-income individuals that is statistically significantly higher than the average of the tracts in the county ($P<0.05$) and is, therefore, a community of concern. Tract 5123.13, which corresponds to Reach 7B, has a population of Hispanic individuals that is over 50 percent and is, therefore, a community of concern. The following section evaluates each alternative by reach to determine if any of the significant impacts identified elsewhere in Chapter 4 would disproportionately impact Reaches 7B or 8.

The impacts related with environmental justice originate in the resource assessments in the preceding sections of this Chapter 4. This section evaluates if those resource impacts disproportionately affect a community of concern in the project area. The details associated with the original impacts are provided in the associated resource section, but the distribution of those impacts on the communities is discussed below. The structure of this section is dissimilar than the resource sections, because it takes a broader view of the effects of alternatives by construction and maintenance activities as it relates to the communities.

4.19.2 No Action Alternative

Section 4.17.2, Socioeconomic Resources, identified the No Action Alternative as having a potentially significant impact to the environment due to intermittent flooding causing business disruptions in and around Reach 8, impacting social and economic resources in the project area. As compared to the Project alternatives, which increase flood protection in Reaches 8, 7B, 7A, and 14, and with no induced flooding in Reaches 6, 5, and 4, the No Project Alternative would result in continued intermittent flooding. The impact to economic resources is disproportionately distributed throughout the Project area, primarily impacting Reach 8, downtown Morgan Hill, due to its high proportion of commercial land use that are exposed to intermittent flooding. No other reach was identified as being significantly economically impacted by flooding. Therefore, the No Project Alternative disproportionately impacts the environmental justice community of concern in Reach 8.

Impact Determination: disproportionate adverse effect

The following impacts are associated with:

Operations and Maintenance

Section 4.2.2, Hydrology and Water Quality, identified the No Action Alternative as having a potentially significant impact to the environment due to the potential to violate water quality standards. Ongoing operations continue to contribute to bank erosion and sedimentation while ongoing flooding continues to contribute to water quality degradation and impairment of existing water quality standards in Reaches 8 and 7B, a disproportionate impact to environmental justice communities of concern.

Impact Determination: disproportionate adverse effect

Section 4.2.2, Hydrology and Water Quality, identified the No Action Alternative as having a potentially significant impact to the environment due to substantially degrading water quality. Ongoing operations continue to contribute to bank erosion and sedimentation while ongoing flooding continues to contribute to water quality degradation and impairment of existing water quality standards in

Reaches 8 and 7B, a disproportionate impact to environmental justice communities of concern.

Impact Determination: disproportionate adverse effect

Section 4.2.2, Hydrology and Water Quality, identified the No Action Alternative as having a potentially significant impact to the environment due to alteration of drainage pattern and course of stream resulting in substantial erosion or siltation on or off site. Ongoing operations would continue causing channel down-cutting contributing to bank erosion and sedimentation. The operations currently take place in all Project reaches and would not disproportionately impact an environmental justice community of concern.

Impact Determination: no disproportionate adverse effect

Section 4.2.2, Hydrology and Water Quality, identified the No Action Alternative as having a potentially significant impact to the environment due to alteration of drainage pattern and course of stream resulting in flooding or increased surface runoff. Flooding would continue, potentially exposing structures and people to 100-year-flood hazard. According to Section 4.17.2, continued flooding imposes a potentially significant impact to the businesses in Reach 8 due to the costs of business interruptions and preventing the sale of goods and services. Reach 8 is disproportionately impacted by continued flooding.

Impact Determination: disproportionate adverse effect

Section 4.10.2, Traffic and Circulation, identified the No Action Alternative as having a potentially significant impact to the environment due to interference and inadequate emergency access during flood events. This interference would be temporary and would impact the areas that experience flooding under the No Project Alternative, particularly in Reach 8 where the population density is the greatest and, therefore, would experience the highest need for emergency services and evacuation routes during a flood event. Reach 8 is disproportionately impacted by interference of emergency access during flood events.

Impact Determination: disproportionate adverse effect

Section 4.10.2, Traffic and Circulation, identified the No Action Alternative as having a potentially significant impact to the environment due to interference with public transit, bicycle, and pedestrian facilities during flood events. This interference would be temporary and would impact the areas that experience flooding under the No Project Alternative, particularly Reach 8 where the population density, access to public transit, number of bicycle, and pedestrian facilities is the highest. Reach 8 is disproportionately impacted by interference of emergency access during flood events.

Impact Determination: disproportionate adverse effect

Section 4.10.2, Traffic and Circulation, identified the No Action Alternative as having a potentially significant impact to the environment due to failure to provide safe access, obstruct access to nearby uses, or fail to provide for future street right-of-way, particularly during flood events. This interference would be temporary and would impact the areas that experience flooding under the No Project Alternative, particularly in Reach 8 where the flooding is greatest. Reach 8 would be disproportionately impacted.

Impact Determination: disproportionate adverse effect

Section 4.18.2, Hazards and Hazardous Materials, indentified the No Action Alternative as having a potentially significant impact to the environment due to interference with emergency response or evacuation plans. This interference would be temporary and would impact the areas that experience flooding under the No Project Alternative, particularly in Reach 8 where the population density is the greatest and, therefore, would experience the highest need for emergency services and evacuation routes during a flood event. Reach 8 is disproportionately impacted by interference of emergency access during flood events.

Impact Determination: disproportionate adverse effect

BMPs for the No Action Alternative, including O&M activities are discussed and described in Chapter 5 and Appendix B of this EIS.

4.19.3 Action Alternatives

4.19.3.1 Tunnel Alternative (Applicant's Proposed Action)

Section 4.4.3.1, Botanical Resources, identified the Tunnel Alternative as having a potentially significant impact to the environment due to removal or temporary disturbance of vegetation that potentially provides suitable habitat for special-status plant species or that support rare or important plan communities. Table 3.4-1 Vegetation Types and Habitats in the Project Area describes the total acres of each vegetation type per reach. According to Table 4.4-1 and Table 4.4-2, 100% of the vegetation in reach 7B for habitats riparian forest (native and non-native), riparian scrub-shrub (native and non-native), and upland herbaceous) will be temporarily or permanently impacted. Reach 7B experiences the most severe impacts to vegetation than any other reach; therefore, an environmental justice community of concern is disproportionately impacted.

Impact Determination: disproportionate adverse effect

Section 4.11.3.1, Air Quality and Greenhouse Gases, identified the Tunnel Alternative as having a potentially significant impact to the environment due to Project-related short-term construction equipment emissions which, although temporary, could contribute to an existing or projected air quality violation due to peak daily emissions of nitrogen oxides (NO_X, as NO and NO_2), which is an ozone (O_3) precursor. These emissions would result from short-term construction activities in every reach, and are considered significant due to their contribution to regional nonattainment of the ozone standards. Such construction emissions would be short-term, because they would permanently cease when construction is completed after a period of approximately 5 years. This impact would be relatively evenly distributed throughout the Project area; however, the construction of the tunnel would result in a slight increase in NO_X emissions compared to excavation of the other reaches, about 16 percent more, but the increase would not be large enough to be considered a disproportionate impact in Reach 8, because it is within 20 percent estimation precision for construction projects. Comparing Tables 4.11-11 and 4.11-12, the change in peak NO_X emissions would be about 43 pounds per day, which would not impact Reach 7B.

Impact Determination: no disproportionate adverse effect

Section 4.11.3.1, Air Quality and Greenhouse Gases, identified the Tunnel Alternative as having a potentially significant impact to the environment due to a net increase of any criteria pollutant for which the Project region is nonattainment. The channel excavation and widening and other construction activity would result in an exceedance of the significance threshold for NO_X. This impact would be relatively evenly distributed throughout the Project area and would not, therefore, disproportionately impact an environmental justice community of concern.

Impact Determination: no disproportionate adverse effect

Section 4.12.3.1, Noise, identified the Tunnel Alternative as having a potentially significant impact to the environment due to Project-related noise levels in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies. The construction related to the portal and tunnel as well as blasting would result in higher noise levels for Reach 8 than any other Project reach with levels of 107 dBA (according to Table 4.12-25), which would be louder than a jet taking off and almost as loud as a rock concert (Purdue N.D.). This noise level could cause serious hearing damage in an 8-hour exposure. The next highest noise level occurs in Reach 4 at 92 dBA (according to Table 4.12-14), which would be a little louder than a lawn mower. This noise level could likely cause hearing damage in an 8-hour exposure. Reach 8 is, therefore, disproportionately impacted.

Impact Determination: disproportionate adverse effect

Section 4.12.3.1, Noise, identified the Tunnel Alternative as having a potentially significant impact to the environment due to the generation of excessive groundborne vibration or groundborne noise levels during construction. The construction related to the portal and tunnel, as well as blasting, would result in higher vibration levels for Reach 8 than any other Project reach, but would not be high enough to cause structural damage. However, all reaches would experience vibration levels that could exceed state standards for annoyance. Therefore, the impacts would not disproportionately impact Reaches 8 or 7B.

Impact Determination: no disproportionate adverse effect

Section 4.12.3.1, Noise, identified the Tunnel Alternative as having a potentially significant impact to the environment due to temporary and periodic increases in ambient noise levels in the Project vicinity above existing baseline levels. According to Table 4.12-24, Estimated Noise Levels for Construction Activities. Compared with Existing Noise Levels, Reaches 7A, 7B, and 8 have similar potential short-term increased noise levels of 38.7, 35.7, and 38.1 dBA, respectively. Reaches 4 and 5 could experience similar potential changes to short-term noise levels, with estimated increases of 31.6 and 26.8 dBA, respectively. Reaches 6 and 14 could experience similar potential changes to short-term noise levels, with estimated increases of 23.9 and 21.1 dBA, respectively. The potential short-term noise increases are relatively evenly distributed across the Project area and, thus, would not disproportionately impact Reaches 8 or 7B.

Impact Determination: no disproportionate adverse effect

Section 4.7.3.1, Agricultural and Forest Resources, Identified the Tunnel Alternative as having a potentially significant impact to the environment due to 50 acres of Prime Farmland, Unique Farmland, or Farmland of Statewide and Local Importance being converted to non-agricultural uses. According to Table 4.7-2, Important Farmlands Within Project Footprint by Reach, Reaches 7B and 8 contain 0.0 acre of Prime Farmland, Unique Farmland, or Farmland of Statewide and Local Importance. Therefore, Reach 7B or Reach 8 is not disproportionately affected.

Impact Determination: no disproportionate adverse effect

Section 4.7.3.1, Agricultural and Forest Resources, Identified the Tunnel Alternative as having a potentially significant impact to the environment due to 17 acres of Williamson Act designated land being subject to permanent conversion. According to Table 3.7.3, Williamson Act Lands within the Project Footprint by Reach, Reaches 7B and 8 contain 0.0 acre of Williamson Act lands. Therefore, Reach 7B or Reach 8 is not disproportionately affected.

Impact Determination: no disproportionate adverse effect

The following impacts are associated with Operations and Maintenance activities:

Section 4.12.3.1, Noise, identified the Tunnel Alternative as having a potentially significant impact to the environment due to routine operation and maintenance activities that could produce periodic increases in ambient noise levels during the life of the Project in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies. According to Table 3.12-13, the NRCS Alternative Reaches 8, 7B, and 4 could experience similar periodic noise elevations. Under the Tunnel Alternative, operations and maintenance would be similar to the NRCS Alternative, with the exception of increased maintenance in Reach 8. The nearest residences along all reaches would exceed corresponding noise standards under the NRCS Alternative; and under the Tunnel Alternative, Reach 8 would have the highest noise of any reach. Therefore, the impact would disproportionately impact Reach 8, an environmental justice community of concern.

Impact Determination: disproportionate adverse effect

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.19.3.2 Natural Resources Conservation Service (NRCS) Alternative

Section 4.4.3.2, Botanical Resources, identified the NRCS Alternative as having a potentially significant impact to the environment due to removal or temporary disturbance of vegetation that potentially provides suitable habitat for special-status plant species or that support rare or important plan communities. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Impact Determination: disproportionate adverse effect

Section 4.11.3.2, Air Quality and Greenhouse Gases, identified the NRCS Alternative as having a potentially significant impact to the environment due to Project-related short-term construction equipment emissions which, although temporary, could contribute to an existing or projected air quality violation due to peak daily emissions of nitrogen oxides (NO_X, as NO and NO_2), which is an ozone (O_3) precursor. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Impact Determination: no disproportionate adverse effect

Section 4.11.3.2, Air Quality and Greenhouse Gases, identified the NRCS Alternative as having a potentially significant impact to the environment due to a net increase of any criteria pollutant for which the Project region is nonattainment. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Impact Determination: no disproportionate adverse effect

Section 4.12.3.2, Noise, identified the NRCS Alternative as having a potentially significant impact to the environment due to Project-related noise levels in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Impact Determination: no disproportionate adverse effect

Section 4.12.3.2, Noise, identified the NRCS Alternative as having a potentially significant impact to the environment due to the generation of excessive groundborne vibration or groundborne noise levels during construction. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Impact Determination: no disproportionate adverse effect

Section 4.12.3.2, Noise, identified the NRCS Alternative as having a potentially significant impact to the environment due to temporary and periodic increases in ambient noise levels in the Project vicinity above existing baseline levels. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Impact Determination: no disproportionate adverse effect

Section 4.7.3.2, Agricultural and Forest Resources, Identified the NRCS Alternative as having a potentially significant impact to the environment due to 50 acres of Prime Farmland, Unique Farmland, or Farmland of Statewide and Local Importance being converted to non-agricultural uses. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Impact Determination: no disproportionate adverse effect

Section 4.7.3.2, Agricultural and Forest Resources, Identified the NRCS Alternative as having a potentially significant impact to the environment due to 17 acres of Williamson Act designated land being subject to permanent conversion. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Impact Determination: no disproportionate adverse effect

The following impacts are associated with Operations and Maintenance activities:

Section 4.12.3.2, Noise, identified the NRCS Alternative as having a potentially significant impact to the environment due to routine operation and maintenance activities that could produce periodic increases in ambient noise levels during the life of the Project in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.19.3.3 Culvert/Channel Alternative

Section 4.4.3.3, Botanical Resources, identified the Culvert/Channel Alternative as having a potentially significant impact to the environment due to removal or temporary disturbance of vegetation that potentially provides suitable habitat for special-status plant species or that support rare or important plan communities. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Impact Determination: disproportionate adverse effect

Section 4.11.3.3, Air Quality and Greenhouse Gases, identified the Culvert/Channel Alternative as having a potentially significant impact to the environment due to Project-related short-term construction equipment emissions which, although temporary, could contribute to an existing or projected air quality violation due to peak daily emissions of nitrogen oxides (NO_X, as NO and NO_2), which is an ozone (O_3) precursor. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Impact Determination: no disproportionate adverse effect

Section 4.11.3.3, Air Quality and Greenhouse Gases, identified the Culvert/Channel Alternative as having a potentially significant impact to the environment due to a net increase of any criteria pollutant for which the Project region is nonattainment. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Impact Determination: no disproportionate adverse effect

Section 4.12.3.3, Noise, identified the Culvert/Channel Alternative as having a potentially significant impact to the environment due to Project-related noise levels in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Impact Determination: no disproportionate adverse effect

Section 4.12.3.3, Noise, identified the Culvert/Channel Alternative as having a potentially significant impact to the environment due to the generation of excessive groundborne vibration or groundborne noise levels during construction. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Impact Determination: no disproportionate adverse effect

Section 4.12.3.3, Noise, identified the Culvert/Channel Alternative as having a potentially significant impact to the environment due to temporary and periodic increases in ambient noise levels in the Project vicinity above existing baseline levels. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Impact Determination: no disproportionate adverse effect

Section 4.7.3.3, Agricultural and Forest Resources, Identified the Culvert/Channel Alternative as having a potentially significant impact to the environment due to 50 acres of Prime Farmland, Unique Farmland, or Farmland of Statewide and Local Importance being converted to non-agricultural uses. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Impact Determination: no disproportionate adverse effect

Section 4.7.3.3, Agricultural and Forest Resources, Identified the Culvert/Channel Alternative as having a potentially significant impact to the environment due to 17 acres of Williamson Act designated land being subject to permanent conversion. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Impact Determination: no disproportionate adverse effect

The following impacts are associated with Operations and Maintenance activities:

Section 4.12.3.3, Noise, identified the NRCS Alternative as having a potentially significant impact to the environment due to routine operation and maintenance activities that could produce periodic increases in ambient noise levels during the life of the Project in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.19.3.4 Reach 6 Bypass Alternative

Section 4.4.3.4, Botanical Resources, identified the Reach 6 Bypass Alternative as having a potentially significant impact to the environment due to removal or temporary disturbance of vegetation that potentially provides suitable habitat for special-status plant species or that support rare or important plan communities. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Impact Determination: disproportionate adverse effect

Section 4.10.3.4, Traffic and Circulation, identified the Reach 6 Bypass Alternative as having a potentially significant impact to the environment due to increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system. The construction of bridges to accommodate the Reach 6 bypass channel is anticipated to interfere with local traffic patterns and parking and with traffic along U.S. 101. Since this construction mainly impacts Reaches 5 and 6, Reaches 7B or 8 will not be disproportionately impacted.

Impact Determination: no disproportionate adverse effect

Section 4.11.3.4, Air Quality and Greenhouse Gases, identified the Reach 6 Bypass Alternative as having a potentially significant impact to the environment due to Project-related short-term construction equipment emissions which, although temporary, could contribute to an existing or projected air quality violation due to peak daily emissions of nitrogen oxides (NO_X, as NO and NO_2), which is an ozone (O_3) precursor. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Impact Determination: no disproportionate adverse effect

Section 4.11.3.4, Air Quality and Greenhouse Gases, identified the Reach 6 Bypass Alternative as having a potentially significant impact to the environment due to a net increase of any criteria pollutant for which the Project region is nonattainment. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Impact Determination: no disproportionate adverse effect

Section 4.12.3.4, Noise, identified the Reach 6 Bypass Alternative as having a potentially significant impact to the environment due to Project-related noise levels in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Impact Determination: no disproportionate adverse effect

Section 4.12.3.4, Noise, identified the Reach 6 Bypass Alternative as having a potentially significant impact to the environment due to the generation of excessive groundborne vibration or groundborne noise levels during construction. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Impact Determination: no disproportionate adverse effect

Section 4.12.3.4, Noise, identified the Reach 6 Bypass Alternative as having a potentially significant impact to the environment due to temporary and periodic increases in ambient noise levels in the Project vicinity above existing baseline levels. Except for within Reach 8, the impacts are expected to be similar to the impacts described and discussed previously in the Tunnel Alternative.

Impact Determination: no disproportionate adverse effect

Section 4.7.3.4, Agricultural and Forest Resources, Identified the Reach 6 Bypass Alternative as having a potentially significant impact to the environment due to 40 acres of Prime Farmland, Unique Farmland, or Farmland of Statewide and Local Importance being converted to non-agricultural uses. According to Table 3.7-2, Important Farmlands Within Project Footprint by Reach, Reaches 7B and 8 contain 0.0 acre of Prime Farmland, Unique Farmland, or Farmland of Statewide and Local Importance. Therefore, Reach 7B or Reach 8 is not disproportionately affected.

Impact Determination: no disproportionate adverse effect

Section 4.7.3.4, Agricultural and Forest Resources, identified the Reach 6 Bypass Alternative as having a potentially significant impact to the environment due to 4.0 acres of Williamson Act designated land being subject to permanent conversion. According to Table 3.7.3, Williamson Act Lands within the Project Footprint by Reach, Reaches 7B and 8 contain 0.0 acres of Williamson Act lands. Therefore, Reach 7B or Reach 8 is not disproportionately affected.

Impact Determination: no disproportionate adverse effect

The following impacts are associated with Operations and Maintenance activities:

Section 4.2.3.4, Hydrology and Water Quality, identified the Reach 6 Bypass Alternative as a potentially significant impact to the environment due to operations that would perpetuate channel instability (incision) and resultant water quality impacts in Reach 5 and Reach 6. This impact would not disproportionately impact Reach 7B or 8, environmental justice communities of concern.

Impact Determination: no disproportionate adverse effect

Section 4.2.3.4, Hydrology and Water Quality, identified the Reach 6 Bypass Alternative as a potentially significant impact to the environment due to operations that would perpetuate channel instability (incision) and thus water quality impacts in Reach 5 and Reach 6. This impact would not disproportionately impact Reach 7B or 8, environmental justice communities of concern.

Impact Determination: no disproportionate adverse effect

Section 4.2.3.4, Hydrology and Water Quality, identified the Reach 6 Bypass Alternative as a potentially significant impact to the environment due to operations that would perpetuate channel instability (incision) and resultant erosion and siltation impacts in Reach 5 and Reach 6. This impact would not disproportionately impact Reach 7B or 8, environmental justice communities of concern.

Impact Determination: no disproportionate adverse effect

Section 4.12.3.4, Noise, identified the Reach 6 Bypass Alternative as having a potentially significant impact to the environment due to routine operation and maintenance activities that could produce periodic increases in ambient noise levels during the life of the Project in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies. Similar to the NRCS Alternative, except that Reach 8 would require additional creek and tunnel maintenance and Reach 6 Bypass would also require maintenance. Similar to the Tunnel Alternative, discussed above in Section 4.19.3.1, the nearest residences along all reaches would exceed corresponding noise standards under the NRCS and Reach 6 Bypass alternatives, Reach 8 would have the highest noise of any reach. Therefore, the impact would disproportionately impact Reach 8, an environmental justice community of concern.

Impact Determination: disproportionate adverse effect

Mitigation measures and BMPs for this alternative, including O&M activities are discussed and described in Chapter 5 and Table 5.4-1 Summary of Mitigation Measures for the Alternatives of this EIS.

4.19.4 Summary of Impacts to Environmental Justice

Under the No Project Alternative, flooding would continue causing economic impact to businesses, substantial degradation and violation to water quality standards due to bank erosion and sedimentation, structures and people to be exposed to 100-year flood hazard, interference with emergency access, emergency response, evacuation plans, public transportation, bicycle paths, and pedestrian facilities, all of which would disproportionately affect an environmental justice community of concern.

All alternatives would result in temporary and permanent loss of California sycamore woodland habitat, excess noise levels, excess groundborne vibration, periodic increases in ambient noise levels, degraded visual character or quality of the surrounding area, conversion of Prime Farmland, Unique Farmland, and Farmland of Statewide and Local Importance, and conversion of Williamson Act land. However, the distribution of these impacts would be across multiple Project reaches and would not disproportionately affect an environmental justice community of concern, except for the Tunnel and Reach 6 Bypass Alternatives where excess noise levels disproportionately impact Reach 8, an environmental justice community of concern.

Mitigation measures and BMPs, as appropriate, for the various Action Alternatives to reduce the impacts to Environmental Justice are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

4.20 CUMULATIVE IMPACTS

4.20.1 Introduction

Section 1508.7 of the CEQ Regulations defines a cumulative impact as “The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.” Cumulative impacts may result from individually minor but collectively significant effects of several projects over a period of time. Cumulative effects may occur when a project’s incremental impacts, added to those of other closely related past, present, and reasonably foreseeable probable future projects, become environmentally important.

The cumulative impact analysis is based on a summary of past, present and reasonably probable future projects within and near the proposed Project area that would affect similar resources in the same geographic area and in the same general timeframe. Therefore, these projects could result in cumulative impacts in combination with the proposed Project alternatives. Table 4.20.2 defines the Project area for each environmental resource evaluated for cumulative impacts.

Cumulative project information listed in Table 4.20.3 is based on information supplied by the City of Morgan Hill, the County of Santa Clara, and the SCVWD. The list identifies projects by the three planning jurisdictions that would likely contribute to cumulative impacts. Cumulative impacts for some resources are not quantifiable and are, therefore, discussed in general terms.

Two of the projects listed in the table have been completed but are included in the cumulative impact analysis because they are located in the same area as the Proposed Action and continued construction could affect the same of similar resources. The Butterfield Boulevard South Extension overlaps with the proposed Project at West Little Llagas near Watsonville and Monterey roads near Reach 7A. In addition, the Wright-Mañana Residential Development (constructed near the corner of Hale and Wright Avenues, overlaps with the project in Reach 8. These two projects are included in the water quality and hydrology and biological resources discussions. The Cochrane-Borello Residential Development Project includes removal of existing orchards and associated uses on Cochrane Road near the base of Anderson Dam. This project is considered in the cumulative assessment for biological resources, agricultural resources, and traffic and transportation (Morgan Hill, 2012).

This Draft EIS concludes that impacts associated with socioeconomics, land use and population and housing, would not have the potential to result in significant adverse impact in combination with the projects identified in Table 4.20-3. Support for this conclusion is provided below and no further discussion is provided in the cumulative impact assessment.

Socioeconomic impacts of the proposed Project alternatives generally would be beneficial and when land is acquired by easement or otherwise disrupted, property owners would receive appropriate compensation. Property tax revenue could be lowered as a result of land acquisition, but the amount would be extremely small in relation to the local tax base. Other projects included in Table 4.20-3 are not expected to result in adverse socioeconomic impacts, and many would have beneficial impacts due to the creation of employment opportunities, purchase of goods and services, and creation of housing.

The proposed Project alternatives' use of lands designated for residential, commercial, and agricultural uses for flood prevention purposes is consistent with local health and safety and environmental regulations and land use policies. The proposed Project would not induce population growth, and although the Project alternatives could result in displacement of up to 12 residences, many of the projects listed in Table 4.20-1 would create numerous new residences, and none of the other projects are known to result in a loss of residences.

The Project area for cumulative impacts varies by resource as shown in Table 4.20-2, depending on likelihood that impacts from the project alternatives could combine with those of other projects. For some resources, such as noise and aesthetic resources, the project area is limited to the project vicinity because projects located further away would not have the potential to affect the same area. For other resources, such as air quality, the project area includes a broader area because impacts of the project alternatives could disperse throughout the region or affect resources located throughout the region thereby affecting the same resources as other projects.

4.20.2 Resources Analyzed for Cumulative Impacts

Table 4.20-2 Defines Project Area of Each Resource Analyzed for Cumulative Impacts

Resource	Project Area
Geology and Soils	Upper Llagas Creek Watershed
Hydrology and Water Quality	Llagas Creek Watershed
Mineral Resources	Available Mineral Resources along Upper Llagas Creek
Botanical Resources	Upper Llagas Creek and special-status species habitat in Santa Clara County
Wildlife Resources	Upper Llagas Creek and special-status species habitat in Santa Clara County
Aquatic Resources	Upper Llagas Creek and special-status species habitat in Santa Clara County
Agricultural and Forest Resources	All agricultural lands within Santa Clara County boundaries
Land Use and Planning	N/A
Cultural Resources	Llagas Creek corridor
Traffic and Circulation	Traffic networks intersecting the Upper Llagas Creek vicinity and haul routes
Air Quality and Greenhouse Gases	San Francisco Bay Area Air Basin
Noise	Lands bordering Reaches 4, 5, and 6 on Upper Llagas Creek, Reaches 7A, 7B, and 8 on West Little Llagas Creek, and Reach 14 on East Little Llagas Creek
Aesthetic Resources	Upper Llagas Creek viewshed
Utilities and Public Services	The City of Morgan Hill and Sphere of Influence of the City of Gilroy, and unincorporated Santa Clara County along Upper Llagas Creek
Recreation Resources	The City of Morgan Hill and Sphere of Influence of the City of Gilroy, and unincorporated Santa Clara County along Upper Llagas Creek
Population and Housing	N/A
Socioeconomics	N/A
Hazards and Hazardous Materials	Morgan Hill and unincorporated Santa Clara County along the Upper Llagas Creek
Environmental Justice	N/A

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Table 4.20-3 List of Projects Evaluated for Cumulative Impacts in the Upper Llagas Creek Flood Control Project Vicinity

Project Name	Location	Project Description	Distance from Proposed Action	Potential Cumulative Impact Topics	Schedule/Status
Santa Clara Valley Water District (SCVWD) Anderson Dam Seismic Studies and Retrofit Project	Anderson Reservoir is a man-made lake along Coyote Creek in Santa Clara County, California near Morgan Hill. The dam sits on the Calaveras Fault, which runs from Hollister to Milpitas.	Retrofit and strengthen Anderson Dam so it can withstand any probable earthquake.	Anderson Dam sits on Cochrane Road, east of Morgan Hill, on Coyote Creek, approximately 5 miles from Upper Llagas Creek.	Potential construction-related noise, air quality, and traffic impacts on local access roads and potential impacts on steelhead.	Planning: 2011–2013 Design: 2013–2016 Construction: 2016–2018
SCVWD Almaden Lake	Almaden Lake is a man-made lake fed by Alamitos Creek upstream of the confluence of Alamitos Creek and the Guadalupe River.	Almaden Lake, which has the high concentration of methyl mercury, is jointly owned by the SCVWD and the City of San Jose (the City); and the City is responsible for management of recreational facilities at the lake. To address the mercury issue, the SCVWD is planning the Almaden Lake project to modify the lake to achieve these objectives: > Reduce mercury in target fish and production of methyl mercury to meet applicable water quality standards; > Reduce thermal barrier to anadromous fish migration; > Remove entrainment and impacts from predatory species; and > Minimize impacts to recreational features.	Almaden Lake is approximately 17 miles for the north end of Reach 8.	Impacts to steelhead.	Planning and design: 2014 Construction: 2015
Barry Swenson Builder Downtown Morgan Hill Revitalization	Redevelopment sites A & B (1st and Monterey and 2nd and Monterey) in Downtown Morgan Hill	Barry Swenson Builder to design and develop two crucial locations in Downtown Morgan Hill.	Less than 1 mile south of Reach 8.	Potential construction-related traffic impacts on local access roads and associated air quality and noise impacts.	In Development Process.
High Speed Rail California High-Speed Rail Authority (CaHSRA)	Two routes under consideration: One route runs east of existing Union Pacific tracks through Morgan Hill. One route runs east of existing U.S. Highway 101 (U.S. 101) until around Dunne Avenue. When the freeway bends, the high speed rail keeps going straight and lines up along Murphy Avenue and continues to San Martin.	By 2029, high speed rail running from San Francisco to Los Angeles via the Central Valley, including 800 miles of new track and up to 24 stations. Morgan Hill is working with other communities, transportation groups, and the CaHSRA to identify the best location for where the High Speed rail will pass through Morgan Hill.	Less than 1 mile east of Reach 8.		Draft EIR/Environmental Impact Statement (EIS) currently underway.
Butterfield Boulevard Linear Park, Park Facilities – Part of the 5-Year Engineering Capital Improvement Projects (CIP)	Butterfield Boulevard	Provides landscaping, walkways, and combination Class 1 bikeway/walkway along Butterfield Channel.	Within 1 mile east of Reach 8.	This project would provide additional public access and recreational opportunities.	Phase 1 and Phase 2 are complete. Phase 3 (San Pedro to Tennant) in Development
Community Park Improvements, Park Facilities – Part of the 5-Year Engineering CIP	Community Park, east and south of Cosmo Avenue, west of Monterey Road, and north of West Edmundson Road	Park improvements, including addition of six tennis courts, new multi-purpose fields, expanded play area including water feature, second restroom, new tennis clubhouse, outdoor basketball court lighting, expanded parking.	Less than 0.5 mile east of Reach 7B.	Potential construction-related traffic impacts on local access roads and associated air quality and noise impacts. This project would provide additional recreational opportunities.	Phase 1 completed in Fiscal Year (FY) 07/08. Phase 2 in FY 13/14 includes all improvements west of the access road. Phases 3 and 4 contingent on relocation of PW Corp Yard and Bus Barn.
Madrone Channel Trail, Park Facilities – Part of the 5-Year Engineering CIP	Between Cochrane Road and Tennant Avenue	Construct an unpaved trail on existing SCVWD service road, adjacent to Madrone recharge channel east of Hwy 101, between Cochrane Road and Tennant Avenue. Construction includes minor improvements to existing maintenance road, rest areas, and signage.	Approximately 2 miles east of Reach 8.	No overlap of construction periods is anticipated. This project would provide additional public access and recreational opportunities.	Design and construction scheduled to begin in FY 11/12.
Sanitary Sewer Rehabilitation, Sanitary Sewer – Part of the 5-Year Engineering CIP	Citywide	Maintaining the City's sewer collection system requires an ongoing program of evaluation, cleaning, improvement, and repairs. Sewer lines are routinely cleaned and video-recorded as needed to evaluate the system.	Within 2 miles of all points of Project site.	Possible overlap with the utility relocation process for the Proposed Project, which could result in an impact on utility infrastructure.	Construction slated for 2013–2014

Project Name	Location	Project Description	Distance from Proposed Action	Potential Cumulative Impact Topics	Schedule/Status
Lift Station Rehabilitation, Sanitary Sewer – Part of the 5-Year Engineering CIP	Citywide	The 14 citywide lift stations are systematically upgraded or replaced as needed. Various improvements include new pump and motor, electrical system, high level floats, alarms, generators available for (or dedicated to) each lift station, generator transfer switches, and a new telemetry system for after-hours monitoring at Public Works and City facilities.	Within 2 miles of all points of Project site.	Possible overlap with the utility relocation process for the Proposed Project, which could result in an impact on utility infrastructure.	Lift Station P construction was completed in FY 09/10. Lift Stations M and O will be designed and reconstructed in FY 11/12 and FY 13/14, respectively.
New Sewer Mains, Sanitary Sewer – Part of the 5-Year Engineering CIP	Citywide	New sewer mains are required to ensure adequate sewer capacity as the City expands. In accordance with the 2002 Sewer Master Plan, some mains will be constructed by the City and some by developers with partial reimbursement from the City.	Within 2 miles of all points of Project site.	Potential construction-related traffic impacts on local access roads.	In FY 13/14 the second phase of the Hill-Barrett trunk sewer will be installed.
Storm Pipe and Inlet Installation, Storm Drainage – Part of the 5-Year Engineering CIP	Citywide	Construction of storm drains and storm inlets at various locations within the City to resolve existing drainage problems, as needed. Problem areas are targeted to eliminate local flooding problems.	Within 2 miles of all points of Project site.	Possible overlap with the utility relocation process for the Proposed Project, which could result in an impact on utility infrastructure.	In Process
West Little Llagas Local Drainage, Storm Drainage – Part of the 5-Year Engineering CIP	West Little Llagas Creek in Morgan Hill	Due to delay of federal funding, the City and the SCVWD have entered into a cost-sharing agreement to produce design documents for the Upper Llagas Flood Control Project (aka PL566).	Within Project footprint in Morgan Hill.	Possible overlap with the utility relocation process for the Proposed Project, which could result in an impact on utility infrastructure.	Design and Environmental Study are expected to begin in April 2010 and to be completed by January 2013.
Butterfield Detention Basin, Storm Drainage – Part of the 5-Year Engineering CIP	Maple / Railroad	Construction of 30+-acre detention basin in accordance with adopted Butterfield Boulevard. EIR. Project would be jointly managed as a Burrowing Owl habitat. Project will have potential as joint-use basin/outdoor recreation area. This project is a requirement for the construction of Butterfield from Tennant Avenue. to Watsonville Road. If this project is constructed, the Morgan Hill Ranch secondary basin, now comprising 4 acres, can be developed.	Approximately 1 mile east Reaches 8 and 7B boundary at Dewitt Creek.	No overlap of construction periods, since construction of the detention basin is complete.	Project slated to begin in 2012.
Butterfield Boulevard South Extension, Streets and Roads – Part of the 5-Year Engineering CIP	Butterfield Boulevard from Tennant Avenue to Watsonville Road, Morgan Hill	Extend Butterfield Boulevard from Tennant Avenue to Watsonville Road, including a grade separation over the Union Pacific Railroad tracks. In addition to the roadway work, a stormwater channel and detention basin will be constructed.	Project area runs less than 0.5 mile from Reach 7A.	No overlap of construction periods, since construction of the road extension is complete.	Project is scheduled to be complete 2013.
Butterfield Boulevard North Extension, Streets and Roads – Part of the 5-Year Engineering CIP	Butterfield Boulevard north of Cochrane Road	Extend Butterfield Boulevard north from Cochrane Road to Madrone Parkway. Improvements include new road section per City standards, curb and gutter, sidewalks, and streetlights.	Approximately 2 miles northeast of Reach 8.	No overlap of construction periods since construction of the road extension is complete.	Scheduled to be complete 2012.
New Signal Construction, Streets and Roads – Part of the 5-Year Engineering CIP	Citywide	New traffic signals are installed as needed to meet growing traffic demands. In FY 07/08, the intersection of Monterey Road and Spring Avenue was studied. It was determined that a new signal was warranted for safety and circulation purposes. The recently approved General Plan Circulation Element includes the Study's recommendation.	Within 2 miles of all points of Project site.	Potential construction-related traffic impacts on local access roads.	In FY 12/13 and FY 14/15, signals at locations yet to be determined will be installed at warranted locations in accordance with the General Plan.
Pavement Rehabilitation Program, Streets and Roads – Part of the 5-Year Engineering CIP	Citywide	This Program involves the rehabilitation of existing street surfaces by crack sealing, slurry seal, overlay, or reconstruction in FY 10/11.	Within 2 miles of all points of Project site.	No overlap of construction periods is anticipated.	Scheduled for FY 10/11.
Cochrane Road Traffic Signal Timing/ Coordination, Streets and Roads – Part of the 5-Year Engineering CIP	Cochrane Road, Morgan Hill	Interconnect traffic signals and striping to improve traffic movement and safety. Signals are to be synchronized to facilitate efficiency.	1.5 miles north of Reach 8.	Potential construction-related traffic impacts on local access roads.	Timing based on earliest date the City may receive VTP 2035 Grant. Staff will pursue other grant opportunities to accelerate timing of project.

Project Name	Location	Project Description	Distance from Proposed Action	Potential Cumulative Impact Topics	Schedule/Status
Underground Monterey Utilities, Streets and Roads – Part of the 5-Year Engineering CIP	Monterey Road, Dunne to 600 feet north of Cosmo	City's goal is to underground the overhead utility lines along Monterey Road from Dunne Avenue to Tennant Avenue. PG&E is responsible for design. Sufficient Rule 20A funds are available to accomplish undergrounding from Dunne to approximately 600 feet north of Cosmo.	Less than 0.5 mile east of Reaches 8 and 7B boundary at Dewitt Creek.	No overlap of construction periods is anticipated.	Construction anticipated to begin in FY 10/11.
Residential Development Control System (RDCS) School Safety Improvements, Streets and Roads – Part of the 5-Year Engineering CIP	Citywide	Construct school pedestrian safety improvements in accordance with RDCS ordinance. Funds can also be used to supplement improvement projects undertaken by developers near schools.	Within 2 miles of all points of Project site.	Potential construction-related traffic impacts on local access roads noise impacts.	2010–2015
Underground Utilities, Streets and Roads – Part of the 5-Year Engineering CIP	Misc. Locations – Citywide	The Utility Undergrounding fund receives revenues from developers authorized by the City to pay an in-lieu fee for the utility undergrounding required of their projects according to the Municipal Code. The funds collected are aggregated to pay for utility undergrounding at key locations in the City. The CIP carries a placeholder for these funds so that they may be used either as a stand-alone CIP project or contributed to a larger project to accomplish undergrounding beyond the limits and responsibility of that project.	Within 2 miles of all points of Project site.	Potential construction-related traffic impacts on local access roads and associated air quality and noise impacts. Possible overlap with the utility relocation process for the Proposed Project, which could result in an impact on utility infrastructure.	2010–2015
U.S. 101 / Tennant Interchange, Streets and Roads – Part of the 5-Year Engineering CIP	U.S. 101 / Tennant Interchange	Widen Tennant Avenue bridge over U.S. 101 and construct a loop ramp for eastbound Tennant Avenue to northbound U.S. 101. In FY 06/07, the Project Study Report was finalized, completing the environmental clearance for the project.	Less than 2 miles east of Reach 7B.	No overlap of construction periods is anticipated.	Construction began in FY 09/10 and is scheduled to be completed in spring of 2011.
Downtown Parking, Streets and Roads – Part of the 5-Year Engineering CIP	Downtown Morgan Hill	Provide more parking downtown by acquiring properties, creating new lots, and expanding or connecting existing lots. In addition, the City's parking lot on the east side of Monterey between Second and Third streets is targeted for expansion. Other parking lots will be constructed as sites become available.	Less than 1 mile east of Reach 8.	Potential construction-related traffic impacts on local access roads and associated air quality and noise impacts.	2010–2015
Santa Teresa Construction, Streets and Roads – Part of the 5-Year Engineering CIP	From Main Avenue to Spring Avenue	Construct Santa Teresa from Main Avenue to DeWitt. Project scope includes roadway improvements, sidewalks, bike lanes, and streetlights. The recently adopted General Plan Circulation Element update has designated this road segment to be a two-lane arterial.	Less than 1 mile east of Reaches 8 and 7B boundary at Dewitt Creek.	No overlap of construction periods is anticipated.	Final design, right-of-way (ROW) acquisition, and environmental review may occur in FY 10/11, followed by construction in FY 11/12.
West Dunne Avenue Widening, Streets and Roads – Part of the 5-Year Engineering CIP	West Dunne Avenue from Monterey Road to Peak Avenue	W. Dunne Avenue to be improved to its ultimate width from Monterey to Peak. No increase in number of travel lanes at this time: will be one lane each direction, with center turning lane. Project will feature safety improvements including new sidewalks, curbs, gutters, streetlights and bike lanes, and will underground existing overhead utility lines.	Within 2 miles of Reaches 8 and 7B boundary at Dewitt Creek.	No overlap of construction periods is anticipated.	In FY 08/09 final design, environmental review and ROW acquisition began, construction expected to begin early FY 10/11.
Cochrane Road Widening, Streets and Roads – Part of the 5-Year Engineering CIP	Cochrane Road, 300 feet East of Sutter Boulevard to U.S. 101	Widen Cochrane Road, east-bound direction, to provide Class II Bike lane and new sidewalk. The City received $162,000 in Transportation Fund for Clean Air (TFCA) grant funds in July of 2009 for this project.	1.5 miles north of Reach 8.	Potential construction-related traffic impacts on local access roads and associated air quality and noise impacts.	2010–2015
Downtown Street Revitalization, Streets and Roads – Part of the 5-Year Engineering CIP	Downtown Morgan Hill	MTC Planning grant program focusing on revitalization of Monterey Road. downtown, including lighting/landscaping of median between Dunne Avenue and Main Avenue. RDA funding for downtown area provided includes pavement repair, curb/gutter/sidewalk repair, water and sewer upgrades, lighting and landscaping upgrades.	Less than 1 mile east of Reach 8.	Potential construction-related traffic impacts on local access roads and associated air quality and noise impacts.	2011–2015
RDCS Miscellaneous Public Improvements, Streets and Roads – Part of the 5-Year Engineering CIP	Citywide	Construct public improvements, including street and utility improvements, to fill gaps and enhance safety, determined by the need to construct public improvements in areas where gaps exist with emphasis on major arterial streets and other locations shown on the RDCS List of Street Improvements.	Within 2 miles of all points of Project site.	Potential construction-related traffic impacts on local access roads and associated air quality and noise impacts. Possible overlap with the utility relocation process for the Proposed Project, which could result in an impact on utility infrastructure.	2010–2015

Project Name	Location	Project Description	Distance from Proposed Action	Potential Cumulative Impact Topics	Schedule/Status
Water Main Replacement, Water – Part of the 5-Year Engineering CIP	Citywide	This project budgets for regular improvements to the City's existing water system.	Within 2 miles of all points of Project site.	No overlap of construction periods is anticipated.	The replacement of water main located in Main Avenue from Peak to Monterey is scheduled to be installed in FY 10/11.
New Water Mains, Water – Part of the 5-Year Engineering CIP	Citywide	New water mains are required to provide adequate water supply as the City expands. In accordance with the 2002 Water Master Plan, some mains will be constructed by the City, and some by developers with partial reimbursement from the City.	Within 2 miles of all points of Project site.	No overlap of construction periods is anticipated. Possible relocation required if within footprint of the utility relocation process for the Proposed Project, which could result in an impact on utility infrastructure.	The new main in Mast Avenue from Church Street to Railroad Avenue is scheduled to be installed in FY 12/13.
Morgan Hill Bikeways Master Plan Bicycle and Trails Advisory Committee (BTAC)	Citywide	Would reduce air pollution by increasing use of bicycles for commuting, reducing automobile use and emissions. Would increase numbers of children cycling to school.	Within 2 miles of all points of Project site.	This project would provide additional public access opportunities.	Slowly incorporated as other transportation projects are developed.
Hale Avenue Extension Project (previously Santa Teresa Boulevard Improvement Project) Project 546007, part of the 5-Year Engineering CIP	From Hale Avenue to DeWitt Avenue, crossing Dunne Avenue	Currently, north-south traffic west of Monterey Road must take a circuitous route through residential neighborhoods. Should the Santa Teresa Boulevard connection be constructed, north-south traffic will use an arterial street that won't have houses fronting the street, thus providing a safer and more efficient means of driving north or south through the western part of Morgan Hill. It will also improve emergency vehicle access.	Less than 0.5 mile of Reaches 8 and 7B boundary at Dewitt Creek.	Potential construction-related traffic impacts on local access roads and associated air quality and noise impacts.	Project is planned for construction beginning in 2013.
The Lodge at Morgan Hill Community Development Partners	Northwest corner of Butterfield Boulevard and Barrett Avenue	138 unit, three-story Senior Apartment project on 5.643 acres. Building amenities include a 3,132-square-foot (sf) commercial kitchen, dining commons, hair salon, card room, computer room, family dining room, reading room, two elevators, exercise room, six laundry rooms, staff locker room, and storage areas for management staff. Site amenities include Bocce court, BBQ area, decorative masonry seating area, two landscaped ponds, covered walkway to vehicle drop off location, vegetated emergency vehicle EVA access road, and meandering sidewalks for outdoor exercise.	Approximately 1 mile east of Reach 7B.	No overlap of construction periods is anticipated.	Vertical Construction began at the end of February and is scheduled to be completed December 2013.
Wright-Mañana Residential Development	Corner of Hale and Wright avenues	15 single-family-residential structures	Within Project footprint in Reach 8.	No overlap of construction periods since construction of the of the housing development is complete.	Completed in 2012.
Cochrane-Borello Residential Development	Cochrane Road near the base of Anderson Dam	Development of a gated residential community, consisting of 244 single-family homes, up to 180 secondary units; a private recreation center (including community pool, tennis court, basketball court, tot lot, fitness center, and outdoor gathering areas), private streets, approximately 23 acres of private open space, private parks, and surrounding landscaping.	Within range of haul route of excavated earth materials from Proposed Project.	Construction-related traffic impacts on local roads and cumulative impacts related to biological resources, noise, air quality, and agricultural resources.	EIR completed 2012. Project completion estimated 2023.
Monterey Dynasty	Monterey Road, across from California Department of Forestry (CDF) Fire Station	Retail Commercial, 268,888 sf.	Within 1 mile southeast of Reach 7B.	No overlap of construction periods is anticipated.	In Process March 2012
Michael Dunn, Villas of San Marcos II	Barrett Avenue, Morgan Hill	41 Multi-Family Units, Low Density, Open Market (consisting of projects of more than 15 dwelling units at build-out).	Approximately 2 miles east of Reach 7B.	Potential construction-related traffic impacts on local access roads and associated air quality impacts.	(unknown)
Standard Pacific Homes, Rose Garden	Between Barrett Avenue and San Pedro, Morgan Hill	53 Single-Family Units, Medium Density, Open Market (consisting of projects of more than 15 dwelling units at build-out).	Approximately 1 mile east of Reach 7B.	No overlap of construction periods is anticipated.	Under Construction, March 2012
City Ventures, Huntington Square	Main Avenue and Butterfield Boulevard, Morgan Hill	148 Multi-Family Units, Open Market (consisting of projects of more than 15 dwelling units at build-out).	Less than 1 mile east of Reach 8.	Potential construction-related traffic impacts on local access roads and associated air quality and noise impacts.	(unknown)
EAH, Inc., Casa Diana	Dunne Avenue and Butterfield Boulevard, Morgan Hill	80 Multi-Family Units, Open Market (consisting of projects of more than 15 dwelling units at build-out).	Less than 1 mile east of Reach 8.	No overlap of construction periods is anticipated.	Under Construction, March 2012

Project Name	Location	Project Description	Distance from Proposed Action	Potential Cumulative Impact Topics	Schedule/Status
Gunter Building, Vista Del Toro	17620 Monterey Road, Morgan Hill	15 Small Vertical Mixed Use Units: a mix of ground floor retail or office and residential use allowed in mixed use districts	Less than 1 mile east of Reach 8.	No overlap of construction periods is anticipated.	4 Units Approved, March 2012
Tri Pointe Homes, Ironhorse	E. Central Avenue at Calle Mazatan, Morgan Hill	32 Single-Family Units, Open Market (consisting of projects of more than 15 dwelling units at build-out).	Less than 1 mile east of Reach 8.	Potential construction-related traffic impacts on local access roads and associated air quality and noise impacts.	Site Review in Process, March 2012
Monterey Dynasty, Diamond Creek	Monterey Road, between Vineyard and Watsonville	131 Multi-Family Units, Rental, Open Market (consisting of projects of more than 15 dwelling units at build-out).	Less than 0.5 mile east of Reach 7A.	Potential construction-related traffic impacts on local access roads and associated air quality and noise impacts.	Tentative Map Approved, March 2012
City Ventures, E. Dunne – City Ventures	E. Dunne Avenue and Church Street, Morgan Hill	50 Multi-Family Units, Open Market (consisting of projects of more than 15 dwelling units at build-out).	Less than 0.5 mile east of Reach 7B.	No overlap of construction periods is anticipated.	Under Construction, March 2012
E & H Third Fam, Campoli - E & H	Campoli Drive and Old Monterey Road, Morgan Hill	Small Project, 11 Single-Family Units	Less than 0.5 mile east of Reach 8.	No overlap of construction periods is anticipated.	Under Construction, March 2012
City Ventures, San Gregorio	Between Hale Avenue and Del Monte Avenue, Morgan Hill	45 Single-Family Units, Open Market (consisting of projects of more than 15 dwelling units at build-out).	Less than 1 mile east of Reach 8.	No overlap of construction periods is anticipated.	Under Construction, March 2012
Monterey Dynasty, Red Jasper	Monterey Road, North of Cosmo Avenue, Morgan Hill	CC-R/CL-R Project, 38 Multi-Family Units	Less than 0.5 mile east of Reach 7B.	Potential construction-related traffic impacts on local access roads and associated air quality and noise impacts.	(unknown)
Dividend Homes, Connemara	Watsonville Road, Morgan Hill	Senior, 37 Single-Family Units	Less than 0.5 mile from Reach 7A.	Potential construction-related traffic impacts on local access roads and associated air quality and noise impacts.	Under Construction, August 2013
Dividend Investments, Mission Ranch	Mission View and Cochrane Road Morgan Hill	328 Single Family Units, Open Market (housing of any type typically consisting of projects of more than 15 dwelling units at build-out). Developments can be sold at rates moderate and above moderate income households	Less than 1 mile east of Reach 8.	Potential construction-related traffic impacts on local access roads and associated air quality and noise impacts.	Under Construction, August 2013
San Sebastian MH General Partnership	Peet Road between Hill Road and Cochrane Road, Morgan Hill	244 Single-Family Units, Open Market (consisting of projects of more than 15 dwelling units at build-out).	1.5 miles north of Reach 8.	Potential construction-related traffic impacts on local access roads and associated air quality impacts.	Under Construction, August 2013
Meritage Homes, AS 13-06	2060 Hecker Pass Hwy, Morgan Hill	187-Single Family Homes	Less than 0.5 mile east of Reach 7B.	No overlap of construction periods since construction of the housing development is complete.	Complete, September 2013
Meritage Homes, Hale-Meritage Homes	Between Hale and Old Monterey Road, Morgan Hill	108 Single-Family Units, Open Market (consisting of projects of more than 15 dwelling units at build-out).	Less than 1 mile east of Reach 8.	Potential construction-related traffic impacts on local access roads and associated air quality and noise impacts.	EIR Completed October 2013

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The following describes the potential for cumulative impacts on each resource area listed in Table 4.20-2.

4.20.2.1 Geology and Soils

As discussed in Section 4.1, maintenance would require activities such as excavation, stockpiling, and transportation of soils and could result in substantial erosion and loss of topsoil. However, implementation of SCVWD BMPs that would avoid or minimize soil erosion and off-site sediment transport would adequately prevent impacts associated with erosion and sediment delivery. In addition state (Construction General Permit) and local regulations (SCVWD BMPs) are in place to prevent the erosion and transportation of topsoil associated with construction activities required for the proposed Project. Other projects would also be required to meet regulatory standards to prevent erosion.

Also discussed in Section 3.1, the proposed Project would include deepening and widening of existing earthen channels; newly constructed hydraulic structures such as box culverts and concrete retaining walls; and roads. Potential damage to Project features, due to earthquake induced liquefaction, could impede the function of the flood control system, diminish flood capacity, and present physical hazards such as ground ruptures, and thus these failures could threaten public health and safety. Potential effects associated with fault rupture and liquefaction could be significant, relative to subterranean construction and the additional Project features, with respect to impeding the function of the flood management system. Overall the proposed Project would be an improvement as compared to the No Action Alternative. The proposed Project, as well as other projects, would be required to meet regulatory standards to minimize seismic-induced damage and impacts of liquefaction and other geohazards. Therefore, there should be no cumulative erosion and loss of topsoil and exposure of people or structures to geologic and seismic hazards as a result of the project.

4.20.2.2 Hydrology and Water Quality

As discussed in Section 3.2, the Project alternatives would not affect groundwater levels or groundwater recharge. Thus, no cumulative impacts would occur. They would have a beneficial impact on flooding, so would not contribute to a significant cumulative impact related to flooding. Water quality impacts from construction would be minimized by compliance with BMPs and the SWPPP required under the GCP, which would prevent cumulative water quality impacts. The potential for bat roosting with consequent contamination and degradation of water quality by bat guano in the tunnel section of Reach 8 is identified as a less than significant impact with mitigation for the Preferred and Reach 6 Bypass alternatives. No other projects were identified that are known to have the potential to affect water quality in Llagas Creek; therefore, no cumulative impacts would occur.

Implementation of state and local regulations requiring the use of BMPs during construction would prevent impacts on water quality related to runoff. Other construction projects would also be required to implement BMPs and major projects would need to obtain authorization under the National Pollutant Discharge Elimination System Construction General Permit. In addition, the geomorphic design of the creek would reduce erosion that currently occurs, thus further reducing impacts to water quality. The mitigation required for the Butterfield Boulevard Extension included rock riprap and other appropriate erosion control measures that were installed along critical points of potential erosion from water flow, including at the outfalls into West Little Llagas Creek and along areas where the Butterfield Channel may overbank into surrounding land (City of Morgan Hill 2010a). The Wright-Mañana Residential Development was required to prepare an Erosion Control Plan as a standard condition prior to issuance of building and/or site development permit, subject to review and approval of the Director of Public Works. In addition, post-construction BMPs implemented by the Wright-Mañana Residential Development to reduce pollutant loading in local waterways included installation of a hydrodynamic separator, proper maintenance and disposal of sediments in the proposed underground detention system, and stenciling of stormwater catch basins to avoid illegal dumping (City of Morgan Hill 2005). Both the City of Morgan Hill and the county have policies in place that require developers to include mitigation to eliminate the flood-inducing impacts of their projects and protect water quality from contamination. The City of Morgan Hill Storm Drainage Master Plan would also include installation of storm drains within the vicinity of the Project. The use of BMPs and adherence to regulations would result in less than cumulatively significant impacts to water quality.

4.20.2.3 Mineral Resources

As discussed in Section 4.3 Mineral Resources, the Project action alternatives could inadvertently impact the local mineral of importance poppy jasper. The likelihood is low, however, because the existing identified deposits of poppy jasper are located outside of the Project boundary, and it is unlikely that a new sizable deposit would be discovered during construction. There is, however, a potential for other projects listed in Table 4.6-1 to also inadvertently affect poppy jasper. If this happened, the cumulative effect would be significant, and the Project's contribution would be cumulatively considerable. Mitigation Measure MIN-2 T would reduce the Project alternatives' contribution to less than cumulatively considerable because it would require evaluation of any discoveries by a qualified geologist and notification of the property owner, who could determine the appropriate course of action. Therefore, the Project alternatives' contribution to the cumulative impact would be less than cumulatively considerable with mitigation.

4.20.2.4 Biological Resources (Aquatic, Wildlife, and Botanical)

As discussed in Section 4.4, Botanical Resources, the proposed Project could temporarily and permanently affect native vegetation and jurisdictional wetlands and waters that are located within the stream reaches, and these impacts would be less than significant with mitigation. The projects identified within the proposed Project footprint (Wright-Mañana Residential Development and Butterfield Boulevard South Extension) did not affect wetlands. Given that most of the proposed development is in urban areas, they are unlikely to affect wetlands, and while proposed trails could be located near wetlands, it is not likely that wetlands would be removed to allow their construction. Thus, cumulative impacts to wetlands are not expected to occur. If other projects did affect wetlands, cumulative impacts would be significant, and the Project alternatives' contribution would be considerable. It would be reduced to less than significant through implementation of Mitigation Measures described in Chapter 5 Table 5.4.1.

All of the proposed Project action alternatives would have less than significant impacts with mitigation on sensitive plant communities (except California sycamore woodlands), riparian communities, special-status plants and their habitats. Impacts on sycamore woodlands would be significant and unavoidable for all alternatives. The Wright-Mañana Residential Development, Butterfield Boulevard South Extension, and Cochrane– Borello Residential Development Project, also had or would have impacts on trees. The Wright-Mañana Residential Development removed 36 trees; the Butterfield Extension removed 25 trees, 13 of which met the definition of a significant size (City of Morgan Hill 2010d); and the Cochrane–Borello Residential Development Project would remove 58 ordinance-sized trees in addition to all the orchard trees in the Project area (Morgan Hill 2012). It is likely that other projects could affect botanical resources, as well.

Thus, the cumulative impact would be significant, and the Project alternatives' contribution would be considerable. It would be reduced to less than cumulatively considerable with the implementation of Mitigation Measures (Chapter 5) because impacts would be reduced or avoided, with the exception of impacts to sycamore trees, which would remain significant. Other projects would be required to implement measures to reduce or avoid impacts as well.

The requirements outlined in the Butterfield Boulevard Extension Mitigated Negative Declaration (MND) (City of Morgan Hill 2010d) to protect trees and replace trees impacted or removed during demolition and grading activities also demonstrates that projects in the area are held to a high standard for tree preservation.

The Butterfield Boulevard Extension also had a riparian habitat restoration plan with a replacement ratio of 3:1 (3 acres of habitat created for each acre disturbed), and the restoration will be monitored for 5 years (City of Morgan Hill 2010d). The local agencies are controlling the cumulative reduction of vegetation in the region, as demonstrated in the conditions of these projects.

Mitigation required with the Proposed Project would result in defined riparian zones, which would be beneficial to both aquatic and terrestrial wildlife and would likely be an improvement over current conditions. Thus, no cumulative impacts would occur.

As discussed in Section 4.5, Wildlife Resources, the Project alternatives could adversely affect sensitive habitats used by special-status species, including burrowing owl, western pond turtle, California tiger salamander (CTS), special-status birds, and San Francisco dusky-footed woodrat. Direct mortality or injury could occur from animals being crushed by construction vehicles, or becoming entrapped in construction trenches associated with channel excavation. Implementation of various SCVWD BMPs related to water quality and biological resources would minimize the Project's potential impacts on special-status birds and bats, CTS, and western pond turtle, although impacts would remain significant, requiring mitigation. Other projects likely would have impacts on wildlife resources, as well, and cumulative impacts would be significant. In particular, future projects could have the potential to affect dusky footed woodrats and CTS related to the High Speed Rail Project and various trails, parks, and recreational master plans or housing development in areas that currently of minimal urban disturbance. The Project alternatives' contribution to this impact would be considerable, but would be reduced to less than considerable by implementation of Mitigation Measures described in Chapter 5, as well as other measures described in Section 4.5.

Other projects would be required to implement mitigation measures, as well. The City of Morgan Hill has a Burrowing Owl Habitat Mitigation Plan, which includes a 250-foot buffer from occupied burrows during breeding season (City of Morgan Hill 2005, 2010d). In addition, the California Department of Fish and Wildlife (CDFW) has new protocols for burrowing owls, established in 2012. These regulations are focused on preventing cumulative impacts on burrowing owls in the area.

The Wright-Mañana Residential Development permit also contained conditions to protect nesting raptors. The permit contains time periods for avoiding nesting season and surveys and buffers in consultation with CDFW if breeding season could not be avoided (City of Morgan Hill 2005). The Butterfield project proposed to conduct vegetation and tree removal during non-breeding season (scheduled removal to occur between September 1 and February 1) (City of Morgan Hill 2010d). The Cochrane-Borello Residential Development Project EIR included mitigation requiring that project construction be scheduled to commence between February 1 and August 31; a preconstruction survey will be conducted by a qualified biologist for nesting birds within the onsite trees, as well as all trees within 250 feet of the site.

Between the Project, the Butterfield Extension, the Wright-Mañana Residential Development Project, and the Cochrane-Borello Residential Development Project, approximately 2,300 trees were or would be removed, and additional trees could be removed by other development. The trees defined as significant in size that could be considered roosting habit could total 100 trees or more between the four projects. Although 100 trees are being removed, ample trees would remain in the area that would be available for nesting including the upper reaches of Llagas Creek; therefore, the impact on roosting and nesting habitat for raptors and bats would be cumulatively less than significant.

The Santa Clara Valley Habitat Plan is an important program to prevent cumulative impacts to sensitive biological resources in Santa Clara County. The Plan will protect, enhance, and restore natural resources in specific areas of Santa Clara County and contribute to the recovery of certain special-status species. Rather than separately permitting and mitigating individual projects, the Plan evaluates natural-resource impacts and mitigation requirements comprehensively in a way that is more efficient and effective for at- risk species and their essential habitats. The Plan allows the County of Santa Clara, Santa Clara Valley Water District, Santa Clara Valley Transportation Authority, and the cities of Gilroy, Morgan Hill, and San Jose to receive endangered-species permits for activities and projects they conduct and those under their jurisdiction. Although the Project is not part of the Plan, all covered activities with potential impacts to sensitive biological resources would need to comply with the relevant mitigations outlined in the Plan to obtain necessary permits, which will reduce the overall cumulative impact to sensitive biological resources in the county.

As described in Section 4.6, Aquatic Resources, the Project alternatives would result in significant impacts requiring mitigation on steelhead migration and spawning and rearing habitat in Llagas Creek during construction and maintenance, as well as other less than significant impacts. They also would result in less than significant impacts on other aquatic resources. Two other SCVWD projects have been identified that could affect steelhead and other aquatic resources in other watersheds– the Anderson Dam Seismic Retrofit project and the Almaden Lake Project, both of which are in the planning stages.

The impacts of the Project alternatives that are characterized as less than significant would not result in significant cumulative impacts in combination with the impacts of other projects because SCVWD BMPs (Appendices B & C)would be implemented that would effectively minimize the potential for adverse impacts on aquatic resources so that no population-level impacts would occur, and no other projects are located in the same watershed that could compound (worsen) the effects of the Project alternatives.

The SCVWD's BMPs include provisions to conduct preconstruction surveys by a qualified biologist to determine the potential for presence of aquatic species prior to the start of construction and avoidance and minimization of impacts to salmonids by avoiding routine use of vehicles and equipment in live salmonid streams between January 1 and June 15 for all instream work. Regardless, the Project alternatives would cause changes in spawning habitat usage and quality, affect rearing habitat, and impede downstream migration of juveniles. The Anderson Dam and

Almaden Lake projects also would affect steelhead by potential water quality degradation or impeding migration specific to their watersheds. The impact would be cumulatively significant because each of these projects could adversely affect the population of steelhead, and the Project alternatives' contribution would be considerable.

The Project alternatives' contribution would be reduced to less than considerable through implementation of mitigation measures for construction and maintenance (Chapter 5, Table 5.4.1), which would reduce or avoid impacts. Additionally, other conditions may be imposed during the permitting process for all three projects, which would further reduce the potential for cumulative impacts.

4.20.2.7 Agriculture and Forest Resources

Agriculture is an important industry in Santa Clara County. Santa Clara County has policies in place to discourage the conversion of productive farmland to other land uses as discussed in Section 4.7. However, the Proposed Project would remove Prime Farmland from production, which would be an unavoidable impact. Although state and local policies discourage farmland conversion, other projects could convert farmland, which would contribute to a significant cumulative impact such as the Cochrane-Borello Project which will have a net loss of 99.9 acres of Prime Farmland over the next 12 years resulting in a net loss of Prime Farmland in South County. Implementation of Project mitigation measures described in Section 4.7 protect other agriculturally productive land in the region on a 1:1 basis but would not eliminate the net loss of farmland. Therefore, Project impacts on agriculture conversion would be cumulatively considerable and, therefore, significant, even with mitigation. Further mitigation, such as converting lands currently not available for farming to agricultural use was dismissed as too costly to be considered as a feasible mitigation. No other feasible mitigation is available to reduce the impact to a less-than-significant level. The mitigation measures for the Cochrane-Borello Project are similar to those developed this Project; but, overall there would be a net loss of Prime Farmland, Unique Farmland, or Farmland of Statewide and Local Importance in South County.

4.20.2.8 Land Use and Planning

Ongoing operations under the No Project Alternative conflicts with at least two county policies: *Health and Safety Policy C-HS 34* and *Health and Safety Policy C-HS (i) 32*; and a City of Morgan Hill policy (General Plan 4i), as cited in Section 4.8.2. The benefits of reduced flooding would not be realized for the No Project Alternative; thus, the local agency goals and policies related to flood protection would not be realized.

This impact is significant since it does not provide for flood protection which conflicts with local jurisdictions' policies designed to avoid an environmental effect.

4.20.2.9 Cultural Resources

Cumulative development in the county of Santa Clara and the cities of Morgan Hill and Gilroy, including growth adopted in the general plans, may result in the unanticipated discovery and removal of cultural resources including archaeological, paleontological, historical and Native American resources. Any future project that requires a Department of the Army permit would include consultation under Section 106 of the National Historic Preservation Act and conditions to avoid, reduce, and or mitigate adverse effect to cultural resources eligible for listing in the National Register of Historic Places.

As discussed in Section 4.9, a variety of cultural resources exist in the Project area. Under all of the action alternatives any known resources would be avoided, during Project design, if possible. If avoidance is not possible, adverse effect would be minimized and/or mitigated. SCVWD BMPs would require the construction to stop if any cultural resources are discovered during construction activities. Required consultation under section 106 of the NHPA and the aforementioned BMPs would ensure cumulative adverse effects to cultural resources are mitigated.

4.20.2.10 Traffic and Circulation

The Project would result in a temporary increase in traffic levels during construction, largely in the immediate Project area and along access routes. Construction would involve heavy equipment access, construction-related traffic, truck trips to dispose of fill at Anderson Dam (223,866 truck trips over a 6-year period), deterioration of local roads, temporary detours on U.S. 101 (Reach 6 Bypass Alternative only), and temporary impacts to parking spots at the Morgan Hill Plaza Shopping. The action alternatives were found to cause an increase in traffic in relation to the existing traffic load and capacity of the street system for a number of local roads, including Cochrane Road.

These effects are expected to be separated in location and time from the traffic effects of other projects, with the exception of the Cochrane-Borelo Project. The Cochrane-Borello Project has a schedule similar to that for the proposed Project and would require use of some of the same major roadways, primarily Cochrane Road. According to the project's EIR, the Cochrane-Borello proposed project would result in approximately 3,255 new daily vehicle trips, and 248 and 324 new morning and afternoon peak hour vehicle trips, respectively. The project-generated vehicle trips would be distributed as follows: 45 percent from the north on US 101, 25 percent from the south on US 101, and 30 percent from the west on Cochrane Road. According to the EIR, the addition of project trips would not degrade acceptable LOS E freeway operations to unacceptable levels (LOS F), and under project conditions, all study intersections are estimated to operate at acceptable levels of service, at LOS C or better during both peak hour periods. The addition of traffic associated with Project construction to that generated by the Cochrane- Borelo Project would cause a significant cumulative impact on Cochrane Road during construction, and the Project's contribution would be cumulatively considerable. The Project's contribution to the significant impact would be reduced to less than cumulatively considerable by the implementation of mitigation measures included in Chapter 5 and implementation of the Traffic Management Plan as an additional measure.

4.20.2.11 Air Quality and Greenhouse Gases

Given the nonattainment status for particulates (PM_{10} and $PM_{2.5}$), NOx, and ROG in the San Francisco Bay Area Air Basin, the combined emissions of these contaminants, by the Project and other projects, is considered a significant cumulative impact, and the Project's contribution would be cumulatively considerable. Project construction activities would require daily use of construction equipment and vehicles powered by diesel and gasoline fuel, the combustion of which would emit criteria air pollutants, including NOx, ROG, and exhaust-based PM_{10}, and $PM_{2.5}$. In addition, Project ground-disturbing activities would release fugitive dust emissions of fine particulate matter—both PM_{10} and $PM_{2.5}$.

The thresholds for a significant project-level impact related construction-related emissions are summarized in Section 4.11, Table 4.11-10. These thresholds also represent the levels at which a project's individual emissions of criteria air pollutants, precursors, would result in a considerable contribution to existing air quality impairments.

As discussed in Section 5.5.11, Impact AQ2 and AQ3, the Project's construction emissions are estimated to exceed the Bay Area Air Quality Management District (BAAQMD) daily emission threshold for NO_X. Even with the implementation AQ2 NRCS above, NO_X emissions would still exceed BAAQMD's threshold. Therefore, the Project's construction activities on cumulative air quality impact are expected to be significant and unavoidable. There are no feasible mitigation measures available to further reduce the impact to a less than significant level.

Project construction would generate some greenhouse gas (GHG) emissions, but would not conflict with present plans, policies, or regulations which primarily affect large stationary sources in California. No significant impact would occur as a result of the Project, and BMPs would further reduce emissions and subsequent impacts. Even with BMPs, the Project would generate GHG emissions and incrementally contribute to climate change, but only in the short-term.

When Project emissions are viewed in combination with world-wide GHG emissions that are contributing to the existing cumulative impact on global climate change, the incremental contribution of Project emissions would not be cumulatively considerable, because they would occur over the short-term. Therefore, the Project would not have a cumulatively considerable impact on global climate change. With the implementation of Mitigation Measures Chapter : Exhaust Emissions Reduction Measures, the Project's incremental contribution would be reduced further.

Therefore, long-term cumulative impacts on climate change by the Project would be less than significant.

4.20.2.12 Noise

As discussed in Section 4.12, noise generated by the Project actions alternatives during construction and operations/maintenance activities could exceed established standards and cause a substantial temporary or periodic increase in ambient noise levels. Nearby receptors also would be exposed to excessive groundborne vibration due to the limited distance from the work areas to the nearest sensitive receptors. Overall, noise and vibration impacts would be localized, involving only the receptors in the immediate vicinity, and because construction of the Project would occur along a linear alignment, no receptor would be exposed to excessive noise levels or vibration from construction for an extended period of time. Noise and vibration impacts from some activities would be significant and unavoidable, however.

Noise attenuates, or is reduced, rapidly with distance, and most of the projects identified in Table 4.20.3 are located too far from the Project area to generate noise that could contribute to a cumulative impact in combination with the Project alternatives. The two projects located within the footprint have already been constructed, and it is anticipated that any noise generated by maintenance activities from these developments would be temporary and minor. Certain development projects would be located nearby, however, and capital improvement projects could be implemented in the immediate Project area, such as the sanitary sewer rehabilitation projects, underground utilities, and storm drainage projects, and new construction, upgrades, and repairs could generate considerable noise. If such projects were implemented in the same general timeframe and location as the Project while construction or maintenance was underway, cumulative impacts would be significant, and the Project's contribution would be considerable.

Implementation of the SCVWD mitigation measures, discussed in Section 5.5.12, would minimize noise and vibration impacts associated with construction and operations/maintenance activities; however, residual noise impacts would remain significant.

4.20.2.13 Aesthetics Resources

As described in Section 4.13, the Project has the potential to degrade the existing visual character and quality of the Project area and surroundings for viewer groups, because construction would require the removal of vegetation within the construction footprint. Additionally, the presence of construction equipment and construction personnel may impede views of the creek during construction activities and may generally change the visual character in the area during construction activities. Removal of structures related to channel widening and realignment during construction, as discussed in 4.13, would also change the general visual character in all reaches where removal or relocation is necessary. During the operations phase of the Project, the primary visual issues would involve the permanent change in visual character of the area due to the flood management improvements along all reaches. The primary visual issues would involve changes in views in terms of channel widening, addition of new access roads, and removal/relocation of structures and vegetation within the Project footprint. As the vegetation matures, the areas of the Project within the viewshed would be improved from its current state, which includes areas of debris accumulation. Although the Wright-Mañana Residential Development and Butterfield Boulevard South Extension required removal of a number of trees within or adjacent to the Proposed Project footprint, they were required to be replaced. Thus, the cumulative impact on visual resources would be less than significant.

4.20.2.14 Utilities and Public Services

As discussed in Section 4.14, a network of underground and overhead utility lines providing water, electricity, phone service, sewer, among other utilities services to customers exists in the Project footprint. Excavation for construction, depending on depth, could result in damage to existing underground utilities and wells providing water for households, industrial, or agricultural users, and some utilities would require relocation. Use of construction equipment could also result in damage or disruption of aboveground utilities. The Morgan Hill Master Plan for storm drainage and sewer also could cause disruption of utilities, and it if is going to be implemented in the Project area within in the next 5 years, it may overlap with the relocation process for the Project. This would result in a cumulatively significant impact on utility infrastructure if utilities were relocated, and then upgraded within a short period of time, and the Project alternatives' contribution would be considerable. Implementation of Mitigation Measures UPS-1b (Section 5.5.14) would reduce potential cumulative impacts to less than considerable because projects would be scheduled to minimize disruption.

Currently, landfills serving Santa Clara County have sufficient capacity for the construction waste and unsuitable excavation materials to be generated by the Project alternatives. In addition, the maximum 1.3 million CY of excavated material is planned to be reused and only the non-suitable materials would bedisposed of. Because landfills have sufficient capacity to accommodate planned development within the construction timeframe, this impact is cumulatively less than significant.

Mitigation Measures as described in 5.5.14 will further minimize impacts to this resource category.

4.20.2.15 Recreation Resources

As discussed in Section 4.15, recreational opportunities in the Project footprint include two facilities that are partially within, or very close to, the Project footprint (these facilities are adjacent to each other near the Morgan Hill Community Park along Reach 7B): the Skate and BMX Park and Centennial Recreation Center. Also, the Project footprint is close to

Galvan Park and Britton Field ball fields adjacent to Britton Middle School (both along Reach 8). The Culvert/Channel Alternative would cross under the ball fields. Currently, a trail is located along Reach 7B near La Crosse Drive and the West Llagas Trail in Morgan Hill provides opportunities for walking and other trail-related activities. The trails are within the Project footprint and would be affected by the various alternatives. Construction activities in the vicinity of the Project footprint may create temporary impacts to recreation resources due to noise, visual quality issues, or traffic attributable to construction-related activities. Additionally, there is the potential to affect parklands if construction occurs on or around these facilities, given the proximity of the Project to recreational facilities along Reaches 7A, 7B, and 8. These impacts to recreational facilities would be temporary and end with the completion of construction. No other projects have been identified that would result in a cumulative impact on the same recreational facilities in the same general timeframe as the Project; therefore, no cumulative impacts from construction activities would occur.

Santa Clara County and Morgan Hill General Plan recreation policies, provided in Section 4.15, promote trails along Llagas Creek, as well as other creek corridors. Although two trails would be removed by the Project alternatives, access to the newly constructed maintenance roads, although unpaved, would be available after the Project construction was complete. This would at least partially offset impacts from the trail removal. Adverse impacts on recreational resources have not been identified for other projects listed in Table 4.20.3; moreover, several of the projects would result in enhanced recreational resources. Therefore, cumulative impacts would be less than significant.

4.20.2.16 Population and Housing

No cumulative impact is antiicapted for population and housing for any alternative considered in this EIS. As described in Section 4.16.4 the numbers of residents displaced and residents removed with the Applicants Proposed Action Alternative and Reach 6 Bypass Alternative is low (i.e. 3) which is less than the other two alternatives, NRCS (12 residents) and Culvert/Channel (7) which is also low considering the total number of residential dwellings within the action area. While residences will be removed, the impacts for all alternatives are considered less-than-significant.

Mitigation measures and BMPs, as appropriate, for the various Action Alternatives to reduce the impacts to Population and Housing are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

4.20.2.17 Socioeconomics Resources

As discussed in Section 4.17.4, the No Action Alternative would impose a significant and unavoidable impact on socioeconomic resources because intermittent flooding of Upper Llagas Creek would continue in the absence of the Project, resulting in sustained business closures and property damages. Cumulative impacts were considered for this rescouce category in relation to other projects identified in 4.20.3 and no foreseeable impacts to Socioeconomic Resoursces are anticipated.

The action alternatives would result in less than significant impacts to socioeconomic resources within the Project area. A few of the specific Project features would result in beneficial impacts to many of the area's socioeconomic resources, particularly the end product of increased flood protection.

Mitigation measure for the various Action Alternatives to reduce the impacts to Socioeconomic Resources are discussed and described in Chapter 5 (Table 5.4-1 Summary of Mitigation Measures for the Alternatives) of this EIS.

4.20.2.18 Hazards and Hazardous Materials

As discussed in Section 4.18, the Project alternatives would improve some contaminated areas as part of the excavation and in preparation of the revegetation sites, resulting in less overall contamination in the area. The Project alternatives also could result in the accidental release of hydrocarbons, routine emission of dust and pollutants, hazardous materials used within 0.25 mile of a school, and excavation near sites known to have soil or groundwater pollution. Cumulative development in the County of Santa Clara and the cities of Gilroy and Morgan Hill, shown in Table 4.20.3 could result in the additional release of hazardous materials in the area, primarily during construction. Hazards and hazardous materials impacts are generally site-specific and are contingent on past and present land uses and existing soil and groundwater conditions. Due to the potential for releases within the local community, cumulative impacts are significant, and the Project alternatives' contribution would be considerable. Implementation of SCVWD BMP HM-12 (Hazardous Materials Management) (Appendix C) would address the risk of an unanticipated encounter with hazardous materials and require that all workers are trained in implementation of the appropriate procedures in the event of encountering hazardous materials, which would reduce the Project alternatives' contribution to less than cumulatively considerable.

The presence of construction equipment and vehicles, worker activities, and materials storage could have the potential to impede emergency access to the Project sites and/or interfere with emergency evacuation plans. As part of the Project's identified mitigation measure Section 5.5.10 a Traffic Control Plan would be developed to ensure that construction activities do not impede emergency response or evacuations. Therefore, any cumulative impacts associated with emergency access would be less than significant.

The use of construction equipment, in particular, equipment with internal combustion engines, gasoline- powered tools, and equipment or tools that produce a spark, fire, or flame—in grassland and woodland areas could pose a fire risk. Some Project elements would be constructed in areas that could pose wildfire risks under dry conditions. Portions of Reaches 7A, 7B, and 8 are located less than 1 mile from a very high fire hazard severity zone in a local area of responsibility. SCVWD BMP HM-14: Incorporate Fire Prevention Measures, is applicable to the construction and operations phase of all elements (Appendix C). In addition, this Project, as well as other projects, would be required to adhere to fire safety provisions of the Public Resources Code. Therefore, the cumulative impact for this rescouce category would be less than significant.

4.20.2.19 Environmental Justice

The Preferred and Reach 6 Bypass alternatives would result in disproportionate environmental justice effects where excess noise levels would disproportionately impact Reach 8, an environmental justice community of concern. If capital improvement projects were implemented in the same area in the same general timeframe as these alternatives, the cumulative impact would be significant, and the Project's contribution would be considerable. Mitigation measures would minimize the impacts from the Project, but the cumulative impact would remain significant and unavoidable, as discussed under Section 4.19.

Irreversible and Irretrievable Commitment of Resources

Under NEPA guidelines, the EIS analysis includes a discussion on irreversible and irretrievable commitment of resources as it pertains to the Action Alternatives. An irreversible commitment of resources refers to effects to the resources that cannot be reversed or that would not be reversed in a foreseeable amount of time. An example would be when a species becomes extinct. Irretrievable commitment of resources describes a resource that is lost for a period of time or as long as the action exists. For example, fishing productivity would be lost in an area closed to be converted to oil exploration for as long as the oil exploration remains.

Construction of any of the Project Alternatives would result in an irreversible commitment of natural resources through the direct consumption of fossil fuels, primarily through the use of refined petroleum products. The Alternatives would also require commitment of other nonrenewable resources, including lumber and other forest products; sand and gravel for concrete; petrochemical construction materials, such as solvents, engine coolant, and lubricants, for construction machinery; steel, copper, lead, and other metals for reinforced concrete and pipes; and water for dust suppression and erosion control. However, this irreversible consumption of natural resources would occur mainly as construction-related impacts and their duration would be limited to approximately 6 years.

Implementation of any of the Project Alternatives would also result in the permanent conversion of land within the Project study area. Long-term changes associated with flood risk management measures along the Upper Llagas Creek would require up to 287 acres of land, depending on the alternative, for permanent easements. Additionally, out of the total acres of land required for permanent easement, approximately 50 acres of Prime Farmland, Unique Farmland, or Farmland of Statewide and Local Importance would be converted from agriculture to nonagricultural uses. However, implementation of Mitigation Measure AG-1 NRCS would offset agricultural conversion on a 1:1 basis. The use of the land would result in a long-term change and would preclude other development or use of land along each reach. However, the land would retain a riparian corridor that has been impacted through urban development in the past.

Accidental releases of fuels, paints, or other chemicals could occur during construction of any of the Project alternatives. However, pursuant to California Health and Safety Code Sections 25500–25520, the construction contractor would be required to limit spills by training construction workers, supervising all construction work, and reporting and cleaning up any inadvertent spills of chemicals used during construction (e.g., fuel, lubricants) with oversight from Santa Clara County Department of Environmental Health Hazardous Materials Compliance Division and the California Department of Toxic Substances Control.

4.20.3 Summary of Environmental Effects

Table 4.20-4 provides a comparison of the environmental effects of the alternatives considered in this EIS. For clarity, the impacts that would result from each alternative are compared to the Applicant's Proposed Action, the Tunnel Alternative. The table is organized by resource area and identifies the most severe impact for each resource. Unavoidable significant adverse impacts are those effects that would significantly affect either natural systems or other community resources, and cannot be mitigated to less than significant. Nearly all the potentially significant impacts associated with the Project action alternatives identified could be reduced to less- than-significant levels by mitigation measures specified in this EIS. Almost all of the potentially significant unavoidable impacts associated with the action alternatives are short-term and associated with construction. Resources with the only significant impacts associated with the No Project Alternative include: Aquatic Resources, Land Use and Planning, Utilities and Public Services, Socioeconomic Resources, and Hazards and Hazardous Materials. Significant, unavoidable impacts are summarized below by environmental resource area.

Table 4.20-4 identifies both the impact level and if the impact degree is more, less, or the same as the Tunnel Alternative. The differences in the degree of an impact are related to the geographical or temporal. The following summarizes, by resource section, the impact level determinations and the degree to which there may be differences even though the designated "impact level" may be the same.

Table 4.20-4 Alternatives Comparison with the Tunnel Alternative (Applicant's Proposed Action)

No Project Resource Category	Alternative	Tunnel Alternative	NRCS Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
Geology and Soils	NI	LTSM	LTSM (-)	LTSM (-)	LTSM (+)
Hydrology and Water Quality	SU	LTSM	LTS	LTS	SU
Mineral Resources	NI	LTSM	LTSM (+)	LTSM(+)	LTSM (-)
Botanical Resources	NI	SU	SU(+)	SU(+)	SU(-)
Wildlife Resources	LTS	LTSM	LTSM(+)	LTSM(+)	LTSM(-)
Aquatic Resources	SU	LTSM	LTSM(=)	LTSM(=)	LTSM(+)
Agricultural and Forest Resources	NI	SU	SU(=)	SU(=)	SU(-)
Land Use and Planning	SU	LTS	LTS(+)	LTS(+)	LTS(-)
Cultural Resource	NI	LTSM	LTSM(+)	LTSM(+)	LTSM(-)
Traffic and Circulation	SU	LTSM	LTSM(+)	LTSM(+)	SU
Air Quality and Greenhouse Gases	LTS	SU	SU(-)	SU(-)	SU(-)
Noise	LTS	SU	SU(-)	SU(-)	SU(=)
Aesthetic Resources	NI	LTSM	LTSM(+)	LTSM(+)	LTSM(+)
Utilities and Public Services	SU	LTSM	LTSM(+)	LTSM(+)	LTSM(-)
Recreation Resources	NI	LTSM	LTSM(=)	LTSM(+)	LTSM(=)
Population and Housing	NI	LTS	LTS(+)	LTS(+)	LTS(-)
Socioeconomic Resources	SU	LTS	LTS(=)	LTS(=)	LTS(-)
Hazards and Hazardous Materials	SU	LTSM	LTSM(+)	LTSM(+)	LTSM(-)
Environmental Justice	DAE	DAE	NDAE	NDAE	DAE(=)

NI: No Impact
(-): Level of impacts are less severe than the Preferred Alternative
LTS: Less Than Significant
(+): Level of impacts are more severe than the Preferred Alternative
LTSM: Less Than Significant with Mitigation
(=): Level of impacts are equal to the Preferred Alternative
SU: Significant and Unavoidable
DAE: Disproportionate Adverse effect
NDAE: No disproportionate Adverse Effect

4.20.3.1 Geology and Soils and Minerals Resources

The construction of the tunnel has the highest degree of impact to geology when comparing the alternatives because it would be creating a new feature that could be impacted in the case of an earthquake. However the degree to the impacts would be higher for the Reach 6 Bypass alternative because it contains more structures that could be susceptible to failure in the event of a large magnitude earthquake such as the bypass and modifications to U.S. 101. In Mineral Resources, there is greater degree of impacts related to the extent of construction excavation associated with the NRCS and Culvert Channel alternatives, which could result in an increase in unanticipated discoveries of poppy jasper.

4.20.3.2 Hydrology and Water Quality

As stated in Section 4.2, there are no significant and unavoidable impacts associated with the Preferred, NRCS, or Culvert/Channel Alternatives. There is a significant and unavoidable impact associated with alteration of the drainage pattern resulting in substantial erosion and siltation in the Reach 6 Bypass Alternative (impact significance criteria HYDRO-5). This is due to the ongoing processes of channel incision that over time would cause over-steepening of streambanks, bed and bank instability, erosion, and sedimentation in Reach 5 and Reach 6 downstream of the proposed bypass channel location. There is no construction in Reach 5 and 6 because the bypass channel would divert that portion of the high flow which is generated by the upstream flood improvements so that there is no induced flooding in these downstream reaches. As such, the Reach 5 and 6 channel segments do not need to be deepened and widened to accommodate the additional flow from the upstream flood improvements. But as a result, and unlike the other action alternatives, there would be no stable channel form constructed in either reach. Consequently, Reach 5 and Reach 6 would be subject to incision and erosion. Additionally, over time the unstable Reach 5 and 6 channel segments would be subject to degradation of water quality and would have a potential to violate water quality standards as erosion and siltation progresses. These are significant and unavoidable impacts of the Reach 6 Bypass Alternative.

Operation and maintenance activities under the No Project Alternative would also have significant and unavoidable impacts associated with the potential for substantial erosion (impact significance criteria HYDRO-5). This is the same channel instability issue as described for the Reach 6 Bypass Alternative, except that the incision and erosion process is applicable to all of the Project reaches. There would also continue to be flooding under the No Project Alternative (significance criteria HYDRO-6), since no flood protection improvements would be implemented, and there would be a potential to degrade water quality and violate water quality standards due to both channel instability and periodic flooding (significance criteria HYDRO-1 and HYDRO-2).

4.20.3.3 Biological Resources (Aquatic, Wildlife, and Botanical)

As discussed in Section 4.6 Aquatic Resources, there is essentially no habitat for special-status aquatic species in Reach 8. Therefore, the increased excavation along the existing channel under the NRCS and Culvert/Channel alternatives compared to the Tunnel Alternative does not increase effects on aquatic resources. This results in an equal level of impacts associated with the Tunnel, NRCS, and Culvert/Channel alternatives for aquatic resources because the main impacts, such as, to sensitive habitats are in the less urbanized reaches (4, 5, 6, 7a, and 14) where construction for each of the alternatives would be the same. There is a greater degree of impacts to wildlife and botanical resources from the NRCS and Culvert/Channel alternatives related to the greater number of trees removed, which would have a greater degree of impact to birds in the area.. Impacts associated with the Reach 6 Bypass would be to a lesser degree than the Tunnel Alternative; because there is no construction and, therefore, no loss of mature trees or disturbance to aquatic habitat in Reaches 5 and 6, particularly to the perennially watered section of Reach 6.

4.20.3.4 Agricultural and Forest Resources

Under the Reach 6 Bypass Alternative, impact level determinations are the same; but to a lesser degree compared with the Tunnel Alternative because of the lack of construction in Reaches 5 and 6. As shown on Section 3.7 and 4.7 and, Reach 5 has 6.5 acres of Important Farmland and 2.6 acres of Williamson Act; and Reach 6 has 5.0 acres and 10.8 acres that would be impacted by the NRCS, Tunnel, and Culvert/Channel alternatives.

4.20.3.5 Cultural Resources

As is the case with mineral resources, there is greater degree of impact related to the larger spatial extent of construction excavation associated with the NRCS and Culvert/Channel alternatives due to the increased risk of unanticipated discoveries of cultural resources. The Reach 6 Bypass has the least risk for unanticipated discoveries due to the reduced extent of excavation.

4.20.3.6 Traffic and Circulation

The degree of traffic and transportation impacts would be greater for the NRCS and Culvert/Channel alternatives because construction would occur in a larger portion of the urban area in Reach 8, along roads causing more detours and interaction between construction-related activities and traffic at various areas in Morgan Hill. However, the Reach 6 Bypass has a higher impact level determination than all of the other alternatives (significant vs. less than significant) due to the detour on U.S. 101 during construction of the bypass channel.

4.20.3.7 Air Quality and Greenhouse Gases

In relation to Air Quality and Greenhouse Gases, the Reach 6 Bypass Alternative estimated emissions from fuel combustion would be about 13 percent higher than the NRCS Alternative while fugitive dust emissions would be about 2 to 6 percent lower than the NRCS Alternative. The Reach 6 Bypass avoids the need for extensive excavation and earthmoving work in Reaches 5 and 6; but comparing to the tunnel construction, more emissions will be generated constructing the tunnel than excavating the creek. The end result is the Tunnel Alternative has the highest emissions because of the tunnel construction and excavation of all the channel reaches downstream.

4.20.3.8 Noise

In relation to Noise, the greatest degree of impact is associated with the construction of the tunnel, which is in close proximity to residences. Consequently, the Reach 6 Bypass has the same degree of impacts as the Tunnel Alternative (both alternatives use the tunnel feature) while the Culvert/Channel and NRCS alternatives have a lower degree of impacts.

4.20.3.9 Aesthetic Resources

Aesthetic impacts would be to a higher degree for the NRCS and Culvert/Channel alternatives compared with the Tunnel Alternative, because more trees and structures would be removed in the urban areas (Reaches 7a and 8) where the change would be apparent to more viewers. However, the Reach 6 Bypass Alternative would also have a higher degree of impact on the visual character than the Tunnel Alternative due to the addition of the bypass channel in Reach 6, which is a new feature on the existing landscape.

4.20.3.10 Utilities and Public Services

The NRCS and Culvert/Channel alternatives' excavation footprint in Reach 8 would increase the required abandonment and/or relocation of some utilities compared to the tunnel construction. Reach 6 Bypass will likely affect the fewest utilities since no construction in Reaches 6 and 5 compared with the Tunnel Alternative.

4.20.3.11 Recreation

Recreation impacts are the same except for having a higher degree of impact under the Culvert/Channel Alternative, because of the temporary closure of the Britton ball fields adjacent to Britton Middle School for installation of the culvert.

4.20.3.12 Land Use and Planning, Population and Housing, and Socioeconomics Resources

Under the Reach 6 Bypass Alternative, impact level determinations are the same but to a lesser degree compared with the Tunnel Alternative for Land Use and Planning, Population and Housing, and Socioeconomics Resources; because of the lack of construction in Reaches 5 and 6, which reduces the amount of agriculture lands taken out of commission and structure removal. The Culvert/Channel and NRCS alternatives have a higher degree of impact on land use and population and housing because of the increased removal of structures and land use conversion in the urban Reach 8 but have equal impacts associated with socioeconomics resources, because of the reduction of agricultural lands would be the same as the Tunnel Alternative. As discussed and as described in Section 3.8 and 4.8 , Reach 5 has 6.5 acres of Important Farmland and 2.6 acres of Williamson Act; and Reach 6 has 5.0 acres and 10.8 acres that would be impacted by the NRCS, Tunnel, and Culvert/Channel alternatives.

4.20.3.13 Hazards and Hazardous Materials

In Hazards and Hazardous Materials, there is greater degree of impact related to the larger extent of construction excavation associated with the NRCS and Culvert/Channel alternatives because of the increased risk of unanticipated discoveries of contaminated soil. Also, the extensive work in the urban area could interfere with emergency responses if routes overlap with the construction area.

4.20.3.14 Environmental Justice

As discussed in Section 4.19 Environmental Justice, the definition of environmental justice is a disproportionately high and adverse environmental or human-health impact on a community of concern. A community of concern is either a low-income population or a minority population. In the Project area, the community of concern is in Reaches 8 and 7B. The No Action Alternative has the most disproportionate adverse effects due to the continued impact on Reach 8 due to flooding. The Tunnel and the Reach 6 Bypass Alternative have a disproportionate adverse effect on Reach 8 due to noise and vibration caused by construction of the tunnel. The NRCS and Culvert/Channel alternatives have no disproportionate impact to communities of concern.

4.20.4 Summary

The No Action Alternative has the most resources with determinations of “No Impact” but also with the most “Significant Impact” determinations. The significant impacts are related to the continued flooding and also to degradation of the creek channel (due to ongoing incision and to water quality issues associated with flooding), which indicates it is not the environmentally superior alternative.

The Reach 6 Bypass Alternative has the least severe impacts relative to the Tunnel Alternative, except for the significant impact associated with traffic effects on U.S. 101 and to anticipated significant impacts of ongoing channel incision in Reaches 5 and 6 with attendant lack of geomorphic stability that leads to bank erosion and associated adverse water quality effects. The Reach 6 Bypass would minimize potential environmental effects when compared to the other alternatives, particularly in relation to Biological Resources, Cultural Resources, Agricultural Resources, Land Use and Planning, Utilities and Public Services, Population and Housing, Socioeconomics, and Hazards and Hazardous Materials. The severity of many of the impacts is less due to the elimination of construction in Reaches 5 and 6; and particularly in Reach 6, which has a section of perennial water that supports aquatic habitat. However, it is not the Proposed Project, because over the long term, without improvements to arrest incision in Reaches 5 and 6, the ecology of the stream will be degraded compared to the Tunnel Alternative and will eventually require greater bank erosion control and maintenance. Therefore, with the mitigation implemented to restore the riparian habitat after construction, and the aquatic benefits of additional channel stability, the Preferred Alternative would be the Environmentally Superior Alternative.

CHAPTER 5 MITIGATION

5.1 INTRODUCTION

As defined by the Council on Environmental Quality, Title 40 Code of Federal Regulation (C.F.R.) §1508.20, mitigation requirements include the following:

- Avoiding the impact altogether by not taking a certain action or parts of an action;
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation;
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
- Reducing or eliminating the impacts over time by preservation and maintenance operations during the life of the action; and
- Compensating for the impacts by replacing or providing substitute resources or environments.

Under the Clean Water Act (CWA) Section 404(b)(1) guidelines implemented through 40 C.F.R. Part 230, the Santa Clara Valley Water District (SCVWD) shall be required to avoid and minimize impacts to waters of the United States, then provide compensatory mitigation for unavoidable adverse impacts. In accordance with Title 40 C.F.R. 1508.20, where significant, adverse impacts were identified, mitigation described in this chapter will include a description of measures made to avoid and minimize (i.e., limit the degree or magnitude) impacts to the environment through planning and design modifications, Best Management Practices (BMPs), and compensatory mitigation. Additionally, this chapter will describe measures to rectify and compensate the impact to Llagas Watershed for the proposed action by repairing and rehabilitating the riparian corridor in Llagas Creek and compensation for impacts by replacing and improving functions and values of riparian and wetland habitats.

5.2 AVOIDANCE AND MINIMIZATION

Avoidance and minimization strategies have been incorporated into various stages of Project progression. Since the initial proposed design in the 1982 Environmental Impact Report/Environmental Impact Statement (EIR/EIS), the SCVWD has made refinements to address and better adapt the Project to increasing urbanization, changes in runoff conditions, conservation and protection of wetland and riparian habitat, and to the federal listing of steelhead. Preliminary avoidance strategies included the development of a bankfull hydrologic design to emulate a natural stable channel and provide for improved sediment transport in the Llagas watershed to avoid and minimize the need for future maintenance (i.e., bank protection and sediment removal), as Llagas Creek in its current state is unstable and incising.

Additional avoidance and minimization strategies include:

- Design the Project to better balance flood protection and habitat objectives;
- Provide 1% flood protection in the urban areas of Morgan Hill only where property damage would be greatest;
- Alternating the grading footprint to avoid large clusters of higher quality vegetation (i.e., Sycamores and Oaks);
- Reduced the number of maintenance roads and access ramps from the NRCS alternative;
- Installation of instream complexity (i.e. rootwads, boulder clusters etc.) for improving aquatic habitat;
- Installation of a low flow channel to promote sediment transport and fish passage;
- Reuse of existing higher quality gravels and cobbles in Llagas Creek to line low flow channel;
- Removal of invasive plant species, Giant Reed (*Arundo donax*) and Himalayan Blackberry (*Rubus armeniacus*) in all reaches to be replaced with native riparian vegetation;
- Removal of six rock chute drop structures from the 1982 design to provide free passage for steelhead migration and localized movement of native fish and better support sediment transport processes;
- Reuse of higher quality topsoil excavated for construction, stockpiled and replaced in revegeation planting;
- Minimize use of riprap to protect creek from erosion;
- Installation of woodpiles within the riparian corridor for improved small mammal habitat;
- Girdling invasive trees to produce snag habitat;
- Purchasing additional right of way in Reach 6 where quality of aquatic habitat is high;
- Modification of design (i.e., placement of maintenance road and ramps) to avoid large clusters of native trees and;
- Develop an alternative with an underground tunnel (The Tunnel Alternative) to avoid impacts to West Little Llagas Creek in Reach 8. The Tunnel Alternative (Applicant's Proposed Action) was conceived because the alternative reduces impacts by requiring a smaller right of way footprint, reduces the amount of vegetation to be removed and excavation needed along the existing West Little

Llagas Creek within a portion of Reach 8, reduces the extent of utilities to be relocated, and reduces the culvert replacements required, which results in less construction related interference with the surrounding environment.

More recent avoidance and minimization strategies to reduce the number of trees impacted by Project design included: strategic placement of access ramps, alternating locations of maintenance roads, purchasing additional right of way and alterations to grading plans. These recent efforts have reduced the number of trees from 1980 to be removed to 1734 resulting in the preservation of an additional 246 trees.

5.3 ONSITE COMPENSATORY MITIGATION

The Lake Silveira compensatory mitigation element which includes creek restoration and wetland creation is common to all alternatives analyzed in detail for this environmental review. The proposed compensatory mitigation for the Project has a protracted history with the first EIS/EIR prepared by the Natural Resources Conservation Service (NRCS), United States Department of Agriculture, and the District in 1982. In 2001, a draft Supplemental Environmental Impact Statement (SEIS)/Supplemental Environmental Impact Report (SEIR) was prepared. At that time, under the authority of the Fish and Wildlife Coordination Act, the United States Fish and Wildlife Service (USFWS) assessed fish and wildlife impacts and mitigation needs for the proposed project. A Coordination Act Report (CAR) was prepared by the USFWS in 2001 and revised in 2003 (USFWS, 2003). As a major mitigation element for the flood protection improvements in Llagas Creek, the USFWS recommended restoration of approximately 1,980 linear feet of abandoned stream channel and conversion of the present day Lake Silveira (Lake) to emergent marsh habitat to replace lost functions and values, and provide aquatic habitat diversity with the mosaic of wetlands adjacent to the restored channel (USFWS, 2003). The Lake was artificially created prior to 1989 when unknown parties breached a portion of the northern levee forcing stream flows into an abandoned gravel quarry pit. The rerouting of the stream subsequently isolated and dewatered a portion of the higher quality riparian habitat of Llagas Creek (Figure 5.4-1).

The SCVWD has developed this compensatory mitigation element to include site specific objectives and a detailed design for implementation. The Applicant began developing the objectives for design of Lake Silveira with the expressed intent or restoring stream functions using the Function Based Framework for Stream Assessment and Restoration Projects (Harmen et. al., 2012). This started with an analysis of hydrology and hydraulics, and geomorphology. Focused studies commenced to address both physicochemical and biological parameters into the planning process. As a result, a series of specific objectives were developed for wetland creation and creek restoration at Lake Silveira.

The multiple objectives in the development of the design are as follows:

- Maximize mitigation value for the proposed action and provide for overall increased ecological functions and values;
- Provide improved habitat for steelhead, turtles, and other special status wildlife species known to occur at the site;

- Reduce suitable habitat for non-native predatory fish;
- Provide riparian habitat within the 52 acre parcel to provide connectivity to existing high quality riparian habitat in Reach 6 (downstream of Monterey Road) and upstream of the lake to Chesbro Reservoir;
- Improve or protect upstream and downstream functions and resources, hydraulic conveyance, groundwater recharge, ecological resources;
- Contribute to improved sediment supply to downstream reaches; ensure geomorphic stability for the Lake, the restored historic channel, and downstream reaches;
- Provide a stable, low-maintenance confluence with the Lake and/or restored historic channel and;
- Improve water quality, including turbidity, temperature, circulation/flushing.
- Remove 12 acres of invasive Himalayan Blackberry (Figure 5.4.3)

The proposed Lake Silveira design will split Llagas Creek flows to re-establish creek low flows to the historic channel (Figure 5.4-1). . Portions of the 8-acre lake would be filled to create approximately 4.25 acres of emergent perennial wetlands, approximately 10.8 acres of forested habitat types including riparian and oak woodland, Sycamore forest, willow forest, and with about 3.2 acres of open water remaining of the original 8-acre lake surface. Figure 5.4.2 provides a proposed design for this mitigation element. This would be accomplished by constructing a hydraulically roughened open-channel flow split structure recommended by the NMFS, that would route some of the Llagas Creek flow back into the historic channel, with a portion of the flows going to the wetland, which would be created by partially filling the lake. When base flows in Llagas Creek upstream of the lake are very low, less than 3 cfs may occur in drought years, most of that flow would be directed into the wetlands. When flows exceed 3 cfs (which is most of the time), the flow would be directed mostly to the historic channel. A lake outlet structure would be installed where the lake ties back into Llagas Creek. The outlet structure would be a weir gate, which would include a grade control structure at or downstream of the lake outlet to prevent incision and destabilization of the bank.

The outlet structure would temporarily have a means to control lake elevations; so that if there is settlement of the wetland surface after construction, the water elevation can be adjusted to optimize the wetland viability and function. It is expected that over the long-term, the permanent outlet structure would not need to be adjustable and that the seasonal water surface elevation in the wetland is expected to only fluctuate within a range of about 0.5 foot.

The wetland would be created by partially filling the lake area at depth with coarse earth materials and providing surface soils of clay and sandy loams potentially derived from the channel excavation in Reach 7A. The submerged wetland fill slopes created around the northern margin of the wetlands would be approximately 2:1 grade and would be compacted to about 90 percent to minimize liquefaction potential. The approximately 4 acre wetland marsh created would have an undulating surface so that there are deeper ponding areas punctuated by islands that are elevated between 1 to 4 feet above the water surface of the “marsh plain”. The design is intended to create a habitat mosaic of open water and vegetated marsh. By keeping the islands close to the deeper open water, predation by mammals can be reduced. Willows and cottonwoods would be planted on the islands above the water surface elevation, as well as on the northeastern edge of the marsh plain. The rest of the marsh plain would be seeded and planted with species, such as rushes, bulrush, and flatsedge (see H.T. Harvey & Associates 2013a for planting details), including around the perimeter of the islands. The portion of the lake south of the marsh plain would mostly remain as open water with depths approximately as they are today. There are existing gravel bars extending out from along the southern shoreline of the lake into the open water areas. These bars would remain as they currently exist, as they provide turtle and bird habitat during low water periods.

Approximately 1,980 linear feet of abandoned Llagas Creek would be re-established. A pilot channel would be excavated starting at the inlet flow split structure downstream for several hundred feet into the abandoned Llagas Creek channel. The pilot channel would help to focus flows when the Project becomes operational to purposely encourage initial scouring and formation of a stable channel at the junction with the split structure. No other grading work is proposed in the abandoned channel. The abandoned channel is heavily over-grown with non-native blackberry, which would be removed manually and with follow-up herbicide sprays over a 3- to 4-year period before planting native understory shrub species. Any understory left bare after blackberry and replanting shrubs would be seeded with an understory mix of mugwort, blue wild rye, and creeping wild rye. The existing channel over-story is well vegetated and it is anticipated that additional natural recruitment would occur once the blackberries are removed and the channel is rewatered. Some in-fill plantings of shrubs, such as mugwort, California blackberry, and snowberry, along with some willows, are proposed.

Along the inlet channel to the wetland, there is a raised berm area that would be planted with oak woodland species. Adjacent to the inlet channel at the level of the floodplain native willow trees are well-established. The existing understory has apparently been completely cleared (by unknown parties). The understory floodplain along the inlet channel would be planted with mugwort, blackberry, snowberry, and a seeding mixture that includes wildrye.

The existing outlet channel would be filled in to reduce the potential of groundwater migrating toward the proposed Reach 7A channel and potentially lowering water levels in the wetland. The new outlet would be excavated 100 feet to the south of the existing outlet. Grade control is likely to be needed in the channel in the vicinity of the outlet structure to prevent channel incision. About 1.5 feet of existing highly compacted soils along the floodplain of the outlet channel would be excavated and replaced with new loam surface soils imported from Reach 7A. Willow forest would be planted along the outlet channel, which includes red, arroyo, and sandbar willow types. Oak woodland forest would be used on higher elevations further away from the channel and lake.

Fill would be placed against an existing soil berm that separates the lake from the historic channel immediately north of the marsh plain (see Figure 5.4.2). The fill slope would be constructed with gradients between 3:1 to 5:1 and will have 2 to 3 feet of imported topsoil, likely from the proposed Reach 7A excavation. The fill slope would be planted with riparian and oak woodland forest.

Just north of the historic channel are upland terraces that are situated about nine feet above the channel and border neighboring agricultural fields. A concrete wall would be removed and some grading would occur on a portion of the upland terrace (Figure 5.4.3). A sycamore forest planting pallete would be used in this part of the upland terrace. The rest of the upland terrace areas would be planted with the forest pallete including oaks, buckeye, sagebrush, coffeeberry, toyon, and others.

The “bow-tie” parcel (informally called as such due to its shape) is adjacent to Lake Silveira along the most downstream portion of the proposed Reach 7A channel. The bow-tie parcel is part of the Lake Silveira element. Clay and sandy loams salvaged from the excavation in this reach would be used to provide topsoil with Sycamore forest to be planted on the lower elevations and willow forest to be planted in a strip along part of the channel. Outside the willow forest higher on the bank would be planted with savanna, which is upland herbaceous habitat with a few individual sycamore trees spaced approximately every 200 feet.

A comparison between the existing and preliminary proposed Lake Silveira habitats is provided in Table 5.3-1.

Based on preliminary design, the Lake Silveira wetland and riparian enhancement site would result in a net increase of about 4.11 acres of Sycamore Forest, 8.13 acres of Riparian Forest, and 4.08 acres of wetland. Upland herbaceous habitat would decrease by about 11.46 acres.

Instream channel habitat improvements consisting of large logs in the Lake would be installed to function as basking surfaces for western pond turtles. Approximately 10 turtle-basking logs are proposed. Additionally, instream habitat complexity, such as log-rootwad structures, would be installed in the re-established Llagas Creek to provide steelhead rearing and refuge habitat.

Table 5.3-1 Lake Silveira Approximate Restoration Areas

Scientific Name	Existing Acreage[1]	Preliminary Proposed Acreage[1]	Net Increase/ Decrease[1,2]
Riparian Forest Native (except Sycamore)	15.56	23.68	8.13
Riparian Forest Non-native	0.78	0.62	-0.15
Riparian Shrub-scrub native	0.33	0.24	-0.09
Riparian shrub-scrub non-native	0.09	0.07	-0.02
Perennial Marsh	0.21	4.29	4.08
Upland Herbaceous	15.51	4.06	-11.46
Aquatic	7.71	3.13	-4.58
Sycamore	1.43	5.54	4.11
Total	41.62	41.62	0.15

[1] Numbers may not add up due to rounding
[2] Negative numbers denote a decrease of the habitat type indicated

Maintenance is anticipated to be minor once the construction is completed and vegetation begins to establish. Maintenance would consist of activities to allow the Lake Silveira component to hydrologically function as planned, so that the wetlands thrive and the historic channel is re-watered. No maintenance would be performed for purposes of flood management. Maintenance work would include clearing sediment from the inlet structure, minor vegetation clearing around the inlet and outlet structures, and along the inlet of the channel to keep the flow split structure functioning. Exotic species control would occur over a period of up to 4 years for blackberry.

5.4 SUMMARY OF MITIGATION MEASURES FOR ALTERNATIVES

To reduce the severity of impacts in all action alternatives, BMPs as well as mitigation measures are proposed for the following resource categories: Geology and Soils, Hydrology and Water Quality, Mineral Resources, Botanical Resources, Wildlife Resources, Aquatic Resources, Agricultural and Forest Resources, Cultural Resources, Traffic and Circulation, Air Quality and Greenhouse Gases, Noise, Aesthetics, Utilities and Public Services, Recreation, Population and Housing, Socioeconomics, and Hazards and Hazardous Materials. However, even with proposed mitigation, some impacts remain significant. Resources with significant impacts only associated with the No Action Alternative include: Aquatic Resources, Land Use and Planning, Utilities and Public Services, Socioeconomic Resources, and Hazards and Hazardous Materials.

Table 5.4-1 summarizes the specific mitigation measures developed for the four alternatives analyzed in this EIS.

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Figure 5.4-1 Ortho-Rectified Aerial Photo of Lake Silveira Depicting Historic Channel Alignment

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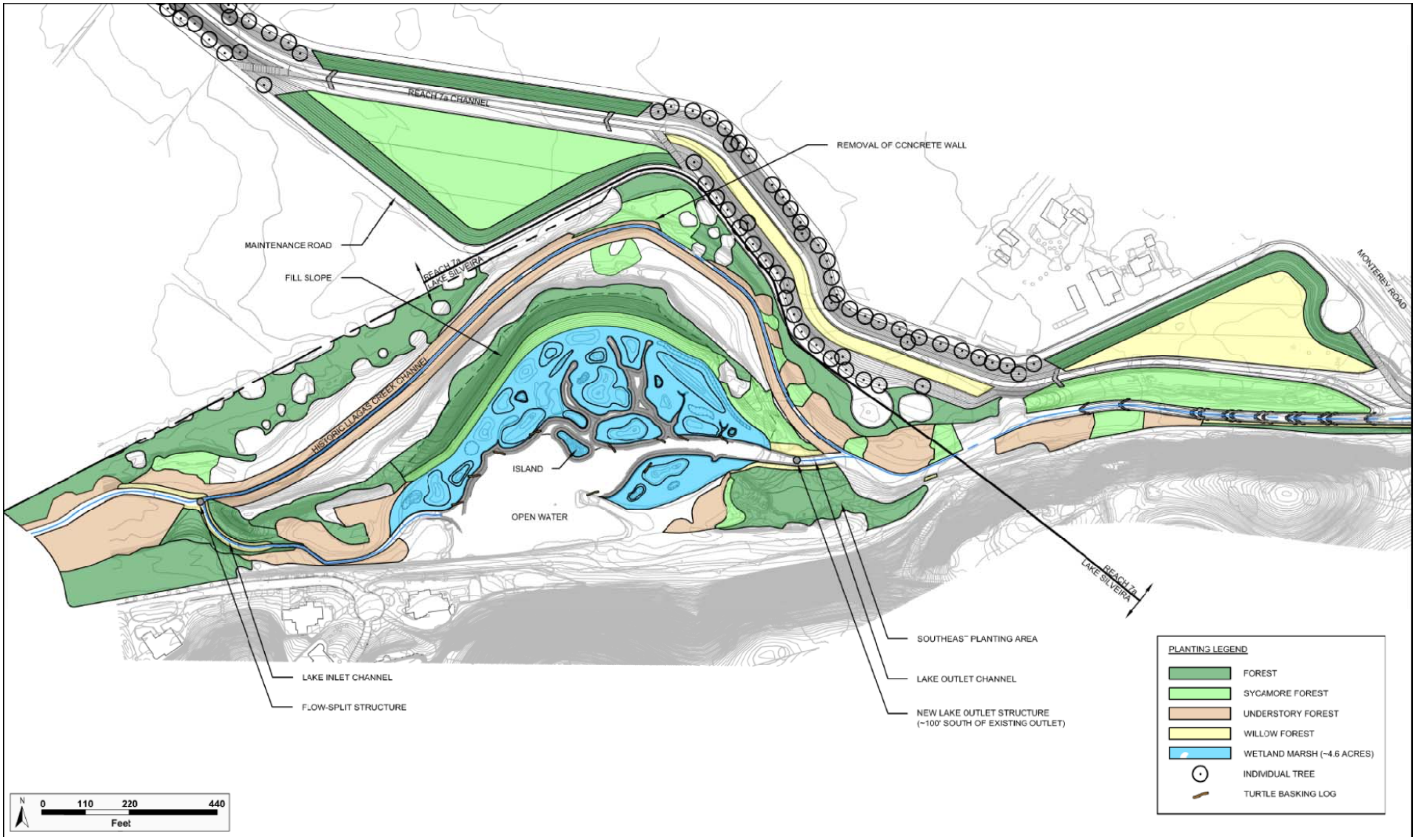

Figure 5.4-2 Proposed Design for Lake Silveira

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Figure 5.4-3 Map Depicting the Locations of Himalayan Blackberry Infestation at Lake Silveira

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Table 5.4-1 Summary of Mitigation Measures for the Alternatives

Environmental Resource Issue	No Project Alternative	Tunnel Alternative (Applicant's Proposed Action)	NRCS Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
Geology and Soils					
GEO-1: Project features could be subject to failure due to earthquake-induced liquefaction ground failures, which could diminish flood capacity and protection and/or present physical hazards to public safety.	**Construction** N/A **Operations and Maintenance** NI	**Construction** NI **Operations and Maintenance** LTSM **Mitigation** GEO-1a: Post Earthquake Inspections. GEO-1b: Post Earthquake Tunnel Inspection.	**Construction** NI **Operations and Maintenance** LTSM **Mitigation** GEO-1a: Post Earthquake Inspections.	**Construction** NI **Operations and Maintenance** LTSM **Mitigation** GEO-1a: Post Earthquake Inspections.	**Construction** NI **Operations and Maintenance** LTSM **Mitigation** GEO-1a: Post Earthquake Inspections. GEO-1b: Post Earthquake Tunnel Inspection.
Hydrology and Water Quality					
HYDRO-1: Potential to violate water quality standards.	**Construction** N/A **Operations and Maintenance** S	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** S **Mitigation** None required
HYDRO-2: Substantially degrades water quality.	**Construction** N/A **Operations and Maintenance** S	**Construction** LTS **Operations and Maintenance** LTSM **Mitigation** WILD-3c: Development and Implementation of a Bat Monitoring Program and Development of Bat/Tunnel Exclusion Devices.	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** S **Mitigation** WILD-3c: Development and Implementation of a Bat Monitoring Program and Development of Bat/Tunnel Exclusion Devices.
HYDRO-3: Creates or contributes runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provides substantial additional sources of potentially impacted runoff.	**Construction** N/A **Operations and Maintenance** NI	**Construction** NI **Operations and Maintenance** NI **Mitigation** None required	**Construction** NI **Operations and Maintenance** NI **Mitigation** None required	**Construction** NI **Operations and Maintenance** NI **Mitigation** None required	**Construction** NI **Operations and Maintenance** NI **Mitigation** None required
HYDRO-4: Substantially depletes or interferes with groundwater supplies, groundwater recharge, or water table level.	**Construction** NI **Operations and Maintenance** NI	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required
HYDRO-5: Alteration of drainage pattern and course of stream resulting in substantial erosion or siltation on- or off-site.	**Construction** NI **Operations and Maintenance** S	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** S **Mitigation** None required

NI = no impact; S = significant; LTS = less than significant; LTSM = less than significant with mitigation; B = beneficial; N/A = not applicable

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Environmental Resource Issue	No Project Alternative	Tunnel Alternative (Applicant's Proposed Action)	NRCS Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
HYDRO-6: Alteration of drainage pattern and course of stream resulting in flooding or increased surface runoff on- or off-site. Places housing within a 100-year-flood hazard area. Places within a 100-year-flood hazard area structures that would impede or redirect flood flows, and exposes people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam.	**Construction** NI **Operations and Maintenance** S	**Construction** NI **Operations and Maintenance** B **Mitigation** None required	**Construction** NI **Operations and Maintenance** B **Mitigation** None required	**Construction** NI **Operations and Maintenance** B **Mitigation** None required	**Construction** NI **Operations and Maintenance** B **Mitigation** None required
Mineral Resources					
MIN-1: Result in the loss of availability of a known valuable mineral resource that would be of value to the region and the residents of California	**Construction** N/A **Operations and Maintenance** NI	**Construction** B **Operations and Maintenance** NI **Mitigation** None required	**Construction** B **Operations and Maintenance** NI **Mitigation** None required	**Construction** B **Operations and Maintenance** NI **Mitigation** None required	**Construction** B **Operations and Maintenance** NI **Mitigation** None required
MIN-2: Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.	**Construction** N/A **Operations and Maintenance** NI	**Construction** LTSM **Operations and Maintenance** NI **Mitigation** MIN-2: Inadvertent Discovery of Poppy Jasper.	**Construction** LTSM **Operations and Maintenance** NI **Mitigation** MIN-2: Inadvertent Discovery of Poppy Jasper.	**Construction** LTSM **Operations and Maintenance** NI **Mitigation** MIN-2: Inadvertent Discovery of Poppy Jasper.	**Construction** LTSM **Operations and Maintenance** NI **Mitigation** MIN-2: Inadvertent Discovery of Poppy Jasper.
Botanical Resources					
BOT-1: Potential for adverse effects on rare or important plant communities, and special-status plant species and their suitable habitat.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** S **Operations and Maintenance** LTSM **Mitigation** BOT-1a: Conduct Focused Protocol-level Surveys for Special-status Plant Species. BOT-1b: Prepare a Mitigation Plan for Special-status Plant Species. BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan. BOT-1d: Prepare a Monitoring Plan for West/East Little Llagas Creek. BOT-1e: Dispose of Invasive Non- native Species.	**Construction** S **Operations and Maintenance** LTSM **Mitigation** BOT-1a: Conduct Focused Protocol-level Surveys for Special-status Plant Species. BOT-1b: Prepare a Mitigation Plan for Special-status Plant Species. BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan. BOT-1d: Prepare a Monitoring Plan for West/East Little Llagas Creek. BOT-1e: Dispose of Invasive Non- native Species.	**Construction** S **Operations and Maintenance** LTSM **Mitigation** BOT-1a: Conduct Focused Protocol-level Surveys for Special-status Plant Species. BOT-1b: Prepare a Mitigation Plan for Special-status Plant Species. BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan. BOT-1d: Prepare a Monitoring Plan for West/East Little Llagas Creek. BOT-1e: Dispose of Invasive Non- native Species.	**Construction** S **Operations and Maintenance** LTSM **Mitigation** BOT-1a: Conduct Focused Protocol-level Surveys for Special-status Plant Species. BOT-1b: Prepare a Mitigation Plan for Special-status Plant Species. BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan. BOT-1d: Prepare a Monitoring Plan for West/East Little Llagas Creek. BOT-1e: Dispose of Invasive Non- native Species.
BOT-2: Potential for adverse effects on jurisdictional wetlands, other Waters of the United States and Waters of the State.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan. BOT-1d: Prepare a Monitoring Plan for West/East Little Llagas Creek. BOT-1e: Dispose of Invasive Non- native Species.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan. BOT-1d: Prepare a Monitoring Plan for West/East Little Llagas Creek. BOT-1e: Dispose of Invasive Non-native Species.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan. BOT-1d: Prepare a Monitoring Plan for West/East Little Llagas Creek. BOT-1e: Dispose of Invasive Non- native Species.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan. BOT-1d: Prepare a Monitoring Plan for West/East Little Llagas Creek. BOT-1e: Dispose of Invasive Non- native Species.

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Environmental Resource Issue	No Project Alternative	Tunnel Alternative (Applicant's Proposed Action)	NRCS Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
BOT-3: Conflicts with local policies and/or plans.	**Construction** N/A **Operations and Maintenance** NI	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** BOT-1a: Conduct Focused Protocol-level Surveys for Special-status Plant Species. BOT-1b: Prepare a Mitigation Plan for Special-status Plant Species. BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan. BOT-1d: Prepare a Monitoring Plan for West/East Little Llagas Creek.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** BOT-1a: Conduct Focused Protocol-level Surveys for Special-status Plant Species. BOT-1b: Prepare a Mitigation Plan for Special-status Plant Species. BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan. BOT-1d: Prepare a Monitoring Plan for West/East Little Llagas Creek.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** BOT-1a: Conduct Focused Protocol-level Surveys for Special-status Plant Species. BOT-1b: Prepare a Mitigation Plan for Special-status Plant Species. BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan. BOT-1d: Prepare a Monitoring Plan for West/East Little Llagas Creek.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** BOT-1a: Conduct Focused Protocol-level Surveys for Special-status Plant Species. BOT-1b: Prepare a Mitigation Plan for Special-status Plant Species. BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan. BOT-1d: Prepare a Monitoring Plan for West/East Little Llagas Creek.
Wildlife Resources					
WILD-1: Potential for adverse effects on common and special-status nesting birds.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** WILD-1a: Vegetation Removal during Avian Non-breeding Season.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** WILD-1a: Vegetation Removal during Avian Non-breeding Season.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** WILD-1a: Vegetation Removal during Avian Non-breeding Season.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** WILD-1a: Vegetation Removal during Avian Non-breeding Season.
WILD-2: Potential for adverse effects on special-status reptiles and amphibians, including western pond turtle and California tiger salamander.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** WILD-2a: Preconstruction Surveys for Special-status Amphibian and Reptile Species. WILD-2b: Biological Monitor for Dewatering Activities. WILD-2c: Relocate Special-status Species from Construction Area. WILD-2d: Implement Compensatory Mitigation for Special-status Amphibians and Reptiles, including California tiger salamander. WILD-2e: Minimize Nightwork Disruption to Wildlife. WILD-2f: Special-status Species Environmental Awareness Training and Construction Avoidance Measures. WILD-2g: Bullfrog population monitoring and control at Lake Silveira. BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** WILD-2a: Preconstruction Surveys for Special-status Amphibian and Reptile Species. WILD-2b: Biological Monitor for Dewatering Activities. WILD-2c: Relocate Special-status Species from Construction Area. WILD-2d: Implement Compensatory Mitigation for Special-status Amphibians and Reptiles, including California tiger salamander. WILD-2e: Minimize Nightwork Disruption to Wildlife. WILD-2f: Special-status Species Environmental Awareness Training and Construction Avoidance Measures. WILD-2g: Bullfrog population monitoring and control at Lake Silveira. BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** WILD-2a: Preconstruction Surveys for Special-status Amphibian and Reptile Species. WILD-2b: Biological Monitor for Dewatering Activities. WILD-2c: Relocate Special-status Species from Construction Area. WILD-2d: Implement Compensatory Mitigation for Special-status Amphibians and Reptiles, including California tiger salamander. WILD-2e: Minimize Nightwork Disruption to Wildlife. WILD-2f: Special-status Species Environmental Awareness Training and Construction Avoidance Measures. WILD-2g: Bullfrog population monitoring and control at Lake Silveira. BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** WILD-2a: Preconstruction Surveys for Special-status Amphibian and Reptile Species. WILD-2b: Biological Monitor for Dewatering Activities. WILD-2c: Relocate Special-status Species from Construction Area. WILD-2d: Implement Compensatory Mitigation for Special-status Amphibians and Reptiles, including California tiger salamander. WILD-2e: Minimize Nightwork Disruption to Wildlife. WILD-2f: Special-status Species Environmental Awareness Training and Construction Avoidance Measures. WILD-2g: Bullfrog population monitoring and control at Lake Silveira. BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan.

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Environmental Resource Issue	No Project Alternative	Tunnel Alternative (Applicant's Proposed Action)	NRCS Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
WILD-3: Potential for adverse effects on common and special-status bats.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** WILD-2e: Minimize Nightwork Disruption to Wildlife. WILD-3a: Preconstruction Surveys for Common and Special-status Bats prior to Removal of Trees and Removal/Replacement of Road Culverts. WILD-3b: Provide Alternative Bat Roost. WILD-3c: Development and Implementation of a Bat Monitoring Program and Development of Bat/Tunnel Exclusion Devices.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** WILD-2e: Minimize Nightwork Disruption to Wildlife. WILD-3a: Preconstruction Surveys for Common and Special-status Bats prior to Removal of Trees and Removal/Replacement of Road Culverts. WILD-3b: Provide Alternative Bat Roost.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** WILD-2e: Minimize Nightwork Disruption to Wildlife. WILD-3a: Preconstruction Surveys for Common and Special-status Bats prior to Removal of Trees and Removal/Replacement of Road Culverts. WILD-3b: Provide Alternative Bat Roost.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** WILD-2e: Minimize Nightwork Disruption to Wildlife. WILD-3a: Preconstruction Surveys for Common and Special-status Bats prior to Removal of Trees and Removal/Replacement of Road Culverts. WILD-3b: Provide Alternative Bat Roost. WILD-3c: Development and Implementation of a Bat Monitoring Program and Development of Bat/Tunnel Exclusion Devices.
WILD-4: Potential for adverse effects on San Francisco dusky-footed woodrats.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan. WILD-2e: Minimize Nightwork Disruption to Wildlife. WILD-4: Preconstruction Surveys for San Francisco Dusky-footed Woodrat Nests prior to Vegetation Removal.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan. WILD-2e: Minimize Nightwork Disruption to Wildlife. WILD-4: Preconstruction Surveys for San Francisco Dusky-footed Woodrat Nests prior to Vegetation Removal.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan. WILD-2e: Minimize Nightwork Disruption to Wildlife. WILD-4: Preconstruction Surveys for San Francisco Dusky-footed Woodrat Nests prior to Vegetation Removal.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan. WILD-2e: Minimize Nightwork Disruption to Wildlife. WILD-4: Preconstruction Surveys for San Francisco Dusky-footed Woodrat Nests prior to Vegetation Removal.
WILD-5: Potential for adverse effects on special-status invertebrates (i.e., Opler's longhorn moth and Bay checkerspot butterfly).	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** WILD-2e: Minimize Nightwork Disruption to Wildlife. WILD-5a: Conduct Plant Surveys for Host Plants of Special-status Invertebrates. WILD-5b: Compensatory Mitigation for Impacts to Serpentine-associated Special-status Invertebrates.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** WILD-2e: Minimize Nightwork Disruption to Wildlife. WILD-5a: Conduct Plant Surveys for Host Plants of Special-status Invertebrates. WILD-5b: Compensatory Mitigation for Impacts to Serpentine-associated Special-status Invertebrates.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** WILD-2e: Minimize Nightwork Disruption to Wildlife. WILD-5a: Conduct Plant Surveys for Host Plants of Special-status Invertebrates. WILD-5b: Compensatory Mitigation for Impacts to Serpentine-associated Special-status Invertebrates.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** WILD-2e: Minimize Nightwork Disruption to Wildlife. WILD-5a: Conduct Plant Surveys for Host Plants of Special-status Invertebrates. WILD-5b: Compensatory Mitigation for Impacts to Serpentine-associated Special-status Invertebrates.
WILD-6: Potential for adverse effects on migratory mammals, including San Joaquin kit fox and American badger.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** WILD-2e: Minimize Nightwork Disruption to Wildlife. WILD-2f: Special-status Species Environmental Awareness Training and Construction Avoidance Measures. WILD-6: Implementation of USFWS Standardized Recommendations for Protection of the San Joaquin Kit Fox prior to or during Ground Disturbance.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** WILD-2e: Minimize Nightwork Disruption to Wildlife. WILD-2f: Special-status Species Environmental Awareness Training and Construction Avoidance Measures. WILD-6: Implementation of USFWS Standardized Recommendations for Protection of the San Joaquin Kit Fox prior to or during Ground Disturbance.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** WILD-2e: Minimize Nightwork Disruption to Wildlife. WILD-2f: Special-status Species Environmental Awareness Training and Construction Avoidance Measures. WILD-6: Implementation of USFWS Standardized Recommendations for Protection of the San Joaquin Kit Fox prior to or during Ground Disturbance.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** WILD-2e: Minimize Nightwork Disruption to Wildlife. WILD-2f: Special-status Species Environmental Awareness Training and Construction Avoidance Measures. WILD-6: Implementation of USFWS Standardized Recommendations for Protection of the San Joaquin Kit Fox prior to or during Ground Disturbance.

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Environmental Resource Issue	No Project Alternative	Tunnel Alternative (Applicant's Proposed Action)	NRCS Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
Aquatic Resources					
AQUA-1: Potential for adverse effects on upstream migration of adult S-CCC steelhead.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTS **Operations and Maintenance** LTSM **Mitigation** AQUA-1a: Steelhead Passage: Channel and Structure Design. AQUA-1b: Steelhead Passage: Inspection of In-channel of Large Woody Debris prior to Removal for Management of Flood Conveyance Channels.	**Construction** LTS **Operations and Maintenance** LTSM **Mitigation** AQUA-1a: Steelhead Passage: Channel and Structure Design. AQUA-1b: Steelhead Passage: Inspection of In-channel of Large Woody Debris prior to Removal for Management of Flood Conveyance Channels.	**Construction** LTS **Operations and Maintenance** LTSM **Mitigation** AQUA-1a: Steelhead Passage: Channel and Structure Design. AQUA-1b: Steelhead Passage: Inspection of In-channel of Large Woody Debris prior to Removal for Management of Flood Conveyance Channels.	**Construction** LTS **Operations and Maintenance** LTSM **Mitigation** AQUA-1: Construction of Fish Exclusion Barrier at the Downstream End of Reach 14. AQUA-1a: Steelhead Passage: Channel and Structure Design. AQUA-1b: Steelhead Passage: Inspection of In-channel of Large Woody Debris prior to Removal for Management of Flood Conveyance Channels.
AQUA-2: Potential for adverse effects on S-CCC steelhead spawning habitat usage and quality.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** AQUA-2a: Preconstruction Surveys prior to In-water Construction. AQUA-2b: Biological Monitor for Dewatering Activities.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** AQUA-2a: Preconstruction Surveys prior to In-water Construction. AQUA-2b: Biological Monitor for Dewatering Activities.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** AQUA-2a: Preconstruction Surveys prior to In-water Construction. AQUA-2b: Biological Monitor for Dewatering Activities.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** AQUA-2a: Preconstruction Surveys prior to In-water Construction. AQUA-2b: Biological Monitor for Dewatering Activities.
AQUA-3: Potential for adverse effects on S-CCC steelhead rearing habitat.	**Construction** N/A **Operations and Maintenance** S	**Construction** LTS **Operations and Maintenance** LTSM **Mitigation** AQUA-1b: Steelhead Passage: Inspection of In-channel of Large Woody Debris prior to Removal for Management of Flood Conveyance Channels. AQUA-3: Installation of Instream Complexity BOT-1b: Prepare a Mitigation Plan for Special-status Plants. BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan.	**Construction** LTS **Operations and Maintenance** LTSM **Mitigation** AQUA-1b: Steelhead Passage: Inspection of In-channel of Large Woody Debris prior to Removal for Management of Flood Conveyance Channels. AQUA-3: Installation of Instream Complexity BOT-1b: Prepare a Mitigation Plan for Special-status Plants. BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan.	**Construction** LTS **Operations and Maintenance** LTSM **Mitigation** AQUA-1b: Steelhead Passage: Inspection of In-channel of Large Woody Debris prior to Removal for Management of Flood Conveyance Channels. AQUA-3: Installation of Instream Complexity BOT-1b: Prepare a Mitigation Plan for Special-status Plants. BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan.	**Construction** LTS **Operations and Maintenance** LTSM **Mitigation** AQUA-1b: Steelhead Passage: Inspection of In-channel of Large Woody Debris prior to Removal for Management of Flood Conveyance Channels. AQUA-3: Installation of Instream Complexity BOT-1b: Prepare a Mitigation Plan for Special-status Plants. BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan.
AQUA-4: Potential for adverse effects on downstream migration of juvenile S-CCC steelhead.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTS **Operations and Maintenance** LTSM **Mitigation** AQUA-1a: Steelhead Passage: Channel and Structure Design.	**Construction** LTS **Operations and Maintenance** LTSM **Mitigation** AQUA-1a: Steelhead Passage: Channel and Structure Design.	**Construction** LTS **Operations and Maintenance** LTSM **Mitigation** AQUA-1a: Steelhead Passage: Channel and Structure Design.	**Construction** LTS **Operations and Maintenance** LTSM **Mitigation** AQUA-4: Construction of Fish Screen and Fish Bypass Facility at the Upstream End of the Bypass Channel. AQUA-1a: Steelhead Passage: Channel and Structure Design.
AQUA-5: Potential for adverse effects to aquatic species from construction and maintenance within and outside the active channel.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required

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Environmental Resource Issue	No Project Alternative	Tunnel Alternative (Applicant's Proposed Action)	NRCS Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
Agricultural and Forest Resources					
AG-1: Convert Prime Farmland, Unique Farmland, or Farmland of Statewide or Local Importance.	**Construction** N/A **Operations and Maintenance** NI	**Construction** LTSM **Location of Project Features** S **Operations and Maintenance** NI **Mitigation** AG-1a: Agricultural Soil Amendments and Treatments: AG-1b: Agricultural Conversion Offsets.	**Construction** LTSM **Location of Project Features** S **Operations and Maintenance** NI **Mitigation** AG-1a: Agricultural Soil Amendments and Treatments: AG-1b: Agricultural Conversion Offsets.	**Construction** LTSM **Location of Project Features** S **Operations and Maintenance** NI **Mitigation** AG-1a: Agricultural Soil Amendments and Treatments: AG-1b: Agricultural Conversion Offsets.	**Construction** LTSM **Location of Project Features** S **Operations and Maintenance** NI **Mitigation** AG-1a: Agricultural Soil Amendments and Treatments: AG-1b: Agricultural Conversion Offsets.
AG-2: Conflict with existing zoning for agricultural use, or a Williamson Act contract.	**Construction** N/A **Operations and Maintenance** NI	**Construction** LTSM **Location of Project Features** S **Operations and Maintenance** NI **Mitigation** AG-1a: Agricultural Soil Amendments and Treatments. AG-2: Williamson Act Lands Conversion Offsets.	**Construction** LTSM **Location of Project Features** S **Operations and Maintenance** NI **Mitigation** AG-1a: Agricultural Soil Amendments and Treatments. AG-2: Williamson Act Lands Conversion Offsets.	**Construction** LTSM **Location of Project Features** S **Operations and Maintenance** NI **Mitigation** AG-1a: Agricultural Soil Amendments and Treatments. AG-2: Williamson Act Lands Conversion Offsets.	**Construction** LTSM **Location of Project Features** S **Operations and Maintenance** NI **Mitigation** AG-1a: Agricultural Soil Amendments and Treatments. AG-2: Williamson Act Lands Conversion Offsets.
AG-3: Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use.	**Construction** N/A **Operations and Maintenance** NI	**Construction** NI **Location of Project Features** NI **Operations and Maintenance** NI **Mitigation** None required	**Construction** NI **Location of Project Features** NI **Operations and Maintenance** NI **Mitigation** None required	**Construction** NI **Location of Project Features** NI **Operations and Maintenance** NI **Mitigation** None required	**Construction** NI **Location of Project Features** NI **Operations and Maintenance** NI **Mitigation** None required
Land Use and Planning					
LAND-1: Physically divide an established community.	**Construction** N/A **Operations and Maintenance** NI	**Construction** NI **Location of Project Features** NI **Operations and Maintenance** NI **Mitigation** None required	**Construction** NI **Location of Project Features** NI **Operations and Maintenance** NI **Mitigation** None required	**Construction** NI **Location of Project Features** NI **Operations and Maintenance** NI **Mitigation** None required	**Construction** NI **Location of Project Features** NI **Operations and Maintenance** NI **Mitigation** None required
LAND-2: Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the Project adopted for the purpose of avoiding or mitigating an environmental effect.	**Construction** N/A **Operations and Maintenance** S	**Construction** NI **Location of Project Features** LTS **Operations and Maintenance** B **Mitigation** None required	**Construction** NI **Location of Project Features** LTS **Operations and Maintenance** B **Mitigation** None required	**Construction** NI **Location of Project Features** LTS **Operations and Maintenance** B **Mitigation** None required	**Construction** NI **Location of Project Features** LTS **Operations and Maintenance** B **Mitigation** None required

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Environmental Resource Issue	No Project Alternative	Tunnel Alternative (Applicant's Proposed Action)	NRCS Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
Cultural Resources					
CU-1: Potential for impacts to unidentified cultural and paleontological resources caused by ground disturbing activities.	**Construction** N/A **Operations and Maintenance** NI	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** one required
CU-2: Construction impacts to known cultural resources.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** CU-2: Avoid Known Cultural Resources during Implementation.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** CU-2: Avoid Known Cultural Resources during Implementation.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** CU-2: Avoid Known Cultural Resources during Implementation.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** CU-2: Avoid Known Cultural Resources during Implementation.
Traffic and Circulation					
TRAFFIC-1: Cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** TRAFFIC-1: Maintain Access to Local Residences and Businesses.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** TRAFFIC-1: Maintain Access to Local Residences and Businesses. TRAFFIC-1: Coordinate with Local Businesses Regarding Access.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** TRAFFIC-1: Maintain Access to Local Residences and Businesses. TRAFFIC-1: Coordinate with Local Businesses Regarding Access.	**Construction** S **Operations and Maintenance** LTSM **Mitigation** TRAFFIC-1: Maintain Access to Local Residences and Businesses.
TRAFFIC-2: Exceed, either individually or cumulatively, an LOS standard established by the County Congestion Management Agency for designated roads or highways.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required
TRAFFIC-3: Result in inadequate emergency access.	**Construction** N/A **Operations and Maintenance** S	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** TRAFFIC-1: Maintain Access to Local Residences and Businesses.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** TRAFFIC-1: Maintain Access to Local Residences and Businesses. TRAFFIC-1: Coordinate with Local Businesses Regarding Access.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** TRAFFIC-1: Maintain Access to Local Residences and Businesses. TRAFFIC-1: Coordinate with Local Businesses Regarding Access.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** TRAFFIC-1: Maintain Access to Local Residences and Businesses.
TRAFFIC-4: Conflict with adopted policies, plans, or programs supporting alternative transportation.	**Construction** N/A **Operations and Maintenance** S	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required

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Environmental Resource Issue	No Project Alternative	Tunnel Alternative (Applicant's Proposed Action)	NRCS Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
TRAFFIC-5: Fail to provide safe access; obstruct access to nearby uses, including due to the loss of parking facilities; or fail to provide for future street right-of-way.	**Construction** N/A **Operations and Maintenance** S	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** TRAFFIC-1: Maintain Access to Local Residences and Businesses. TRAFFIC-5: Coordinate with Local Businesses Regarding Parking.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** TRAFFIC-1: Maintain Access to Local Residences and Businesses. TRAFFIC-5: Coordinate with Local Businesses Regarding Parking. TRAFFIC-1: Coordinate with Local Businesses Regarding Access.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** TRAFFIC-1: Maintain Access to Local Residences and Businesses. TRAFFIC-5: Coordinate with Local Businesses Regarding Parking. TRAFFIC-1: Coordinate with Local Businesses Regarding Access.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** TRAFFIC-1: Maintain Access to Local Residences and Businesses. TRAFFIC-5: Coordinate with Local Businesses Regarding Parking.
TRAFFIC-6: Potential damage to roads due to construction- generated traffic.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** TRAFFIC-6: Repair Local Roadways to Pre-Project Conditions.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** TRAFFIC-6: Repair Local Roadways to Pre-Project Conditions.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** TRAFFIC-6: Repair Local Roadways to Pre-Project Conditions.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** TRAFFIC-6: Repair Local Roadways to Pre-Project Conditions.
Air Quality and Greenhouse Gases					
AQ-1: Conflict with or obstruct implementation of the applicable Air Quality Attainment Plan or Congestion Management Plan.	**Construction** NI **Operations and Maintenance** LTS	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required
AQ-2: Violate any stationary source air quality standard or contribute to an existing or projected air quality violation.	**Construction** NI **Operations and Maintenance** LTS	**Construction** S **Operations and Maintenance** LTS **Mitigation** AQ-2: Exhaust Emissions Reduction Measures.	**Construction** S **Operations and Maintenance** LTS **Mitigation** AQ-2: Exhaust Emissions Reduction Measures.	**Construction** S **Operations and Maintenance** LTS **Mitigation** AQ-2: Exhaust Emissions Reduction Measures.	**Construction** S **Operations and Maintenance** LTS **Mitigation** AQ-2: Exhaust Emissions Reduction Measures.
AQ-3: Result in a net increase of any criteria pollutant for which the Project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).	**Construction** NI **Operations and Maintenance** LTS	**Construction** S **Operations and Maintenance** LTS **Mitigation** AQ-2: Exhaust Emissions Reduction Measures.	**Construction** S **Operations and Maintenance** LTS **Mitigation** AQ-2: Exhaust Emissions Reduction Measures.	**Construction** S **Operations and Maintenance** LTS **Mitigation** AQ-2: Exhaust Emissions Reduction Measures.	**Construction** S **Operations and Maintenance** LTS **Mitigation** AQ-2: Exhaust Emissions Reduction Measures.
AQ-4: Expose sensitive receptors to substantial pollutant concentrations.	**Construction** NI **Operations and Maintenance** LTS	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required

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Environmental Resource Issue	No Project Alternative	Tunnel Alternative (Applicant's Proposed Action)	NRCS Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
AQ-5: Create objectionable odors affecting a substantial number of people.	**Construction** NI **Operations and Maintenance** NI	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required
GHG-1: Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.	**Construction** NI **Operations and Maintenance** LTS	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required
GHG-2: Conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.	**Construction** NI **Operations and Maintenance** LTS	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required
Noise					
NOI-1: Noise generation levels in excess of established standards.	**Construction** N/A **Operations and Maintenance** S	**Construction** S **Operations and Maintenance** S **Mitigation** NOI-1a: Reduce Noise from Construction and Operational Activity. NOI-1b: Noise and Vibration Control Plan. NOI-1c T: Notify Residents of Construction Work; Implement Noise Complaint Procedure.	**Construction** S **Operations and Maintenance** S **Mitigation** NOI-1a: Reduce Noise from Construction and Operational Activity. NOI-1b: Noise and Vibration Control Plan. NOI-1c T: Notify Residents of Construction Work; Implement Noise Complaint Procedure.	**Construction** S **Operations and Maintenance** S **Mitigation** NOI-1a: Reduce Noise from Construction and Operational Activity. NOI-1b: Noise and Vibration Control Plan. NOI-1c: Notify Residents of Construction Work; Implement Noise Complaint Procedure.	**Construction** S **Operations and Maintenance** S **Mitigation** NOI-1a: Reduce Noise from Construction and Operational Activity. NOI-1b: Noise and Vibration Control Plan. NOI-1c: Notify Residents of Construction Work; Implement Noise Complaint Procedure.
NOI-2: Generation of excessive groundborne vibration.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** S **Operations and Maintenance** LTS **Mitigation** NOI-2a: Vibration Limits. NOI-2b: Alternate Overnight Accommodations. NOI-2c: Notify Residents of Pile Driving Activities/Vibratory Compactor Use. NOI-2d: Prohibit Vibratory Pile Driving within 200 feet of Residential Structures.	**Construction** S **Operations and Maintenance** LTS **Mitigation** NOI-2a: Reduce Vibration from Construction Activity.	**Construction** S **Operations and Maintenance** LTS **Mitigation** NOI-2a: Reduce Vibration from Construction Activity.	**Construction** S **Operations and Maintenance** LTS **Mitigation** NOI-2a: Vibration Limits. NOI-2b: Alternate Overnight Accommodations. NOI-2c: Notify Residents of Pile Driving Activities/Vibratory Compactor Use. NOI-2d: Prohibit Vibratory Pile Driving within 200 feet of Residential Structures.
NOI-3: Substantial permanent increase in ambient noise levels.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required

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Environmental Resource Issue	No Project Alternative	Tunnel Alternative (Applicant's Proposed Action)	NRCS Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
NOI-4: Substantial temporary increase in ambient noise levels.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** S **Operations and Maintenance** LTS **Mitigation** NOI-1a: Reduce Noise from Construction and Operational Activity. NOI-1b: Noise and Vibration Control Plan. NOI-1c: Notify Residents of Construction Work; Implement Noise Complaint Procedure.	**Construction** S **Operations and Maintenance** LTS **Mitigation** NOI-1a: Reduce Noise from Construction and Operational Activity. NOI-1b: Noise and Vibration Control Plan. NOI-1c: Notify Residents of Construction Work; Implement Noise Complaint Procedure.	**Construction** S **Operations and Maintenance** LTS **Mitigation** NOI-1a: Reduce Noise from Construction and Operational Activity. NOI-1b: Noise and Vibration Control Plan. NOI-1c: Notify Residents of Construction Work; Implement Noise Complaint Procedure.	**Construction** S **Operations and Maintenance** LTS **Mitigation** NOI-1a: Reduce Noise from Construction and Operational Activity. NOI-1b: Noise and Vibration Control Plan. NOI-1c: Notify Residents of Construction Work; Implement Noise Complaint Procedure.
NOI-5: Excessive noise levels from public airport.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required
NOI-6: Excessive noise levels from private airstrip.	**Construction** N/A **Operations and Maintenance** NI	**Construction** NI **Operations and Maintenance** NI **Mitigation** None required	**Construction** NI **Operations and Maintenance** NI **Mitigation** None required	**Construction** NI **Operations and Maintenance** NI **Mitigation** None required	**Construction** NI **Operations and Maintenance** NI **Mitigation** None required
Aesthetic Resources					
AES-1: Substantially degrade the visual character or quality of the site or surrounding area.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan.
AES-2: Permanently and substantially obstruct or block any scenic vista or view corridor that is designated on local plans as significant or important.	**Construction** N/A **Operations and Maintenance** N/A	**Construction** NI **Operations and Maintenance** NI **Mitigation** None required	**Construction** NI **Operations and Maintenance** NI **Mitigation** None required	**Construction** NI **Operations and Maintenance** NI **Mitigation** None required	**Construction** NI **Operations and Maintenance** NI **Mitigation** None required
AES-3: Conflict with local plans and policies on protecting visual and aesthetic resources.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan.	**Construction** LTSM **Operations and Maintenance** LTS **Mitigation** BOT-1c: Prepare a Revegetation, Monitoring, and Mitigation Plan.

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Environmental Resource Issue	No Project Alternative	Tunnel Alternative (Applicant's Proposed Action)	NRCS Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
AES-4: Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area	**Construction** N/A **Operations and Maintenance** N/A	**Construction** LTSM **Operations and Maintenance** NI **Mitigation** WILD-2e: Minimize Nightwork Disruption to Wildlife.	**Construction** LTSM **Operations and Maintenance** NI **Mitigation** WILD-2e: Minimize Nightwork Disruption to Wildlife.	**Construction** LTSM **Operations and Maintenance** NI **Mitigation** WILD-2e: Minimize Nightwork Disruption to Wildlife.	**Construction** LTSM **Operations and Maintenance** NI **Mitigation** WILD-2e: Minimize Nightwork Disruption to Wildlife.
Utilities and Public Services					
UPS-1: Disrupt utility service by damaging or displacing infrastructure.	**Construction** NI **Operations and Maintenance** S	**Construction** LTSM **Operations and Maintenance** NI **Mitigation** UPS-1a: Well Replacement.	**Construction** LTSM **Operations and Maintenance** NI **Mitigation** UPS-1a: Well Replacement.	**Construction** LTSM **Operations and Maintenance** NI **Mitigation** UPS-1a: Well Replacement.	**Construction** LTSM **Operations and Maintenance** NI **Mitigation** UPS-1a: Well Replacement.
UPS-2: Served by a landfill with sufficient permitted capacity to accommodate the Project's solid waste disposal needs.	**Construction** NI **Operations and Maintenance** NI	**Construction** LTS **Operations and Maintenance** NI **Mitigation** None required	**Construction** LTS **Operations and Maintenance** NI **Mitigation** None required	**Construction** LTS **Operations and Maintenance** NI **Mitigation** None required	**Construction** LTS **Operations and Maintenance** NI **Mitigation** None required
UPS-3: Implementation of an alternative would have a significant impact on one or more of the following public services: (a) Fire protection; (b) Police protection; (c) Schools (d) Other public facilities.	**Construction** NI **Operations and Maintenance** NI	**Construction** LTSM **Operations and Maintenance** NI **Mitigation** UPS-3: Emergency Response Plan and Notification.	**Construction** LTSM **Operations and Maintenance** NI **Mitigation** UPS-3: Emergency Response Plan and Notification.	**Construction** LTSM **Operations and Maintenance** NI **Mitigation** UPS-3: Emergency Response Plan and Notification.	**Construction** LTSM **Operations and Maintenance** NI **Mitigation** UPS-3: Emergency Response Plan and Notification.
Recreation Resources					
REC-1: Disrupt access to or diminish existing recreational resources, such as parks or trails.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTSM **Location of Project Features** LTSM **Operations and Maintenance** LTS **Mitigation** REC-1a: Trail Detour. REC-1b: Recreational Facility Protection. REC-1c: Public Outreach.	**Construction** LTSM **Location of Project Features** LTSM **Operations and Maintenance** LTS **Mitigation** REC-1a: Trail Detour. REC-1b: Recreational Facility Protection. REC-1c: Public Outreach.	**Construction** LTSM **Location of Project Features** LTSM **Operations and Maintenance** LTS **Mitigation** REC-1a: Trail Detour. REC-1b: Recreational Facility Protection. REC-1c: Public Outreach.	**Construction** LTSM **Location of Project Features** LTSM **Operations and Maintenance** LTS **Mitigation** REC-1a: Trail Detour. REC-1b: Recreational Facility Protection. REC-1c: Public Outreach.
REC-2: Displace recreational users to outlying and/or other regional facilities and physically deteriorate these areas.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTS **Location of Project Features** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Location of Project Features** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Location of Project Features** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Location of Project Features** LTS **Operations and Maintenance** LTS **Mitigation** None required

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Environmental Resource Issue	No Project Alternative	Tunnel Alternative (Applicant's Proposed Action)	NRCS Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
Population and Housing					
POP-1: Induce substantial population growth in an area.	**Construction** N/A **Operations and Maintenance** NI	**Construction** NI **Operations and Maintenance** NI **Mitigation** None required	**Construction** NI **Operations and Maintenance** NI **Mitigation** None required	**Construction** NI **Operations and Maintenance** NI **Mitigation** None required	**Construction** NI **Operations and Maintenance** NI **Mitigation** None required
POP-2: Displace substantial numbers of existing housing and/or people.	**Construction** N/A **Operations and Maintenance** NI	**Construction** LTS **Operations and Maintenance** NI **Mitigation** None required	**Construction** LTS **Operations and Maintenance** NI **Mitigation** None required	**Construction** LTS **Operations and Maintenance** NI **Mitigation** None required	**Construction** LTS **Operations and Maintenance** NI **Mitigation** None required
Socioeconomic Resources					
ECON-1: Create a housing shortage, whether by inducing population growth, depleting the housing stock, or constraining future housing development.	**Construction** NI **Operations and Maintenance** NI	**Construction** NI **Operations and Maintenance** NI **Mitigation** None required	**Construction** NI **Operations and Maintenance** NI **Mitigation** None required	**Construction** NI **Operations and Maintenance** NI **Mitigation** None required	**Construction** NI **Operations and Maintenance** NI **Mitigation** None required
ECON-2: Result in substantial losses of real property, whether physically or by sustained diminution in value.	**Construction** LTS **Operations and Maintenance** NI	**Construction** LTS **Operations and Maintenance** B **Mitigation** None required	**Construction** LTS **Operations and Maintenance** B **Mitigation** None required	**Construction** LTS **Operations and Maintenance** B **Mitigation** None required	**Construction** LTS **Operations and Maintenance** B **Mitigation** None required
ECON-3: Substantially reduce employment or income.	**Construction** LTS **Operations and Maintenance** NI	**Construction** B **Operations and Maintenance** NI **Mitigation** None required	**Construction** B **Operations and Maintenance** NI **Mitigation** None required	**Construction** B **Operations and Maintenance** NI **Mitigation** None required	**Construction** LTS **Operations and Maintenance** NI **Mitigation** None required
ECON-4: Displace or substantially disrupt business operations.	**Construction** S **Operations and Maintenance** NI	**Construction** LTS **Operations and Maintenance** B **Mitigation** None required	**Construction** LTS **Operations and Maintenance** B **Mitigation** None required	**Construction** LTS **Operations and Maintenance** B **Mitigation** None required	**Construction** LTS **Operations and Maintenance** B **Mitigation** None required
ECON-5: Substantially reduce the supply of fiscal resources to local jurisdictions through property assessments and taxable sales.	**Construction** LTS **Operations and Maintenance** NI	**Construction** LTS **Operations and Maintenance** B **Mitigation** None required	**Construction** LTS **Operations and Maintenance** B **Mitigation** None required	**Construction** LTS **Operations and Maintenance** B **Mitigation** None required	**Construction** LTS **Operations and Maintenance** B **Mitigation** None required

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Environmental Resource Issue	No Project Alternative	Tunnel Alternative (Applicant's Proposed Action)	NRCS Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
Hazards and Hazardous Materials					
HAZ-1: Creation of hazard through transport, use, or disposal of hazardous material.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required
HAZ-2: Exposure of workers or the public to existing hazardous materials contamination.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** HAZ-2a: Work Site Housekeeping Procedures. HAZ-2b: Soil and Groundwater Management Plan. HAZ-2c: Existing Hazardous Site Search. HAZ-2d: Implement Recommended Phase I or Phase II Hazardous Materials Investigation and Any Required Follow- Up Remediation. HAZ-2e: Minimize the Area of Disturbance. HAZ-2f: Stop Work and Implement Hazardous Materials Investigations and Remediation in the Event that Unknown Hazardous Materials are Encountered. HAZ-2g: Conduct Asbestos and Lead Surveys for Buildings that need to be Demolished. HAZ-2h: Develop an Asbestos Dust Mitigation Plan and Implement other Actions Required by the BAAQMD ATCM. HAZ-2i: Evaluation of Soil for Reuse.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** HAZ-2a: Work Site Housekeeping Procedures. HAZ-2b: Soil and Groundwater Management Plan. HAZ-2c: Existing Hazardous Site Search. HAZ-2d: Implement Recommended Phase I or Phase II Hazardous Materials Investigation and Any Required Follow-Up Remediation. HAZ-2e: Minimize the Area of Disturbance. HAZ-2f: Stop Work and Implement Hazardous Materials Investigations and Remediation in the Event that Unknown Hazardous Materials are Encountered. HAZ-2g: Conduct Asbestos and Lead Surveys for Buildings that need to be Demolished. HAZ-2h: Develop an Asbestos Dust Mitigation Plan and Implement other Actions Required by the BAAQMD ATCM. HAZ-2i: Evaluation of Soil for Reuse.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** HAZ-2a: Work Site Housekeeping Procedures. HAZ-2b: Soil and Groundwater Management Plan. HAZ-2c: Existing Hazardous Site Search. HAZ-2d: Implement Recommended Phase I or Phase II Hazardous Materials Investigation and Any Required Follow-Up Remediation. HAZ-2e: Minimize the Area of Disturbance. HAZ-2f: Stop Work and Implement Hazardous Materials Investigations and Remediation in the Event that Unknown Hazardous Materials are Encountered. HAZ-2g: Conduct Asbestos and Lead Surveys for Buildings that need to be Demolished. HAZ-2h: Develop an Asbestos Dust Mitigation Plan and Implement other Actions Required by the BAAQMD ATCM. HAZ-2i: Evaluation of Soil for Reuse.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** HAZ-2a: Work Site Housekeeping Procedures. HAZ-2b: Soil and Groundwater Management Plan. HAZ-2c: Existing Hazardous Site Search. HAZ-2d: Implement Recommended Phase I or Phase II Hazardous Materials Investigation and Any Required Follow-Up Remediation. HAZ-2e: Minimize the Area of Disturbance. HAZ-2f: Stop Work and Implement Hazardous Materials Investigations and Remediation in the Event that Unknown Hazardous Materials are Encountered. HAZ-2g: Conduct Asbestos and Lead Surveys for Buildings that need to be Demolished. HAZ-2h: Develop an Asbestos Dust Mitigation Plan and Implement other Actions Required by the BAAQMD ATCM. HAZ-2i: Evaluation of Soil for Reuse.
HAZ-3: Generation of hazardous emissions or handling of hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** HAZ-2c: Existing Hazardous Site Search. HAZ-2e: Minimize the Area of Disturbance. HAZ-2f: Stop Work and Implement Hazardous Materials Investigations and Remediation in the Event that Unknown Hazardous Materials are Encountered. HAZ-2h: Develop an Asbestos Dust Mitigation Plan and Implement other Actions Required by the BAAQMD ATCM.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** HAZ-2c: Existing Hazardous Site Search. HAZ-2e: Minimize the Area of Disturbance. HAZ-2f: Stop Work and Implement Hazardous Materials Investigations and Remediation in the Event that Unknown Hazardous Materials are Encountered. HAZ-2h: Develop an Asbestos Dust Mitigation Plan and Implement other Actions Required by the BAAQMD ATCM.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** HAZ-2c: Existing Hazardous Site Search. HAZ-2e: Minimize the Area of Disturbance. HAZ-2f: Stop Work and Implement Hazardous Materials Investigations and Remediation in the Event that Unknown Hazardous Materials are Encountered. HAZ-2h: Develop an Asbestos Dust Mitigation Plan and Implement other Actions Required by the BAAQMD ATCM.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** HAZ 2c: Existing Hazardous Site Search. HAZ-2e: Minimize the Area of Disturbance. HAZ-2f: Stop Work and Implement Hazardous Materials Investigations and Remediation in the Event that Unknown Hazardous Materials are Encountered. HAZ-2h: Develop an Asbestos Dust Mitigation Plan and Implement other Actions Required by the BAAQMD ATCM.

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Environmental Resource Issue	No Project Alternative	Tunnel Alternative (Applicant's Proposed Action)	NRCS Alternative	Culvert/Channel Alternative	Reach 6 Bypass Alternative
HAZ-4: Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** HAZ-2c: Existing Hazardous Site Search HAZ-2d: Implement Recommended Phase I or Phase II Hazardous Materials Investigation and Any Required Follow- Up Remediation. HAZ-2e: Minimize the Area of Disturbance. HAZ-2f: Stop Work and Implement Hazardous Materials Investigations and Remediation in the Event that Unknown Hazardous Materials are Encountered.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** HAZ-2c: Existing Hazardous Site Search. HAZ-2d: Implement Recommended Phase I or Phase II Hazardous Materials Investigation and Any Required Follow-Up Remediation. HAZ-2e: Minimize the Area of Disturbance. HAZ-2f: Stop Work and Implement Hazardous Materials Investigations and Remediation in the Event that Unknown Hazardous Materials are Encountered.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** HAZ-2c: Existing Hazardous Site Search. HAZ-2d: Implement Recommended Phase I or Phase II Hazardous Materials Investigation and Any Required Follow-Up Remediation. HAZ-2e: Minimize the Area of Disturbance. HAZ-2f: Stop Work and Implement Hazardous Materials Investigations and Remediation in the Event that Unknown Hazardous Materials are Encountered.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** HAZ-2c: Existing Hazardous Site Search. HAZ-2d: Implement Recommended Phase I or Phase II Hazardous Materials Investigation and Any Required Follow-Up Remediation. HAZ-2e: Minimize the Area of Disturbance. HAZ-2f: Stop Work and Implement Hazardous Materials Investigations and Remediation in the Event that Unknown Hazardous Materials are Encountered.
HAZ-5: Potential to result in safety hazard due to location within 2 miles of a public use airport.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required
HAZ-6: Interference with emergency response or evacuation plan.	**Construction** N/A **Operations and Maintenance** S	**Construction** LTSM **Operations and Maintenance** B **Mitigation** UPS-3: Emergency Plan and Notification.	**Construction** LTSM **Operations and Maintenance** B **Mitigation** UPS-3: Emergency Plan and Notification.	**Construction** LTSM **Operations and Maintenance** B **Mitigation** UPS-3: Emergency Plan and Notification.	**Construction** LTSM **Operations and Maintenance** B **Mitigation** UPS-3: Emergency Plan and Notification.
HAZ-7: Breeding or harborage of disease vector organisms.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** HAZ-2a: Work Site Housekeeping Procedures. HAZ-7: Prepare and Implement a Mosquito and Vector Control Plan.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** HAZ-2a: Work Site Housekeeping Procedures. HAZ-7: Prepare and Implement a Mosquito and Vector Control Plan.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** HAZ-2a: Work Site Housekeeping Procedures. HAZ-7: Prepare and Implement a Mosquito and Vector Control Plan.	**Construction** LTSM **Operations and Maintenance** LTSM **Mitigation** HAZ-2a: Work Site Housekeeping Procedures. HAZ-7: Prepare and Implement a Mosquito and Vector Control Plan.
HAZ-8: Exposure of people or structures to risk of wildland fires.	**Construction** N/A **Operations and Maintenance** LTS	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required	**Construction** LTS **Operations and Maintenance** LTS **Mitigation** None required

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5.5 DESCRIPTION OF MITIGATION MEASURES

5.5.1 Geology and Soils

Mitigation Measure GEO-1a: Post Earthquake Inspections. In the aftermath of a major earthquake, the SCVWD would inspect the Project culverts, maintenance roads, and channel for any failures that require repair or remediation and implement repairs. In some circumstances, state and federal governments may provide disaster assistance to enable rapid response, funding, and resources for repairs under Federal Emergency Management Agency (FEMA) disaster assistance.

Mitigation Measure GEO-1b: *Post Earthquake Tunnel Inspection*. When an earthquake of Magnitude 3.7 (typically the smallest magnitude with visually observable damage) or greater occurs in the Project vicinity, tunnel displacement bands will be inspected for any structural instability and any necessary repairs will be made.

5.5.2 Hydrology and Water Quality

Mitigation Measure WILD-3c: *Development and Implementation of a Bat Monitoring Program and Development of Bat/Tunnel Exclusion Devices*. A bat monitoring program will be implemented upon completion of tunnel construction per the guidance of regulatory agencies and local bat experts. The monitoring program will include, but not be limited to, maintaining air flow through the tunnel to inhibit the use of the tunnel by roosting bats. Exterior grade plywood will be used to exclude bats from smaller manholes and a braided nylon net with 0.25-inch mesh suspended over larger access points (H.T. Harvey & Associates 2012a). Visual inspections by a qualified biologist for bats and bat sign (i.e., individual animals and guano) will be conducted in the tunnel annually prior to annual maintenance activities in the tunnel. If bats are detected, acoustic monitoring with AnaBat™ or Petersson units will be installed to monitor the number of bats using the tunnel. After establishing a baseline count of bats occupying the tunnel, consultation with resource agencies would be consulted to determine if further action is necessary. In the event that bats would need to be excluded from the tunnel, SCVWD staff will install one-way exits at the tunnel entrances through which the bats can leave, but cannot return. Exits will consist of netting with 1/60.25-inch mesh to prevent bats from returning. This mitigation measure would identify if bats are using the tunnel and, if so, would exclude them. This would reduce the potential for harm or injury in case of a large flood and would protect against water quality degradation.

5.5.3 Mineral Resources

Mitigation Measure MIN-2: *Inadvertent Discovery of Poppy Jasper*. If, during the course of Project construction, any deposit of poppy jasper is discovered, all work shall immediately stop within 50 feet of the discovery and a geologist shall be notified immediately. The geologist shall initiate investigation to determine the significance of the discovery. The property owner would be notified of the discovery, as they would be the legal owner of the mineral and have final decision on its disposition (Maxey Pers. Com. 2013b).

5.5.4 Botanical Resources

Mitigation Measure BOT-1a: *Conduct Focused Protocol-Level Surveys for Special-Status Plant Species*. Pre-construction protocol-level focused special-status plant surveys shall be conducted in suitable habitat for the four special-status plant species that may occur in the study area (big-scale balsamroot, Loma Prieta hoita, fragrant fritillary, and arcuate bush-mallow). These surveys shall be conducted according to the CNPS (2001), CDFG (2009), and USFWS (2003) special-status plant survey protocols. Protocols require surveys during the appropriate blooming periods of the target species to determine presence or absence. Different species flower at different times of the year; therefore, more than one survey would likely be necessary. Surveys shall include mapping any sensitive communities observed during the focused plant surveys.

Mitigation Measure BOT-1b: *Prepare a Mitigation Plan for Special-Status Plant Species*. If special-status plant species are found in the study area (see Mitigation Measure BOT-1a T), consultation shall be initiated with USFWS or CDFW to finalize a mitigation plan, as appropriate. If required, the mitigation plan shall minimally include:

- Preparation by a qualified botanist with experience in native plant restoration, mitigation, and management;
- Description of avoidance measures, such as construction setbacks, installation of exclusionary fencing prior to and during construction, and pre-construction training of construction personnel on the identification and location of these plants. If sensitive plant species can be avoided, then no further mitigation is required;
- If special-status plants cannot be avoided, compensatory mitigation for unavoidable impacts, which will include preservation or creation;
- Creation of a new population using propagules collected from the impact site or protection of an existing population at a ratio of 2 acres preserved for each acre removed or as determined in agency consultation; including clearly defined performance criteria focusing on plant establishment and non-native species control measures and locations and procedures for restoration. Plants shall be salvaged only where feasible as determined by a qualified botanist. Plant salvage will not be conducted in lieu of population creation using local propagules or population preservation.
- Specification of a minimum 5-year post-construction maintenance and monitoring plan for any plant salvage or habitat creation to ensure that the plant establishment performance criteria are met. The monitoring program shall include potential remedial action measures. Annual reports and a final report shall be prepared and submitted to USFWS or CDFW, as appropriate, to document the success of the mitigation;
- Secure a source of funding for mitigation and monitoring operations; and

- Alternatively, plant credits may be purchased at a mitigation bank at a ratio of 2:1 at a local site, or in southern Santa Clara Valley if local options are not available.

Mitigation Measure BOT-1c: *Prepare a Revegetation, Monitoring, and Mitigation Plan*. A revegetation and monitoring plan shall be prepared to compensate for impacts to wetlands, riparian woodland, Riparian Scrub-shrub, and California sycamore woodland. This plan will address on-site revegetation, as well as off-site mitigation.

The plan shall provide very specific mitigation requirements for western sycamores, including minimum number for planting, number that must meet performance criteria, very specific performance criteria (to measure vigor, height, stem diameter, period of time without irrigation, period of time without protection from herbivores, etc.), and remedial measures if trees fail.

The plan shall include the following minimum components:

- Funding
- Implementation schedule
- Limits of area for collection of propagules, including very specific requirements for western sycamores to ensure the non-hybrid stock
- Planting types and densities
- Irrigation plans
- Weed control
- Performance criteria for trees
- Performance criteria for habitat
- Reporting
- Adaptive management plan

Mitigation Measure BOT-1d: *Prepare a Monitoring Plan for West/East Little Llagas Creek*. A plan will be prepared to monitor changes to vegetation and vegetative communities in West/East Little Llagas Creek that may result from altered hydrology related to the Project. Monitoring shall be conducted for a minimum of 5 years. The Plan will include monitoring timing, methods, reporting and funding contingencies for replacement for the loss of native mature trees at a minimum 5:1 ratio.

Mitigation Measure BOT-1e: *Dispose of Invasive Non-Native Species*. When invasive non-native species are removed during construction, precautions shall be taken to prevent the spread and establishment of these species, including off-site disposal and ensuring all plant parts capable of starting new individuals are hauled off site.

5.5.5 Wildlife Resources

Mitigation Measure WILD-1a: *Vegetation Removal During Avian Non-breeding Season*. To the extent possible, vegetation will be removed during the avian non-breeding season between September 1 and February 1. If vegetation removal occurs outside of this timeframe, a general preconstruction survey for nesting bird will be conducted no more than 14 days before ground disturbance and no more than 7 days before vegetation removal to avoid disturbance to active nests, eggs, and/or young. If an active nest is discovered within the work area, a “no disturbance” buffer zone will be established around the nest until a qualified biologist has determined that all young have fledged and are independent of parental care; the buffer zone size would depend on the species, location, and placement of nest, in consultation with CDFW. The removal of vegetation will be the minimal amount necessary to achieve Project goals.

Mitigation Measure WILD-2a: *Preconstruction Surveys for Special-Status Amphibian and Reptile Species*. Preconstruction survey for special-status amphibian and reptiles will include, but not be limited to WPT and CTS. Surveys will be conducted by a qualified biologist in reaches with perennial water, standing ponds, and where in-water construction would be required. Surveyed area would also include adjacent upland habitat, including scrub and annual grassland and clearings in riparian woodland, within dispersal range of the species. Preconstruction surveys will be performed by a qualified biologist within 48-hours prior to construction activities. For areas where construction would occur within identified CTS habitat, SCVWD will consult with CDFW and USFWS to obtain authorization for activities that could affect the species and implement all applicable protection measures specified through the consultation. Protection measures shall be focused on locations where special-status species have been identified within and adjacent to the ROW and where special-status amphibian and reptiles could potentially be affected, as determined in consultation with CDFW and/or USFWS. Protection measures could include, but are not limited to, the following:

- Where impacts on potential special-status amphibians and reptile breeding habitat can be avoided, establish site-specific exclusion zones to protect these areas. Install temporary fencing around the exclusion areas with “Sensitive Habitat Area” signs posted.

- Where it is not possible to avoid work within or adjacent to potential special-status amphibians and reptile breeding sites, limit work in those areas to the period of June 1 to October 14 or From October 15 to May 31, within potential CTS dispersal habitat, minimize operation of proposed Project vehicles and equipment at night off pavement during rain events and within 24 hours following rain events. Check under vehicles parked overnight off pavement before moving them.

- From April 1 to August 31 within potential WPT dispersal habitat, minimize operation of proposed Project vehicles and equipment in upland habitat to minimize potential of crushing nests and dispersing females.

Mitigation Measure WILD-2b: *Biological Monitor for Dewatering Activities*. During clearance of the work area, after preconstruction surveys have been conducted, an on-site biological monitor will be present, from prior to start of construction activities until the site is dewatered and completely isolated. The monitor will inspect the work area to determine if any wildlife are present and have become entrapped during the dewatering. If special-status species are detected, all construction activity will cease, except as directed by the biological monitor, until these species can be captured and relocated following the guidance of the appropriate regulatory agency.

Mitigation Measure WILD-2c: *Relocate Special-status Species from Construction Area*. If special-status amphibians and reptiles, such as WPT and CTS, are found in the construction area and need to be relocated, CDFW or USFWS, as appropriate, will be notified prior to commencing the relocation effort. Prior to capturing the animals, the biologist will propose a capture method, handling procedures, and area to which the animals will be moved with the agencies listed above. The person performing the relocation will have all necessary permits for doing such work including FESA Section 10(a)(1)(A) permit. If special-status amphibian and reptile species are found, SCVWD will consult with resource agencie(s) regarding translocation to suitable habitat that will not be affected by construction activity. In the unlikely event that egg nests or suitable estivating burrows are discovered within upland habitat, the area will be flagged and a buffer will be installed until proper guidance is received from the appropriate regulatory agencie(s). If an individual is discovered, aquatic barriers will be installed and the animal will be relocated by a qualified USFWS and/or CDFW-approved biologist and excluded from the work area.

Mitigation Measure WILD-2d: *Implement Compensatory Mitigation for Special-Status Amphibians and Reptiles, including California tiger salamander*. SCVWD will provide mitigation to compensate for unavoidable impacts to special-status amphibians and reptiles and their habitat. Quantification of impacts to special-status amphibians and reptiles will be completed by determining the extent of impacts to lands that are within potentially suitable habitat based upon scientific information and occurrence or in consultation with the appropriate resource agency. The extent of impacts to suitable upland CTS habitat will guide the ratio of compensation necessary to mitigate impacts to less than significant. The ratio of and type of compensation for impacts will follow the appropriate resource agency guidance and recommendation. SCVWD will work with resource agencies to utilize the Valley HP to provide compensation for the protection, enhancement, and/or management of suitable habitat that currently supports or could support the species; mitigation lands for CTS. The suitable habitat will consist of upland habitat, must be located within Santa Clara County, and within the area where the species is thought to currently occur. Mitigation lands identification would be based on scientific information and/or in consultation with the appropriate resource agency.

Mitigation Measure WILD-2e: *Minimize Nightwork Disruption to Wild*life. Operational area boundaries should be determined prior to nightfall. As construction areas shift throughout the project, night work areas will be determined prior to construction. Illumination beyond the immediate work area will be minimized. All required lights should be shielded and pointing downward to control light beyond the immediate work area. If possible, red filters or red vellum should be placed over any lights attached to equipment. Acceptable stationary light fixtures include: Low Pressure Sodium (LPS) 18w, 35w, red, orange or amber LED (true red, orange or amber diodes, NOT filters), true red neon, other lighting sources that produce light of 560 nm or longer. Equipment shall not be operated at speeds that exceed a fast walk (< 5 mph) if off road. Noise beyond necessary operations should be minimized. Verbal communication should be at a conversational level.

Mitigation Measure WILD-2f: *Special-Status Species Environmental Awareness Training and Construction Avoidance Measures*. Worker training will be conducted to educate workers about the potential presence of special-status wildlife with potential for occurrence within and adjacent to the Project area. Training will include, but not be limited to, special-status amphibian and reptile species with potential to occur in the Project area. The training will include a brief description of special-status wildlife's listing status, identification keys, behavior, habitat, sensitivity to human disturbance, the definition of take and consequences, and Project measures to implement to protect the biological resource and prevent take of the species. Protection measures may include limiting construction activities to daylight hours (beginning when the sun rises and ending when the sun goes down in most situations), speed limits, and clean construction.

Mitigation Measure WILD-2g: *Bullfrog Population Monitoring and Control at Lake Silveira*. SCVWD will initiate a bullfrog population monitoring program prior to the restoration project construction at Lake Silveira and include three sets of day and night surveys to be conducted in the spring or early summer (i.e., the bullfrog breeding season). The three sets of day/night surveys will be repeated every 3 years. If significant increases in the bullfrog population are observed, SCVWD, in consultation with resource agencies, may undertake control measures, to reduce the population.

Mitigation Measure WILD-3a: *Preconstruction Surveys for Common and Special-status Bats prior to Removal of Trees and Removal/Replacement of Road Culverts*. If tree and building removal is undertaken during the migration season from late August through October, no additional measures are required. For tree or building removal during the breeding and maternity season from November through mid-August, preconstruction surveys of trees and structures proposed for removal within the Project area would be conducted.

Before tree and culvert removal activities occur, a qualified biologist will conduct a preconstruction survey for roosting bats in the trees scheduled for removal no more than 7 days prior to removal activities and culverts scheduled for replacement or removal no more than 7 days prior to disturbance activity. If bats, or the presence of bats (e.g., guano), are detected roosting in the trees or man-made structures identified for removal, the biologist will work with CDFW (if the bat species detected is a special-status bat species) to determine acceptable ways to minimize disturbance to roosting bats.

Project activities will avoid occupied roosts, implement non-disturbance buffers around active maternity colonies and hibernacula in consultation with wildlife agencies, and ensure safe eviction of non-breeding bats where avoidance is not feasible.

If the roost is determined to be a maternity roost, the biologist will consult with the appropriate resource agency biologists to determine appropriate measures to protect the maternity roost. Such measures could include the prohibition of removal of the maternity roost tree and trees within 250 feet of the tree until the maternity roost is no longer active.

Mitigation Measure WILD-3b: *Provide Alternative Bat Roost*. In coordination with the resource agency, to compensate for the loss of roosting trees, bat boxes will be installed in the areas of the removed roosting habitat, but at least 150 feet from construction zone. The number and location of the bat boxes will be determined in consultation with CDFW.

If a tree or structure containing special-status bats, such as pallid bat, is removed, destroyed, and its suitability to provide habitat for the bat is diminished by Project activities, then a qualified biologist will design and determine an appropriate location for an alternative roost. If a tree or structure containing a maternity roost of special-status bats is disturbed by Project activities, to the point that the disturbance causes abandonment of the roost site, then an alternative roost will be constructed. The type and placement of an alternative roost will be determined by a qualified biologist in consultation with the appropriate resource agency. The alternative roost site will be monitored until occupancy is determined (or based on guidance by the appropriate resource agency); if by that time the structure is not occupied by special-status bats, a qualified bat biologist, in consultation with CDFW, will identify alternative structures, placement locations, and monitoring lengths.

Mitigation Measure WILD-3c: *Development and Implementation of a Bat Monitoring Program and Development of Bat/Tunnel Exclusion Devices*. See 5.5.2 for description.

Mitigation Measure WILD-4: *Preconstruction Surveys for San Francisco Dusky-Footed Woodrat Nests prior to Vegetation Removal*. A preconstruction survey would be conducted for San Francisco dusky-footed woodrats and woodrat nests within a 10-foot buffer area of areas proposed for vegetation removal and areas that provide suitable habitat for the species, such as riparian forests along the West Little Llagas Creek, the confluence of Lake Silveira and West Little Llagas Creek, and East Little Llagas Creek. Pre-construction surveys will be conducted no more than 30 days prior to the period of disturbance. If wood rat nests are found, they would be reported to CDFW and flagged for avoidance. Stakes, flags, or plastic tape will be used to enforce avoidance. If any woodrat nests are found that cannot be avoided, trapping and relocation of the wood rat(s) upstream or to a suitable adjacent river or creek nearby will be implemented in consultation with CDFW. If pups are found within the nest, the nest material should be replaced until young are weaned (up to 6 weeks from birth) and are independent of parental care, at which point the nest should be dismantled and relocated.

The species' habitat is relatively widespread; impacts to woodrat habitat would not require additional species-specific mitigation. However, implementation of Mitigation Measure BOT-1c T would increase riparian habitat supporting the dusky-footed woodrat, by providing riparian mitigation that could benefit the species.

Mitigation Measure WILD-5a: *Conduct Plant Surveys for Host Plants of Special-Status Invertebrates*. Plant surveys will be conducted during the appropriate blooming period for host plants of special-status invertebrates within the Project area. Plant surveys will be conducted in annual grassland habitat (or other suitable habitat for serpentine associated plants) that would be proposed for removal or impacted by Project activities. Surveys would focus on primary host plants of special-status invertebrates and will include Plantago erecta and Platystemon californicus, as well as secondary host plants, Castilleja densilforous and C.exerta. Surveys will be conducted by a qualified biologist/botanist and if native host plants are observed the area, they will be flagged and avoided. No vegetation removal will occur within designated buffer until guidance has been provided by appropriate regulatory agencies.

Mitigation Measure WILD-5b: *Compensatory Mitigation for Impacts to Serpentine-associated Special-status Invertebrates*. If impacts to serpentine-associated special-status invertebrates cannot be avoided, SCVWD will compensate for impacts as a result of Project activities through the preservation and management of serpentine communities. Serpentine habitat will be mapped and quantification of impacts to serpentine habitat would occur will be completed by determining the extent of impacts to lands that are within potentially suitable habitat for the species based upon scientific information and occurrence or in consultation with the appropriate resource agency. Compensation for unavoidable impacts to serpentine communities will be provided through the enhancement, management, or protection of in-kind communities at a ratio identified by the appropriate resource agency. Procedures for identifying impacts to potential habitat and preservation and management of mitigation lands, will follow the guidance and recommendation of appropriate resource agencies. Prior to Project implementation, a management and monitoring plan will be developed in consultation with the USFWS or appropriate resource agency.

Mitigation Measure WILD-6: *Implementation of USFWS Standardized Recommendations for Protection of the San Joaquin Kit Fox prior to or during Ground Disturbance*. To prevent the potential take and avoid any short- or long-term impact to San Joaquin kit fox, SCVWD will comply with BMPs outlined in the USFWS Standardized Recommendations for Protection of the San Joaquin Kit Fox prior to or during Ground Disturbance (USFWS 1999) during the construction phase of the Project to mitigate for potential impacts. Recommended measures include:

- Restrict Project-related vehicle traffic to established roads or other designated areas onsite. Vehicles should observe a 20 MPH speed limit in all Project areas (except on paved pre-existing roads with an established speed limit). Off-road traffic outside of the designated Project areas should be prohibited;

- All excavated, steep-walled holes or trenches more than 2 feet deep shall be covered at the close of each working day by plywood or similar materials or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, each shall be thoroughly inspected for trapped animals that should be allowed to escape before proceeding;

- All construction pipes, culverts, or similar structures with a diameter of 4 inches or greater that are stored open onsite for one or more nights shall be thoroughly inspected for animals before the pipe is subsequently buried, capped, or otherwise used or moved in any way;

- All food-related trash items, such as wrappers, cans, bottles, and food scraps, shall be disposed of in closed containers and removed at least once a week from the Project site;

- No firearms shall be allowed on the Project site; and

- No pets (i.e., dogs, cats, etc.) shall be permitted onsite.

If a kit fox is found onsite, all work within the area should cease until a qualified biologist, approved by the Applicant, is notified in order to outline additional avoidance measures to be implemented, as well as consult with regulatory agencies (USFWS and CDFW). Any recommendations from the agencies shall be implemented.

5.5.6 Aquatic Resources

Mitigation Measure AQUA-1: *Construction of Fish Exclusion Barrier at the Downstream End of Reach 14*. To mitigate the potential migration of adult steelhead into Reach 14, a fish exclusion barrier would be constructed at the downstream end of the reach. The exclusion barrier would be designed following the criteria and guidelines in Anadromous Salmonid Passage Facility Design (NMFS 2008) for exclusion barriers.

Mitigation Measure AQUA-1a: *Steelhead Passage: Channel and Structure Design*. To mitigate the potential passage impediment through the Project area, final channel design will incorporate criteria from Anadromous Salmonid Passage Facility Design (NMFS 2008). Detailed within this document are criteria, rationale, and guidelines for designing proper fish passage. Designing instream structures to allow fish passage requires site-specific analysis of each type of structure in addition to analysis of hydrology information and river morphology trends, as well as biological information including life stage, run size, and period of migration. Passage for adult salmonid through different types of instream structures would be obtained by following type specific criteria and guidelines, and analyzing site-specific attributes to maintain water velocities of less than 3 to 4 meters per second, fall heights of less than 3 meters, and depth of pools below the falls at least 1.25 times the fall height (Bjornn and Reiser 1991).

Mitigation Measure AQUA-1b: *Steelhead Passage: Inspection of In-channel of Large Woody Debris prior to Removal for Management of Flood Conveyance Channels*. To mitigate the potential removal and loss of in-channel LWD that may be used as hydraulic refuge for upstream migrating adult salmonids, size criteria will be developed whereby in-channel LWD above the size criteria would be inspected prior to removal for flood conveyance. Pieces of wood below the size criteria would not require inspection prior to removal. LWD above the size criteria will be inspected to determine if it poses an erosion hazard of flood threat, and a biologist will assess if it is ecologically important to the channel. If determined not to be a threat, the LWD will remain in the channel but may be modified to prevent debris capture, bank scour, or aggradation. If determined to be a threat, the LWD will be removed and replaced, removed from the channel permanently, or moved to a nearby instream location that reduces flood hazard and maintains ecological function.

Mitigation Measure AQUA-2a: *Preconstruction Surveys prior to In-channel Construction*. Perform preconstruction surveys in areas where in-water construction would be required during steelhead spawning periods prior to January 1. Preconstruction surveys will be performed by a qualified biologist to determine if steelhead are present or have recently spawned (as indicated by the presence of redds) in the construction area. Steelhead surveys will consist of visual surveys. If present and not spawning, steelhead will be captured and relocated to areas of suitable habitat that will not be affected by the construction activity. If the steelhead are spawning or a redd is detected in the proposed work area; work would cease until such time that work would not impact the redd.

Mitigation Measure AQUA-2b: *Biological Monitor for Dewatering Activities*. During the isolation of the work area, after preconstruction surveys have been conducted, an on-site biological monitor will be present during all working hours from prior to the time activities to isolate the site begin until the site is dewatered and completely isolated. The monitor will inspect the work area to determine if any spawning steelhead or redds are present during the dewatering. If either are detected, all construction activity will cease, except as directed by the monitor, until the individual can be captured and relocated or until such time that work would not impact the redd.

5.5.7 Agricultural and Forest Resources

Mitigation Measure AG-1a: *Agricultural Soil Amendments and Treatments*. For areas converted temporarily for construction, the SCVWD would rip and disk the ground after Project work is completed as to not leave the area in a compacted state after construction is complete. The landowner would be consulted as to the necessary depth of the sub-soiling. Additionally, soil amendments, such as compost, could be added to the lands to return the soil to its original or better texture and tilth.

Mitigation Measure AG-1b: *Agricultural Conversion Offsets*. For each acre of Prime Farmland, Unique Farmland, and Farmland of Statewide Importance that is permanently converted to nonagricultural use, the SCVWD will offset (at a 1:1 ratio) the conversion of these lands by either contributing to a fund that protects agricultural land at current market value or acquiring the land. SCVWD could collaborate with other local governmental agencies, including cities, the county, Santa Clara County Open Space Authority, and/or non-profits, including the Santa Clara County Farm Bureau, to identify lands suitable for mitigation. In the event that active agricultural lands currently designated as Important Farmlands are not available within the county, SCVWD could work with the aforementioned agencies and organizations to develop an alternative to compensate for the conversion of these Important Farmlands by the Project. For example, SCVWD could also consider contributing to local or regional land conservation banking program or organization. Additionally, SCVWD could purchase off-site conservation easements at the same 1:1 ratio.

Mitigation Measure AG-2: *Williamson Act Lands Conversion Offsets*. For each acre of Williamson Act Lands that is converted as a part of this alternative, the SCVWD will offset (at a 1:1 ratio) the conversion of these lands by either contributing to a fund that protects agricultural land at current market value or acquiring the land. Lands that are classified both as FMMP and Williamson Act lands would not be subject to double mitigation. As such, SCVWD would only need to mitigate for these lands at a 1:1 ratio. SCVWD could work with existing growers in the county and the Farm Bureau along with local agencies, such as the Santa Clara County Department of Agriculture and the Santa Clara County Open Space Authority, to identify lands eligible for Williamson Act classification. SCVWD could work with these entities and landowner(s) to enter these lands under Williamson Act contracts to mitigate for the loss of these lands under this alternative. Given the partial overlap of Williamson Act Lands and other Important Farmlands, this mitigation measure should be implemented in conjunction with Mitigation Measure AG-1b T.

5.5.8 Land Use and Planning

None required.

5.5.9 Cultural Resources

Mitigation Measure CU-2: *Avoid Known Cultural Resources during Implementation*. A qualified archeologist will mark site boundaries of known cultural resources prior to the start of construction to avoid these resources. A qualified archaeologist shall be on call through the duration of the Project and shall be on site during activities occurring within 100 feet of known cultural resources. The archaeologist shall have the authority to stop work if Project construction impacts cultural resources.

5.5.10 Traffic and Circulation

Mitigation Measure TRAFFIC-1 NRCS: *Coordinate with Local Businesses Regarding Access*. Where construction will take place along Monterey Road in downtown Morgan Hill (Reach 8), the Applicant shall work with the construction contractors and the local business owners to ensure that employee and patron access is maintained at all times during business hours. Prior to any construction activities in Reach 8 that would affect the downtown area, the Applicant shall develop an access mitigation plan that specifically defines the areas of the sidewalk/street affected by Project construction and includes provisions to ensure that customers can park and walk to those businesses. These provisions should include, but not be limited to, signage stating that "Businesses are Open During Construction," signage directing motorists to alternate parking locations on side streets, and detour signage for any segments of sidewalk that are closed during construction. A public meeting or other outreach efforts shall be conducted to ensure that local business owners are provided an opportunity to review these provisions and discuss Project impacts prior to the start of construction. The SCVWD shall conduct the construction operations in a manner that will cause as little inconvenience as possible to adjacent property owners. Mitigation shall accomplish the following:

- Convenient access by vehicles and pedestrians to driveways, houses, buildings, and businesses shall be maintained in operational condition; and temporary approaches to crossings or intersecting streets shall be provided and kept in good condition.

- When construction operation is directly within a driveway area, the SCVWD shall provide temporary access. The existing access shall not be closed until the temporary replacement access is usable. Once construction is completed, access shall be restored to a condition equal to or better than the existing condition prior to the operation.

Mitigation Measure TRAFFIC-1: *Maintain Access to Local Residences and Businesses*. The SCVWD shall include specifications for vehicle and pedestrian access control during construction activities that would serve as mitigation as follows:

- Convenient access by vehicles and pedestrians to driveways, houses, buildings, and businesses along the work shall be maintained in operational condition and temporary approaches to crossings or intersecting streets shall be provided and kept in good condition.

- When construction operation is directly within the driveway area, the SCVWD must provide temporary access. The existing access shall not be closed until the temporary replacement access is usable. Once construction is completed, restore access to a condition equal to or better than the existing condition prior to the operation.

Mitigation Measure TRAFFIC-5: *Coordinate with Local Business Regarding Parking*. The Applicant and its contractors shall work with the operators/business owners, such as the Morgan Hill Plaza Shopping Center, to ensure that sufficient customer parking is maintained for those businesses during Project construction. Prior to any construction activities, the SCVWD shall develop a circulation and parking mitigation plan that specifically defines the areas of the parking lot that will affect the Morgan Hill Plaza shopping center and any other Project locations where construction may affect parking that is used to access local residences or businesses. The mitigation shall provide temporary restriping of remaining parking areas to provide additional spaces, if necessary and temporary restriping of circulation drive aisles, as needed. Construction vehicle and equipment staging and storage shall be limited to the immediate construction area to the extent feasible so as not to affect customer vehicle traffic.

Mitigation Measure TRAFFIC-6: *Repair Local Roadways to Pre-Project Conditions*. The SCVWD will consult with Santa Clara County and the City of Morgan Hill before the start of construction to discuss use of local roadways as haul routes. The SCVWD shall document the existing condition of the roads and haul routes. Following construction, SCVWD will consult with Santa Clara County and the City of Morgan Hill and will repair any damage to local roads that occurred as a result of construction activities. If it is determined that the Project construction activities caused road damage along haul routes, then those roads will be restored to pre-Project conditions immediately after all construction work using a haul road has been completed. If there is interim damage identified to a roadway segment on a haul route prior to completion of Project construction that requires repairs, then the County and City will consult with SCVWD and determine if temporary repairs are needed until the Project construction is completed and the SCVWD can implement a permanent repair of the road.

5.5.11 Air Quality and Greenhouse Gases

Mitigation Measure AQ-2: *Exhaust Emissions Reduction Measures*. The Applicant and its contractor(s) shall implement the following measures during construction of all Project activities to reduce construction-related exhaust emissions:

- Idling time of diesel powered construction equipment shall be minimized by shutting equipment off when not in use and reducing idling time to two minutes. Clear signage shall be provided for construction workers at all access points.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked and determined to be running in proper condition prior to operations.
- All diesel-powered construction equipment shall be in compliance with the In-Use Off-Road Diesel-Fueled Fleets Rule and all portable equipment shall be in compliance with PERP as effective and applicable at the time construction work is performed (see Section 3.11.3.5).

5.5.12 Noise

Mitigation Measure NOI-1a: *Reduce Noise from Construction and Operational Activity*. Use noise-reducing enclosures around stationary noise-generating equipment capable of 6-dB attenuation and take advantage of existing barrier features, including material stockpiles, to block sound transmission.

Mitigation Measure NOI-1b: *Noise and Vibration Control Plan.* Prepare a Noise and Vibration Control Plan that will include noise control measures to achieve compliance with applicable noise performance standards for non-tunnel construction activity (as the Noise and Vibration Control Plan listed in BMPs above are related to tunnel construction only).

Mitigation Measure NOI-1c: *Notify Residents of Construction Work; Implement Noise Complaint Procedure*. Before construction, the SCWVD shall send out a notice to residences within 1,500 feet of the Project work areas, which will include the proposed start date and contact information for reporting complaints related to noise. The Applicant will designate a Project liaison to respond to noise complaints during construction.

Mitigation Measures NOI-2a: *Vibration Limits*. The Applicant will incorporate restrictions on controlled detonations into the contract specifications. Ground surface vibration shall be limited to 0.5 in/sec PPV, measured at the nearest residential structure or nearby location of comparable slant distance; if it is not possible to measure at a comparable slant distance, then the vibration should be monitored at several distances to verify the propagation curve and to provide a reliable estimate at the structure. Prior to use of controlled detonations, the contractor shall perform tests to determine the vibration dampening properties of the rock. This information will be used to control the vibration from controlled detonations to within the required PPV limit of 0.5 in/sec. Such tests may include small test blasts in sealed borings to measure vibration attenuation. The contract specifications shall also limit blast overpressure to 0.0145 psi or 134 dB at nearby residences. The contract specifications shall require the contractor to notify neighbors at the portals within 500 feet of near-surface detonation activity of the construction activity schedule and to advise residents to remove precious and fragile items from walls and shelves. The contract specifications shall require the contractor to notify neighbors within 500 feet slant distance of underground detonation activity (away from the portals) of construction activity schedules.

Mitigation Measures NOI-2b: *Alternate Overnight Accommodations*. If construction monitoring indicates that the tunnel excavation would exceed nighttime disturbance (annoyance) criteria and no other feasible mitigation is available, the Applicant shall offer to provide alternate sleeping accommodations for the impacted residents for the nights that the tunneling operations would be within the confirmed impact zone.

Mitigation Measures NOI-2c: *Notify Residents of Pile Driving Activities/Vibratory Compactor Use*. Notify residents within 25 feet of any access road or within 200 feet of any impact pile driving or vibratory compactor activities regarding the potential for perceptible vibration. Advise them that vibration from vibratory compactors or impact pile driving activities temporarily operating along nearby haul roads may cause objects on walls and shelves to move and encourage them to move precious and fragile items off walls and shelves.

Mitigation Measures NOI-2d: *Prohibit Vibratory Pile Driving within 200 feet of Residential Structures*. The Applicant shall limit the use of vibratory pile driving equipment to greater than 200 feet away from residential structures.

5.5.13 Aesthetic Resources

Mitigation Measure BOT-1c: *Prepare a Revegetation, Monitoring, and Mitigation Plan*. A revegetation and monitoring plan shall be prepared to compensate for impacts to wetlands, riparian woodland, Riparian Scrub-shrub, and California sycamore woodland. This plan will address on-site revegetation, as well as off-site mitigation.

The plan shall provide very specific mitigation requirements for western sycamores, including minimum number for planting, number that must meet performance criteria, very specific performance criteria (to measure vigor, height, stem diameter, period of time without irrigation, period of time without protection from herbivores, etc.), and remedial measures if trees fail.

The plan shall include the following minimum components:

- Funding
- Implementation schedule
- Limits of area for collection of propagules, including very specific requirements for western sycamores to ensure the non-hybrid stock
- Planting types and densities
- Irrigation plans
- Weed control
- Performance criteria for trees
- Performance criteria for habitat
- Reporting
- Adaptive management plan

Mitigation Measure WILD-2e: *Minimize Nightwork Disruption to Wildlife*. See Section 5.5.5 for description.

5.5.14 Utilities and Public Services

Mitigation Measure UPS-1: *Well Replacement*. The SCVWD will identify wells, if any, that may be impacted by construction and will make a new well operable or provide an equally reliable source of water to the current well owner or operator prior to the construction activities that would interrupt the service of the original well.

Mitigation Measure UPS-3: *Emergency Response Plan and Notification*. The SCVWD will develop an emergency response plan, which would include:

- A map of all underground and above ground utilities;
- A response plan for potential damage to infrastructure including identification of other close proximity utilities; and
- A detailed construction schedule with locations of construction and alternative routes identified for emergency responders.

This plan will be developed in consultation with emergency responders prior to construction and the implementation of the response plan. The response plan will determine if the road closures may affect emergency response times and SCVWD will work with local police, sheriff, and fire protection services to address their concerns, if any. The plan will be updated if construction schedules change to reduce response time delays that could result from lack of information of construction on arterial or collector roads used by emergency response.

5.5.15 Recreation Resources

Mitigation Measure REC-1a: *Trail Detour*. The Applicant will work with the City of Morgan Hill to determine an alternate route for the trail through city streets until the city decides that they will re-establish the paved trail in the future. The detour trail would be on sidewalks and city streets with signage and markings to delineate the detour.

Mitigation Measure REC-1b: *Recreational Facility Protection*. Public recreational lands or facilities within or close to the Project footprint should be avoided during construction, if possible. If a public recreational facility is impacted during construction, SCVWD will return the facility to equal or better condition after construction is completed. If parking areas are impacted during or after Project construction, alternative parking will be provided. If a facility is completely closed due to Project construction, SCVWD will, to the best extent possible, limit the amount of time of the closure or target the closure for times of lower park use. If it is determined that parklands or parking areas would need to be closed for an extended time period, the viability of developing a temporary opportunity in lieu of the closed facility should be considered and provided, if possible. This mitigation measure would not apply to SCVWD owned lands, including the West Llagas Trail.

Mitigation Measure REC-1c: *Public Outreach*. If a park or trail is impacted during construction, an outreach plan will be developed to inform the public before the closure or access limitation. Outreach will be conducted by posting flyers or informational boards at parks or other public spaces, posting information on pertinent websites or in a newspaper. The outreach information will inform residents and park visitors about the purpose of the construction, the length of time expected to complete the Project, and of similar recreational opportunities in the vicinity of the study area.

5.5.16 Population and Housing

One less-than-significant impact was identified for each of the action alternatives. The less-than-significant impact is associated with the removal of residences, and the subsequent displacement of the residents due to construction of the various proposed Project features. The Tunnel Alternative and the Reach 6 Bypass Alternative would result in the displacement of individuals who live in three residences which is less than the NRCS (12 residences) and Culvert/Channel (7 residences) Alternatives.

The Applicant's Proposed Action requires removal of three residences. To mitigate impacts, appropriate compensation will be provided to the owners for the loss of their residences as well as finding them new residences through the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.

5.5.17 Socioeconomic Resources

At over $80 million annually, greenhouse nursery production is the highest gross value crop in Santa Clara County. While these displacements are not expected to be substantially disruptive of business within the Project area as a whole, they could result in substantial disruptions to individual operations and owners. Relocation efforts, complying with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, would ensure the business operations are not significantly affected and owners are appropriately compensated for the disruption during relocation. Any business closure associated with relocation would be temporary. There is no additional mitigation required beyond compliance with the Act.

However, to mitigate impacts to greenhouse corps, besides compensating the owners for their land, for the improvements (greenhouse structures and any appurtenances) within the required project right of way, compensation is to also be granted for the loss of the crops/plants in their growing cycle beyond a year. For crops with a year or less growing cycle, included in the acquisition process, the Applicant will issue the owner a permit to allow the owner to operate and maintain their greenhouse until the crops/plants have been harvested.

5.5.18 Hazards and Hazardous Materials

Mitigation Measure HAZ-2a: *Work Site Housekeeping Procedures*. To reduce impacts related to unknown hazardous materials releases from construction and operations and maintenance, the following measures will be implemented:

- The work site, areas adjacent to the work site, and access roads will be maintained in an orderly condition, free and clear from debris and discarded materials. Personnel will not sweep, grade, or flush surplus materials, rubbish, debris, or dust into storm drains or waterways.
- Upon completion of work, all building materials, debris, unused materials, concrete forms, and other construction-related materials will be removed from the work site.

- To prevent mosquito breeding on construction sites, the Applicant will ensure that surface water is gone within 4 days (96 hours). All outdoor grounds will be examined and unnecessary water that may stand longer than 96 hours will be drained. Construction personnel will properly dispose of unwanted or unused artificial containers and tires. If possible, any container or object that holds standing water that must remain outdoors will be covered, inverted, or have drainage holes drilled.

Mitigation Measure HAZ-2b: *Soil and Groundwater Management Plan*. Prior to ground breaking activities, the SCVWD shall include in construction specifications the implementation of a Soil and Groundwater Management Plan (SGMP) prepared by state registered hazardous waste investigation and remediation professionals. The SGMP shall be present on site at all times and readily available to site workers. The SGMP shall include a health and safety plan, emergency notification protocols, and handling and sampling procedures for site workers in accordance with OSHA and Santa Clara County Hazardous Materials Compliance Division requirements. The SGMP shall also describe protocols for offsite disposal of contaminated soils or groundwater. In addition, the SGMP shall include coordination and notification protocols and requirements for any inadvertent releases of hazardous materials within the vicinity of any schools.

Mitigation Measure HAZ-2c: *Existing Hazardous Site Search*. Prior to construction, and for maintenance activities as part of its annual preparation of the Notice of Proposed Work (NPW), the Applicant will conduct a search for existing known contaminated sites on the State Water Resource Control Board's GeoTracker Web site (http://www.geotracker.waterboards.ca.gov). The GeoTracker search will only be performed for the SCVWD's ground disturbing activities. For any proposed ground disturbing maintenance sites located within 1,500 feet of any "open" sites where contamination has not been remediated, the SCVWD will contact the RWQCB case manager listed in the database. The Applicant will work with the case manager to ensure construction and maintenance activities would not affect cleanup or monitoring activities or threaten the public or environment.

Mitigation Measure HAZ-2d: *Implement Recommended Phase I or Phase II Hazardous Materials Investigation and Any Required Follow-Up Remediation*. Prior to Project-related groundbreaking at sites for which a Level I/Phase I investigation has identified the need for a Phase II investigation within the Project footprint, the Applicant would conduct a Phase II hazardous materials investigation consistent with all applicable federal, state, and local codes and regulations. The Applicant would also be responsible for ensuring that all recommendations of the Phase II investigation, including site remediation and/or additional coordination with regulatory agencies, would be implemented consistent with the Phase II and all applicable codes, standards, and regulations. If waste disposal is necessary, the Applicant will ensure that all hazardous materials removed during construction would be handled and disposed of by a licensed waste-disposal contractor and transported by a licensed hauler to an appropriately licensed and permitted disposal or recycling facility, in accordance with local, state, and federal requirements.

Mitigation Measure HAZ-2e: *Minimize the Area of Disturbance*. To minimize potential impacts from unknown soil contamination, soil disturbance will be kept to the minimum footprint necessary to complete the construction or maintenance activity.

Mitigation Measure HAZ-2f: *Stop Work and Implement Hazardous Materials Investigations and Remediation in the Event that Unknown Hazardous Materials are Encountered*. In the event that unknown hazardous materials are encountered during construction or maintenance activities, all work in the area of the discovery will stop and the Applicant will conduct a Phase II hazardous materials investigation to identify the nature and extent of contamination and evaluate potential impacts on Project construction and human health.

If no Phase I investigation was previously conducted and is identified as appropriate, it may be done concurrent with or prior to Phase II. If necessary, based on the outcomes of the Phase II investigation, the Applicant will implement Phase III remediation measures consistent with all applicable local, state, and federal codes and regulations.

Construction in areas known or reasonably suspected to be contaminated will not resume until remediation is complete. If waste disposal is necessary, the Applicant will ensure that all hazardous materials removed during construction are handled and disposed of by a licensed waste-disposal contractor and transported by a licensed hauler to an appropriately licensed and permitted disposal or recycling facility, in accordance with local, state, and federal requirements.

Mitigation Measure HAZ-2g: *Conduct Asbestos and Lead Surveys for Buildings that need to be Demolished*. Prior to construction, the SCVWD would conduct an asbestos and lead-based paint survey of any buildings that need to be demolished or relocated and verify that soil around the building(s) is free of lead chips. If asbestos is found, proper disposal methods would be implemented as described under BMP HM-12, Assure Proper Hazardous Materials Management.

Mitigation Measure HAZ-2h: *Develop an Asbestos Dust Mitigation Plan and Implement other Actions Required by the BAAQMD ATCM*. In the event of an unanticipated discovery of NOA, work will be stopped, and the SCVWD will develop an Asbestos Dust Mitigation Plan to minimize emissions. The following types of operations are subject to the indicated control, administrative, and reporting requirements under the asbestos BAAQMD ATCM for construction and grading operations:

- For Construction and Grading Operations that will disturb more than 1 acre:
    - o Prepare and obtain BAAQMD approval for an Asbestos Dust Mitigation Plan prior to any construction or grading activity;
    - o The Asbestos Dust Mitigation Plan must specify how the operation will minimize emissions and must address specific emission sources; and

- o Prevent visible emissions from crossing the project boundaries regardless of the size of the disturbance.

- For Construction and Grading Operations that will disturb 1 acre or less:
  - o Vehicle speed is limited to 15 mph or less; Water must be applied prior to and during ground disturbance;
  - o Keep storage piles wet or covered; and
  - o Track-out prevention and removal.

- For Road Construction and Operations and Maintenance:
  - o Must use dust control measures for a specified set of emission sources;
  - o Prevent visible emissions from crossing the project boundaries; and
  - o The BAAQMD must be notified before any work begins.

Mitigation Measure HAZ-2i: Evaluation of Soil for Reuse. Prior to construction, the Applicant will perform a limited risk assessment to determine whether constituents in soil may affect sensitive ecological receptors' or impact water quality objectives. Specifically, arsenic, cobalt, nickel, and vanadium are present in soils in study area at levels that exceed ESLs established by RWQCB-SF on the basis of the Urban Area Ecotoxicity Exposure Criteria. Nickel concentrations in soil also exceed commonly used screening values (for San Francisco Bay sediments) for surface and foundation material used in wetland creation (Weiss 2011). Although the Proposed Project is in the CCRWQCB, they do not have established ESLs for ecotoxicity, so the San Francisco ESLs will be utilized in the absence of CCRWQCB standards.

The concentrations of arsenic, cobalt, nickel, and vanadium should be evaluated to ensure that soil reuse will meet the water quality objectives established in the Basin Plan and will not impair the beneficial uses of the East Little Llagas Creek, West Little Llagas Creek, Llagas Creek, or downstream water bodies.

5.5.19 Environmental Justice

At over $80 million annually, greenhouse nursery production is the highest gross value crop in Santa Clara County. While these displacements are not expected to be substantially disruptive of business within the Project area as a whole, they could result in substantial disruptions to individual operations and owners. Relocation efforts, complying with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, would ensure the business operations are not significantly affected and owners are appropriately compensated for the disruption during relocation. Any business closure associated with relocation would be temporary. There is no additional mitigation required beyond compliance with the Act.

However, to mitigate impacts to greenhouse corps, besides compensating the owners for their land, for the improvements (greenhouse structures and any appurtenances) within the required project right of way, compensation is also to be granted for the loss of the crops/plants in their growing cycle beyond a year. For crops with a year or less growing cycle, included in the acquisition process, the Applicant will issue the owner a permit to allow the owner to operate and maintain their greenhouse until the crops/plants have been harvested.

5.6 BEST MANAGEMENT PRACTICES (BMPS)

In addition to the specific mitigation measuring detailed in this chapter, to protect, restore and mitigate any further impacts to waters of the US the Applicant has prepared for implementation a list of Best Management Practices. The BMPs for maintenance (no action alternative) are located in Appendix B with a comprehensive list of additional BMPs located in Appendix C of this EIS.

5.7 SUMMARY

The District Engineer adds special conditions to DA permits when such conditions are necessary to satisfy legal requirements or to otherwise satisfy the public interest requirement. Permit conditions are directly related to the impacts of the proposal and appropriate to the scope and degree of those impacts. The mitigation measures discussed in the Chapter were developed by the Applicant in coordination with resource agencies to minimize the Project’s effect on the environment. Additional mitigation measures may be developed as a result of public and agency review of this Draft EIS and review and evaluation of the DA permit application. Mitigation measures necessary to ensure the project is not contrary to public interest as well as a requirement for adhering to the terms and conditions to implement reasonable and prudent measures associated with ‘incidental take” of any federally listed species would be incorporated as special conditions of any issued permit. Regulatory permits also include specific conditions that contain the compensatory mitigation requirements including performance standards for measuring success and assurances for long-term maintenance. Concurrent with the EIS and as part of the evaluation of the DA permit application, the USACE will determine if the Applicant’s proposed compensatory mitigation plan is sufficient to offset unavoidable impacts to aquatic resources as a result of the Proposed Action. Prior to issuance of any permit, the Applicant would be required to submit a final mitigation plan determined by the USACE to meet the requirements of 33 C.F.R. Part 332. A final mitigation plan would include corrective actions/adaptive management and evaluation of sufficient financial assurances for the performance of all obligations, covenants, terms, conditions, and agreements required under any issued permit.

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CHAPTER 6 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

This chapter provides a description of the major Federal regulations and Executive orders that may currently or in the future apply to the various alternatives analyzed in this *Upper Llagas Creek Project Environmental Impact Statement (Upper Llagas EIS)*.

6.1 NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

The National Environmental Policy Act (NEPA) of 1969 (42 United States Code [U.S.C.] § 4321 et seq.) establishes a national policy requiring that Federal agencies consider the environmental impacts of major Federal actions significantly affecting the quality of the human environment before making decisions and taking actions to implement those decisions. Implementations of NEPA requirements in accordance with Council on Environmental Quality (CEQ) regulations (Title 40 of the *Code of Federal Regulations* [C.F.R.] Parts 1500 through 1508 [40 C.F.R. Part 1500-1508]) can result in a Categorical Exclusion, an environmental assessment, a Finding of No Significant Impact, or an environmental impact statement (EIS). This EIS has been prepared in accordance with NEPA requirements, CEQ regulations (40 C.F.R. Part 1500 et seq.), U.S. Army Corps of Engineers (USACE) provisions for implementing the procedural requirements of NEPA (33 C.F.R. Part 230; USACE Engineering Regulation ER 200-2-2); and the NEPA Implementation Procedures for the Regulatory Program (Appendix B of 33 C.F.R. Part 325).

NEPA requires federal agencies to cooperate with other federal agencies, state and local governments, and to involve public stakeholders or citizens. Chapter 7 and Appendix D document the public involvement process as part of this EIS.

6.2 ENDANGERED SPECIES ACT OF 1973

Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531), requires federal agencies to consult with the U.S. Fish and Wildlife Service of the Department of the Interior and/or the National Marine Fisheries Service of the Department of Commerce (Services) to ensure that agency actions do not jeopardize the continued existence of endangered or threatened species or adversely modify critical habitat that supports such species. Species are listed as endangered if found to be in danger of extinction throughout all or a significant portion of their ranges; species are listed as threatened if they are likely to become endangered within the foreseeable future. The ESA also protects designated critical habitat for listed species, which are areas of physical or biological features essential to the conservation of the species and which may require special management considerations.

Chapter 3 of the EIS documents listed species and critical habitat within the proposed action area and Chapter 4 of the EIS assess effects to listed species as a result of the proposed action including effects from construction of flood protection components, mitigation, and ongoing vegetation maintenance. Coordination with the Services has been ongoing as described in Chapter 7 and Appendix D. Concurrent with the public and agency review comment period of this EIS, the USACE will request initiation of consultation with the Services pursuant to Section 7 of the ESA.

6.3 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT OF 1996

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) mandated the National Marine Fisheries Service (NMFS) and Fisheries Management Councils to include the identification and protection of essential fish habitat (EFH) in all federal fishery management plans. The Magnuson-Stevens Act requires all federal agencies to consult with NMFS for any federally permitted, funded, or proposed work that may adversely affect EFH. EFH is defined as "waters and substrate necessary for spawning, breeding, feeding, or growth to maturity." The phrase "adversely affect" refers to any impact that reduces the quality or quantity of EFH. As documented in Chapter 3 and Appendix D, no EFH exists within the project area.

The Magnuson-Stevens Act states that consultation regarding EFH should be consolidated, where appropriate, with the interagency consultation, coordination, and environmental review procedures required by other federal statutes, such as NEPA, the Fish and Wildlife Coordination Act, and the ESA. EFH consultation requirements can be satisfied through concurrent environmental compliance requirements.

6.4 FISH AND WILDLIFE COORDINATION ACT (FWCA)

The FWCA (16 U.S.C. § 661 et seq.), amended 1946, 1958, 1978, and 1995, requires federal agencies to consult with the USFWS or, in some instances, with NMFS and with state fish and wildlife resource agencies before undertaking or approving water projects that control or modify surface water. The purpose of this consultation is to ensure that wildlife resources held in public trust receive appropriate consideration and be coordinated with the features of these water resource development projects. Federal agencies undertaking water projects are required to fully consider recommendations made by the USFWS, NMFS, and state fish and wildlife resource agencies in Project reports, such as documents prepared to comply with NEPA and to include measures to reduce impacts on wildlife in Project plans.

6.5 MIGRATORY BIRD TREATY ACT (MBTA)

The MBTA (16 U.S.C. § 703 et seq.) implements various treaties and conventions among the United States, Canada, Japan, Mexico, and Russia; providing protection for migratory birds as defined in 16 U.S.C. § 715j. The MBTA makes it unlawful for any "person" to take, kill, capture, collect, possess, buy, sell, trade, ship, import, or export any migratory bird, including feathers, parts, nests, or eggs. The MBTA does not protect the habitat of migratory birds. Violations of the MBTA are considered criminal offenses.

Case law from 1977 held that federal agencies are not considered persons under the MBTA and are considered exempt from its provisions. Therefore, the provisions of the MBTA do not regulate the USACE activities. SCVWD activities, however, continue to be regulated by the MBTA.

6.6 CLEAN WATER ACT OF 1972 (CWA)

The U.S. Environmental Protection Agency (USEPA) is the federal agency responsible for water quality management and administers the Federal Water Pollution Control Act Amendments of 1972 and 1987, collectively known as the CWA. The CWA establishes the principal federal statutes for water quality protection. It was established with the intent “to restore and maintain the chemical, physical, and biological integrity of the nation’s water, to achieve a level of water quality that provides for recreation in and on the water, and for the propagation of fish and wildlife.”

Several key sections of the CWA guide the regulation of water pollution in the United States:

<u>Section 208, Water Quality Control Plans</u>. This section requires the preparation of local water quality control plans by regulatory agencies throughout the nation. Each water quality control plan covers a defined drainage area. The primary goal of each water quality control plan is to attain water quality standards established by the CWA and the state governments within the defined area of coverage. Minimum content requirements, preparation procedures, time constraints, and federal grant funding criteria pertaining to the water quality control plans are established in Section 208 of the CWA. Preparation of the water quality control plans has been delegated to the individual states by the USEPA.

<u>Section 401, Water Quality Certifications</u>. This section of the CWA requires that, prior to the issuance of a federal license or permit for an activity or activities that may result in a discharge of pollutants into navigable waters (Section 404 discussed below), the permit applicant must first obtain a certification from the state in which the discharge would originate. A state certification indicates that the proposed activity or activities would not result in a violation of applicable water quality standards established by federal or state law, or that no water quality standards apply to the proposed activity.

<u>Section 402, National Pollutant Discharge Elimination System (NPDES).</u> The NPDES requires permits for pollution discharges into water bodies such that the permitted discharge does not cause a violation of federal and state water quality standards. The NPDES permits define quantitative and/or qualitative pollution limitations for the permitted source and control measures that must be implemented to achieve the pollution limitations. Pollution control measures are often referred to as BMPs. State Water Board Water Quality Control Order No. 97-03-DWQ lists industry-specific waste discharge requirements applicable to this Project, which include mining requirements.

<u>Section 404, Discharge of Dredge and Fill Material.</u> Section 404 assigns the USACE with permitting authority for proposed discharges of dredged and fill material into waters of the U.S., defined as “ . . . waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; territorial seas and tributaries to such waters.” Section 404 is applicable to projects in which fill material would be placed within or below the ordinary high-water mark (OHWM) of a stream. Any project requiring a 404 permit also requires a Section 401 water quality certification (discussed above). The USACE typically considers all natural drainages with defined beds and banks to be waters of the U.S. Section 404 establishes procedures by which the permitting agency is to review, condition, approve, and deny permit requests. Per the regulations, permitting

agencies are responsible to conduct public noticing and provide the opportunity for public hearings during the review of each permit request. This responsibility includes informing the Services of each permit request. Consultation is required for proposed discharges that could affect species protected by the ESA. Measures that are required by the Services to minimize impacts to federally protected species must be included as conditions of the permit.

6.7 CLEAN AIR ACT OF 1972

The Clean Air Act (42 U.S.C. § 7401 et seq.) is intended to "protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population." Section 118 of the Clean Air Act (42 U.S.C. § 7418) requires that each Federal agency with jurisdiction over any property or facility engaged in any activity that might result in the discharge of air pollutants comply with "all Federal, state, interstate, and local requirements" with regard to the control and abatement of air pollution.

Section 109 of the Clean Air Act (42 U.S.C. § 7409 et seq.) directs USEPA to set National Ambient Air Quality Standards (NAAQS) for criteria pollutants. USEPA has identified and set NAAQS under 40 C.F.R. Part 50 for the following criteria pollutants: particulate matter, sulfur dioxide, carbon monoxide, ozone, nitrogen dioxide, and lead. Section 111 of the Clean Air Act (42 U.S.C. § 7411) requires establishment of national standards of performance for new or modified stationary sources of atmospheric pollutants. Section 160 of the Clean Air Act (42 U.S.C. § 7470 et seq.) requires that specific emission increases be evaluated prior to permit approval to prevent significant deterioration of air quality. Section 112 of the Clean Air Act (42 U.S.C. § 7412) requires specific standards for releases of hazardous air pollutants (including radionuclides).

6.8 NATIONAL HISTORIC PRESERVATION ACT OF 1966

Federal regulations for cultural resources are governed primarily by Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended. Section 106 requires federal agencies to take into account the effects of their undertakings on historic properties and, if appropriate, afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment on such undertakings. The ACHP's implementing regulations, "Protection of Historic Properties" can be found in 36 C.F.R. Part 800. Specific regulations for the USACE Regulatory Program are found in Appendix C of 33 C.F.R. Part 325, Procedures for the Protection of Historic Properties. The goal of the Section 106 review process is to offer a measure of protection to sites, which are determined eligible for listing or listed in the National Register of Historic Properties (NRHP). The criteria for determining NRHP eligibility are found in 36 C.F.R. Part 60. Recent amendments to the NHPA (1986 and 1992), and subsequent revisions to the implementation regulations have strengthened the provisions for Native American consultation and participation in the Section 106 review process.

The criteria at 36 C.F.R. Part 60.4 [a-d] for determining the significance and eligibility of prehistoric and historic sites for inclusion in the NRHP are listed as follows:

The quality of significance in American history, architecture, archaeology, culture, and engineering is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and that are associated with events that have made a significant contribution to the broad patterns of our history; that are associated with the lives of persons significant in our past; that embody the distinct characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or that have yielded, or may be likely to yield, information important in prehistory or history.

The Section 106 process includes identifying cultural resources, determining any impacts to cultural resources, and determining the eligibility of cultural resources for inclusion in the NRHP. The Section 106 process also includes completing a Memorandum of Agreement (MOA), if any undertaking would have an adverse effect on cultural resources listed in or eligible for the NRHP (i.e., historic properties). The MOA would identify measures to resolve any adverse effects to historic properties.

6.9 NATIVE AMERICAN GRAVES PROTECTION AND REPATRIATION ACT

The Native American Graves Protection and Repatriation Act 25 U.S.C. §3001 presents a systematic process for determining the rights of lineal descendants and Indian tribes and Native Hawaiian organizations to certain Native American human remains, funerary objects, sacred objects, or objects of cultural patrimony with which they are affiliated.

6.10 UNIFORM RELOCATION ASSISTANCE AND REAL PROPERTY ACQUISITION POLICIES ACT OF 1970

This act, passed in 1970, is "To provide for uniform and equitable treatment of persons displaced from their homes, businesses, or farms by federal and federally assisted programs and to establish uniform and equitable land acquisition policies for federal and federally assisted programs." The act covers any person displaced from "real property" as a direct result of a written notice of intent to acquire the property of the individual for programs or projects undertaken by a state agency, federal agency or with the financial assistance of a federal agency. The act covers residents who own private property as well as businesses (excepting farm operations). The displaced individual, business or property owner is entitled to receive "comparable replacement dwelling" as well as relocation assistance. Compensation to displaced persons may be in the form of expenses associated with relocation, costs of direct losses as a result of moving a business or farm operation (as determined by the state), and actual expenses to reestablish a displaced farm, nonprofit organization or small business up to $10,000. This act prohibits the state from acquiring property through means of condemnation and provides the state act in good faith in negotiating a fair market value for property with the owner as a preferred means of acquisition.

6.11 EXECUTIVE ORDER 11988, *FLOODPLAIN MANAGEMENT*

Executive Order (EO) 11988 requires federal agencies to recognize the values of floodplains and to consider the public benefits from restoring and preserving floodplains. Under this EO, the federal agencies must ensure their actions avoid, to the extent practicable, the long and short term adverse impacts associated with the occupancy and modification of floodplains, and avoid direct and indirect support of floodplain development whenever there is a practicable alternative. Federal agencies shall reduce the risk and hazard associated with floods; minimize the impact of floods on human health, welfare, and safety; and restore and preserve the beneficial and natural values of the base floodplain.

6.12 EXECUTIVE ORDER 11990, *PROTECTION OF WETLANDS*

Executive Order 11990 directs federal agencies, in carrying out their responsibilities, to provide leadership to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. This policy states that federal agencies should avoid, to the extent possible, the long- and short-term adverse impacts associated with destruction or modification of wetlands. It also states that agencies should avoid undertaking and providing support for new construction in wetlands, including draining, dredging, channelizing, filling, diking, impounding, and other related activities, unless the agency finds that no practicable alternatives exist and all practical measures have been taken to minimize harm to wetlands.

All of the Project alternatives carried forward for detailed analysis in this EIS would result in the permanent and temporary loss of wetlands and riparian habitat. Each of the alternatives has been designed to minimize impacts on wetlands to the extent practicable.

6.13 EXECUTIVE ORDER 12898, *FEDERAL ACTIONS TO ADDRESS ENVIRONMENTAL JUSTICE IN MINORITY POPULATIONS AND LOW-INCOME POPULATIONS*

Executive Order 12898, issued by the President on February 11, 1994, requires each federal agency to identify and address disproportionately high and adverse human health or environmental impacts, including social or economic impacts of programs, policies, and activities on minority and low-income populations of the United States (CEQ 1997). The memorandum accompanying the order specifies that federal agencies should analyze the environmental effects on minority and low-income populations, and Indian tribes of federal actions, when such analysis is required by NEPA (CEQ 1997).

The CEQ provides additional guidance on environmental justice analysis, including definitions of minority and low-income populations in their 1997 publication, Environmental Justice Guidance under the National NEPA (CEQ 1997). In 2004, the USEPA published a Toolkit for Assessing Potential Allegations of Environmental Injustice to provide some standardization in methodology for performing environmental justice analysis within the NEPA framework (USEPA 2004).

6.14 EXECUTIVE ORDER 13112, *INVASIVE SPECIES*

Executive Order 13112, *Invasive Species* (February 3, 1999), requires agencies to prevent the introduction of invasive species; to provide for their control; and to minimize their economic, ecological, and human health impacts. The proposed alternatives take all feasible and prudent measures to minimize the introduction and spread of invasive species.

6.15 EXECUTIVE ORDER 11593, *PROTECTION AND ENHANCEMENT OF THE CULTURAL ENVIRONMENT*

Under Executive Order 11593, the federal government will provide leadership in preserving, restoring, and maintaining the Nation's historic and cultural environment. This EO addresses the NRHP and provides guidance to those involved with federal properties that should be inventoried and nominated for listing on the NRHP.

6.16 EXECUTIVE ORDER 13007, *INDIAN SACRED SITES*

Pursuant to EO 13007, agencies must consider the effects of their actions on the physical integrity of sacred sites, and access to and ceremonial use of such sites, by Indian religious practitioners.

6.17 EXECUTIVE ORDER 13084, *CONSULTATION AND COORDINATION WITH INDIAN TRIBAL GOVERNMENTS*

Pursuant to EO 13084, the United States has a unique legal relationship with Indian tribal governments, as set forth in the U.S. Constitution, treaties, statutes, EOs, and court decisions. Since the formation of the Union, the United States has recognized Indian tribes as domestic dependent nations under its protection. In treaties, our Nation has guaranteed the right of Indian tribes to self-government. As domestic dependent nations, Indian tribes exercise inherent sovereign powers over their members and territory. The United States continues to work with Indian tribes on a government-to-government basis to address issues concerning Indian tribal self-government, trust resources, and Indian tribal treaty and other rights.

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CHAPTER 7 AGENCY CONSULTATION AND PUBLIC OUTREACH

7.1 PUBLIC SCOPING PROCESS

Under the National Environmental Policy Act (NEPA), all agencies are required to consider all environmental impacts for federal projects and federal rules. NEPA also requires agencies to cooperate with other federal agencies, and with state and local governments, and to involve public stakeholders or citizens. All persons and organizations that have a potential interest in the Proposed Action are urged to participate in the NEPA environmental analysis process. These persons and organizations may include federal, state, and local agencies; federally recognized Indian tribes; interested stakeholders; and minority, low-income, or disadvantaged populations.

Pursuant to National Environment Policy Act (NEPA), 40 C.F.R. §1501.7(b), U.S. Army Corps of Engineers (USACE) published a Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) for the Proposed Project on September 28, 2015, in the Federal Register, Vol. 80, No. 187, pages 58232-58234, Document No. 2015-21475 (Appendix*). The NOI provided information on the purpose and need for the Proposed Action, background, the alternatives to be evaluated, and the geographic locations of the project sites. The NOI further provided the point of contact information at U.S. Army Corps of Engineers (USACE) to submit comments and receive additional information. Due to previous environmental reviews as outlined in Section 1.5.1, including the prior NOI to prepare a EIS ,the number of public meetings including the public scoping meeting in October 2012, and since the Proposed Action has not changed, a public scoping meeting following circulation of the NOI was not held.

7.1.1 Public Involvement

A number of public and agency meetings have been held on the Proposed Action. Past meetings have involved members of the interested public as part of the community process and meetings were conducted to keep resource agencies informed of the progressing scope and design of the Project. The California Environmental Quality Act (CEQA) lead agencies held nine formal meetings from May 2001 to fall 2013 (Table 7.1-1), with the objective of listening to and recording questions and comments from the general public, stakeholders, and local, state, and federal agencies. Questions and comments provided by the meeting attendees will be addressed and incorporated into the alternatives formulation and the environmental review process (NEPA and CEQA process). Section 1.3, Permits, Approvals, and Regulatory Requirements, is a synopsis of the federal, state, and local regulatory requirements that must be met prior to the implementation of the Upper Llagas Creek Project.

Table 7.1-1 Meeting Records

Date	Topic
May 30, 2001	Public Meeting—Design (Restoration) Workshop
November 14, 2001	Public Scoping Meeting
October 3, 2002	Public Meeting—Workshop for Reach 8 Alternatives
September 22, 2004	Joint Resource Agency Meeting
February 24, 2011	Update Meeting
October 25, 2012	Public Scoping—Community Meeting
August 2, 2012	Joint Agency Meeting—Lake Silveira
April 10, 2013	Public Meeting—Lake Silveira
November 6, 2013	Public Meeting—Property Owners

Official transcripts of the most recent Public Scoping/Update Meeting in October 2012 were prepared by Leila S. Strand, Certified Shorthand Reporter 2098. The scoping process involved solicitation of comments from the general public, local focus groups, and input from federal, state, and local agencies and organizations with interest or jurisdiction within the Upper Llagas Creek watershed.

At the 2012 scoping meeting, the SCVWD provided information on the background and purpose of the Proposed Action, requested public comment on relevant environmental and socioeconomic issues to be addressed in the EIS/EIR analysis, and provided preliminary information to the public on the NEPA and CEQA processes. Individuals spoke on behalf of themselves, stakeholders, or local and state government agency representatives. A total of 28 questions were received during the October 3, 2002 meeting. A total of 29 unique project-related questions were also received during the October 25, 2012 meeting. A comment summary is presented in Table 7.2-1. The public was invited to submit written comments by November 12, 2012. During that meeting several comments were made by attendees that just upstream from the Project there has been a persistent, long-term flooding problem at Llagas Road. The public requested SCVWD to consider whether the flooding could be addressed under the Proposed Project design. As a result of the meeting and the stated public concerns, the SCVWD incorporated measures into the Project design to address flooding at Llagas Road.

Public meetings and the ongoing informal public review period fulfill the NEPA requirement to receive input from the public on the scope of the Project, including the scope of the issues to be addressed. Santa Clara Valley Water District has made available the presentation given on October 25, 2012, at the following web address: http://valleywater.org/Services/UpperLlagas.aspx.

7.2 SUMMARY OF SCOPING COMMENTS

All unique Project-related comments received during the prior USACE public scoping meeting and scoping period (comments were due by November 12, 2012), as well as written comments received during the scoping period for this EIS that ended in October 2015, are included in Appendix A. Comments received are categorized into four broad categories: (1) project components (2) scope of the impacts analysis, (3) alternatives analysis, and (4) miscellaneous.

Table 7.2-1 Comments Received During Public Scoping

Category	Comment Summary	Date
Project Components	Are flood control measures being installed for the Butterfield extension across Monterey Road?	October 25, 2012
Project Components	Which reaches affect each community because the population density is so high in Morgan Hill and less in San Martin.	October 25, 2012
Project Components	Why wasn't the reach of the creek north of Reach 8 on Llagas Road part of the project? Why would it start at Wright Ave?	October 25, 2012
Project Components	Llagas Creek Road intersection has double culverts and one is blocked, Llagas Road floods almost every year. Is addressing that problem part of this project?	October 25, 2012
Project Components	In Reach 6, the freeboard of the channel is being increased, but why is that not increasing our level of flood protection?	October 25, 2012
Project Components	How much are you going to widen the creek in Morgan Hill?	October 25, 2012
Project Components	What are the dimensions for widening the creek in Reach 4?	October 25, 2012
Project Components	The first project completed on the other side of Buena Vista is the same width almost all the way down, is this project going to be the same width?	October 25, 2012
Project Components	What is going to be the required setback in Reach 7?	October 25, 2012
Project Components	If Reach 7A is being completed in the first phase of construction, when is Reach 7B being completed?	October 25, 2012
Project Components	Before 7B is completed will the water continue to back up on Watsonville Road?	October 25, 2012
Project Components	If Reaches 4 and 7A are being completed during the first phase, how will the construction be sequenced?	October 25, 2012
Project Components	Will West Little Llagas Creek be disconnected when Reach 7A is built?	October 25, 2012
Alternatives Analysis	Were the discarded alternatives decided with City engineers and officials or was the decision financial?	October 25, 2012
Alternatives Analysis	Quantify the land acquisition required under Alternative B [Reach 6 Bypass Channel] which was described as having the least amount of land acquisition required.	October 25, 2012
Alternatives Analysis	Which alternative would have the least amount of easements required?	October 25, 2012
Alternatives Analysis	How will Alternative D [Culvert/Channel Alternative] double box culverts cross Britton Middle School and how long will it take to cross the fields as it will be an impact on the community?	October 25, 2012

Category	Comment Summary	Date
Scope of the Impacts Analysis	What is the potential for possible pollution with equipment working in the creek?	October 25, 2012
Miscellaneous	If we weren't trying to get money from the federal government would we still need to have a federal lead agency?	October 25, 2012
Miscellaneous	Under Alternative E [?], it was stated no homes or structures would be taken, does this mean nothing would be taken through eminent domain?	October 25, 2012
Miscellaneous	Does this mean the entire project through all reaches nothing would be taken through eminent domain?	October 25, 2012
Miscellaneous	With all the agencies consulted will the District be using the Habitat Conservation Plan?	October 25, 2012
Miscellaneous	When this project is complete will it affect our FEMA insurance will the District be handling the change in flood protection with FEMA or is there something each homeowner will need to do when the project is complete?	October 25, 2012
Miscellaneous	How does the District coordinate with County Roads & Airports so there is not any unnecessary flooding around Columbet Avenue, and how do we get assistance with the maintenance when we are in County jurisdiction.	October 25, 2012
Miscellaneous	Where are the funds coming from to support this project?	October 25, 2012
Miscellaneous	What is the District's current plan for buying easements?	October 25, 2012
Miscellaneous	What percentage of the 2000 bond is going toward the project now?	October 25, 2012
Miscellaneous	If Measure B passes does that give the District access to property through eminent domain?	October 25, 2012
Miscellaneous	What is the Benefit to Cost Ratio?	October 25, 2012
Miscellaneous	Comment Letter National Parks Service for protection of historic trail alignment	October 22, 2015

7.3 RESOURCE AGENCY CONSULTATIONS

Between 2010 and 2015, six Resource Agency Meetings were held with USACE, National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), Central Coast Regional Water Quality Control Board (CCRWQCB), and California Department of Fish and Wildlife (CDFW) to actively engage the resource agencies in the Project. Resource agency meetings are listed in Table 7.3-1. Comment letters received from agencies are located in Appendix A. The following agencies and organizations were contacted during development of the EIS:

Federal Agencies

- NOAA Fisheries (National Marine Fisheries Service)
- Natural Resource Conservation Service

- U.S. Fish and Wildlife Service
- U.S. Environmental Protection Agency

State Agencies

- California Department of Fish and Wildlife
- Central Coast Regional Water Quality Control Board
- California Department of Conservation
- California Department of Transportation (Caltrans)

Regional and Local Agencies

- Santa Clara County
    - Planning Department
    - Parks and Recreation Department, Environmental Resource Agency
    - Fire Department
- Santa Clara Valley Water District
- South County Airport
- City of Morgan Hill
    - Department of Parks and Recreation
    - Department of Public Works
    - Planning Department
    - Department of Public Works
- San Martin
    - San Martin County Water District

Local Utilities and Organizations

- Charter Communications
- Pacific Gas and Electric Company
- Streams for Tomorrow

Table 7.3-1 Agency Consultation Meeting Records

Date	Topic	Agencies
September 14, 2010	Project Update at Coyote Watershed Integrated Working Group Meeting	USACE, CDFW, EPA, NMFS
April 28, 2011	Resource Agency Site Tour	USACE, NMFS, EPA, CCRWQCB
January 13, 2012	Site Tour Lake Silveira USFWS	USACE, USFWS
August 2, 2012	Resource Agency Deign Update	USACE, EPA, NMFS, USFWS , CCRWQCB, CDFW
June 25, 2013	Resource Agency Design Update Meeting	USFWS, NMFS, CCRWQB, CDFW
June 28, 2013	Meeting at Lake Silveira	NMFS, CDFW
November 18, 2013	Resource Agency Mitigation Strategy Meeting	USACE, EPA, NMFS, USFWS, CCRWQCB, CDFW
January 28, 2014	Hydraulic Modeling Meeting	CCRWQCB
February 11, 2014	Meeting to Discuss Design Parameters	CCRWQCB
November 17, 2015	Field tour and permit review CDFW	CDFW

7.4 STATE HISTORIC PRESERVATION OFFICE

The San Francisco District archaeologist conducted the cultural resources study in two phases. Phase I consisted of research of archaeological records and literature on file with the State of California and in the project files of the USACE office. Phase II consisted of an archaeological survey to identify and, as necessary, evaluate cultural resources for their eligibility for listing in the National Register of Historict Places.The records search and survey was conducted to comply with Section 106 of the National Historic Preservation Act of 1966 (PL89-665, as amended) to consider the effects upon historic properties and historic properties eligible for listing in the National Register of Historic Places.

The USACE delineated the Area of Potential Effects (APE), defined as the geographical area within which a project may cause changes, directly or indirectly, in the character or use of historic properties located in the APE. The APE for this project is comprised of the six reaches, totaling approximately 12.7 miles, situated on the main branch of Llagas Creek, West Little Llagas Creek, and East Little Llagas Creek. It encompassed the stream channels and strips of land running parallel on both sides of the streams.

Although the cultural resource reports identified five sites “along” the streams in the APE, the USACE observed that no cultural materials from the sites extended in the narrow. Thus it is reasonable to conclude that the APE does not contain prehistoric cultural resources, and an evaluation of National Register eligibility of the sites is not necessary. The USACE previously coordinated with the Native American Heritage Commission and Native American Tribes and no and no additional information regarding cultural resources was revealed. Concurrent with this EIS, the USACE is consulting with the State Historic Preservation Officer (SHPO) to solicit and request comment on the findings and conclusions of the identification and evaluation efforts.

7.5 RESOURCE AGENCY COORDINATION

The Applicant introduced the project to resource agency staff in 2010, and focused project meetings began April 28, 2011. Meeting records includes summary notes with questions, comments, and action items recorded during the meeting. The draft notes were then disseminated to resource agency staff for corrections or additions. The meeting records also include comment letters as well as an excel spreadsheet with comments and responses on design plans and specifications for the 65% design. Table 7.5-1 provides a description of the type of document available as well as the meeting/correspondence dates. Full records of the resource agencies questions/concerns with responses are available in Appendix D.

Table 7.5-2 Resource Agency Coordination

Date of Meeting/ Correspondence	Document Type	Agencies Providing Comments/Questions	Location of Document
Joint Agency Field Tour 4/28/2011	Summary of questions and responses from resource agency staff during field tour	USACE, NMFS, CDFW, CCRWQCB, EPA	Appendix D
Joint Agency Design Update 8/2/2012	Summary of meeting notes/questions/comments during design update meeting	USACE, NMFS, CDFW, CCRWQCB, EPA, USFWS	Appendix D
Comments and Response to CCRWQCB 1/24/2013	Comments and responses from the CCRWQCB for 30% design submittal	CCRWQCB	Appendix D
Meeting with USFWS to discuss mitigation 1/28/2013	Summary of questions/actions regarding Lake Silveira for Compensatory Mitigation	USACE, USFWS	Appendix D
Meeting with NMFS and CDFW at Lake Silveira 6/27/2013	Summary of questions/concerns raised for development of Lake Silveira	NMFS, CDFW	Appendix D
Comment Letter from CCRWQCB	Criteria for demonstrating minimization of impacts to waters of the US	CCRWQCB	Appendix D
Resource Agency Comments 65% Design 11/16/2013	Summary of questions/responses from resource agency staff on 65% design plans and specifications	USFWS, CDFW, CCRWQCB	Appendix D
Comment letter NMFS on Lake Silveira Design 1/16/2014	Comments and recommendation for improving design for SCC Steelhead at Lake Silveira	NMFS	Appendix D
Letter from USFWS regarding mitigation 1/17/2014	Concurrence that mitigation measures from the CAR were incorporated into design	USFWS	Appendix D
Meeting Notes with CCRWQCB 2/11/2014	Summary of comments/question regarding development of design	CCRWQCB	Appendix D

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CHAPTER 8 LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES OF THE ENVIRONMENTAL IMPACT STATEMENT ARE SENT

The following is a list of agencies, organizations and persons to whom the copies of the Draft Environmental Impact Statement (EIS) were sent.

8.1 PAPER COPY

The following libraries, agencies, organizations, and Native American Indian Tribes were sent a paper copy of the Draft EIS:

Federal Agencies

- U.S. Environmental Protection Agency, Region 9, San Francisco, CA
- U.S. Fish and Wildlife Service, Sacramento, CA
- National Marine Fisheries Service, Santa Rosa, CA

Libraries

- Santa Clara County Library District, Morgan Hill, CA
- Santa Clara County Library District, Gilroy, CA
- San Jose Public Library, San Jose, CA

Native American Indian Tribes

- Amah Mutsun Tribal Band, Galt, CA
- Ohlone/Costanoan Indian Tribe, Linden, CA
- Ohlone Indian Tribe, Patterson, CA
- Amah Mutsun Tribal Band of Mission San Juan Bautista, Woodside, CA
- Muwekma Ohlone Indian Tribe, Milpitas, CA
- Ohlone/Costanoan Indian Tribe, Union City, CA
- The Ohlone Indian Tribe, Fremont, CA

State Agencies

- California Department of Fish and Wildlife, Napa, CA
- Central Coast Regional Water Quality Control Board, San Luis Obispo, CA

8.2 COMPACT DISC

The following agencies, organizations, persons, and Native American Indian Tribes were provided a compact disc (CD) of the draft EIS:

Federal Agencies

- U.S. Environmental Protection Agency, Region 9, San Francisco, CA
- U.S. Fish and Wildlife Service, Sacramento, CA
- National Marine Fisheries Service, Santa Rosa, CA

Appointed Offices

- Senator Dianne Feinstein, San Francisco, CA
- Senator Barbara Boxer, Oakland, CA
- Congresswoman Zoe Lofgren, San Jose, CA
- Congressman Sam Farr, Salinas, CA
- California State Senator Bill Monning, Monterey, CA
- California State Assemblyman Luis Alejo, Salinas, CA

Native American Indian Tribes

- Amah Mutsun Tribal Band, Galt, CA
- Ohlone/Costanoan Indian Tribe, Linden, CA
- Ohlone Indian Tribe, Patterson, CA
- Amah Mutsun Tribal Band of Mission San Juan Bautista, Woodside, CA
- Muwekma Ohlone Indian Tribe, Milpitas, CA
- Ohlone/Costanoan Indian Tribe, Union City, CA
- The Ohlone Indian Tribe, Fremont, CA

State Agencies

- California Department of Fish and Wildlife, Napa, CA
- Central Coast Regional Water Quality Control Board, San Luis Obispo, CA
- California Department of Transportation, Oakland, CA
- State Clearinghouse, Sacramento, CA
- State Office of Historic Preservation, Sacramento, CA
- Native American Heritage Commission, Sacramento, CA

Local Agencies

- City of Gilroy—Planning Department, Gilroy, CA
- City of Morgan Hill—Community Development Department, Morgan Hill, CA
- Loma Prieta Resource Conservation District, Gilroy, CA
- Santa Clara County Department of Planning and Development, San Jose, CA
- Santa Clara County Parks & Recreation Department, Los Gatos, CA

8.3 LETTER NOTIFICATION

The following agencies, organizations, and persons were notified by letter that the Draft EIS is posted on the United States Army Corps of Engineers (USACE) website.

Federal Agencies

- U.S. Environmental Protection Agency, Region 9, San Francisco, CA
- U.S. Fish and Wildlife Service, Sacramento, CA
- National Marine Fisheries Service, Santa Rosa, CA

Appointed Offices

- Senator Dianne Feinstein, San Francisco
- Senator Barbara Boxer, Oakland, CA
- Congresswoman Zoe Lofgren, San Jose, CA
- Congressman Sam Farr, Salinas, CA
- California State Senator Bill Monning, Monterey, CA
- California State Assemblyman Luis Alejo, Salinas, CA

Native American Indian Tribes

- Amah Mutsun Tribal Band, Galt, CA
- Ohlone/Costanoan Indian Tribe, Linden, CA
- Ohlone Indian Tribe, Patterson, CA
- Amah Mutsun Tribal Band of Mission San Juan Bautista, Woodside, CA
- Muwekma Ohlone Indian Tribe, Milpitas, CA
- Ohlone/Costanoan Indian Tribe, Union City, CA
- The Ohlone Indian Tribe, Fremont, CA

State Agencies

- California Department of Fish and Wildlife, Napa, CA
- Central Coast Regional Water Quality Control Board, San Luis Obispo, CA
- California Department of Transportation, Oakland, CA
- State Clearinghouse, Sacramento, CA
- State Office of Historic Preservation, Sacramento, CA
- Native American Heritage Commission, Sacramento, CA

Local Agencies and Entities

- City of Gilroy—Planning Department, Gilroy, CA
- City of Morgan Hill—Community Development Department, Morgan Hill, CA
- Loma Prieta Resource Conservation District, Gilroy, CA
- Santa Clara County Department of Planning and Development, San Jose, CA
- Santa Clara County Parks & Recreation Department, Los Gatos, CA
- Clean South Bay, Palo Alto, CA
- Committee for Green Foothills, Palo Alto, CA
- County of Santa Clara, San Jose, CA
- Downtown Association Residents Council and Morgan Hill Downtown Association, Morgan Hill, CA
- Downtown Business Association, Morgan Hill, CA
- Business Assistance and Housing Services, Morgan Hill, CA
- Morgan Hill Chamber of Commerce, Morgan Hill, CA
- Morgan Hill Unified School District, Morgan Hill, CA
- Santa Clara Audobon Society, Cupertino, CA
- Santa Clara County Farm Bureau, Morgan Hill, CA
- Santa Clara County Fire Department, Los Gatos, CA
- Santa Clara County Office of Emergency Services, San Jose, CA
- Santa Clara County Office of the Sheriff, San Jose, CA
- South County Land Use Committee, Salinas, CA

Libraries

- Santa Clara County Library District, Morgan Hill, CA
- Santa Clara County Library District, Gilroy, CA
- San Jose Public Library, San Jose, CA

Public

- John McKay, Morgan Hill, CA
- Alfred Angelino, Gilroy, CA
- Jerry DiSalvo, San Jose, CA
- Dennis Kennedy, Morgan Hill, CA
- Rocke Garcia, Morgan Hill, CA
- John Panos, Gilroy, CA
- Ray Alcini, San Jose, CA
- Gayle Richter, Morgan HIll, CA
- Del Fresh Produce, Gilroy, CA
- Acacia Mobile Home Park, Morgan Hill, CA
- Hill Haven Mobile Home Park, Morgan Hill, CA
- Wanda Young, Palo Alto, CA
- Royal Oaks Enterprises, Morgan Hill, CA
- John and May-Jih Chu, San Jose, CA
- Maple Leaf RV Park, Morgan Hill, CA
- Uesegi Farms Incorporated, Gilroy, CA
- Lucy Chang, Morgan Hill, CA
- Raymond and Deborah Hernandez, San Martin, CA
- Mary Vescerantale, San Jose, CA
- Rod and Marcy Lake, San Jose, CA
- Victor and Virginia Locarnini, Morgan Hill, CA
- Paul and Becky Harris, San Martin, CA
- Susan McElwaine, San Jose, CA
- Mai and Son Nguyen, San Jose, CA
- Mary McBride, Campbell, CA
- Mark and Kisti Daniels, San Martin, CA
- CAC Enterprises, San Leandro, CA
- Roberty McBride et al, Campbell, CA
- Harry Hiraki, San Martin, CA
- Loraine and Raymond Caruso, San Martin, CA
- Monterey Hills LLC, Milpitas, CA
- Mary and Marion Cox, Morgan Hill, CA
- Gary Teskey and Leon Youce, Morgan Hill, CA
- Liang Rong Zhen, San Jose, CA
- Kwong Yip, Mountain View, CA
- Donald and Catherine Stansbury, Gilroy, CA
- Santiago Aceves, Gilroy, CA
- Paul and Kalin Weihs, Gilroy, CA
- Edward and Nancy Meyer, Gilroy, CA
- Duane and Pama Thompson, Gilroy, CA
- Felix and Gail Dominguez, Gilory, CA
- Angelo and Andriana Robba, San Martin, CA
- Leonam Reif, San Martin, CA

- Phuong Chu, San Martin, CA
- Ray and Mary Alvarez, San Martin, CA
- Richard Palmisano, San Martin, CA
- Amy Mok, Milpitas, CA
- Rocky and Hui Tam, Morgan Hill, CA
- Virginia Perkins, San Martin, CA
- Tracy Templeton-Smith and Craig Smith, San Martin, CA
- Martha and Estanislao Haro, San Martin, CA
- Lucia and Tomas Yanez, San Martin, CA
- Aurora Munoz, San Martin, CA
- David and Joyce Fontana, San Martin, CA
- Joseph and Tiffany Della Maggiore, San Martin, CA
- Gaylord and Elouise Hartman, San Martin, CA
- Steve Aguilar, San Martin, CA
- Hilda Andrade, San Martin, CA
- Robert Russell, Bristol, IN
- Hugo Sencion, San Martin, CA
- Gary and Nancy McDowell, San Martin, CA
- Carol Clevett, San Martin, CA
- Laura Rojas, San Martin, CA
- Kristine and Thomas Friebel, San Martin, CA
- Kimthoa Tran, San Martin, CA
- Timothy Gray, San Martin, CA
- Honorio and Maria Lamas, San Martin, CA
- Nemo and Andrea Ganoza, San Martin, CA
- Louis and Carol Trinkchero, San Martin, CA
- Robert and Sandra Cerruti, San Martin, CA
- Antonia and Teresa Pereira, San Martin, CA
- Vincent and Sarah Roman, San Martin, CA
- John Powell, San Jose, CA
- Marguerite Kroff, San Martin, CA
- Efrain Romero, San Martin, CA
- Frank Delgado, San Martin, CA
- Wayne and Lana Foletta, San Martin, CA
- Fernando Ortiz, San Martin, CA
- John and Maxine Demaria, San Martin, CA
- Margaret Ann Sartin, San Martin, CA
- Jocob and Senaida Villalba, San Martin, CA
- Bruno and Eugenia Martino, Morgan Hill, CA
- Arthur and Lupe Duffy, Morgan Hill, CA
- Llagas Hale Investors LLC, Morgan Hill, CA
- Tansy Michael, Santa Barbara, CA
- Ruth Kyles, Morgan Hill, CA
- Manana Investors LLC, Morgan Hill, CA
- Brad and Susan Rentfrow, Morgan Hill, CA
- Normal Stiawalt, San Martin, CA
- Edith Aochi, Morgan Hill, CA
- Grisetti trustee, Morgan Hill, CA
- Robeson, Morgan Hill, CA
- Nance Trustee, Morgan Hill, CA
- McAndress, Morgan Hill, CA

- Winter, Morgan Hill, CA
- Ramey, Morgan Hill, CA
- Luther, Morgan Hill, CA
- Nelson Trustee, Morgan Hill, CA
- Leonard Trustee, Saint Marys, CA
- Ulm Trustee, Morgan Hill, CA
- Kyle and Kami Haynes, Morgan Hill, CA
- John A Giancola & Sons, Gilroy, CA
- John and Heidi Crouch, Morgan Hill, CA
- Mark and Nancy Willis, Morgan Hill, CA
- Rita Trubell, Apache Junction, AZ
- Dennis Montero and Fattima Contreras, Morgan Hill, CA
- Stacy Barrett, Morgan Hill, CA
- Mark Apton, Santa Clara, CA
- David and Debra Graves, Morgan Hill, CA
- William and Susan Woo, San Mateo, CA
- George and Mary Chiala, Morgan Hill, CA
- Roger and Carlay Ames, Morgan Hill, CA
- Catherine Snively, Orinda, CA
- Eric Williams, Morgan Hill, CA
- Rafael and Susana Paredes, Morgan Hill, CA
- Sergio and Sylvia Topete, Morgan Hill, CA
- Matthew and Jenifer Leopow, Morgan Hill, CA
- Eddie and Mary Esther Archuleta, San Jose, CA
- Robert Hammond, Morgan Hill, CA
- Roy Greathouse, Morgan Hill, CA
- William Olive, Morgan Hill, CA
- Arthur Silva, Gilroy, CA
- General Telephone Co., Morgan Hill, CA
- Mina Echols, Morgan Hill, CA
- Gerald and Phyllis Disalvo, San Jose, CA
- Eric and Carolyn Wallace, Morgan Hill, CA
- Gary and Nadine Wright, Rocklin, CA
- Virginia Peterson, Gilroy, CA
- Luis and Nenita Tan, Morgan Hill, CA
- Methodist Church, Morgan Hill, CA
- Gayle Richter, Morgan Hill, CA
- Garrott and Diane Carrol, Morgan Hill, CA
- Joan Walley, Morgan Hill, CA
- RDW Properties, Morgan Hill, CA
- Telfer Enterprises, Morgan Hill, CA
- Gary and Jean Walton, Morgan Hill, CA
- S & G Builders LLC, Sunnyvale, CA
- Pacific Gas & Electric, Morgan Hill, CA
- Linda Ahern, Pleasanton, CA
- David and Jennifer Chan, Morgan Hill, CA
- Morgan Hill Plaza, Los Angeles, CA
- PS Development LLC, San Jose, CA
- Villa Ciolino Associates, Gilroy, CA
- Mario Herrera, Morgan Hill, CA
- Corwin and Maria Shrophsire, Morgan Hill, CA

- Paul Davis, Gilroy, CA
- Nancy Pierce, Morgan Hill, CA
- Baraba Doubrava, Morgan Hill, CA
- Jess Sanchez, Bakersfield, CA
- Thomas and Kathleen Tomasello, Morgan Hill, CA
- Ferial Seoud, Morgan Hill, CA
- Jesse Hernandez, Morgan Hill, CA
- Raymond and Mary Trimble, Morgan Hill, CA
- Li Chen, Cupertino, CA
- Don Avante Associates, San Rafael, CA
- Monterey Dynasty LLC, Cupertino, CA
- Pepper Lane-Cosmo, Los Gatos, CA
- Sormeh Real Estate LLC, Los Gatos, CA
- Westcoast Cycles LLC, Gilroy, CA
- John and Heather Panos, San Martin, CA
- JMB Properties LLC, Santa Clara, CA
- Esquivel Family Ltd Parternship, Morgan Hill, CA
- Khang Sieu and Fung Ka Ly, Saratoga, CA
- David Maruyama, Los Altos, CA
- Diamond Creek Villa LLC, Cupertino, CA
- Tzwu-Chwan and Mei-Tsu Wu, Cupertino, CA
- James and Priscilla Warinner, San Jose, CA
- Siu and Gee Chiu, San Martin, CA
- Timothy Woodward, San Jose, CA
- Wei-Lung Leung, San Martin, CA
- Tom Iwanaga, San Martin, CA
- Darrell and Patricia Roger, San Martin, CA
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- Grady and Lavadam Taylor, San Martin, CA
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- Raul and Delia Moreno, San Martin, CA
- Omar Hindiyeh, Discovery Bay, CA
- Conception Rodriguez, San Martin, CA
- Cheryla McLaughlin, San Martin, CA
- Laurantina Dempsey, San Martin, CA
- James and Donal Byrom, San Martin, CA
- Leo and Alice Doyle, San Martin, CA
- Amy Lawrence, San Martin, CA
- Joyce and Howard Honerlah, San Martin, CA
- Ying-Tsong and Fu-Mei Loh, Saratoga, CA
- Johnny Estrada, San Jose, CA
- Ken and Monica Churchill, Monterey, CA
- Shellie Lewis, Santa Clara, CA
- Stanley Heick, Morgan Hill, CA
- Richard and Annam Llewellyn, San Martin, CA
- Patrick and Mary Simpson, San Martin, CA
- Robin and Jeff Parsons, San Martin, CA
- Cameron Lee, Milpitas, CA
- Feliz and Stella Chuo, Thermal, CA
- Nathan and Marta Price, Morgan Hill, CA

- Esteban Garibay, San Martin, CA
- Ariana Gallegos and Juan Chavarria, San Martin, CA
- Gera Family Partnerhsip, Saratoga, CA
- Raymond Levy, San Francisco, CA
- MH Sterling Group, Los Gatos, CA
- Sunset Properties Inc, San Francisco, CA
- Francisco Arriaga, San Jose, CA
- Nature Quality, San Martin, CA
- Oralia Maciel, San Jose, CA
- Union Pacific Railroad, San Francisco, CA
- Shun and Liang Kuang, San Martin, CA
- Ernest Burroughs, Denair, CA
- Macario and Lupe Salas, Gilroy, CA
- Zhang Liang, Gilory, CA
- Kenneth Fredenburg, Gilory, CA
- Lawandaj Duarte, Gilroy, CA
- Alexander and Frances Posada, Gilroy, CA
- Sondra Serenka, Gilroy, CA
- David and Cheryl Ariki, Gilroy, CA
- Surendran and Minaxi Mody, Gilroy, CA
- John and Janet Hyland, Gilroy, CA
- Yum In Sook, Gilroy, CA
- Trevor and Linda Hayes, Gilroy, CA
- Elaine Jelsemdale, Gilroy, CA
- Imre and Kinga Kabai, Gilroy, CA
- Michael and Jacqueline Delmonico, Gilroy, CA
- Chauncey Russo, Gilroy, CA
- Norma Kay Ota, Gilroy, CA
- Jerry and Gina Stanley, Gilroy, CA
- Emilia De La Torre, San Jose, CA
- Kong-Chen Chen, San Jose, CA
- Gary Pollack, Redwood City, CA
- Vernon Schofield, Gilroy, CA
- Boping Chen, San Jose, CA
- Kessler Trustee, San Martin, CA
- Robert Malech, Gilroy, CA
- Joe and Honoria Rosa, Gilroy, CA
- Mahmood and Marian Hassan, Hollister, CA
- Steven and Dena Malech, Gilroy, CA
- Rober and Kristen Morton, Gilroy, CA

CHAPTER 9 REFERENCES

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