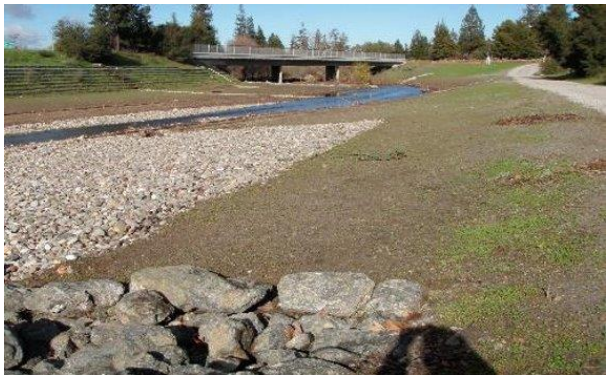
UPPER GUADALUPE RIVER
FLOOD RISK MANAGEMENT PROJECT
San José, California



DRAFT INTEGRATED GENERAL REEVALUATION REPORT AND SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT

November 2022

US Army Corps of Engineers®
San Francisco District

Valley Water

DRAFT FINDING OF NO SIGNIFICANT IMPACT

UPPER GUADALUPE RIVER FLOOD RISK MANAGEMENT PROJECT
San José, California

The U.S. Army Corps of Engineers, San Francisco District (Corps) has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. The final Integrated General Reevaluation Report and Supplemental Environmental Assessment (GRR/EA) dated **DATE OF FINAL GRR/EA**, for the Upper Guadalupe River Flood Risk Management Project addresses flooding risk management opportunities and feasibility along the Upper Guadalupe River in San Jose, California. The final recommendation is contained in the report of the Chief of Engineers, dated **DATE OF CHIEF'S REPORT**.

The Final GRR/EA, incorporated herein by reference, evaluated various alternatives that would reduce flood risk and associated damages, reduce life safety risk, increase recreational opportunities, realize environmental quality benefits, and reduce channel maintenance requirements in the study area. The recommended plan is the National Economic Development (NED) Plan and the Comprehensive Benefits Plan, and includes:

- Widening the channel on the east bank for just over 1 mile of the mainstem, requiring the extension of four crossings. Additional measures include protection of mature "islands" of riparian vegetation, other biological and biotechnical enhancements, gravel augmentation, and a public recreational trail. Approximately 9,300 feet of floodwalls will be installed on two undersized tributaries, along with eight box culvert replacements.

- Fish and wildlife mitigation constructed as part of the previously authorized project (5.6 acres of riparian forest) is expected to address all habitat impacts resulting from the recommended plan (approximately 0.97 acres).

In addition to a "no action" plan, five alternatives were evaluated in the final array of alternatives, as discussed in Section 3.5 of the GRR/EA.[1] The alternatives included the Modified Valley View (Alternative 2b), Modified Bypass (Alternative 3b), Nonstructural (Alternative 4), Low Scope (Alternative 7), and Combination (Alternative 8b) plans. The Nonstructural Plan was included in the final array of alternatives to comply with The Assistant Secretary for the Army for Civil Works (ASACW) Policy Directive on "Comprehensive Documentation of Benefits in Decision Document, this alternative was eliminated from further consideration under NEPA. The Nonstructural Plan is not viable under NEPA because it has a lower effectiveness when compared to the other plans (43% of flood damages reduced versus 87-98% for the other alternatives) and leaves the study area with high residual risk, so it therefore does not meet the purpose and need under NEPA.

SUMMARY OF POTENTIAL EFFECTS:

For all alternatives, the potential effects were evaluated, as appropriate. A summary assessment of the potential effects of the recommended plan are listed in Table 1:

[1] **40 CFR 1505.2(a)(2) requires a summary of the alternatives considered.**

Table 1: Summary of Potential Effects of the Recommended Plan

	Insignificant effects	Insignificant effects as a result of mitigation*	Resource unaffected by action
Aesthetics and Recreation	☐	☒	☐
Air quality	☐	☒	☐
Biological resources	☐	☒	☐
Climate change*	☐	☐	☐
Cultural resources	☐	☒	☐
Environmental justice	☐	☒	☐
Geologic resources and seismicity	☐	☒	☐
Hazardous materials	☐	☒	☐
Land use	☐	☒	☐
Noise	☐	☒	☐
Public safety	☐	☒	☐
Public services and utilities	☐	☒	☐
Socioeconomics	☒	☐	☐
Transportation	☐	☒	☐
Water resources	☐	☒	☐

*With no Federal threshold available for greenhouse gases, and no applicable threshold as a point of comparison, there is no quantitative way to establish the level of significance for these emissions (see Section 4.16 of the GRR/EA).

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan (the Combination Plan [Alternative 8b]). Best management practices (BMPs) as detailed in the Section 4.0 of the GRR/EA will be implemented to minimize impacts.[2]

- **Aesthetics and Recreation:** Measures will be taken to stage construction activities in areas outside of visually sensitive areas, or provide screening. Additional measures will be taken to blend new structures or alterations to existing structures with their surroundings, potentially including aesthetic treatments that honor the archeological and cultural history of the area.

- **Air quality:** Best management practices (BMPs) will be implemented to minimize effects to local residents including dust control (e.g., watering roads, covering haul trucks carrying loose material), measures to reduce tracking soil/mud outside of the construction site, measures related to vehicle-emissions (e.g., minimizing idling times, proper maintenance of construction equipment), and publicly-posted contact information to report dust complaints with a 48 hour time period to respond and take corrective action.

- **Biological resources:** Compensatory mitigation was completed in advance of the project and no additional compensatory mitigation is required. Measures (including those identified in the Biological Opinion) will be implemented that protect the integrity

[2] 40 CFR 1505.2(a)(3) all practicable means to avoid and minimize environmental harm are adopted.

of the existing remaining biological resources (e.g., vegetation protection plan, BMPs during construction) as well as provide for the successful of newly installed vegetation at providing the intended biological benefits.

- **Climate change:** Measures to reduce greenhouse gas emissions where possible include using fuel efficient construction equipment, recycling construction waste, minimizing vehicle-emissions, encouraging energy efficiency, reducing emissions related to hauling, and seeking opportunities for beneficial reuse of disposal material.

- **Cultural resources:** Measures include developing and implementing a Tribal Cultural and Archaeological Monitoring Treatment Plan (TCAMTP), and having archaeological and tribal monitors present during ground disturbing work.

- **Environmental justice:** It will be necessary to coordinate with the City of San José to assist in relocation of the unhoused communities to a location outside of the flood hazard zone in order to facilitate construction of the project.

- **Geologic resources and seismicity:** Measures include preparation of a Stormwater Pollution Protection Plan (SWPPP) and BMPs to reduce potential erosion and runoff during rain events.

- **Hazardous materials.** Measures include conducting additional testing and techniques/approaches to reduce exposures to elevated mercury concentrations. The excavation footprint will be minimized in locations with high mercury concentrations and excavated materials with elevated mercury concentrations will have at least 3 ft of soil cover.

- **Land use:** Measures include compliance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1960, and any associated compensation for properties needed to construct the Combination Plan.

- **Noise:** Noise reduction measures include but are not limited to establishing construction work hours, equipping construction equipment with standard noise control devices, and selecting haul routes that avoid heavily populated residential streets whenever possible.

- **Public safety:** Measures to protect public safety during construction include posting warning signs to restrict or prohibit public access; providing advanced notification to residents and business in the surrounding area; and coordinating with local agencies on access routes. After construction, permanent signage will be installed where necessary to restrict or prohibit public access, and a system for trail closures and other early warning notifications will be implemented.

- **Public services and utilities:** Measures include coordination with the City of San José Police and Fire departments, as well as the Crime Prevention Unit on construction activities that may impede delivery of services, especially road closures; as well as, notification and coordination with utility companies to reduce impacts from service interruptions, or damaged utilities.

- ***Socioeconomics:*** *[no avoidance or mitigation measures recommended].*

- **Transportation:** A detailed Construction Traffic Management Plan will be implemented during construction. Other traffic control measures include implementing traffic management techniques, and coordinating with transportation agencies on bridge closures, haul routes, and other circulation considerations.

- **Water resources:** Measures include preparation of a Stormwater Pollution Protection Plan (SWPPP), implementation of measures identified in the Biological Opinion to reduce potential impacts to water quality, and provisions of the Clean Water Action Section 401 Water Quality Certification.

COMPENSATORY MITIGATION:

No additional compensatory mitigation is required as part of the recommended plan.

Public review of the draft GRR/EA and FONSI was completed on **DATE DRAFT EA AND FONSI REVIEW PERIOD ENDED**. All comments submitted during the public review period were responded to in the Final GRR/EA and FONSI. A 30-day state and agency review of the Final IFR/EA was completed on **DATE SAR PERIOD ENDED**. As a result of state and agency review, the final IFR/EA was (SUMMARIZE CHANGES MADE).

OTHER ENVIRONMENTAL AND CULTURAL COMPLIANCE REQUIREMENTS:

ENDANGERED SPECIES ACT

Pursuant to section 7 of the Endangered Species Act of 1973, as amended, the National Marine Fisheries Service (NMFS) issued a biological opinion, dated 11 February 2005, that determined that the recommended plan will not jeopardize the continued existence of the following federally listed species or adversely modify designated critical habitat: Central California Coast (CCC) Steelhead (*Oncorhynchus mykiss*). All terms and conditions, conservation measures, and reasonable and prudent alternatives and measures resulting from these consultations shall be implemented in order to minimize take of endangered species and avoid jeopardizing the species.

NATIONAL HISTORIC PRESERVATION ACT

USACE's identification efforts within the area of potential effects for the Preferred Action alternative did not locate any existing historic properties. Literature research and consultation with tribes have indicated the Upper Guadalupe River is highly sensitive for discovering unanticipated cultural resources from any ground-disturbing work. A Tribal and Cultural Archaeological and Monitoring Treatment Plan will need to be implemented before construction occurs. This document will be included within a Programmatic Agreement for the project to comply with Section 106 of the National Historic Preservation Act. This agreement document will ensure that the SHPO and any other concurring parties are included in future identification efforts as well as the development of specific avoidance, minimization, and mitigation measures during the design phase of the project.

CLEAN WATER ACT SECTION 404(B)(1) COMPLIANCE

Pursuant to the Clean Water Act of 1972, as amended, the discharge of dredged or fill material associated with the recommended plan has been found to be compliant with section 404(b)(1) Guidelines (40 CFR 230). The Clean Water Act Section 404(b)(1) Guidelines evaluation is found in Appendix C5 of the GRR/EA.

CLEAN WATER ACT SECTION 401 COMPLIANCE:

A water quality certification pursuant to section 401 of the Clean Water Act was obtained from the San Francisco Bay Regional Water Quality Control Board in December 2003. Coordination with the Water Board is ongoing to determine if the project's existing Section 401 Water Quality Certification (WQC) applies to the Combination Plan. Preliminary conversations indicate that even if it cannot be, a new WQC would be very similar to the existing document. All conditions of the water quality certification shall be implemented in order to minimize adverse impacts to water quality.

OTHER SIGNIFICANT ENVIRONMENTAL COMPLIANCE:

All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed.

FINDING

Technical, environmental, economic, and cost effectiveness criteria used in the formulation of alternative plans were those specified in the Water Resources Council's 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives.[3] Based on this report, the reviews by other Federal, State and local agencies, Tribes, input of the public, and the review by my staff, it is my determination that the recommended plan would not cause significant adverse effects on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.[4]

_____ _____

Date

Kevin P. Arnett
Lieutenant Colonel, U.S. Army
District Commander and Engineer

[3] 40 CFR 1505.2(a)(2) requires identification of relevant factors including any essential to national policy which were balanced in the agency decision.

[4] 40 CFR 1508.1(l) states the FONSI is a document by a Federal agency briefly presenting the reasons why an action, not otherwise categorically excluded (§ 15018.4), will not have a significant effect on the human environment and for which an environmental impact statement therefore will not be prepared.

EXECUTIVE SUMMARY

ES-1. INTRODUCTION

This is a General Reevaluation[1] of a flood risk management project which also had an authorized recreation purpose. The project was previously authorized in 1999 and reauthorized in 2007. Design and construction were ongoing from 2009 to 2018, with inconsistent funding, and issues arising during design that warranted a general reevaluation. Costs had risen, and technical concerns about with-project velocities being too high meant that additional erosion control features would likely need to be added and mitigated for. Given the high cost of mitigation and construction in this area, the economic justification of the previously authorized (and partly constructed) plan became uncertain, initiating the general reevaluation. This General Reevaluation Report is integrated with a Supplemental Environmental Assessment prepared to comply with the National Environmental Policy Act, (NEPA). The Integrated Report provides a detailed account of reformulation, evaluation, and public, agency, tribal, and stakeholder engagement that the study team undertook in order to identify a tentatively selected plan for consideration during public and agency review.

The non-federal sponsor is the Santa Clara Valley Water District (Valley Water). As the local sponsor, Valley Water is a cost-sharing partner with the U.S. Army Corps of Engineers (USACE), working to deliver the project.

Figure ES-1. Study area map.

ES-1.1 Purpose and Need

The purpose of the study is to determine if there is Federal Interest in implementing an alternative to reduce flood risk along the Upper Guadalupe River in San José consistent with

[1] A *General Reevaluation* is a study to affirm, reformulate or modify a plan, or portions of a plan, under current planning criteria. This study may be similar to a Feasibility Study (USACE Engineering Regulation 1105-2-100).

Federal laws and regulations. The purpose and need for the action, as required by NEPA (40 CFR 1502.13) specifies the underlying purpose and need to which the agency is responding in proposing the alternatives, including the proposed action. Under NEPA, the purpose of the action is to reduce flood risk along the Upper Guadalupe River in San José.

The action is needed because there is a high risk of flooding in the densely populated city of San José, California, from the Upper Guadalupe River, and Ross and Canoas Creeks. Flood event breakouts from the Upper Guadalupe River, Canoas Creek, and Ross Creek have resulted in deep flooding in communities of concern with known environmental justice disparities and shallow flooding in historically more affluent communities. There are approximately 3,490 people living in residential structures that are projected to flood during a 1% annual exceedance probability (AEP) event. Just under half of those residents are considered to be socially vulnerable based on income, race, age, mobility, etc. (as defined in section 3.5.4 of the main report). Future without project expected annual damages from flooding are roughly $22.5 million. In addition to the structures and people at risk, transportation corridors have been identified to be at risk from flooding.

The city of San José is the third largest city in California and tenth largest in the United States, with a population of approximately 1 million people (based on 2020 Census estimates), which can be expected to grow to over 1.7 million during a 50-year period of analysis. There is a potential life safety risk in the densely populated urban areas within the floodplain due to the rapid nature of the flooding in this system. Flood depths and velocities in the channel pose a significant life safety risk to the large, unhoused population residing in encampments along the channel. The unhoused population in San José has increased significantly with rising home prices, and the City of San José has indicated that they do not have sufficient temporary or alternate housing to meet existing needs.

The river and its associated floodplains have a documented history of flooding dating back nearly 100 years, with consequences ranging in the millions of dollars in damages from more recent flooding events in 1995 and 1998. The primary drivers of flooding during storm events on the Upper Guadalupe River are segments of low channel capacity and hydraulic pinch points at bridges and undersized culverts where flows are “pinched” into a narrower space and overtop the channel. High velocities during flood events have incised the channel creating steep riverbanks that have constrained flows that historically spread out in a wide floodplain. Habitat quality in the mainstem river channel is low due to anthropogenic degradation over time. However, the Guadalupe watershed continues to support federally threatened steelhead that use the main channel as a migration corridor to rearing and spawning habitat in the upper watershed, and the Guadalupe River downstream of Hedding Street is designated critical habitat for steelhead. Through *engineering with nature*, improvements to the channel are expected to not only manage the risk of floodwaters breaking out of the constricted reaches, but also create a floodplain bench and valuable riparian habitat, garnering benefits to the environment and society.

Finally, there are societal needs for this project which include: 1) a lack of access to the riparian corridor for recreation, and 2) inequity in who currently bears the most dangerous flood risk due to steep income inequality with the most dangerous flood risk areas being located in socially vulnerable parts of the study area. Section 1.9 identifies the specific problems being addressed by the study and the opportunities created by the study within the Upper Guadalupe River watershed.

ES-2. PLAN FORMULATION

The reformulation effort began by generating consensus on removing two key constraints that previous evaluations had maintained. The first constraint was that floodwalls had to be less than five feet for safety and drainage. Since floodwall designs have evolved in the last twenty years such that they can be built safely, and with effective local drainage, greater than five feet, this constraint is no longer a limitation. The second constraint was that more extensive widening of the river mainstem was considered

not viable. This reevaluation determined that it could be considered, if done in a nature-based fashion that restored river processes and improved habitat function long-term. In the 1998 Feasibility Study (FS) and Environmental Impact Statement/Environmental Impact Report (EIS/EIR), large-scale widening was screened out due to unacceptable impacts to significant habitat for threatened steelhead. Extensive emphasis had been placed on conserving mature riparian vegetation because it was thought that it could not be successfully revegetated in heavy clay soils. Recent constructed mitigation for this project, however, demonstrated that there were effective planting best practices that supported new riparian establishment. Thus, the team was able to investigate new alternatives, not previously considered, which included incorporating engineering with nature strategies. The reformulation also provided the opportunity to quantify and deliver more comprehensive benefits (i.e., environmental quality and societal benefits in addition to economic benefits associated with flood risk management). The engineering with nature approach was coordinated closely with resource agencies, to ensure that channel widening in the most constricted channel reaches was acceptable from the perspective of effects to threatened species.

Another formulation strategy that the team employed was to vary the scale and cost of the alternatives and try to identify the smallest plan possible that could deliver some benefits. The team also looked more closely at nonstructural measures such as relocating and floodproofing structures, early warning systems, evacuation planning, and risk communication. The team focused on areas of flood breakouts from the channel and tributaries, focusing on removing hydraulic constrictions, both in terms of channel capacity and pinch points that push high flows out of the channel.

The final array of alternatives evaluated was:

Alternative 1—No Action Alternative. Describes what would happen if no action is taken as part of this project. Used for comparison with action alternatives to assess the benefits and impacts of proposed plans.

Alternative 2b—Modified Valley View Plan. This is the previous national economic development (NED) plan (plan that maximized net flood risk management (FRM) benefits) and uses channel widening and bypasses, culvert, and bridge replacements, as well as floodwalls on the tributaries to increase channel capacity and reduce flood damages.

Alternative 3b—Modified Bypass Plan. This is the previously authorized locally preferred plan. This is the largest structural alternative analyzed and uses channel widening on the eastern bank of the Upper Guadalupe River, with even more bypass features that include alcoves to provide connectivity to the main channel. This plan would include gravel augmentation and alcoves, as well as culvert/bridge replacements throughout the system.

Alternative 4—Non-Structural Plan. Includes elevation of 593 residential structures and flood proofing for 121 nonresidential structures within the 4% annual exceedance probability (AEP) floodplain. Non-physical measures include evacuation plans, early warning system, risk communication, and flood emergency preparedness plans.

Alternative 7—Low Scope Plan. The Low Scope alternative is focused on seeing if there is a lower cost plan that may be justified. It has fewer bridge and culvert replacements than the Bypass and Combination Plans and focuses work in the reaches with breakouts, or at the most constricting pinch points. Non-physical nonstructural measures have been incorporated, including evacuation plans, early warning system, risk communication, and flood emergency preparedness plans.

Alternative 8b—Combination of Engineering with Nature and Traditional FRM Plan (Combination Plan). This plan combines engineering with nature features, such as floodplain reconnection in the constricted portions of the mainstem of the Upper Guadalupe River, with traditional flood risk management features, such as floodwalls, on the tributaries where homes abut the creek. The Combination Plan also includes gravel augmentation and alcoves, as well as bridge and culvert replacement at the most restricting pinch points in the system. Non-physical nonstructural measures have been incorporated, including evacuation plans, early warning system, risk communication, and flood emergency preparedness plans.

To support making informed decisions using a holistic analysis of all potential benefits and impacts, the team worked to identify and analyze benefits across economic, environmental, and social categories, such as life safety and environmental justice / equity. The USACE Hydrologic Engineering Center Flood Damage Reduction Analysis software (HEC-FDA) is the model traditionally used to quantify and compare NED benefits. Instead of delineating economic reaches for HEC-FDA analysis using only flooding and structure type criteria, the team broadened the analytical lens and defined *flooding impact areas* to account for differences in social vulnerability, life safety parameters, and more. This enabled a more detailed evaluation and comparison for other social effects (OSE), such as environmental justice and life safety. Finally, the team also conducted ecological modeling, in coordination with the USACE's Ecosystem Restoration Planning Center of Expertise, to evaluate and compare the environmental quality (EQ) benefits of each alternatives. This detailed analysis supported the identification of not only the NED Plan, but also the plan that maximized benefits across all categories, i.e. a comprehensive benefits plan.

ES-3. RECOMMENDED PLAN

The tentatively selected plan (TSP) is Alternative 8b the Combination of Engineering with Nature and Traditional FRM Plan (Combination Plan).

The Combination Plan is both the NED and the Comprehensive Benefit Plan; it reduces 95% of damages across all flood events modeled. The plan has a total project cost of $152.8 million, with $15.2 million in net benefits and a benefit-cost ratio of 3.4. The Combination Plan will provide $59 million in gross regional products, 554 jobs, and $83.9 million in regional economic output.

The Combination Plan has significant environmental justice (OSE) benefits, with 90.5% of persons removed from the 1% AEP floodplain located in socially vulnerable flooding impact areas. All eleven critical infrastructure elements in the 0.2% AEP without project floodplain are removed from the floodplain with this plan, meaning the risk of flooding is managed for a 0.2% AEP event.

The Combination Plan maximizes EQ benefits compared to other alternatives by providing an increase of over 30 habitat units via floodplain benches which will support increased riparian forest habitat, when compared with the without project condition; and an increase in both aquatic rearing habitat (0.93 acres), and spawning habitat (0.14 acres). The purpose of the floodplain bench is to increase the capacity of the channel, reducing hydraulic constrictions and flood damages. However, by designing it with habitat in mind, more EQ benefits are gained.

Agriculture and development in the Santa Clara Valley have eliminated most of the riparian forest in the region. The riparian forest along the Guadalupe River and nearby creeks constitutes the last remaining areas of significant riparian forest in the valley. Along the Upper Guadalupe River, remaining riparian habitat has been reduced and degraded by channelization, gravel mining, and development. This project converts parking lots and pavement to riparian forests and reestablishes a previously urbanized floodplain. Riparian forests are considered to be among the most productive habitats for wildlife in California, providing food sources and shelter for fish and wildlife. These habitats support the most dense and diverse wildlife communities in the Santa Clara Valley, with generally the highest levels of biodiversity. Thus, the EQ benefits that this FRM project delivers are significant. Unlike the previously authorized plan, the mitigation for adverse impacts from the Combination Plan can be contained within the study area, and no additional ecological mitigation would be needed beyond what was constructed in Reaches 10b and 12 prior to initiation of the reevaluation study.

Cultural resources are likely to be encountered with the deep excavation proposed in the Combination Plan. Ground disturbance along the river banks could uncover unanticipated cultural resources, which would require mitigation or avoidance if discovered. A Tribal Cultural and Archaeological Monitoring

Treatment Plan is currently being drafted with the State Historic Preservation Officer (SHPO) and tribal consulting parties to address discoveries for cultural resources. This treatment plan will be implemented by the end of the feasibility study. USACE is also exploring ways to identify unanticipated sites through surveys and testing during design and before construction occurs. The projected costs for cultural resource mitigation as well as additional surveys, testing, and monitoring have been included in project cost estimates.

It is important to note that this is not an ecosystem restoration project and the team did not formulate for ecosystem restoration, but rather for flood risk management. Thus, there are further opportunities to restore the riparian ecosystem in this system which were not evaluated because they were not associated with FRM measures.

The study is cost-shared 50/50 with the non-federal sponsor. Iimplementation will be cost-shared between 35%-50% non-federal for creditable FRM features and 50% Federal / 50% non-federal for recreation features, with 100% of the operations, maintenance, repair, replacement, and rehabilitation costs to be paid by the non-federal sponsor. Based on estimated costs for the recommended plan, the creditable FRM features will be cost-shared 50% non-federal/ 50% Federal. With the implementation of the Combination Plan, there is residual risk (i.e. risk that remains after the project is in place) in the northern regions of the study area. There is an opportunity to reduce residual risk during feasibility level design and optimization of the recommended plan.

ES-3.1 Significant Resources/Environmental Considerations

This project has benefited from a lengthy history of agency coordination and environmental documentation. This document is an integrated General Reevaluation Report (GRR) and Supplemental Environmental Assessment (EA) to the 1998 Feasibility Study and integrated Environmental Impact Statement/Environmental Impact Report (1998 FS/EIS/EIR). The Bypass and Valley View Plans were evaluated in the EIS integrated with the 1998 FS/EIS/EIR. While the function of many of the proposed measures has changed (for example, floodplain widening rather than a bypass channel), the proposed construction (excavation of the channel banks) and associated effects are generally consistent between the plans assessed in the 1998 FS/EIS/EIR and the newly considered plans in this GRR/EA. As a result, much of the analysis of the Bypass and Valley View Plans are incorporated into the EA by reference, with their impacts summarized and displayed comparatively with the Combination and Low Scope Plans.

The team has coordinated with resource agencies throughout the GRR process. This area is important habitat for Endangered Species Act listed California Central Coast steelhead and special status Chinook salmon, and the team has been working to design a project that minimizes impacts and provides long-term benefits to steelhead while still being in the scope of FRM. The National Marine Fisheries Service (NMFS) has determined that the existing biological opinion (issued in 2000 and supplemented in 2005) for the Bypass Plan are also applicable to the Combination Plan. In addition, coordination with the U.S. Fish and Wildlife Service (USFWS) is ongoing under the Fish and Wildlife Coordination Act. A staff memorandum with comments on the alternatives and draft recommendations on how to further reduce effects and incorporate habitat considerations into the project was provided. Prior to the final report, USACE anticipates receiving draft and final Coordination Act Reports from USFWS and will consider and incorporate their recommendations, as appropriate.

The San Francisco Bay Regional Water Quality Control Board (Water Board) has indicated that either the existing Section 401 Water Quality Certification (issued in 2003) may apply to the Combination Plan, or they will issue a new, similar document prior to construction. The final decision regarding the Section 401 compliance will be documented through a letter exchange in the final report. Significant additional coordination with the Water Board is occurring to incorporate appropriate construction assumptions

regarding the presence of mercury in sediments throughout the study area, which has ramifications on water quality, public health and safety, and air quality considerations for the study.

The team has been coordinating with the California SHPO under Section 106 of the National Historic Preservation Act. The Tamien and neighboring Ohlone tribes were identified as Section 106 consulting parties due to the cultural significance of the Upper Guadalupe River area's buried sites, culturally significant native plants and animals, and the river itself having traditional and religious importance for their people.

ES-3.2 Plan Implementation

Pending agency approval, congressional authorization, and appropriations, design is expected to begin in 2025 and last two years, and the first construction element is expected to begin in 2026, with construction lasting seven years. A preliminary construction sequencing plan was established for the purposes of the environmental analysis, but will be further refined during feasibility level design. The non-federal sponsor supports this project.

ES-4. VIEWS OF THE PUBLIC, AGENCIES, STAKEHOLDERS, AND TRIBES

The public is supportive of this project and would like to see recreation trails added with connectivity to other trails and the downtown area. Members of the public have expressed concern with trash and encampments in the river channel affecting aesthetics and safety. Agencies have expressed support for the nature and process-based approach to FRM and are committed to working with USACE, acknowledging the importance of managing the risk of flooding in an urban area. NMFS indicated a willingness to help with the geomorphic design to maximize benefits to federally threatened steelhead, and offered to draft interpretive signage for environmental education to be used on the recreation trail. The City of San José has been engaged and supports this project. In particular, the Parks, Recreation, and Neighborhood Services and the BeautifySJ Divisions have collaborated closely with the USACE team to coordinate on opportunities to improve and connect recreation and work with unhoused communities to improve life safety. Santa Clara County has also been engaged and is supportive of the project.

Tribes are also supportive of the project and recognize the need and importance of managing flood risk, with the Ohlone Indian Tribe, Indian Canyon, and Tamien Nation responding to USACE and Valley Water's requests to consult on the study. Tribes agree that the Upper Guadalupe area is sensitive for cultural sites. A representative from the Tamien Nation indicated there was likely to be unavoidable impacts to cultural and tribal resources due to the high likelihood for unanticipated cultural sites being uncovered during construction. The area was determined to be a sacred place with several tribal villages being situated along the river. Non-disturbing survey methods such as ground penetrating radar or cadaver dogs were requested to be used to avoid the impacts associated with subsurface testing itself. Two tribes requested archaeological monitoring for any excavation and ground-disturbing work on-site, along with the development of a treatment plan should cultural resources or buried ancestral remains be uncovered.

Tribes expressed an interest in providing input for the plant palette that will be applied to revegetation areas to incorporate vegetation to support their traditional lifeways and practices. Tribes were open to working with USACE on cultural educational interpretive signage for recreation users to share their beliefs and why the Upper Guadalupe River is a culturally significant area.

ES-5. REVIEWS

This report has undergone USACE District Quality Control review. Once the Draft Report is released it will undergo concurrent public, resource agency, policy and legal, and USACE Agency Technical Review.

ES-6. UNRESOLVED ISSUES/AREAS OF CONTROVERSY

There are no areas of controversy identified. Issues that remain to be resolved prior to finalization are incorporating updated hydraulic roughness ("Manning's n") values into the analysis to reflect a higher level of channel roughness than originally modeled in the hydraulic inundation mapping for the with-project conditions. Sensitivity analysis was performed on the TSP to test the sensitivity to updated n-values. This change is not expected to change the plan selection as it will impact all plans similarily. The team will also address small pockets of deeper residual flooding in the with-project condition that may reflect errors in the HEC-RAS model associated with stitching data layers together, or may require minor revisions to the plan to address prior to the final report.

ES-7. SUMMARY OF POST AUTHORIZATION CHANGE

The following provides a summary comparison of the TSP to the Authorized Project in the 16-item format of a Post-Authorization Change Report (ER 1105-2-100, Appendix G, Amendment #1, June 2004). The draft GRR is a post-authorization change report that addresses these items in more detail.

1. Description of the Authorized Project

The Authorized Project from the 1998 Feasibility Study and EIS/EIR is the Bypass Channel Plan. This is a Locally Preferred Plan that when constructed, would alleviate damages associated with flooding along the upper Guadalupe River. The Bypass Channel Plan would provide flood protection against a 1% AEP flood event by combining channel widening, bypass channels, flood walls, and five bridge replacements. The channel bank would be widened at intermittent locations along nearly two miles of the river. Three bypass channels would provide additional capacity along 1.5 miles of the river. Floodwalls varying in height between two and four feet would be built at various locations along the river. The total length of the floodwalls would be approximately two-thirds of a mile. The Bypass Channel Plan would also increase the capacities of the downstream portions of two major tributaries, Ross Creek and Canoas Creek. The Authorized Project also includes a recreation trail on the maintenance roads which are required for operation and maintenance of the flood control features. Mitigation for project construction would be achieved on project lands and include planting of 22.4 acres of riparian forest, 3.6 acres of urban forest, and 1.5 acres of wetland habitat. The Bypass Channel Plan includes betterments associated with the bridge replacement at Pearl Avenue.

The Authorized Plan was modified during PED. Some of the changes were required for implementation, either through permits or to address new information developed in PED. Two reaches of the previously authorized plan were built in the Upper Guadalupe River – Reaches 10B and 12. These two reaches were built primarily to provide compensatory mitigation for future flood risk management feature impacts to riparian forest and shaded riverine aquatic (SRA) habitat. They were selected for providing mitigation because they needed minimal flood risk management improvements to meet the design flow capacity.

Approximately 170 acres of land are required for implementation of the Authorized Project. No new lands are required for the recreation features.

2. Authorization

Section 4 of the Flood Control Act of 18 August 1941, PL 228 [H.R. 4911] authorized a preliminary examination of the Guadalupe River, its tributaries and adjacent streams. The authorization reads as follows:

> *The Secretary of War is hereby authorized and directed to cause preliminary examinations and surveys for flood control, to be made under the direction of the Chief of Engineers, in drainage areas, the United States and its territorial possessions, which include the following named localities: Coyote River and tributaries, California; San Francisquito Creek, San Mateo and Santa Clara Counties, California; Matadero Creek, Santa Clara County, California; and Guadalupe River and tributaries.*

On 6 June 1945, the Chief of Engineers endorsed the Preliminary Examination Report of Guadalupe River and Tributaries (dated 28 February 1945). This endorsement authorized a flood control investigation of Guadalupe River, Coyote Creek, San Francisquito Creek and numerous other creeks which continued to be studied under the 1941 Guadalupe River and Adjacent Streams authorization.

In addition to study authority, Congress authorized construction of the Upper Guadalupe River Project in 1999 per legislation contained in the Water Resources Development Act (WRDA) of 1999 (PL 106-53), Section 1-01(a)(9):

> *Construction of the locally preferred plan for the flood damage reduction and recreation project, Upper Guadalupe River, California, described as the Bypass Channel Plan of the Chief of Engineers dated August 19, 1998, at a total cost of $140,328,000, with an estimated Federal cost of $44,000,000 and an estimated non-Federal cost of $96,328,000.*

The WRDA of 2007 (PL 110-114), Section 3037 re-authorized the project as such:

> *The project for flood damage reduction and recreation, Upper Guadalupe River, California, authorized by section 101(a)(9) of the Water Resources Development Act of 1999 (113 Stat. 275), is modified to authorize the Secretary to construct the project generally in accordance with the Upper Guadalupe River Flood Damage Reduction, San José, California, Limited Reevaluation Report, dated March 2004, at a total cost of $256,000,000, with an estimated Federal cost of $136,700,000 and an estimated non-Federal cost of $119,300,000.*

3. Funding Since Authorization

Current funding for the Upper Guadalupe River FRM Project were provided under a Feasibility Study Cost Share Agreement FCSA signed 30 December 2020 between the Corps and Valley Water. Federal Funding was provided through Work Plan funding in FY20 with Cost Shared Non-Federal Funding provided Valley Water.

Prior project funds for the Preconstruction Engineering and Design (PED) and Construction General (CG) for Reaches 10B and 12 were provided in Work Plan allocations prior to FY20.

The funding since authorization is shown below in Table ES-1.

Table ES-1. Funding since authorization.

TOTAL All Cost Shares	Allocated or Authorized	Fiscal Year(s)
Federal General Investigation (GI) Funds	$ 5,980,578.26	FY89 - FY05

Federal Construction General (CG) Funds	$ 25,308,164.00	FY06 – FY17
Federal Feasibility Study Funds	$ 1,500,000.00	FY20
Sub-Total Fed Funding	**$ 32,936,353.26**	
Non-Federal Cash PED Funds	$ 2,961,928.69	
Non-Federal Cash CG Funds	$ 2,157,141.31	
Non-Federal Cash Feasibility Funds	$ 1,500,000.00	FY21 – FY22
Work-in Kind Funding CG	$ 2,636,473.75 *	
Lands, Easements, Rights-of-way, Relocations, and Disposal (LERRD) CG	$ 4,350,439.70 *	
Sub-Total Non-Fed Funding	**$ 13,605,983.45**	
TOTAL	**$ 46,542,336.71 ***	

* *Estimated Work-In-Kind Project Coordination Team (PCT) Costs and LERRDs submitted by Valley Water under review.*

4. Changes in Scope of Authorized Project

The changes in scope between the Authorized Project (Bypass Channel Plan) and the TSP (Combination Plan) are shown below in Table ES-2.

Table ES-2. Changes in scope of authorized project.

Feature	Bypass Channel Plan (Authorized Plan)	Combination Plan (Tentatively Selected Plan)
Channel	**Reach 7:** Create a bypass channel 60-85 ft wide as an independent channel from the CalTrain railroad bridge (formerly SPRR) to Willow St., as a combined channel from Willow to Alma St., and as an independent channel from Alma St. to the UPRR Bridge.	**Reach 7:** Create a 50-150 ft wide floodplain bench on the east bank of the main channel. Islands will be left in place to preserve existing riparian vegetation. Gravel augmentation, flood plain revegetation, and placement of large woody debris structures in low flow channel.
	Reach 8: Create a bypass channel 85 ft wide as an independent channel from the UPRR Bridge to Willow Glen Way and a 128 ft entrance weir immediately downstream from Willow Glen Way.	**Reach 8:** Create a 50-150 ft wide floodplain bench on the east bank of the main channel. Islands will be left in place to preserve existing riparian vegetation. Gravel augmentation, flood plain revegetation, and placement of large woody debris structures in low flow channel.
	Canoas Creek: Maintain existing slopes from Guadalupe River to Nightingale.	**Canoas Creek:** Widening at culverts.
	Ross Creek: Excavate to 35 ft wide from Guadalupe River to a point 600 ft upstream of Jarvis.	**Ross Creek:** Widening at culverts.
Floodwalls	**Reach 7:** No floodwalls.	**Reach 7:** Floodwall at Elks Lodge (if needed).
	Reach 8: No floodwalls.	**Reach 8:** No floodwalls.
	Canoas Creek: Floodwalls on both banks.	**Canoas Creek:** Floodwalls on both banks.

Feature	Bypass Channel Plan (Authorized Plan)	Combination Plan (Tentatively Selected Plan)
	Ross Creek: Floodwalls between Almaden and Cherry.	**Ross Creek:** Intermittent floodwalls on both banks.
Bank Stabilization	**Reach 7:** 4,200 ft riprap/gabions in bypass channel's east side and 500 ft riprap in natural channel's west side.	**Reach 7:** 450 ft of biotechnical bank stabilization on the west bank of Reach 7. Riprap if needed.
	Reach 8: 1,300 ft riprap/gabions on both sides of bypass channel. Vortex weirs and riprap in natural channel from Willow Glen Way to 400 ft downstream.	**Reach 8:** Biotechnical bank stabilization or riprap if needed.
	Canoas Creek: No riprap.	**Canoas Creek:** No riprap.
	Ross Creek: 5,000 ft of articulated mat lining.	**Ross Creek:** No riprap.
Bridges and Culverts	**Reach 7:** Add a culvert to the Caltrain railroad bridge (formerly the SPRR Bridge). Replace the Willow St. and Alma Ave. Bridges.	**Reach 7:** Retrofit/replace two CalTrain railroad bridges, the Willow St. bridge, and the Alma Ave. bridge.
	Reach 8: Replace bridges at UPRR and Willow Glen.	**Reach 8:** Retrofit at the abandoned Union Pacific railroad bridge with box culvert. The Willow Glen bridge has already been rebuilt.
	Canoas Creek: Replace 2 culverts (at Almaden and at Nightingale).	**Canoas Creek:** Replace 2 culverts (at Almaden and at Nightingale).
	Ross Creek: Replace 2 culverts (at Almaden and at Jarvis).	**Ross Creek:** Replace 5 culverts (at Almaden, Cherry, Jarvis, Kirk, and Meridian).

5. Changes in Project Purpose

The primary authorized purposes are flood risk management and recreation improvements along the Upper Guadalupe River and its tributaries in San José, California within Santa Clara County. There is no change to the project purpose.

6. Changes in Local Cooperation Requirements

In the 1998 Chief of Engineers Report for the Authorized Project, the recommended cost-sharing requirements were in accordance with WRDA 1996, including a minimum of 35% but not to exceed 50% non-federal cost share for flood risk management features and a 50% non-federal cost share for recreation features. The non-federal sponsor would also be responsible for an additional payment for betterments associated with project construction of the LPP. The TSP is the NED plan rather than an LPP. It does not include betterments, so the additional payments would not be necessary. The 35% to 50% non-federal flood risk management and 50% non-federal recreation cost share requirements are consistent between the authorized project and the TSP.

7. Change in Location of Project

The Authorized Plan and the TSP generally follow the same footprint along the upper Guadalupe River. However, the footprint of the TSP is significantly downscoped on the mainstem of the Upper Guadalupe River when compared with the previously authorized plan, with no work currently anticipated in Reaches 9, 10, 11, and 12 beyond the advanced mitigation already constructed.

The Bypass Channel Plan required a total of 186.92 acres of real estate in fee title and/or under easement. Rounded, the concluded estimate inclusive of incremental costs for FEE acquisition of the required

LERRDs for the Authorized Plan was $145,000,000. The Combination Plan would require about 19.5 acres in fee title and/or under easement for an estimated total of $68,000,000.

Construction of reached 10B and 12 required a total of 25 parcels. Anticipated remaining real estate requirements for the Modified Bypass Plan (as a proxy for the Authorized Plan) and the TSP are shown below in table ES-3.

Table ES-3. Change in real estate of authorized project.

Alternative	Real Estate Cost Estimate Fee Acquisition	Appx. Total Parcels	Parcels Owned by NFS	Privately Owned Parcels Remaining to Acquire	Parcels Owned by the State of California	Parcels Owned by Other Local Public Agencies	Parcels in the Public Right-of-Way, Roads, and Expressways
Authorized Project: Bypass Channel Plan	$145,000,000[1]	257	96	104	4	15	26
TSP: Combination Plan	$68,000,000	75	54	13	4	4	0

[1] *Costs based on Alternative 3b: Modified Bypass Plan, which is a modified version of the Authorized Project.*

8. Design Changes

No work is currently anticipated in Reaches 9, 10, 11, and 12 beyond the advanced mitigation already constructed. FRM features are included in the most constricted reaches of the mainstem—Reaches 7 and 8. Some small levee or floodwall segments may be considered at targeted low spots during optimization in these upstream reaches, but are not currently part of the plan. The design for the mainstem for the previously authorized plan was a combination of bypass channels, widening, floodwalls, and removal of constrictions in the channel and tributaries through bridge and culvert replacements and rehabilitations. FRM features in the previously authorized plan were included in Reaches 7 through 12. The TSP mainstem design includes increasing channel capacity through widening and creation of a floodplain bench with riparian forest. By using engineering with nature design in this reach, the TSP is able to provide environmental quality benefits. The environmentally friendly design of the TSP greatly reduced the cost to mitigate for impacts that was associated with the previously authorized plan and made channel widening acceptable. This measure was previously excluded due to the unacceptable impacts to federally threatened steelhead associated with a traditional trapezoidal channel widening which was considered in the Reconnaissance Study of the 1980s.

On the tributaries to the Upper Guadalupe River—Ross Creek and Canoas Creek—the design changed to varying degrees. The Canoas Creek TSP design is largely the same as the previously authorized plan, through the floodwall height went from low to medium-high, and the extent of the floodwalls extends further upstream than in the previously authorized plan. On Ross Creek, the previously authorized plan included channel widening and deepening, a low flow channel, concrete mat lining at slopes, culvert replacements at Ross/Almaden crossing, Cherry Street, and Jarvis Street. For the TSP, the design on Ross Creek includes the same culvert replacements, plus an additional one at Meridian Street and another at Kirk Street further upstream. Instead of the widening and deepening, the Ross Creek design includes 6-ft high floodwalls on both sides of the channel.

9. Changes in Total Project First Costs

The total first cost of the Bypass Channel Plan, including flood control and recreation, was estimated at $132,835,000 at October 1997 price levels, of which $130,618,000, was for the flood damage reduction features and $2,217,000 was for the recreation improvements. In addition to the total first cost, betterment features are estimated at $2,685,000.

Table ES-4 is a comparison of the estimated cost for the TSP and the authorized project updated to current price levels.

Table ES-4. Changes to total project first costs.

Item	1998 Authorized Project		Last Report to Congress (2007)	TSP
	Oct 1997 Prices	Oct 2022 Prices	Oct 2007 Prices	Oct 2022 Prices
Total Project First Costs	$132.8M (excluding 2.7M in betterments)[1]	Remaining: $510.8M[2] Sunk: $36.7M Total: $547.5M	$256M[3]	Remaining: $152.8M Sunk: $36.6M Total: $189.4M[4]

[1] Cost as reported in the 1998 Upper Guadalupe River Chief of Engineers Report.
[2] Costs based on Alternative 3b: Modified Bypass Plan, which is a modified version of the Authorized Project.
[3] Cost as reported in the Limited Reevaluation Report in section 3037 of WRRDA 2007.
[4] Includes $36.7M spent during construction of reaches 10a and 12 plus remaining costs for TSP

Changes in costs are attributed to increased mitigation costs, increased real estate costs, increased construction costs. However, the total project first cost of the TSP is less than the Authorized Project when both are evaluated at October 2022 prices levels.

10. Changes in Project Benefits

Table ES-5 shows a comparison of the benefits given in the project document, the benefits last reported to Congress, and the benefits based on reevaluations that have been done to support the TSP.

Benefits decreased significantly between October 1997 and 2022 for the 1998 Authorized Project due to the increase in construction, real estate, and mitigation costs for the Bypass Channel Plan.

Table ES-5. Changes in project benefits.

Item	1998 Authorized Project		Last Report to Congress (2007)	TSP
	Oct 1997 Prices	Oct 2022 Prices	Oct 2007 Prices	Oct 2022 Prices
Net Annual Benefits	$12.1M[1]	$0.65M[2]	n/a	$15.2M[3]

[1] Benefits as reported in the 1998 Upper Guadalupe River Chief of Engineers Report.
[2] Benefits based on Alternative 3b: Modified Bypass Plan, which is a modified version of the Authorized Project.
[3] TSP net annual benefits based on remaining benefits to compared to remaining costs for features not already constructed.

11. Benefit-to-Cost Ratio

Total average annual costs, based on a Fiscal Year 1998 Federal interest rate of 7.125 percent and a 50-year period of analysis, were estimated in the 1998 Upper Guadalupe River Chief of Engineers Report at $11,455,000 for the flood damage reduction features and $147,000 for the recreation improvements. Total average annual flood damage reduction benefits were estimated at $23,577,000, yielding net benefits of $12,122,000, and a benefit to cost ratio (BCR) of 2.1 to 1.

Table ES-6. Changes in project benefit-to-cost ratio.

Item	1998 Authorized Project		Last Report to Congress (2007)	TSP
	Oct 1997 Prices	Oct 2022 Prices	Oct 2007 Prices	Oct 2022 Prices
FRM Benefit-to-Cost Ratio	2.1[1]	1.0[2, 3]	n/a	3.4[3, 4]

[1] *BCR as reported in the 1998 Upper Guadalupe River Chief of Engineers Report.*
[2] *BCR based on Alternative 3b: Modified Bypass Plan, which is a modified version of the Authorized Project.*
[3.] *Fiscal Year (FY) 2023 price levels, 50-year period of analysis, 2.5% discount rate.*
[4] *Remaining benefits compared to remaining cost of features not already constructed.*

12. Changes in Cost Allocation

Table ES-7 compares the cost allocation among the project purposes for the Authorized Project and the TSP.

13. Changes in Cost Apportionment

The Federal share of the cost of the authorized Bypass Channel Plan was established in WRDA 1999, and updated in WRDA 2007[2]. The cost apportionment of the TSP for Recreation is the same as the previously authorized Bypass Channel Plan. However, the FRM features were cost shared 52.6% Federal and 47.4% non-federal in the previously authorized Bypass Channel Plan, and would be cost shared 50 / 50 for the TSP, as shown in Table ES-7.

[2] There is a discrepancy between the WRDA 2007 authorization for $256 million in construction costs and the 2005 Limited Reevaluation Report (LRR) which estimated $212 million. Table ES-7 utilizes the more accurate cost estimate numbers from the LRR to explain cost allocation, though the authorized amount is higher.

Table ES-7. Changes in cost allocation and apportionment.

Item	Authorized Project: Bypass Channel Plan		TSP: Combination Plan	
	Oct 2003 Prices[1]		Oct 2022 Prices	
	Federal	Non-federal	Federal	Non-federal
Flood Risk Management				
Percent Cost Share	52.6%	47.4%	50%	50%
Creditable FRM Costs	$110,208,804	$99,209,520	$88,212,637 ($27,862,175 sunk + $60,350,000 remaining)	$88,212,637 ($9,464,876 sunk + $78,747,769 remaining)
Non-Creditable FRM Costs	N/A	N/A	N/A	$14,005,540 ($2,636,473 sunk + $11,369,066 remaining)[2, 3]
Recreation				
Percent Cost Share	50%	50%	50%	50%
Total Recreation Costs	$1,333,167	$1,333,167	$1,180,000	$1,180,000
Flood Risk Management and Recreation Total	**$111,541,971**	**$100,542,687**	**$89,392,698**	**$103,398,238**
	TOTAL $212,084,658		**TOTAL $192,791,000 ($39,963,516 sunk + $152,827,420 remaining)**	

[1] Cost share as reported in the 2005 Upper Guadalupe River Limited Reevaluation Report.
[2] All LERRDs are the responsibility of the non-federal sponsor. LERRDs that are in excess of 45% of total creditable costs are not creditable.
[3] There are also sunk project coordination team costs that are not creditable, due to minimum 5% cash requirement.

14. Environmental Considerations in Recommended Changes

The environmental effects of the new TSP are similar in nature but much smaller in extent to those of the originally authorized project. The new TSP also has significantly more beneficial effects to the environmental quality of the project area. The original EIS was adequate, but the effects of the originally authorized plan were re-analyzed for resources that have been added and where conditions have changed since it was published. The new NEPA document is a supplemental EA to the original EIS.

15. Public Involvement

The 1998 FS/EIS/EIR details the extensive public engagement undertaken at the time. The General Reevaluation team has endeavored to meaningfully engage with the public and stakeholders, as well as resource agencies and tribes at key points in the study to solicit input on the scope of the Reformulation and the evaluation of the alternatives in the Reformulation. Further input on the TSP will come during this public review and will be reviewed and incorporated as appropriate into a refined recommendation. Responses to comments will be included in the Final GRR/EA.

16. Project History

The Upper Guadalupe River Feasibility Study was authorized by Section 4 of the Flood Control Act of 18 August 1941, PL 228 [H.R. 4911]. The study was completed in January 1998. The Chief of Engineers recommended the Bypass Channel Plan in his report to Congress dated 19 August 1998. In 1999, Congress authorized the construction of the Bypass Channel Plan in Section 101(a)(9).

The PED phase revealed new information that resulted in a need to modify the design for the Bypass Channel Plan. At this point project costs had increased due to consultation with regulatory agencies, inflation, land values, and construction price levels. This resulted in the Limited Reevaluation Report: Proposed Project Modifications for the Upper Guadalupe River Project dated 1 April 2004 (LRR). The LRR did not recommend any modifications to the purpose, scope, or location of the Bypass Channel Plan.

In 2007, Congress reauthorized construction of the project with full federal cost share through Section 3037. By 2015, construction was completed in only Reaches 10b and 12. As USACE began to work towards the construction phase for Reaches 7 and 8, issues were identified concerning high velocities, unacceptable erosion risk, conflicting needs of resource agencies, and an aging EIS/EIR. This led USACE and the NFS to consider whether a GRR would be appropriate.

In 2021, a GRR was initiated to reevaluate the previously studied, congressionally authorized, and partially constructed project along the Upper Guadalupe River. Specifically, the GRR seeks to assess alternatives for federal interest in providing flood risk management and recreation improvements, from I-280 extending south 5.5 miles along the Upper Guadalupe River in Santa Clara County, San José.

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ACRONYMS AND ABBREVIATIONS

AADT	average annual daily traffic
ac-ft	acre-feet
AEP	annual exceedance probability
AMT	adaptive management team
APE	area of potential effects
AQMD	Air Quality Management District
BAAQMD	Bay Area Air Quality Management District
BART	Bay Area Rapid Transit
BCR	benefit cost ratio
bgs	below ground surface
BMPs	best management practices
BO	biological opinion
BP	before present
CAA	Clean Air Act
CAR	Coordination Act Report
CARB	California Air Resources Board
CDFW	California Department of Fish and Wildlife
CE	common era
CEJST	climate and economic justice screening tool
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CNDDB	California Natural Diversity Database
CO	carbon monoxide
CO2eq	carbon dioxide equivalents
CRLF	California Red-legged Frog
dB	decibel
dBA	a-weighted decibel
District	USACE, San Francisco District
DO	dissolved oxygen
DTSC	Department of Toxic Substance Control
EA	environmental assessment
ECO-PCX	Ecosystem Restoration Planning Center of Expertise
EFH	essential fish habitat
EIA	economic impact area
EIR	environmental impact report

EIS	environmental impact statement
EJ	environmental justice
EO	executive order
EOP	environmental operating principles
EQ	environmental quality
ERR	economic reevaluation report
ESA	Federal Endangered Species Act
ESU	evolutionarily significant unit
EWN	engineering with nature
FONSI	finding of no significant impact
FRM	flood risk management
FWCA	Fish and Wildlife Coordination Act
FWOP	future without project
FY	fiscal year
GHGs	greenhouse gases
GIS	geographic information system
GRR	general reevaluation report
GRR/EA, or Integrated Report	general reevaluation report/environmental assessment
GWIWG	Guadalupe Watershed Integration Working Group
H&H	hydraulics and hydrology
HEC-FDA	Hydrologic Engineering Center Flood Damage Reduction Analysis software
HSI	habitat suitability index
HTRW	hazardous, toxic and radioactive waste
IDC	interest during construction
IPaC	information for planning and consultation
Ldn	day-night level
LERRDs	lands, easements, rights-of-way, relocations, and disposal
LPP	locally preferred plan
LRR	limited reevaluation report
MAMP	monitoring and adaptive management plan
MMP	mitigation and monitoring plan
NAAQS	national ambient air quality standards
NAHC	Native American Heritage Commission
NAVD	North American Vertical Datum
NED	national economic development
NEPA	National Environmental Policy Act
NFIP	national flood insurance program
NFS	non-federal sponsor
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service

NNBF	natural and nature-based features
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NRHP	National Register of Historic Places
NTU	nephelometric turbidity unit
O_3	ozone
O&M	operation and maintenance
OMB	Office of Management and Budget
OMRR&R	operations, maintenance, repair, replacement and rehabilitation
OSE	other social effects
P&G	principles and guidelines
PAR	population at risk
Pb	lead
PDT	project delivery team
PED	preconstruction engineering design
PM	particulate matter
RAWG	resource agency working group
RCRA	Resource Conservation and Recovery Act
RED	regional economic development
ROD	record of decision
ROG	reactive organic gases
SACW	Secretary for the Army (Civil Works)
SBA	South Bay Aqueduct
SCVWD	Santa Clara Valley Water District
SFBAAB	San Francisco Bay Area Air Basin
SHPO	State Historic Preservation Officer
SIP	state implementation plan
SO_2	sulfur dioxide
SRA	shaded riverine aquatic
SVI	social vulnerability index
SWPPP	stormwater pollution prevention plan
TCP	traditional cultural properties
TMDL	total maximum daily load
TOD	transit oriented development
TSP	tentatively selected plan
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
Valley Water	Santa Clara Valley Water District
VTA	Santa Clara Valley Transportation Authority

Water Board	San Francisco Bay Regional Water Quality Control Board
WIIN	Water Infrastructure Improvements for the Nation Act
WQC	Section 401 water quality certification
WRDA	Water Resources Development Act

1 INTRODUCTION

Section 1 will introduce the Upper Guadalupe River Flood Risk Management (FRM) Reformulation Study, the U.S. Army Corps of Engineers (USACE) planning process, and the congressional authority under which this work is conducted. The study area, background, and history will be described. The purpose and need of the project, with detailed description of the problems, opportunities, objectives, and constraints, as well as the scope of the study are also laid out in this section.

1.1 Introduction

General Reevaluation Studies are feasibility studies that are conducted to affirm, reformulate or modify an authorized plan, or portions of a plan, under current planning criteria. This General Reevaluation, or Reformulation Study, is being conducted by the USACE, San Francisco District (District), in partnership with the Santa Clara Valley Water District (Valley Water, previously referred to as SCVWD) who is serving as the non-federal sponsor (NFS). The primary authorized purposes are flood risk management (FRM) and recreation improvements along the Upper Guadalupe River and its tributaries in San José, California within Santa Clara County. This reevaluation updates a previously authorized project, which was described in the 1998 Upper Guadalupe River Feasibility Study and Environmental Impact Statement/Environmental Impact Report (1998 FS/EIS/EIR). USACE and Valley Water identified issues with the previously authorized project (the Bypass Plan) during the Preconstruction Engineering and Design Phase that warranted a General Reevaluation in order to proceed. These issues are discussed in Section 1.6.

1.2 USACE Planning Process

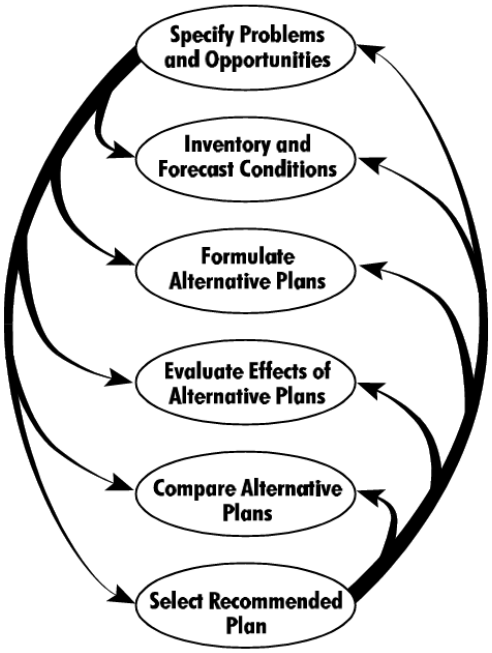


Figure 1. USACE 6-Step planning process.

The USACE Planning Process is a six-step iterative process (Figure 1). The six steps are: 1) identify problems and opportunities, 2) inventory and forecast conditions, 3) formulate alternative plans, 4) evaluate alternative plans, 5) compare alternative plans, and 6) select a recommended plan. USACE planning is performed in interdisciplinary teams comprised of engineers, biologists, economists, real estate specialists, cultural resources specialists, a project manager, and more. The planner leads the team through the study phase and helps to document the team's analysis, explaining how the recommendation was reached. In order to arrive at an acceptable and implementable recommendation, the team not only looks at what benefits each plan provides, compared to their cost, but also analyzes and compares the potential impacts of a plan. It is important to engage with stakeholders, resource agencies, and the public during plan formulation to include their input into the process and support meaningful public engagement. The impact analysis and public and agency engagement processes comply with the National Environmental Policy Act (NEPA). Engagement and impact analysis are interwoven not only in the plan formulation and selection process, but into the report as well. This General Reevaluation Report is integrated with a Supplemental Environmental Assessment (GRR/EA, or Integrated Report) which documents the NEPA process and compliance. This Integrated Report mirrors the plan formulation and evaluation process—beginning with

defining the problems and opportunities and culminating in the selection and description of a Recommended Plan.

The Feasibility Study Phase is completed when the recommendation is approved. A recommendation for implementation (i.e. a decision to build or implement the recommended plan), would proceed to the next phase—the Preconstruction Engineering and Design Phase—pending Congressional authority, funding, and the execution of a new Project Partnership Agreement. This would be followed by the Construction Phase, and finally the Operations and Maintenance Phase of the project.

1.3 Study Authority

Section 4 of the Flood Control Act of 18 August 1941, PL 228 [H.R. 4911] authorized a preliminary examination of the Guadalupe River, its tributaries and adjacent streams. The authorization reads as follows:

> *The Secretary of War is hereby authorized and directed to cause preliminary examinations and surveys for flood control, to be made under the direction of the Chief of Engineers, in drainage areas, the United States and its territorial possessions, which include the following named localities: Coyote River and tributaries, California; San Francisquito Creek, San Mateo and Santa Clara Counties, California; Matadero Creek, Santa Clara County, California; and Guadalupe River and tributaries.*

On 6 June 1945, the Chief of Engineers endorsed the Preliminary Examination Report of Guadalupe River and Tributaries (dated 28 February 1945). This endorsement authorized a flood control investigation of Guadalupe River, Coyote Creek, San Francisquito Creek and numerous other creeks which continued to be studied under the 1941 Guadalupe River and Adjacent Streams authorization.

1.3.1 Construction Authority

In addition to study authority, Congress authorized construction of the Upper Guadalupe River Project in 1999 per legislation contained in the Water Resources Development Act (WRDA) of 1999 (PL 106-53), Section 1-01(a)(9):

> *Construction of the locally preferred plan for the flood damage reduction and recreation project, Upper Guadalupe River, California, described as the Bypass Channel Plan of the Chief of Engineers dated August 19, 1998, at a total cost of $140,328,000, with an estimated Federal cost of $44,000,000 and an estimated non-Federal cost of $96,328,000.*

The WRDA of 2007 (PL 110-114), Section 3037 re-authorized the project as such:

> *The project for flood damage reduction and recreation, Upper Guadalupe River, California, authorized by section 101(a)(9) of the Water Resources Development Act of 1999 (113 Stat. 275), is modified to authorize the Secretary to construct the project generally in accordance with the Upper Guadalupe River Flood Damage Reduction, San José, California, Limited Reevaluation Report, dated March 2004, at a total cost of $256,000,000, with an estimated Federal cost of $136,700,000 and an estimated non-Federal cost of $119,300,000.*

The tentatively selected plan (TSP) described in this Draft Integrated Report is an interim response to the study authority which includes a broader territory than is addressed with the TSP.

1.4 Study Area

The study area includes not only the geographic boundary of where an eventual project may be built, but the entire area which stands to benefit from, or be impacted by the project, such that full evaluation and comparison of alternatives can be performed. The project area is where an eventual project may be built, or where constructed elements of the previously authorized plan are located (see Section 2.1.2 for more information).

1.4.1 Tribal Land Acknowledgement

A land acknowledgment serves as a formal statement to recognize indigenous history and raise awareness of the original stewards of the lands, water, and natural resources where a USACE project is located. Land acknowledgments are not intended to be an isolated act to comply with current practices, but instead should be considered a starting point for exploring ways to understand and support indigenous communities moving forward. The study area for Upper Guadalupe takes place on the aboriginal homelands of Tamien Nation.

Since time immemorial, Tamien Nation has continued their relationship with the land and waters based on respect, agreement, and reciprocity to maintain balance. USACE, as a Federal agency, acknowledges that incorporating this land acknowledgment in this project's documentation is a new direction and is willing to improve upon future land acknowledgments. Moreover, USACE acknowledges and supports Tamien Nation and the neighboring Ohlone, and is committed to partnering for a more equitable and inclusive future for the Upper Guadalupe River.

1.4.2 Study Area Description

The study area includes roughly 5.5 miles of the Upper Guadalupe River main stem between the Southern Pacific Railroad Bridge and the Blossom Hill Road Bridge. Two tributaries, which frequently overtop their banks, Ross Creek and Canoas Creek, are also included within the study area.

The study area is located in the City of San José, Santa Clara County, in west-central California, immediately south of the San Francisco Bay. The study area is in the southwestern portion of the City of San José, within the highly urbanized Santa Clara Valley. The Guadalupe River is the third largest stream in Santa Clara County. The river flows through downtown San José and discharges into the San Francisco Bay approximately 20 miles north of its origin in the Santa Cruz Mountains (Figure 2, Figure 3, and Figure 6).

The study area lies within the Guadalupe River drainage basin encompassing a total of approximately 170 square miles. The Upper Guadalupe River drainage area (Guadalupe River upstream of Los Gatos Creek) comprises approximately 95 square miles. Flowing north in a slight meander across the gentle gradient of the Santa Clara Valley, the Guadalupe River watershed is bounded on the south and southwest by the Santa Cruz Mountains, on the west by the drainage basins for San Tomas Aquino and Saratoga Creeks, on the east by the Coyote Creek Basin, and on the north by San Francisco Bay.

The Upper Guadalupe Project is divided into Reaches 6−12. Reaches 7−12 (Figure 2) are cost shared between USACE and Valley Water. Reach 6 is just north (downstream) of Reach 7 and was constructed and funded independently by Valley Water. The Guadalupe River flows northward towards Alviso Slough in the San Francisco Bay. Reach 12 is upstream from Reach 11, and so forth.

Figure 2. Study location within the Guadalupe River watershed (San José, California).

The study area is highly urbanized. The Upper Guadalupe River and its tributaries are flanked by widespread residential subdivisions, commercial shopping centers, and industrial development, with limited agricultural land. Several computer-based technology companies have their headquarters in the region. Property improvements adjacent to the river typically encroach onto the channel banks. Open spaces in the study area include three city-operated neighborhood parks adjacent to the project corridor. Additional open space exists in and above Reach 12 (as defined in Section 1.8 and pictured in Figure 2) on both river banks near Blossom Hill Road where Valley Water maintains percolation for groundwater recharge and water supply.

The upper watershed is composed of mostly undeveloped land, and includes a system of reservoirs owned and operated by Valley Water, including Almaden, Calero, and Guadalupe Reservoirs, as well as percolation ponds (Figure 3) (Valley Water 2022). These reservoirs and percolation ponds provide water supply and groundwater recharge. Additional water supply reservoirs owned and operated by Valley Water and the San José Water Company are in the upper watershed on Los Gatos Creek, but do not have any hydraulic influence on the study area, which is upstream of where Los Gatos Creek discharges into the Guadalupe River. They are owned and operated by Valley Water and provide water supply and groundwater recharge. The dams, Almaden Lake, and the Alamitos Drop Structure (located just downstream of Almaden Lake), trap a significant percentage of the gravel that would otherwise reach the Upper Guadalupe River study area. Guadalupe River begins at the confluence of Guadalupe Creek and Alamitos Creek. Channel realignment during urban and agricultural development, loss of sediment supply, the connection of creeks upstream and downstream of a historic willow grove near Curtner Avenue, and channel confinement have caused the river to incise dramatically in the study area.

The riparian forests in the study area have generally been narrowed, degraded, and fragmented over time. However, these riparian forests are still characterized as unusually extensive when compared to those in most other urban stream environments in the San Francisco Bay area, and are still very important to wildlife. The Guadalupe River provides habitat to federally listed steelhead and other aquatic species, which likely use the study area as a migration corridor to move farther upstream for spawning. Two shaded riverine aquatic (SRA) habitat mitigation reaches, Reaches 10B and 12 (Figure 2), were constructed between 2009 and 2018 as part of the originally authorized project. These mitigation reaches have established riparian habitat along channel banks that were previously lacking quality habitat. These mitigation reaches will be incorporated into the alternatives developed as part of this reevaluation and will serve as advanced mitigation for this project.

Soils upstream of and in the study area contain varying degrees of mercury. Mercury is a legacy pollutant from the California Gold Rush, when cinnabar mines in the Central Coast Ranges (in particular Upper Alamitos Creek) produced the mercury used to extract gold from the Sierra Nevada mountains. The Tamien Nation used natural deposits of cinnabar in the Guadalupe watershed for paint and other purposes. Large-scale extraction in the New Almaden mines began in the mid-1800s, the oldest mine in California and most productive mercury mine in the United States until closing in 1976. Mercury mining waste is the largest source of mercury to waters of the Guadalupe River Watershed and the San Francisco Bay.

The average annual rainfall in the Guadalupe River basin is approximately 15 inches, though it varies greatly throughout the Watershed, from just under 14 inches at the downtown San José gage to approximately 42 inches at the Lexington gage. The majority of rainfall typically occurs from October through April. The rainfall events that occur can lead to flash floods. The Upper Guadalupe River is not subject to tidal influence because of its location far upstream from the San Francisco Bay.

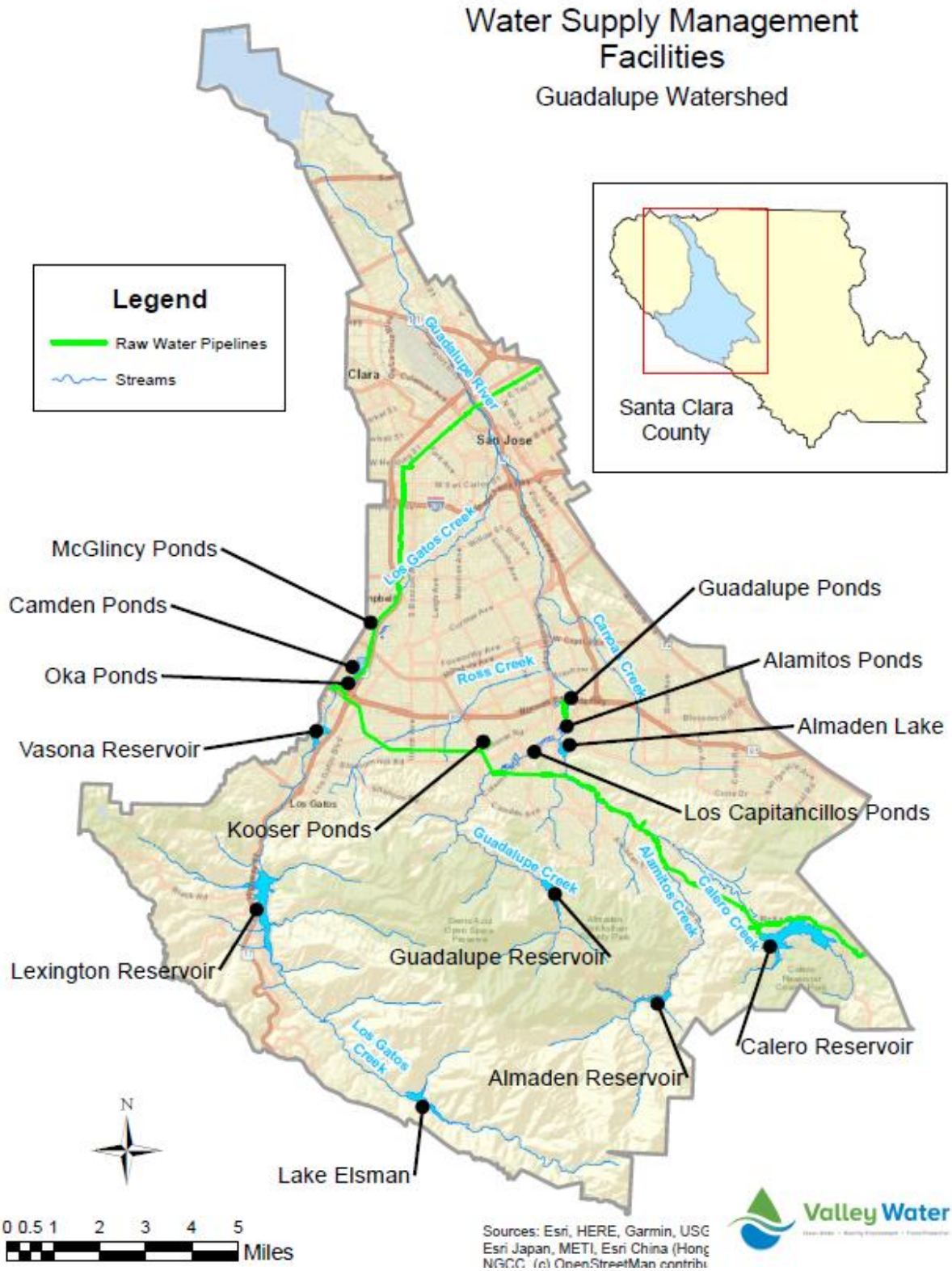


Figure 3. Water supply management facilities in the Guadalupe Watershed.

1.5 Background and History

The Guadalupe River has a very long history of floods as rivers naturally flood periodically. Documentation of adverse flood impacts to communities dates back to the founding of Mission Santa Clara and pueblo San José de Guadalupe by Mexican settlers in 1777. Soon after their establishment both settlements were forced to move from their original location on the bank of the river to higher ground. Very little factual data is available from the floods prior to 1930 when the first stream gauges were installed. Since then, ten major historical flood events on the Guadalupe River system were recorded, 1941, 1953, 1958, 1980, 1982, 1983, 1986, January 1995, March 1995, and 1998, though anecdotal evidence also suggests flooding in 1862, 1867, 1895, 1911, 1917, 1950, and 1963 (Valley Water and USACE, San Francisco District, January 1998).

The 1% annual exceedance probability (AEP) floodplain inundates approximately 2,310 acres, while the 0.2% AEP floodplain inundates roughly 2,960 acres, with a greater volume of water in a similar floodplain, based on hydraulics and hydrology (H&H) analysis completed for this study. Impacts and damages due to flooding have intensified since World War II, as the Valley's primary land use changed from agricultural to residential, commercial, and industrial. There have been approximately ten significant floods since 1930.

One of the highest discharges on record was produced by the flood of 1958 when floodwaters overbanked in downtown San José and covered a two square block area to depths of up to four feet. During the February 1980 event, the river overtopped its east bank upstream of Alma Street and flooded the Elks Lodge and surrounding area. In March 1982, the river's east bank was again overtopped inundating about 15 acres between the Union Pacific Railroad crossing and West Virginia Street. The under crossing of the Southern Pacific Railroad at Willow Street and Alma Street filled with flood waters to a depth of ten feet. This approximately 15-acre area was again flooded in January 1983 and Santa Clara County declared a National Disaster Area.

Most recently, significant flooding occurred in Santa Clara County as a result of the storms of January and March 1995 (Figure 4). According to the Santa Clara County Flood Report, the AEP of these events ranged from 20% to 2% AEP. Severe flooding damaged more than 150 homes in the Gardner, Willow Glen, and South San José residential districts, and shut down Highway 87 and the parallel light rail line—both major commuter thoroughfares. The Mayor of San José declared a state of emergency and the President of the United States declared Santa Clara County a Federal disaster area for both storms.

Figure 4. Photograph of flooding from the Guadalupe River at Willow Street, March 10, 1995.
(Source: 1998 FS/EIS/EIR, USACE & Valley Water)

In the central area of the county floodwaters from Guadalupe River, Calero, Canoas, and Ross Creeks caused extensive property damage in the City of San José and flooded Highway 87 (Figure 5). Estimates of damages by the Santa Clara Office of Emergency Services were $3,000,000 for the January event and $6,369,000 for the March event (equivalent to $5,830,000 and $12,377,000 in 2022 dollars) (Valley Water 1995).

Freeway and light rail flooding occurred again in 1998. At noon on Monday, February 2, 1998, the National Weather Service issued a "Flash Flood Warning" for the bay area including Santa Clara County. The rainfall that occurred in the County was very heavy, as much as 8-to-9 inches in a 24-hour period. This heavy rainfall, together with already saturated watersheds, resulted in flooding at several locations throughout the County. Guadalupe River overbanked near Alma Avenue in San José, flooding the Elks Lodge parking area and the Willow Street/Highway 87 underpass.

Flows also broke out downstream of Virginia Street, flooding Highway 87 and closing the roadway. Ross Creek overbanked at Cherry Avenue flooding the area around Montmorency Drive. Damage estimates for Santa Clara County during the February 1, 1998, to February 8, 1998, storm period approached $20,000,000 (equivalent to $36,340,000 in 2022 dollars) (Valley Water 2001).

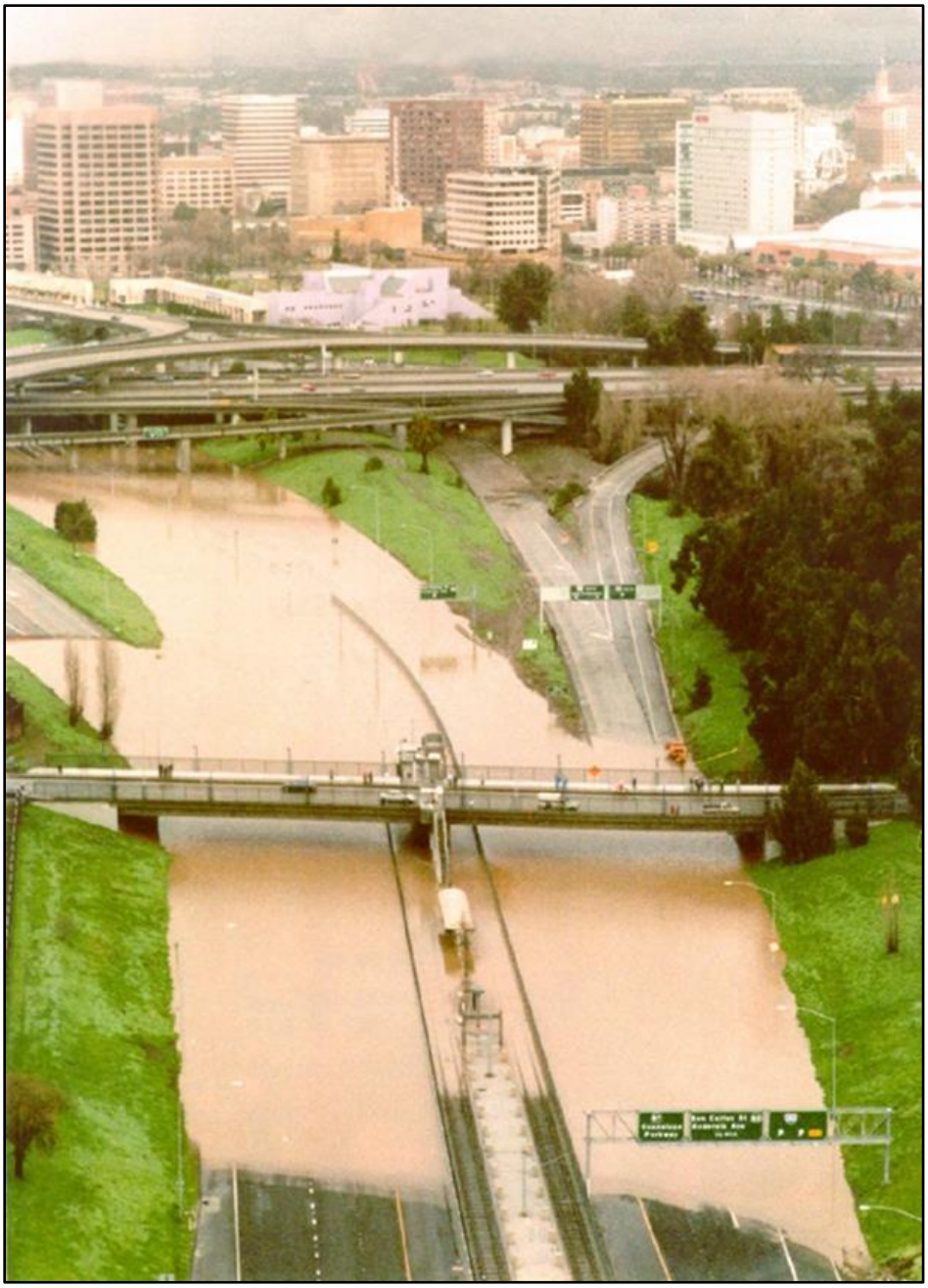


Figure 5. Photograph of flooding in the Flood of January 9, 1995. Downtown San José is seen in background. (Source: Valley Water)

1.6 Related Projects, Studies, and Reports

Numerous studies and reports related to the Upper Guadalupe River FRM Project have been conducted. A detailed list of these report can be found in the 1998 FS/EIS/EIR (Santa Clara Valley Water District and USACE, San Francisco District, January 1998).

The Reconnaissance Phase for the Upper Guadalupe River was initiated in 1987 and completed in 1989. The preliminary investigation looked at FRM measures between Interstate 280 to Blossom Hill Road, including Reach 6. It found that the Widened Channel Plan was the most efficient alternative for

providing FRM. During the Feasibility Phase, Reach 6 was excluded as it was considered to be unlikely to be economically justified based on preliminary analysis from the 1980s. When Reach 6 was excluded from the USACE study, Valley Water proceeded with evaluation and design for Reach 6 independently. The 1998 FS/EIS/EIR recommended construction of the Bypass Plan, which was the Locally Preferred Plan (LPP) and the Least Environmentally Damaging Plan because it avoided impacting riparian habitat by bypassing flows into a separate bypass channel. The Valley View Plan was identified as the plan that maximized net national economic development benefits. The Widened Channel Plan was not considered in the Feasibility Phase due to unacceptable impacts to threatened steelhead, though widening was incorporated to varying degrees in each of the plans considered. Once the 1998 FS/EIS/EIR was completed, environmental compliance work continued by both the USACE and Valley Water. Once the permits for the authorized Bypass Plan and Reach 6 were obtained, design and construction began on the mitigation segments of the Upper Guadalupe River project (Reaches 10B and 12). Valley Water constructed Reach 6 independently, as described in the Section 1.8.

In 2017, Preconstruction Engineering and Design Phase for the previously authorized project was ongoing. As part of the design process, the with-project velocities for the Bypass Plan in Reaches 7 and 8 were evaluated using a detailed two-dimensional combined channel and floodplain model (HEC-RAS 5.0.3) and design issues were identified for Reaches 7 and 8, which resulted in this current reformulation effort.. The 2017 evaluation found that velocities in the bypass and the channel would be 18 feet per second (fps) at some locations. These with-project velocities were considered to be significantly higher than maximum permissible velocities for a stable channel design, which is estimated to be in the range of 4 to 6 fps (Hydraulic Evaluation of 60% Design Concept for Reaches 7 and 8, Memorandum for the Record: Upper Guadalupe River Project, December 5, 2017, CESPK-ED-HA). This evaluation recommended erosion control measures which were considered during Pre-Construction Engineering and Design (PED) Phase. Erosion control measures considered included bank protection such as traditional riprap revetments and hard armoring, biotech improvements or bioengineering, a larger bypass channel to reduce stages at bridge locations, adjustments to the inflow weir to change flows, and pool and riffles with energy dissipation plan to break up slope drop. The benefit to cost ratio of the Bypass Plan in 2017 was considered marginal, just over 1.0. Adding the cost of these additional erosion control features and associated mitigation risked the economic justification of the project, and there was doubt that sufficient mitigation opportunities were available to fully mitigate the environmental impacts to steelhead habitat from erosion control measures under consideration. Thus, a decision was made to initiate a General Reevaluation to reevaluate this project and reformulate new alternatives for consideration using the latest available information developed in the PED Phase.

A summary of major project history is presented in Table 1 to provide a timeline of key events leading up to the reformulation.

Table 1. Upper Guadalupe River Project history, 1998 to 2021.*

Year	Action
1998-1999	USACE/Valley Water FS/EIS/EIR finalized, Record of Decision and congressional authorization in 1999
1996-2004	Draft EIR/EIS for Valley Water with USACE Regulatory in 1996, Final EIR/EIS completed in 1999, initially filed in 2000. Revised EIR/EIS in 2001. Record of Decision signed in 2004. Valley Water plan revised to cover larger area, which added Guadalupe River Reaches 6 and 13, longer sections of Ross and Canoas Creeks, and removal of barriers to fish passage.
2000	National Marine Fisheries Service (NMFS) Biological Opinion (BO) issued in March 2000

Year	Action
1999-2005	Early PED work. USACE Limited Reevaluation Report (LRR) with EA and permitting. NED plan design further developed to refine cost-sharing on the locally preferred plan. 50-year plan changed to bypass in Reaches 7 and 8 to address environmental concerns. Water temperature modeling performed to address concerns over impacts to steelhead and Chinook salmon that arose during the 1998 FS/EIS/EIR The modeling was used to determine acceptable construction schedule, and later to evaluate Almaden Lake bypass (required by the Regional Water Quality Control Board order).
2002	Guadalupe Watershed Integration Working Group (GWIWG) established to facilitate coordination and consensus on environmental concerns and permitting.
2005	NMFS provided supplemental BO for LRR
2007	Congress reauthorized the project based on the LRR which addressed project cost limitations (per section 902 of WRDA 1986). The LPP was reauthorized. This project has not been in the President's budget since 2007, and has been funded via Congressional appropriation and the USACE Workplan.
1994-2012	Valley Water removed fish migration barriers and added fish ladder at the Alamitos drop structure such that steelhead can now access spawning and rearing habitat in the foothills. Reach 13 plantings completed by Valley Water. Reach 6 was constructed by Valley Water using a hybrid bypass-floodplain approach. The lower than bank full floodplain elevation (800 cfs) has led to instability and risk of avulsion without a constructed Reach 7.
2009-2018	Initial construction/revegetation for Reaches 10B and 12 was completed by USACE in 2012 and 2015 respectively Mitigation monitoring continues.
2016-2018	H&H updates performed in 2016 and economic updates performed in 2017-2018. Project costs also updated.
Dec 2017	Hydraulic evaluation of 60% Design Concept for Reaches 7 and 8. These PED efforts identified erosion and velocity issues with the authorized plan that required new analysis to resolve.
Dec 2020	Reformulation effort initiated in December 2020. Subject of this Integrated Report.

* *After completion of the 1998 FS/EIS/EIR.*

Relevant studies, reports, and authorizations since 1998, are listed below:

- Historic Properties Identification and Evaluation, Upper Guadalupe River Flood Control Feasibility Study (ARS 1993)
- Biological Assessment: Impacts of the Upper Guadalupe River Flood Control Project on Chinook Salmon and Steelhead (September 1998)
- Upper Guadalupe Biological Opinion (April 2000)
- Waste Discharge Requirements and Water Quality Certification for Valley Water and USACE. Order R2-2003-0115.
- Signed Record of Decision (ROD) Guadalupe River Project Modifications Downtown San José, California, 2001
- Santa Clara Valley Water District Self-Monitoring Program Water Quality Sampling Plan (December 2001)
- California Regional Water Quality Control Board San Francisco Bay Region (Water Board), Tentative Order, Waste Discharge Requirements and Water Quality Certification for Santa

Clara Valley Water District and United States Army Corps of Engineers Upper Guadalupe River Flood Control Project, City of San José, Santa Clara County, 2003

- Limited Reevaluation Report (LRR): Proposed Project Modifications, Upper Guadalupe River Project, San José, California (USACE, February 2005[3])
- Upper Guadalupe Flood Control Project Supplemental Design Documentation Report Reach 10B (USACE, February 2006, prepared by GAIA Consulting, Inc.)
- Santa Clara Valley Prehistory: Archaeological Investigations at CA-SCL-690, The Tamien Station Site, San José, California (Hylkema, 2007)
- Map and Construction Plan for Willow Glen Way Bridge Replacement Project (Santa Clara Valley Water District, 2008, Prepared by Moffatt & Nichol)
- Guadalupe Watershed Hydrologic Assessment (USACE, November 2009)
- Upper Guadalupe Flood Control Project Supplemental Design Documentation Report ITR/BCOE Submittal Reach 12 (USACE, March 2010, prepared by Moffatt & Nichol)
- 2012 Level 3 Economic Reevaluation Report (USACE, 2012)
- Upper Guadalupe River Gravel Augmentation Study (USACE, McBain & Trush, Moffatt & Nichol, September 2013)
- Map and Construction Plan for Upper Guadalupe River Reach 6 from Interstate 280 to Union Pacific Railroad (Santa Clara Valley Water District, 2016)
- Guadalupe River Floodplain Hydraulics Without Project Scenario Report (USACE, May, 2016, prepared by Noble Consultants, Inc.)
- Level 3 Economic Reevaluation Report (ERR) (USACE, 2017)
- Hydraulic Evaluation of 60% Design Concept for Reaches 7 & 8 for Upper Guadalupe River Project (USACE Sacramento District, CESPK-ED-HA, December 2017)
- Guadalupe River Bridge Replacement, Project Update for the US Army Corps of Engineers Civil Works (Caltrain, December 2019)
- Memorandum for Record: Review of mitigation statues for Upper Guadalupe Flood Risk Management Project. 2 September 2020.
- Map and Construction Plan for Upper Guadalupe River Reach 6 Aquatic Habitat Improvement Project, San José, California (Santa Clara Valley Water District (Valley Water), 2021)

1.7 Purpose and Need*

The purpose of the study is to determine if there is Federal interest in implementing an alternative to reduce flood risk along the Upper Guadalupe River in San José consistent with Federal laws and regulations. The purpose and need for the action, as required by NEPA (40 CFR 1502.13) specifies the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action. Under NEPA, the purpose of the action is to reduce flood risk along the Upper Guadalupe River in San José.

The action is needed because there is a high risk of flooding in the densely populated city of San José, California, from the Upper Guadalupe River, and Ross and Canoas Creeks. Flood event breakouts from the Upper Guadalupe River, Canoas Creek, and Ross Creek have resulted in deep flooding in communities of concern with known environmental justice disparities and shallow flooding in historically affluent communities. There are approximately 3,490 people living in residential structures that are projected to flood during a 1% annual exceedance probability (AEP) event. Just under half of those residents are considered to be socially vulnerable based on income, race, age, mobility, etc. (as defined in Section 3.5.4). Future without project expected annual damages from flooding are roughly $22.5 million. In addition to the structures and people at risk, transportation corridors have been identified to be at risk of flooding.

[3] WRDA 2007 reauthorized the Bypass, and references a draft 2004 version of the LRR.

The city of San José is the third largest city in California and tenth largest in the United States, with a population of approximately 1 million people (based on 2020 Census estimates), which can be expected to grow to over 1.7 million during a 50-year period of analysis. There is a potential life safety risk in the densely populated urban areas within the floodplain due to the rapid nature of the flooding in this system. Flood depths and velocities in the channel pose a significant life safety risk to the large, unhoused population residing in encampments along the channel. The unhoused population in San José has increased significantly with rising home prices, and the City of San José has indicated that they do not have sufficient temporary or alternate housing to meet existing needs.

The river and its associated floodplains have a documented history of flooding dating back nearly 100 years, with consequences ranging in the millions of dollars in damages from more recent flooding events in 1995 and 1998. The primary drivers of flooding during storm events on the Upper Guadalupe River are segments of low channel capacity and hydraulic pinch points at bridges and undersized culverts where flows are "pinched" into a narrower space and overtop the channel. High velocities during flood events have incised the channel creating steep riverbanks that have constrained flows that historically spread out in a wide floodplain. Habitat quality in the mainstem river channel is low due to anthropogenic degradation over time. However, the Guadalupe watershed continues to support federally threatened steelhead that use the main channel as a migration corridor to rearing and spawning habitat in the upper watershed, and the Guadalupe River downstream of Hedding Street is designated critical habitat for steelhead. Through engineering with nature, improvements to the channel are expected to not only manage the risk of floodwaters breaking out of the constricted reaches, but also create a floodplain bench and valuable riparian habitat, garnering benefits to the environment and society.

Finally, there are societal needs for this project which include: 1) a lack of access to the riparian corridor for recreation, and 2) inequity in who currently bears the most dangerous flood risk due to steep income inequality with the most dangerous flood risk areas being located in socially vulnerable parts of the study area.

Section 1.9 below identifies the specific problems being addressed by the study and the opportunities created by the study within the Upper Guadalupe River watershed.

1.8 Planning Reaches and Flooding Impact Areas Descriptions

The Upper Guadalupe River study area is divided into planning reaches that segment the mainstem of the river into smaller reaches, as well as the tributary creeks to the river (Figure 6). The planning reaches are were defined based on varying general characteristics which reflect different types of design and planning considerations. The following reach descriptions highlight the current conditions of the river, as it relates to historical flow paths, geomorphology, slope, and channel constriction and straightening. This is useful to understand for flood risk management as it pertains to appropriate options for stabilizing erosion, slowing velocities that contribute to erosion, and finding opportunities to store, bypass, and sink floodwaters, as well as achieving environmental quality improvements for fish and habitat in this significant ecosystem.

Figure 6. Study area location within the Guadalupe River watershed (San José, California).

In assessing the impacts from flooding and potential benefits which could be gained by various alternatives, the team also defined "flooding impact areas" which differ from the planning reaches. These are traditionally referred to as economic reaches which are used in the benefit modeling that is performed. With added focus to quantify benefits beyond just economic, the team defined these areas using a variety of considerations, such as breakout points in the channel, where socially vulnerable populations (based on age, socioeconomics, mobililty, etc.) reside, and depth and velocity of flooding—so that flood hazard and life safety could be compared in a more nuanced fashion by alternative. Unhoused communities are prevalent along the river throughout the study area, and are at risk due to the potential for bank failure resulting from high water events.

The flooding impacts spill out beyond the planning reach boundaries and into the floodplain, flowing downstream and into lower elevation areas in the study area. While the planning reaches delineate where measures to manage the risk of flooding are focused, the flooding impact areas (Figure 7) are used to evaluate and compare the benefits of the alternatives. The study area (Figure 6) includes the larger area and any and all potential benefits and impacts from the potential project.

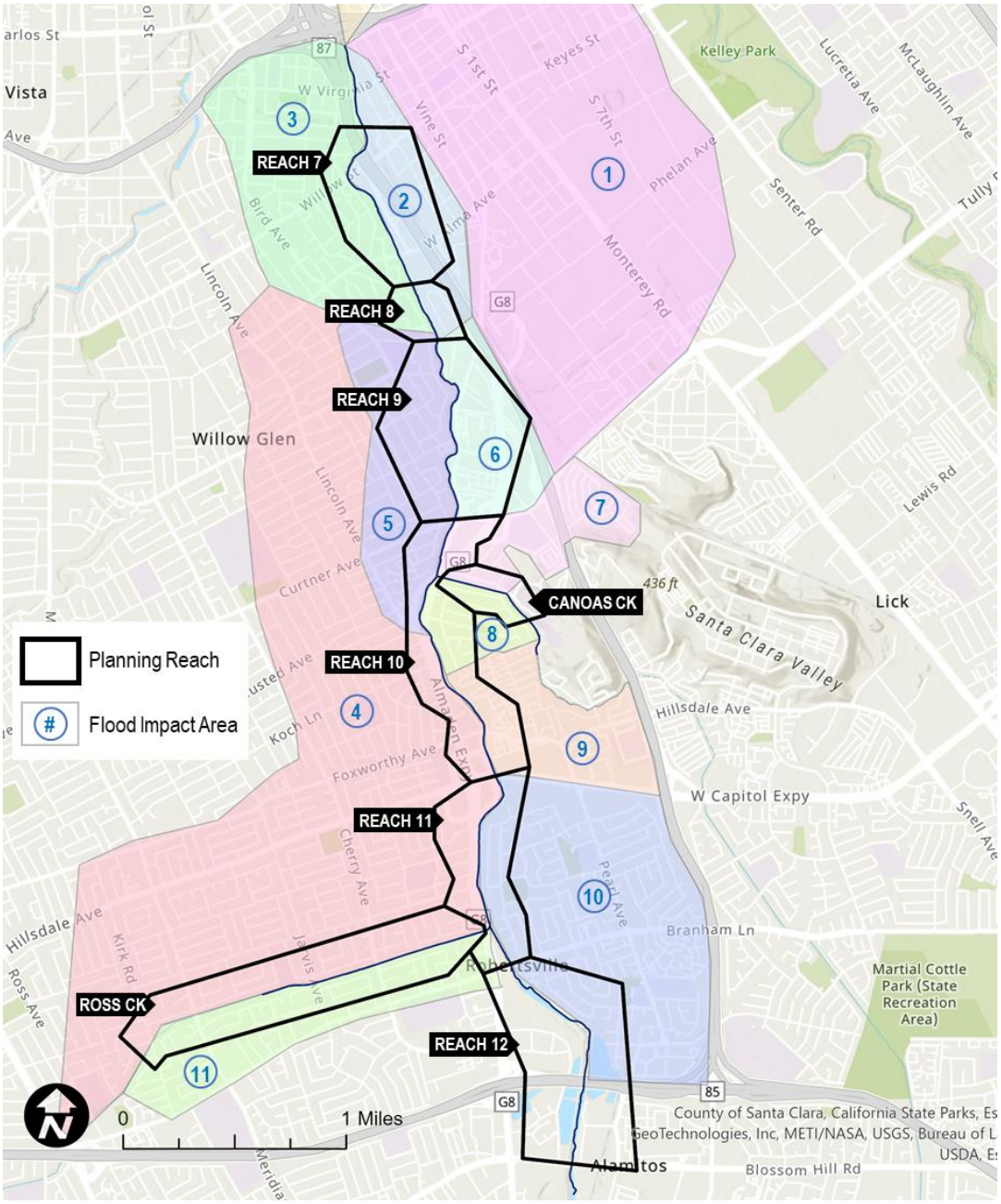


Figure 7. Flooding Impact Areas relative to planning reaches.

1.8.1 Reach 12

Historically, Reach 12 was a braided system meandering through an oak woodland. This reach historically transported and deposited coarse materials, which helps explain why quarry ponds are located

here, including the Alamitos Percolation Ponds, historical quarry ponds now used for groundwater recharge. Reach 12 includes both residential and commercial land use, with the Valley Transportation Authority (VTA)-Oakridge rail stop located to the east of the channel. While Reach 12 is constrained by infrastructure and development, there are opportunities to slow down sediment transport which would benefit the entire system. The Branham Lane bridge divides Reaches 12 and 11, and has a capacity of 7,200 cubic feet per second (cfs) which corresponded with a 4% AEP flood event based on past USACE analysis (H&H Appendix of the LRR 2005). There are existing recreation trails in this reach to which there may be opportunity to connect and/or extend.

The mitigation features of the Reach 12 design of the originally authorized Bypass Plan (discussed in Section 2.1.2 were constructed in 2015 to advance the mitigation for the project. During revegetation work in 2015, a historical refuse deposit was encountered consisting of debris from historic farmers and settlers around the area. A Historic Property Treatment Plan was implemented for this inadvertent discovery and it was determined to not be historically significant due to its poor integrity.

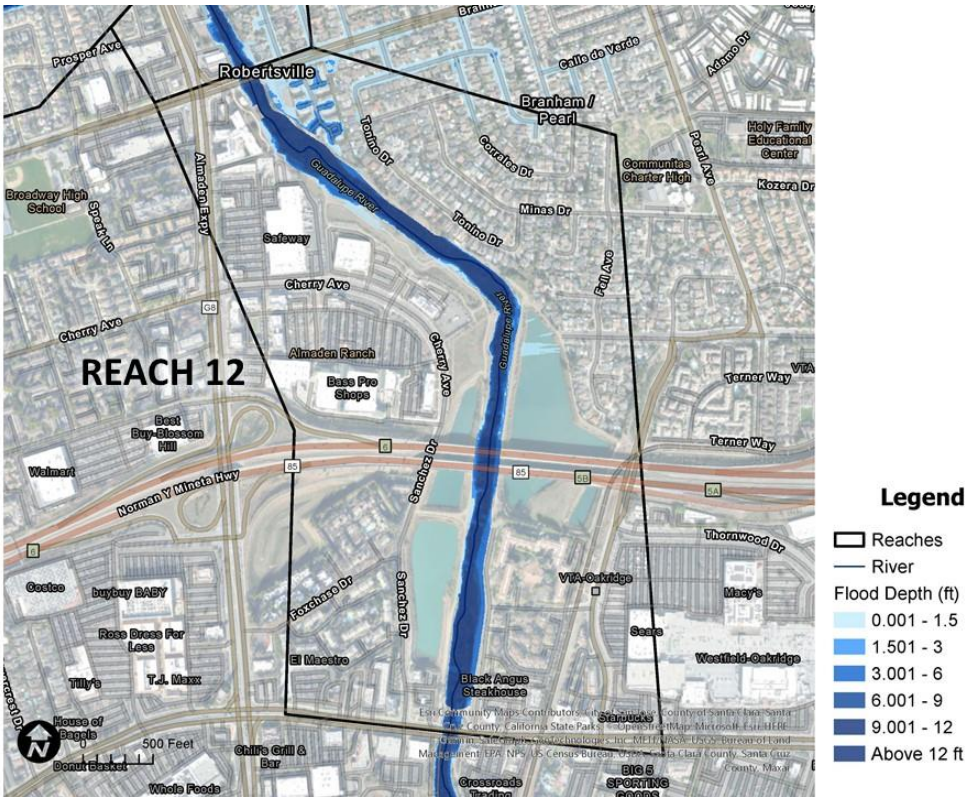


Figure 8. Reach 12 aerial map with 1% AEP flood inundation map.

There are erosion issues under the bridge in the park near Chynowerth Avenue, as well as maintenance issues in this area. Unsheltered communities are camped along the river in Reach 12 and throughout the study area. Trash and debris from encampments create a maintenance challenge, and can pose safety risks for maintenance staff.

1.8.2 Reach 11

This reach is both constrained and straightened, particularly on the west bank. Ross Creek enters the mainstem of the Guadalupe River in Reach 11, from the west. Land use is mostly residential, with some residences and the Almaden Expressway coming very close to the channel. Thousand Oaks Park is located east of the channel and ABC Learning Montessori School, as well as the Hacienda

Environmental Science Magnet School are west of the channel in this reach. Some commercial use is concentrated near Branham Lane at the south and Hillsdale Ave/Capital Expressway, the transition point to Reach 10. There are several car dealerships and car service centers located off the Capital Expressway, near the channel. The Capital Expressway has a capacity of 8,200 cfs and could pass a roughly 3% AEP event based on the 2005 analysis (USACE, San Francisco District, 23 February 2005).

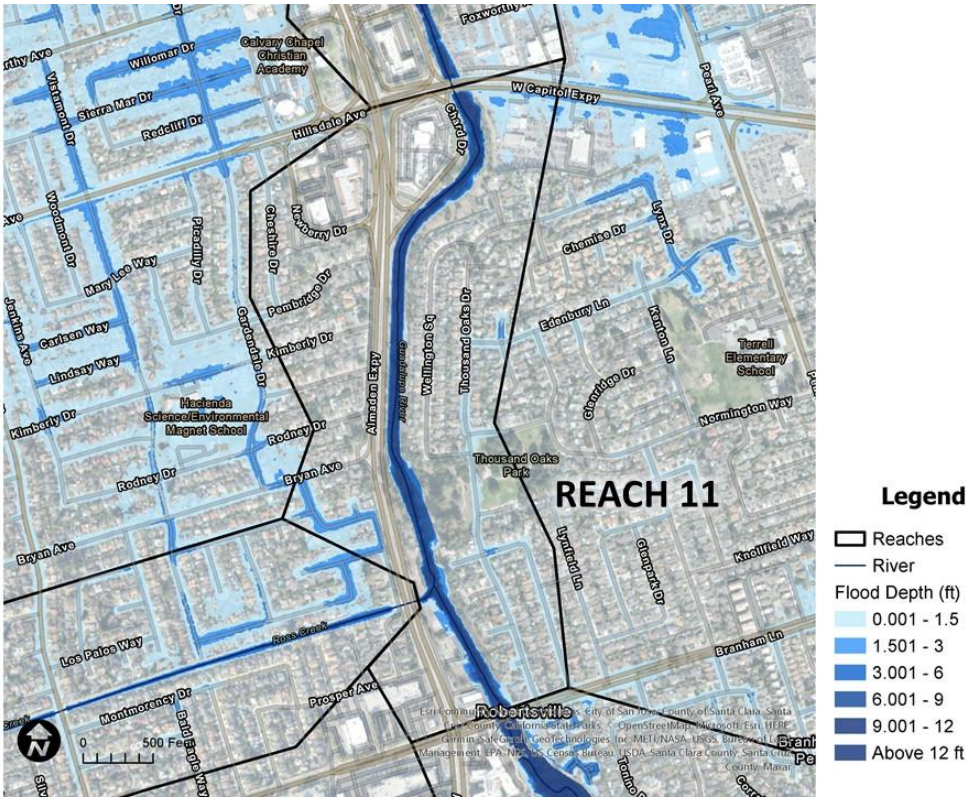


Figure 9. Reach 11 aerial map with 1% AEP flood inundation map.

1.8.3 Ross Creek Reach

Ross Creek is a significant tributary to the Guadalupe which rises in the hills above Los Gatos, and historically was only connected to the main stem in high flow events. At present, the headwaters of Ross Creek likely provide important habitat for threatened fish species. However, the creek currently flows through a trapezoidal flood control channel with limited riparian vegetation on its banks and is highly constrained by residential land uses. It therefore poses a hazard for migrating fish populations. Habitat quality in this reach is low, with limited vegetation resulting in high water temperatures not advantageous for fish. Like Canoas Creek, Ross Creek has minimal capacity near its confluence with the Guadalupe River due to backwater effects and low-capacity culverts and cross sections. During a joint USACE and Valley Water site visit on February 3, 2021, erosion was observed in Ross Creek on Glacier Drive. According to Valley Water, overtopping issues exist in this reach, where water has overtopped the bank and caused flooding in the residential area north of Ross Creek. Reed Elementary School is located directly north of and abutting Ross Creek.

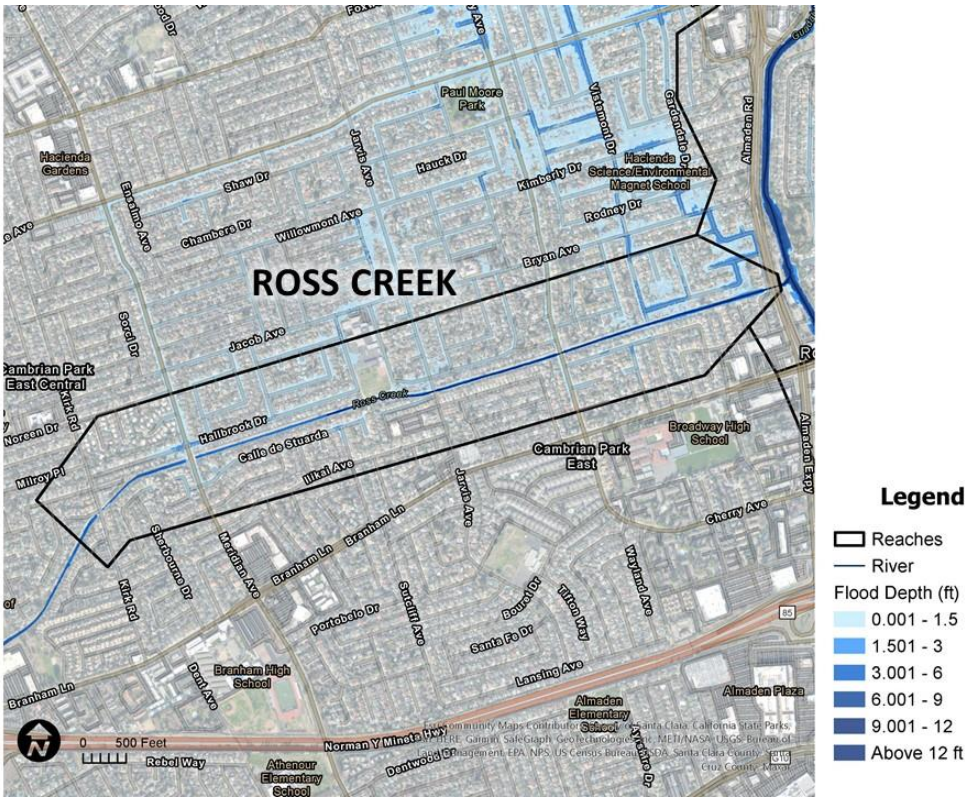


Figure 10. Ross Creek aerial map at confluence with Reach 11 with 1% AEP flood inundation map.

1.8.4 Reach 10

Reach 10 was divided into three subreaches A, B, and C, in the 1998 FS/EIS/EIR. Authorized features of Reach 10B, which include flood control channel modifications, grade control structures, a gage station, riparian vegetation planting and woody debrist structures, were constructed by the USACE in order to advance some of the mitigation for the authorized Bypass Plan.

The upstream portion of Reach 10 (subreach 10C in the 1998 FS/EIS/EIR) is relatively wide with mature vegetation on both banks. There is more space available on the east bank to widen and bench. This portion provides an opportunity for slowing velocities and reducing overall stream power, which would benefit to downstream reaches where erosion and channel incision are concerns. Canoas Creek enters the mainstem from the east about midway through Reach 10 (at Reach 10B from the 1998 FS/EIS/EIR). Development is both commercial (mostly on the west side of the channel) and residential east of the channel.

Where the channel historically splits (subreach 10B, where Almaden Road becomes Lincoln Avenue), one branch forms a western channel that moves downstream through sycamore and broad riparian zones, and an eastern channel that branches through a freshwater marsh. The alluvial fan loses slope in this location, and historically spread its flows across multiple channels. This indicates that there is a loss of stream power in this reach At Wren Drive, the channel was rebuilt by USACE in 2010. The work included flood control channel modifications, a low-flow geomorphic channel and riparian plantings. The North Almaden Expressway bridge crosses the channel in this reach with a high capacity of 21,000 cfs, which could pass the 1% AEP event based on the 2005 analysis (USACE, San Francisco District, 23 February 2005).

The downstream portion of Reach 10 (subreach 10A of the 1998 FS/EIS/EIR) is very constrained and relatively straightened. The Curtner Ave bridge is located where the downstream edge of Reach 10 meets Reach 9. This bridge has a capacity of 11,340 cfs which could pass a 2% AEP event based on the 2005 analysis. The downstream portion has both residential and commercial development very close to the channel.

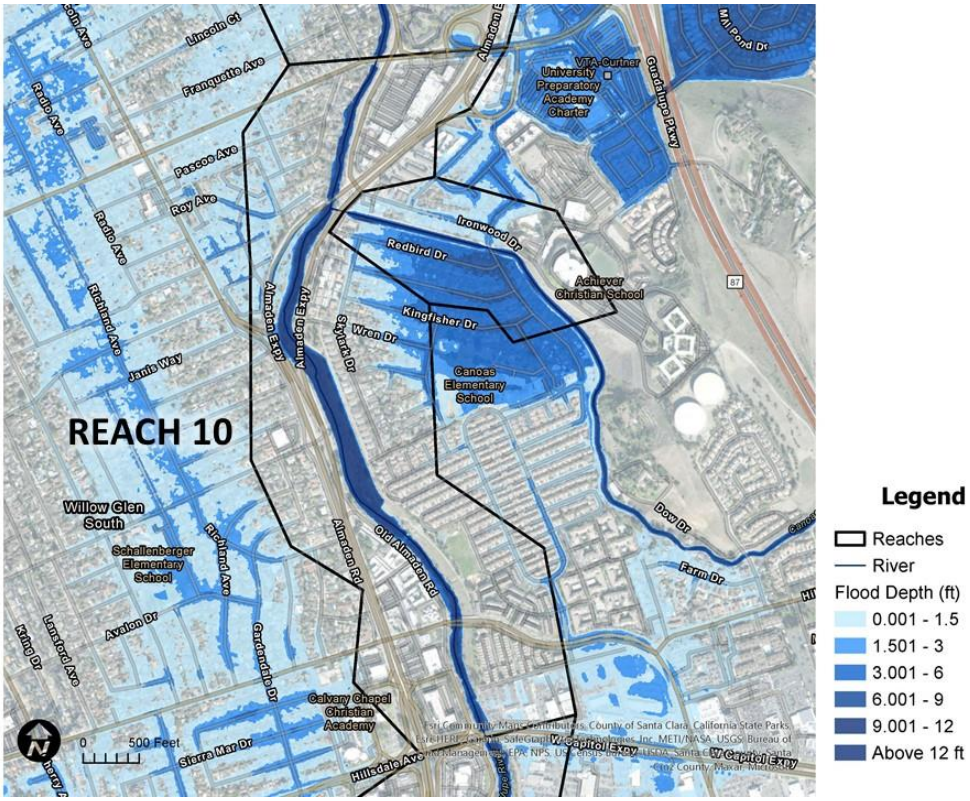


Figure 11. Reach 10 aerial map with 1% AEP flood inundation map.

1.8.5 Canoas Creek Reach

Canoas Creek enters the mainstem where the Almaden Expressway-Canoas bridge is located. This bridge has a capacity of 10,000 cfs, roughly a 3% AEP event based on the 2005 H&H analysis. Canoas Creek is a remnant of a historical freshwater marsh complex which flanked the west side of Communication Hill, likely a bedrock control. The creek was channelized, and the wetland drained for urban development. The creek currently flows through a trapezoidal flood control channel with limited riparian vegetation on its banks and is highly constrained by residential land uses. The channel is now connected to the river in a way that likely causes erosion at the confluence. As such, Canoas Creek also has minimal capacity near its confluence with the Guadalupe River due to backwater effects and low-capacity culverts and cross sections.

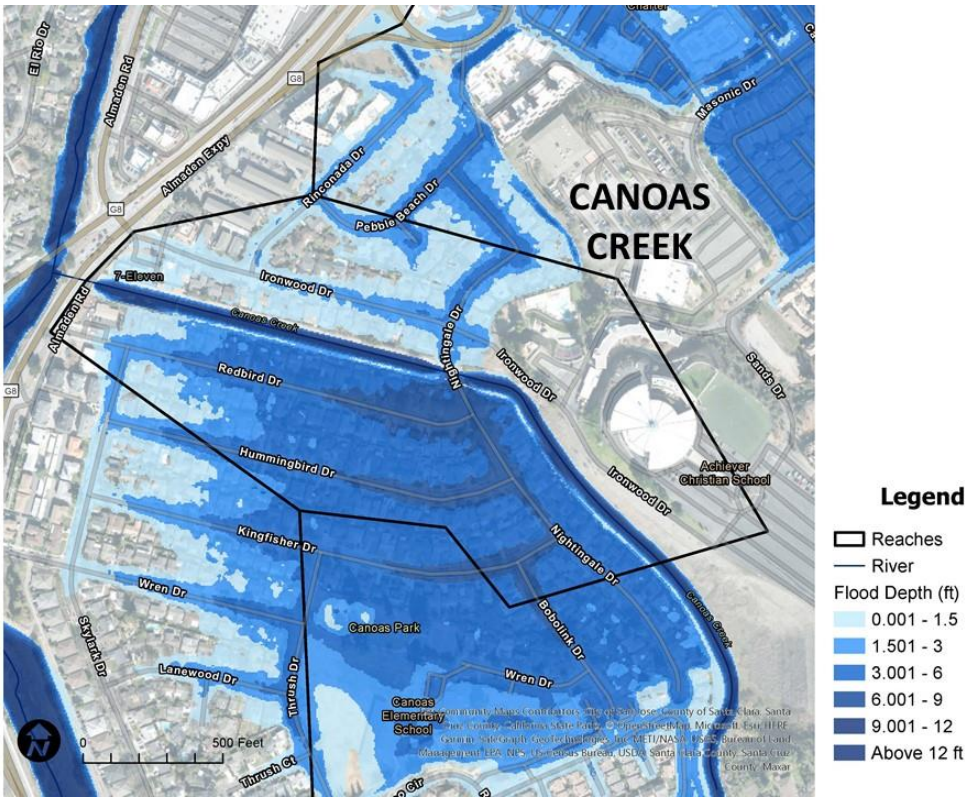


Figure 12. Canoas Creek aerial map with 1% AEP flood inundation map.

1.8.6 Reach 9

Reach 9 is more sinuous and follows the historical course of the Guadalupe River. Historically, this section of the river meandered through sparse vegetation, including sycamore alluvial woodlands, and was characterized by dynamic multi-thread channels in places, with smaller channels branching off into the marsh complex. Today, the reach is constrained on the east bank by Almaden Road and on the west bank by residential land uses. Malone Road bridge is located in the middle of Reach 9 and has a capacity of 12,000 cfs, roughly 1.8% AEP event based on the 2005 analysis. Willow Glen Way bridge is located where Reach 9 meets Reach 8 and has a capacity of 11,630 cfs, which could pass a roughly 1.8% AEP event based on the 2005 analysis.

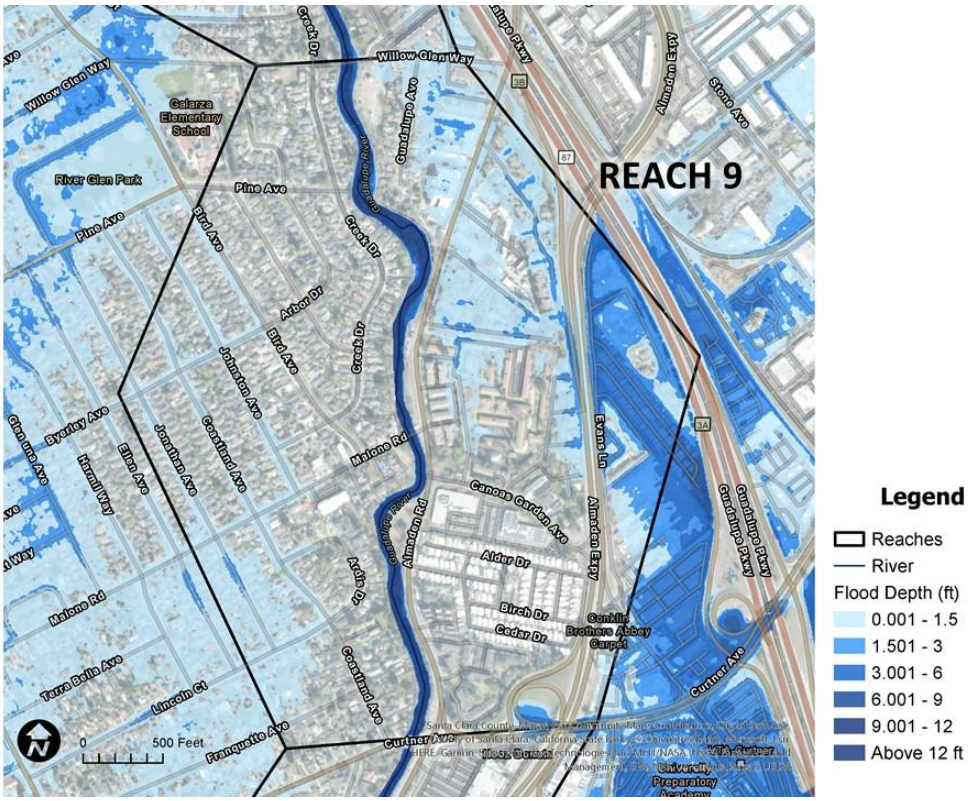


Figure 13. Reach 9 aerial map with 1% AEP flood inundation map.

1.8.7 Reach 8

Reach 8 was also historically straightened with some of the lowest capacity for flood waters of all the reaches. This is where the channel historically dissipated into a willow grove. Therefore, in this location the channel would spread out and deposit suspended sediments if it could. Instead, it has become artificially steeper, which likely causes sediment to transport quickly through this reach. The channel is narrow in this reach, and very constrained by residential houses on both sides. Reach 8 is most likely challenging for fish to migrate through, and is geomorphically simplified with long glides[4], and has low habitat value.

Multiple flap gates exist in Reaches 8 and 7, near Creek Drive, which runs along the creek in these reaches, and Padre Drive, which Creek Drive dead ends into at the top of Reach 8. These flap gates appear to be in an acceptable condition. A minimum facilities analysis of the existing interior drainage will be performed prior to the finalization of the plan in order to assess what minimum facilities stormwater drainage improvements are needed in order to avoid this project impacting the function of the stormwater interior drainage system. A sack-crete wall with rebars was also observed in this area extending into Reach 7.

[4] Runs or glides are channel areas characterized by non-turbulent flow over a relatively flat stream bottom (Platts et al. 1983) with glides having velocities slower than in runs. Predominance of runs, glides or pools instead of alternating pools and riffles or other fast-water habitats is generally associated with altered physical habitat.

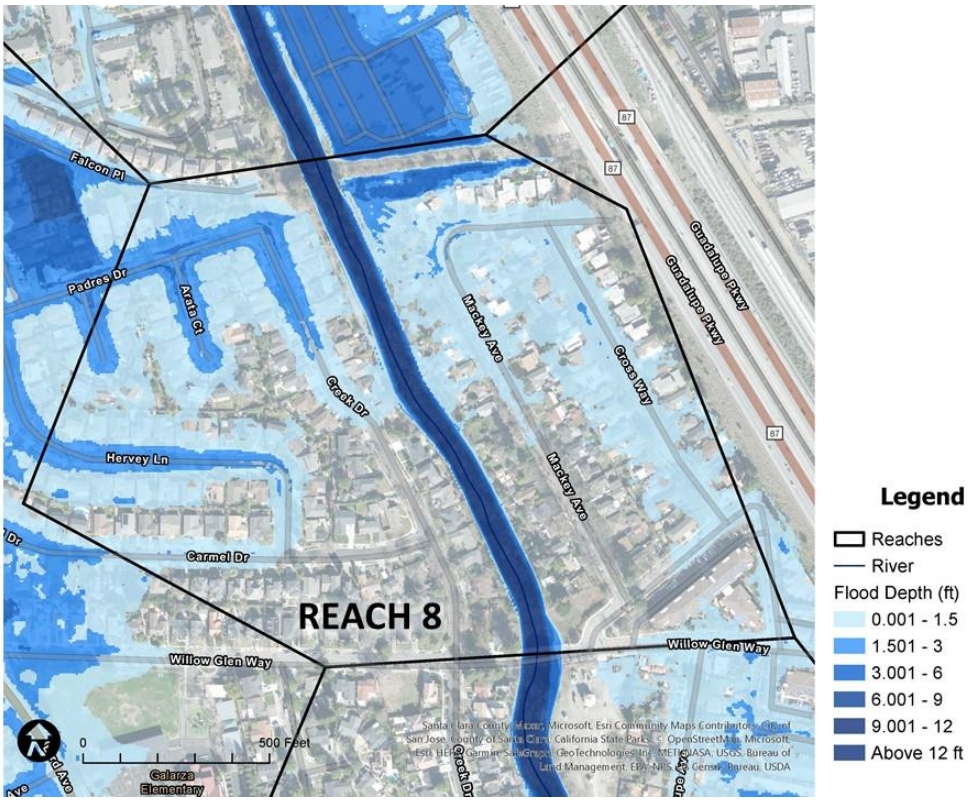


Figure 14. Reach 8 aerial map with 1% AEP flood inundation map.

1.8.8 Reach 7

Reach 7 is a long and straightened reach of the Guadalupe River with some of the lowest capacity for flood waters of all the reaches. Willow Street Bridge, located in Reach 7, is one of two bridges with the least capacity in the study area. It has a 6,420 cfs capacity which constricts flows and can only pass a roughly 12.5-14.3% AEP event based on the 2005 analysis. The other lowest capacity bridge is also located in Reach 7 at Alma Street. With a capacity of only 6,300 cfs, it can pass a relatively frequent event of similar size down to the Willow Street Bridge. The Union Pacific Railroad (UPRR) bridge is also located in this reach and has a capacity of 11,300 cfs, a roughly 2% AEP event based on the 2005 analysis.

When flooding occurs in Reach 7, floodwaters break out from the west bank at Willow Street and between the UPRR and Willow Glen Way, then flow downstream into the locally constructed Reach 6 to Interstate 280.

Reach 7 was historically ditched to connect the historical river, which lost power and dissipated into a willow grove at Willow Glen Way. Artificial over-connections of channels (diffuse and distinct historical channels that were connected for increased flood conveyance) caused the channel slope to increase. Subsequent loss of sinuosity also caused increased velocities and bed and bank incision.

A significant Native American cultural site was identified in the vicinity of Reach 7 based on literature research. More information about this site is available in Section 2.11.

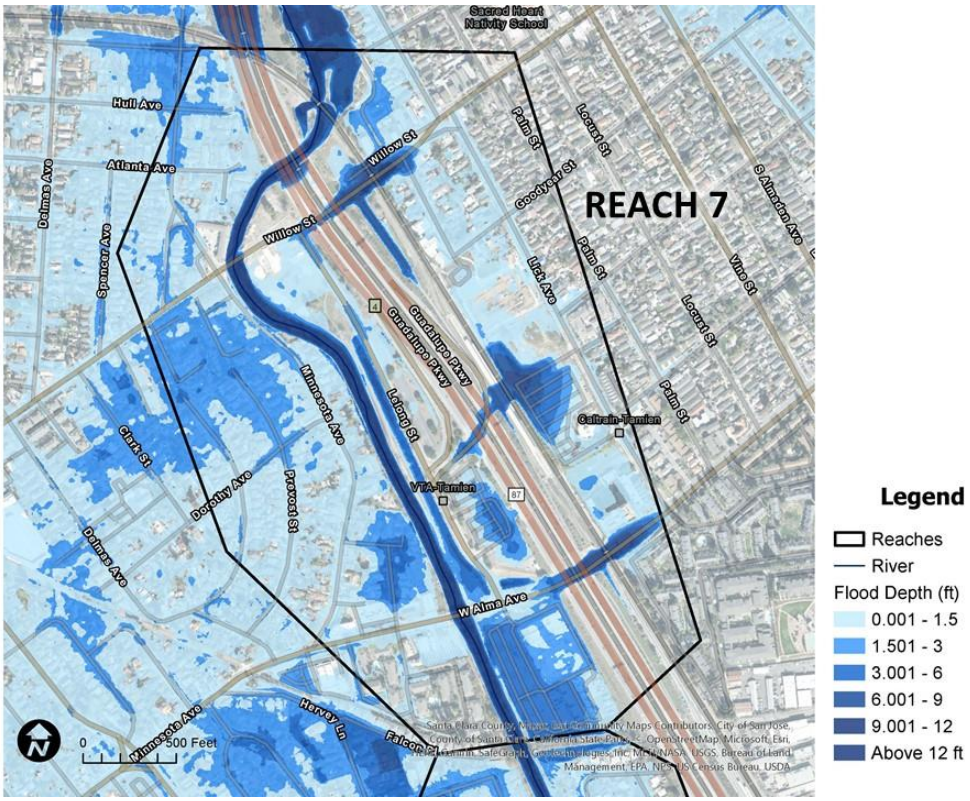


Figure 15. Reach 7 aerial map with 1% AEP flood inundation map.

Reach 7 land use is primarily dense residential, with commercial structures, and a Caltrain station to the northwest of the Guadalupe Freeway, or Highway 87. Tamien Park is located north of the Caltrain station. There are parking lots on the east bank of the river and undeveloped land at the intersection of Lelong in Reach 8 which may provide an opportunity for detention pond storage.

During the site visit on February 3, 2021, there was evidence of a population living in encampments near Mclellan Avenue in Reach 7. Near Lelong Street and Willow Street, according to Valley Water, high water was recorded up to the girders under the bridge. Overtopping of the banks has also been observed near Alma and Lelong streets, based on relatively frequent events.

1.9 Problems and Opportunities

Problems

The following problems in the study area were identified in the first step of the USACE six-step planning process:

1. Recurring flooding along the Guadalupe River has and continues to result in significant damages to the surrounding community and the City of San José, since at least the 1800s. Flooding continues to be a risk in the study area, particularly for socially vulnerable communities.
2. There is significant life safety risk from flooding to the roughly 135 unhoused people living in about ten encampments[5] along the Upper Guadalupe River. The high number of encampments makes it difficult for first responders to alert and evacuate people in the event of a flood, which can occur rapidly in this system. Unhoused communities likely lack the resources and means to

[5] As of counts performed in 2021. The exact number of people and encampments fluctuates regularly.

evacuate quickly and safely and have barriers to establishing a safer living situation that can be challenging to overcome.

3. There is potential for life loss where depths exceed 7 feet at the 1% AEP event north of Canoas Creek near Mill Pond Drive in a neighborhood where there is only one evacuation route out of the neighborhood. Depths exceed 6 feet at the 1% AEP south of Canoas Creek near Hummingbird Drive creating the potential for a life safety hazard. The Virginia and Curtner Light Rail stations could be impacted from high velocities, depths, and velocity-depth combinations.
4. High velocities, a straightened channel, and the sediment-starved condition of the river have created an incised and simplified channel morphology that lacks the complexity necessary to support native fish and wildlife, including migratory and rearing habitat for federally threatened steelhead (*Oncorhynchus mykiss*). River habitat degradation additionally threatens stands of regionally scarce and significant mature riparian vegetation, that contribute to shaded riverine aquatic, and undercut bank habitats.
5. The instability of the channel has threatened nearby infrastructure and poses a high operations and maintenance cost for Valley Water, and infrastructure owners such as Caltrain. There are varying degrees of mercury in the sediments which makes offsite sediment placement more costly.
6. A disproportionate share of the existing flood risk in the study area, accounting for roughly 73% of the future without project damages, and all or most of the most hazardous potential flood conditions, is borne by communities which are already socially vulnerable based on income, race, age, and mobility. Socially vulnerable communities may have a more difficult time evacuating during a flood, and recovering from its effects, exacerbating the short and long-term consequences of the flood.
7. Current lack of public access to the riparian corridor and dense urban development which limits open space results in limited recreational opportunities.

Opportunities

1. Opportunity to realize incidental environmental quality benefits within the scope of reducing flood risk in the channel and the riparian corridor.
2. Opportunity to increase access to the river corridor to address the community's need for open space and recreation opportunities in the urban study area.
3. Opportunity to reduce channel maintenance requirements and their associated cost.

While most of the river is highly constrained by infrastructure and development, there are areas where lowered floodplain terraces could alleviate high in-channel velocities, widen the active channel, and lower flood stage, thereby decreasing flood risk downstream in a manner that is ecologically friendly and would realize environmental quality benefits. Incorporating natural and nature-based features (NNBFs) for FRM could also contribute to a lower maintenance plan and contribute to a self-mitigating plan as well by improving habitat quality. The opportunity to design a self-sustaining, multi-stage channel would reduce maintenance requirements because a multi-stage channel spreads out the water and slows it down, reducing the erosive stress on the channel banks.

1.9.1 Existing Flood Hazard

The study area is at risk of flooding in low-lying areas. Based on USACE hydrology and hydraulics modeling and past flood events, when breakouts of the existing channel occur, the flow leaves the channel and enters a floodplain that flows parallel with the existing channel until the floodwaters pond at the downstream end of the study area. During a 4% AEP event, floodwaters break out from the west bank between the Union Pacific Railroad and Willow Glen Way, then flow downstream towards Interstate 280. Floodwaters also break out from the east bank downstream of the Union Pacific Railroad, and flow downstream between Highway 87 and the Upper Guadalupe River channel, and then reenter the channel at Virginia Avenue downstream of Reach 7. Likewise, for the 2% AEP event, floodwaters break out from

the east bank downstream of Alma Street and flow towards Interstate 280. Floodwaters also break out from the west bank at Willow Street and between the Union Pacific Railroad and Willow Glen Way, then flow downstream to Interstate 280.

Finally, flows from the 1% AEP flood event break out from the Upper Guadalupe River's east bank downstream of Alma Street, and from 1,000 feet on either side of Branham Lane. Floodwaters flow downstream through the floodplain towards Interstate 280. Canoas Creek and Ross Creek also overtop their downstream banks and contribute to the flooding within the Upper Guadalupe River floodplain. Flooding along the west bank is similar to that which occurs in the 2% AEP floodplain. The 0.2% AEP floodplain is similar to the 1% AEP floodplain, but with a greater volume of floodwater. The 1% AEP floodplain and the 0.2% AEP floodplain inundate approximately 2,310 and 2,960 acres, respectively.

For events greater than the 20% AEP event on Ross Creek, backwater effects from Upper Guadalupe River cause Ross Creek to overflow, resulting in breakouts from both banks that either flow downstream through the Upper Guadalupe River floodplain towards Interstate 280 or pond to the south of the creek. Similarly, for events greater than the 11% AEP event on Canoas Creek, backwater effects cause Canoas Creek to overflow its downstream levees. The overflow floods subdivisions from Blue Jay Road to the intersection of Almaden Expressway and Highway 87.

Overbank flows begin damaging structures adjacent to the Upper Guadalupe River starting at the 4% AEP event. More severe events tend to inundate additional properties more than add depth (and damage) to structures inundated by less severe events. The number and value of property types inundated by specific events (identified by AEP) are discussed in Appendix B—Economics and Other Social Effects Analysis.

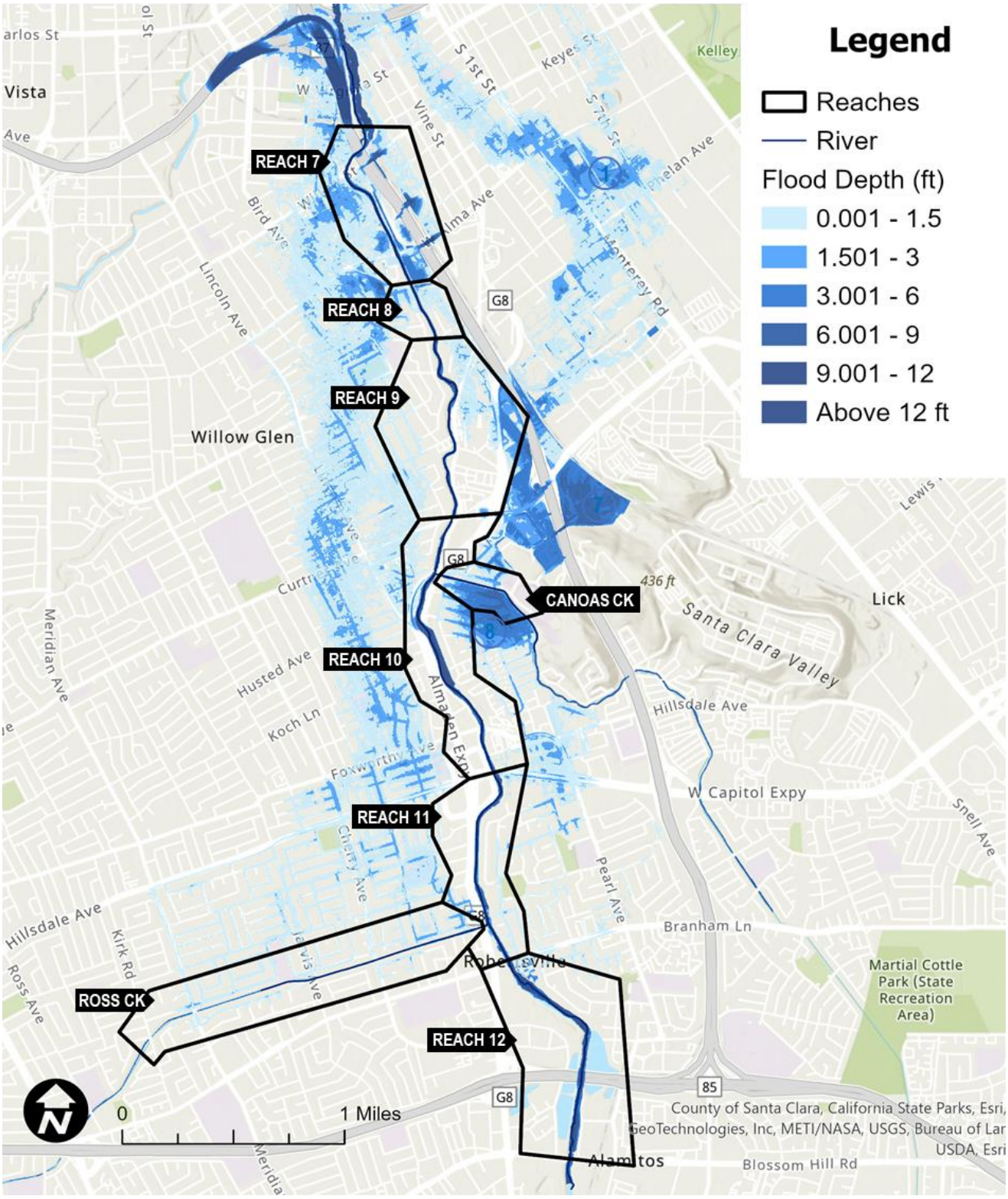


Figure 16. Flooding resulting from a 1% AEP event in the study area by reach.

1.10 Objectives and Constraints

The following planning objectives were developed for the Guadalupe River Reformulation study area over the 50-year period of analysis from 2026 to 2076.

1.10.1 Planning Objectives

- Reduce flood risk and associated damages to central San José neighborhoods due to flooding from the Upper Guadalupe River and its tributaries, Canoas Creek and Ross Creek.
- Reduce life safety risk to the central San José neighborhoods, specifically Canoas Garden, from flooding.
- Increase access to the riparian corridor for recreational opportunities, particularly where they can connect to existing trails, parks, or other significant destinations, or offer recreational opportunities that are unique to the area.
- Within the scope of reducing flood risk, realize environmental quality benefits and improve ecological succession patterns in the channel and the riparian corridor.
- Reduce channel maintenance requirements in incised reaches 7 and 8 of the Upper Guadalupe River mainstem between Caltrain/UPRR crossing and Willow Glen Way.

1.10.2 Planning Constraints

Constraints are overriding concerns that must be considered in the formulation of a plan. These concerns may be of such importance that to violate them would compromise the validity of the planning effort. They can be divided into universal constraints and study-specific constraints. Only study-specific constraints are included here.

- The Upper Guadalupe River provides habitat for federally threatened steelhead and other salmonids. Riparian forest is regionally scarce habitat and a significant and important resource for fish and wildlife, providing shade for federally threatened steelhead, and habitat for birds and other fish. A recommendation resulting from this Reformulation cannot create unacceptable and unmitigable impacts to federally listed threatened and endangered species.
- The construction schedule will be constrained based on the project biological opinion, which limits in-water work to the period between June 1st and October 15th of any given year, with some exceptions.

1.11 Study Scope

The study will produce a GRR to the Chief of Engineers. General Reevaluation Studies are to affirm, reformulate or modify a plan, or portions of a plan, under current planning criteria. The scope of the Reformulation includes a general reevaluation of structural, nonstructural, and nature-based flood risk management and recreation options that could meet current and future needs, within the policies and regulations of the USACE. Since the General Reevaluation was triggered due to not knowing whether the previously authorized plan, nor the previous NED plan remained economically justified, the scope of the general reevaluation was purposefully broad, yet targeted. The scope included strategies of:

- Thoroughly updating the economic inventory since this has changed since the previous evaluation;
- H&H and other Future Without Project (FWOP) condition updates, like climatic, environmental, socioeconomic, and cultural conditions, focused on key metrics to be used for benefit comparison;

- Quantitative analysis of other social effects (OSE), environmental quality (EQ), and regional economic development (RED) benefits to evaluate alternatives equally across comprehensive benefit categories;
- Identifying alternatives at varying scales;
- Focusing on where the most damages or biggest life safety concerns are;
- Evaluating engineering with nature (EWN) opportunities since environmental mitigation was such a large part of the cost of previous plans.

Previous analysis which led to screening measures was reevaluated but scaled to an appropriate level of reanalysis based on what, if any, changes have occurred since the last evaluation. For example, the Valley Water 2001 EIR/EIS explains why reservoir construction and existing reservoir reoperation were screened out. For reoperation, the study found that the reduction in flow was not sufficient to eliminate the need for extensive channel modifications in the downstream reaches and that they would have to be kept empty, resulting in an unacceptable and very costly water supply impact. Since water prices have more than doubled since the previous analysis, this work did not need to be redone beyond a cursory review because the water supply impact would only increase with water prices increasing. This is discussed in more detail in Section 3.3.1. Existing data, information, and analysis were utilized effectively, where possible throughout this reevaluation.

This report is structured to integrate the requirements of the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. §4321 et seq), as amended, the Council on Environmental Quality (CEQ) NEPA Implementing Regulations (40 CFR §1500-1508), and U.S. Army Corps of Engineers (USACE) Procedures for Implementing NEPA (33 CFR §230), with the requirements of the USACE plan formulation and selection process. The GRR and EA are integrated because the study planning process informs NEPA, and NEPA compliance informs study planning. Sections marked with an asterisk (*) next to their title are denoted to assist readers in identifying information required for an EA consistent with 40 CFR §1501.5(c).

2 EXISTING AND FUTURE WITHOUT PROJECT CONDITIONS

This section provides both the existing conditions (a baseline), as well as a forecast of the "Future Without Project" (FWOP) conditions, which together provide the basis for plan formulation. The existing conditions provide a description of the human environment, which is subdivided into the natural, physical, economic, and built environments. As this document is a supplement to the 1998 FS/EIS/EIR, much of the existing conditions text in not repeated for the sake of brevity. The existing conditions are instead summarized and updated where they have changed since the original document was written.

2.1 Introduction

To set the stage for resource specific existing and FWOP conditions, the period of analysis for these descriptions and the existing programs, studies, and projects are first introduced.

2.1.1 Period of Analysis

The 50-year period of analysis for this General Reevaluation starts in base year 2026, which is an assumption of when the first increment of construction could be built, and goes to 2076.

2.1.2 Existing Programs, Studies, Projects

The following projects were identified as relevant projects in the vicinity of the study area that should be considered as part of the future without project condition. Additionally, this list includes any past, present, or reasonably foreseeable future projects that may have impacts which, if combined with the impacts of the proposed alternatives, could combine to create a cumulative effect under NEPA. The exact construction timing and sequencing of some of these projects may not yet be determined or may depend on uncertain funding sources. All of these projects are required to individually evaluate the effects of the proposed project features on environmental resources in the area. In addition, avoidance, minimization, or mitigation measures must be developed to avoid or reduce any adverse effects to less than significant based on Federal and local agency criteria. Those effects that cannot be avoided or reduced to less than significant are more likely to contribute to significant cumulative effects in the area.

Relevant projects are projects that are related or similar projects that are reasonably foreseeable, and have the potential to affect the same resources and fall within the same geographic and temporal scope as the cumulative effects analysis, as defined in Section 4.17 below. A cumulative impact refers to two or more individual effects which, when considered together, are significant or compound or increase other environmental impacts. The individual effects may be changes resulting from a single project or a number of separate projects. Cumulative effects are evaluated in Section 4.17 below.

<u>Completed Mitigation for the Previously Authorized Bypass Plan</u>

Two reaches of the previously authorized plan were built in the Upper Guadalupe River – Reaches 10B and 12. These two reaches were built primarily to provide compensatory mitigation for future flood risk management feature impacts to riparian forest and SRA habitat. They were selected for providing mitigation because they needed minimal flood risk management improvements to meet the design flow capacity. Reach 10B included a low flow geomorphic channel, grade control structures, riparian vegetation plantings and streamside wood structures. Reach 12 included a raised berm between the channel and percolation ponds, riparian vegetation plantings and streamside wood structures. The riparian plantings included native species like willow, cottonwood, California rose, valley oak and coast live oak. The reaches have been monitored by USACE and Valley Water for whether they meet the success criteria under the project's Mitigation and Monitoring Plan (MMP). They have been generally been successful, and now provide 5.6 acres of riparian forest and 3,700 linear feet of SRA habitat.

Almaden Lake Improvement Project

Valley Water's Almaden Lake Improvement Project will restore the creek channel section within Almaden Lake Park and eliminate the current condition whereby Alamitos Creek flows through the lake (Valley Water 2022a). Los Alamitos Creek currently flows into the lake, and the project will separate the lake, re-establish the channel corridor and enhance the reconstructed channel with natural creek features, such as riffles, pools, and runs, to improve passage for native fish to the upper watershed. Riparian habitat will also be returned to improve the wildlife corridor with its numerous ancillary benefits to a creek system. A separated lake will remain at the park along with its existing island and a new island. Water for the lake will be from an imported water source.

Almaden Lake is located immediately upstream of the Upper Guadalupe River study area. Though construction was originally planned to begin in 2023, there have been delays and could overlap with the Project. The Almaden Lake Improvement Project is intended to enhance in-channel habitat and ecological conditions in the Upper Guadalupe River corridor. Separating the lake from the channel could reduce predation risk on juvenile salmonids by removing passage through a lotic environment that is likely to harbor populations of predatory fish and American bullfrogs (*Lithobates catesbeianus*) . Separating out the river from the lake may also help reduce water temperatues and with sediment continuity through the study area. In addition, this project may be a potential recipient of excess sediment for beneficial reuse.

South San Francisco Bay Shoreline Project

This project is a partnership with the California State Coastal Conservancy, the U.S. Army Corps of Engineers (USACE), and regional stakeholders (including Valley Water) to provide tidal flood protection, restore and enhance tidal marsh and related habitats, and provide recreational and public access opportunities (Valley Water 2022b). Initial construction for flood protection is planned for Economic Impact Area (EIA) 11, which is the urban area of North San José and the community of Alviso. Construction work on Reaches 1 through 3 began in December 2021 and is estimated to continue until January 2024. Other FRM features and the ecosystem restoration components will follow on after Reaches 1 through 3 are complete. This project may be a potential recipient of excess sediment for beneficial reuse.

Lower Guadalupe River and Downtown Guadalupe River Flood Protection Project

The Lower Guadalupe River and Downtown Guadalupe River Flood Protection Projects extend approximately 8.8 miles along Guadalupe River from Marina County Park in Alviso to Interstate 280. The Lower Guadalupe River Flood Protection Project was completed with local funds and the Downtown Guadalupe River Flood Protection Project was a joint project with the U.S. Army Corps of Engineers (USACE). Both projects provide flood protection from a 1% AEP event for approximately 4,300 structures from downtown San José to Alviso along Guadalupe River.

The Downtown Guadalupe River Project in downtown San José was completed in 2005 by the Sacramento District of USACE, in partnership with Valley Water, as well as the City of San José and the San José Redevelopment Agency[6]. The purpose of this project is to provide 100-year flood protection, fish and wildlife mitigation, and recreation features as part of the larger flood protection plan for the entire watershed and the Guadalupe River Park. The Guadalupe River Park opened in 2005 and was, at the time, considered groundbreaking in flood protection infrastructure and public space design.

Valley Water Reach 6 of the Upper Guadalupe River Flood Risk Management Project

Reach 6 extends from the downstream boundary of USACE and Valley Water Upper Guadalupe River Reformulation's Reach 7 at the UPRR crossing to Interstate 280. Construction of FRM and migitation

[6] A history of the Downtown Guadalupe River constructed project can be found on page 121 of this Sacramento District History book: https://www.spk.usace.army.mil/Portals/12/documents/history/Sacramento-District-History-Book-1929-2004.pdf

features along this 2,500 foot long, or nearly half-mile, reach was constructed and funded independently by Valley Water in September 2012 to manage the risk of flooding and provide recreation. A floodplain bench was created by excavating 195,000 cubic yards of soil to reestablish a floodplain that ranges between 40 and 220 feet wide (Figure 17). The floodplain concept for Reach 6 was developed through iterative coordination with resource agencies and with input from the public and is what was constructed by Valley Water. Mitigation plantings included installation of approximately 1,000 new plants which have since begun to establish well into a riparian forest between the floodplain and the former channel.

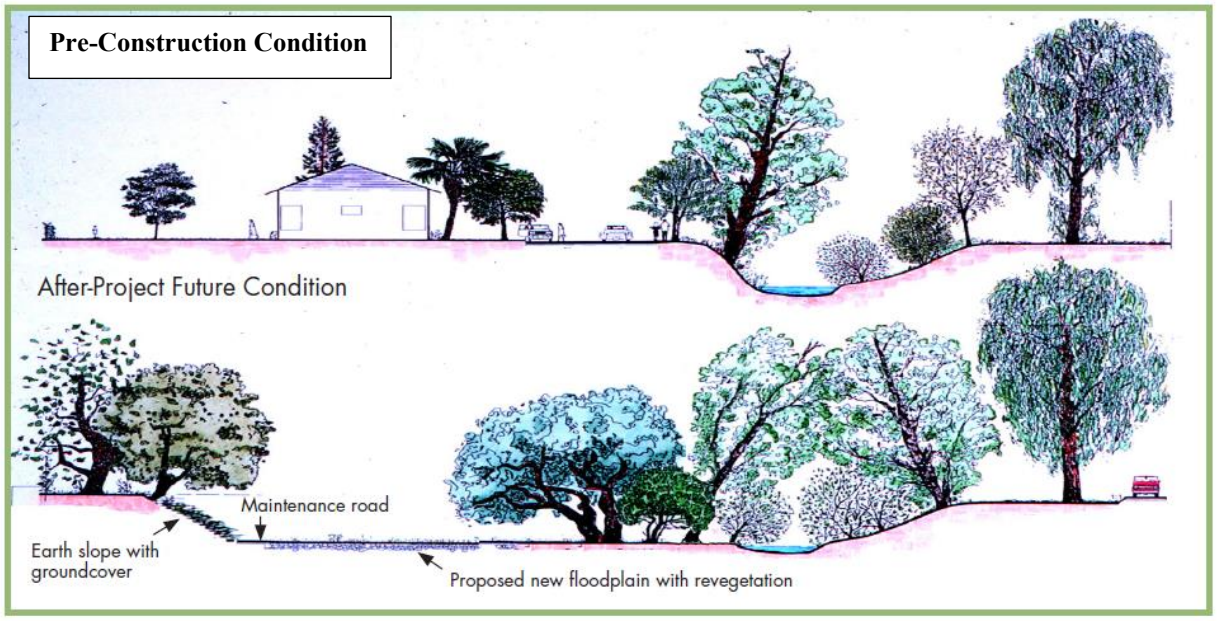


Figure 17. Floodplain concept for Reach 6.

Islands were established in order to preserve prime existing/previous riparian habitat where possible, creating alcoves of refugia for fish (Figure 18). The island concept for Reach 6, which was developed to avoid significant and costly potential impacts to riparian habitat. The island, or alcove concept is that the islands will shift and move over time, or even be blown out during big storms, but preserve prime riparian vegetation where possible that will provide critical shaded riparian aquatic habitat while the newly planted riparian floodplain forest establishes, blunting the short-term impacts to threatened steelhead.

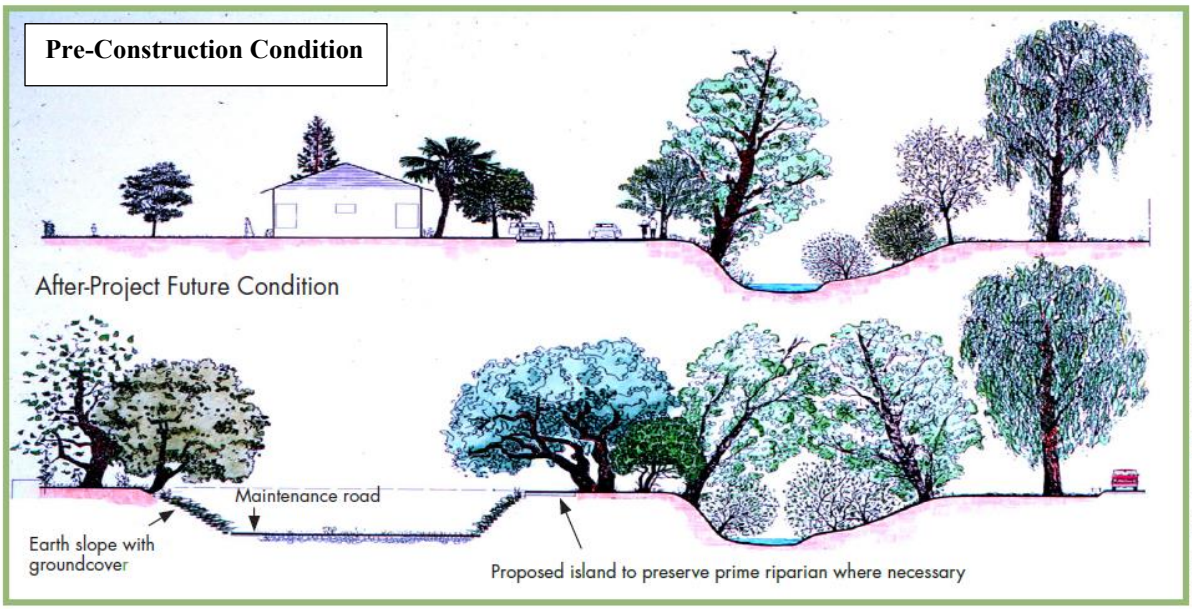


Figure 18. The island concept for Reach 6.

The Virginia Street Bridge was extended to remove a pinch point that constricted storm flows, causing out of bank flooding risk. Recreational improvements included an urban landscape park and a Guadalupe River Trail on the maintenance path. Construction of Reach 6 cost roughly $10.7 million.

In August 2021, Valley Water began constructing the Reach 6 Aquatic Habitat Improvement Project, which is part of the local-funding only project. In November 2021, Phase 1 of a Gravel Augmentation Study was completed by Valley Water as part of a permit requirement by the San Francisco Bay Water Board for the construction of Reach 6. The study included placing gravel in the channel to form riffles at two sites upsteam of West Virginia Street Bridge (Reach 6) to assess how the gravel moves in the system in order to improve channel stability and aquatic habitat. Tracer colored rocks with pit tags for electric location were placed in-channel and tracked over a five-year monitoring period to assess how the gravel moves in the system. Valley Water is currently monitoring the stability of the two gravel augmentation sites and will continue this effort until 2026. Mitigation planting, the last element of the construction project, was completed in November 2021. Phase 2 (estimated started date 2026) will include five additional gravel augmentation sites between Virginia Street Bridge and Interstate 280 (Reach 6) and incorporate monitoring information from Phase 1 in the design. This study is an opportunity to incorporate existing information and future lessons learned to improve project design.

In November 2021 Phase 1 of a Gravel Augmentation Study was completed by Valley Water as part of a permit requirement by the San Francisco Bay Water Board for the construction of Reach 6. The goal of this study was to assess how the gravel moves in the system in order to improve channel stability and aquatic habitat. Phase 2 is targeted to begin in 2026 and will include five additional gravel augmentation sites between Virginia Street Bridge and Interstate 280.

In August 2021, Valley Water began constructing the Reach 6 Aquatic Habitat Improvement Project, which is part of the local-funding only project. Valley Water completed installing the two gravel sites in October 2021. Mitigation planting, the last element of the construction project, was completed in November 2021. Valley Water is currently monitoring the stability of the two gravel augmentation sites and will continue this effort until 2026.

Guadalupe River – Alviso to I-880

The Guadalupe River - Alviso to Interstate 880 Project (Valley Water) will restore the river's flood protection level to its design capacity of a 1% AEP flood and provide natural flood protection for residents and businesses (Valley Water 2022c). The project limits are from Tasman Drive in Santa Clara to Interstate 880 near Airport Parkway in San José. The project is located downstream of the study area and currently in the planning phase with construction expected to finish in 2025.

Willow Glen Bridge Replacement

Willow Glen Bridge was replaced in 2007 by Valley Water and the City of San José to pass flows associated with a 1% AEP event. Prior to replacement, Willow Glen Way Bridge had the capacity to pass 11,630 cfs, which is roughly a 2% AEP event (USACE and Valley Water 1998).

Guadalupe River Bridge Replacement

Caltrain operates on two tracks, northbound and southbound, over the Guadalupe River in San José, just north of Tamien Station (Caltrain 2019, 2022). The northbound track is on a wooden trestle bridge constructed in 1935 and the southbound track is on a concrete bridge constructed in 1990. The bridges are located in an area of high erosion and are at risk of bank failure during storm events. Riverbank failures have occurred in several previous years, requiring emergency stabilization measures. To address these safety issues and protect the rail bridges, Caltrain proposes to widen the channel and complete the necessary enhancements to the rail bridges. The railroad bridges are also used by UPRR freight service; Amtrak passenger service; and by the Altamont Commuter Express and Capitol Corridor to reach the Tamien Yard.

The project is located within Reach 7 at the northern extent of the study area. Construction is estimated to take 2 years and continue until 2024. The project design is compatible with potential additional channel widening in the future by the project (Upper Guadalupe Flood Control Project, Reach 7). Dewatering is required and in-channel work is limited to June 15 to October 15 work window to project special-status fish species.

Guadalupe River Trail Master Plan (City of San José)

The Guadalupe River Trail Master Plan is a City of San José project that would construct an approximately 4.9 mile reach adjacent to Guadalupe River, beginning at McLellan Avenue, east of the river and extending to Chynoweth Avenue (including the study area) (City of San José 2022b). Implementation of the Master Plan would close a gap within an existing trail system to support a continuous trail system from the Los Alamitos Creek and Almaden Lake Trails near the foothills of Almaden Valley in the south to Gold Street in the Alviso neighborhood of north San José. Once fully developed, the entirety of the Guadalupe River Trail will extend about 20 miles and link the San Francisco Bay to south San José.

High Speed Rail – Caltrain

High Speed Rail will construct a 520-mile high speed train system connecting the Los Angeles Metropolitan Area, the Central Valley, and the San Francisco Bay Area. The California High-Speed Rail Authority's Board of Directors certified the Final Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for both the San Francisco to San José project section (certified on August 18, 2022) and the the San José to Merced project section (certified April 28, 2022). The Board's actions completes the environmental clearance for high-speed rail in Northern California and extends environmental clearance to over 420 miles of the project's 500-mile Phase 1 alignment from San Francisco to Los Angeles/Anaheim. High speed trains will travel on 21 miles of track through San José including portions that run through and adjacent to the study area.

Transit-Oriented Development

Projects that are transit-oriented allow people to live and work near public transportation, which helps clear the air, ease traffic, and adds infrastructure investments to the community. Santa Clara Valley Transportation Authority (VTA) has a number of Transit Oriented Development (TOD) projects in its portfolio, with five active development projects underway in the vicinity of study area: Tamien Station, Curtner Station, Capitol Station, Branham Station, and Blossom Hill Station.

Tamien Station is the furthest along of VTA's TOD projects (VTA 2019). The project is a Planned Development Rezoning from the A(PD) Planned Development Zoning District to the R-M(PD) Planned Development Zoning District to allow up to 569 multi-family residential dwelling units (434 market rate and 135 affordable units) and commercial or childcare facility up to 3,000 square feet on an approximately 6.96 gross-acre site. Construction is estimated to begin in early 2023, starting with the affordable units.

The storm drains that serve the project site discharge to the Upper Guadalupe River so surface runoff from the project site would be collected and discharged to Upper Guadalupe River. The creation of additional impervious surfaces could contribute to flashiness of flows within the river. Construction could overlap with the Project.

Valley Water Dam Retrofits

Valley Water has several dams in the process of undergoing seismic retrofits (Valley Water 2022d):

- **Anderson Dam Seismic Retrofit Project:** Anderson Reservoir on Coyote Creek is currently limited to about 3% of its capacity due to seismic concerns. This is Valley Water's largest water reservoir which stores local rainfall runoff and imported water from the Central Valley Project. The project is currently in the design phase with a draft EIR to be released in Spring 2023. Construction is expected to start in January 2025 and last through January 2032.
- **Calero Dam Seismic Retrofit Project:** The Calero Dam on Calero Creek is critical to Valley Water's water storage and management, capturing runoff from the nearby foothills and transfers from Almaden Reservoir. The project will stabilize dam embankments, replace and modernize the outlet works, replace and modernize the spillway to increase freeboard, and break Fellow's Dike (an older and smaller dam located on the southern-most section of the reservoir that is severely deteriorated). The project is currently in the design phase. Due to operational constraints, construction can only take place after construction on Anderson Dam is complete. Construction is expected to start in January 2032 and last through January 2034.
- **Guadalupe Dam Seismic Retrofit:** The Guadalupe Dam primarily stores water for recharging groundwater basins. The project will stabilize dam embankments, replace and modify the outlet works, and modify the spillway to increase freeboard. The project is currently in the design phase and construction is expected to begin April 2025 and last through September 2027.
- **Almaden Dam Improvements Project:** On Alamitos Creek, Almaden Dam is also continuing its seismic retrofit design. A separate capital project to address outlet and spillway improvements at Almaden Dam is in the planning phase. Construction is expected to begin in 2030 and last through 2031. Project improvements are on hold until Valley Water completes improvements at the Anderson, Calero and Guadalupe dams.

Calero, Guadalupe, and Almaden Dams all impound water that ultimately drains to the study area, and implementation of these two projects could overlap with construction of the Project. The Anderson Dam project will likely overlap with construction of the Project; however, it does not drain to the study area.

VTA's Bay Area Rapid Transit (BART) Silicon Valley Extension Program

VTA's BART Silicon Valley Extension Program is managed by VTA in cooperation with BART. The complete extension is being built in two phases. Phase I, the Berryessa Extension, was a 10-mile, two-

station project that opened for service in June 2020. Phase II is a six-mile, four-station extension that will bring BART from Berryessa/North San José through downtown San José to the City of Santa Clara. The Phase II Project is planned to include an approximately five-mile subway, which includes three underground stations (28th Street/Little Portugal, Downtown San José, and Diridon), one ground-level station (Santa Clara), a maintenance and storage facility, and additional facilities. Transit oriented communities are planned for each of the four station areas and will be realized as a separate effort through VTA's Real Estate and Transit-Oriented Development department. Phase II has completed the environmental process and is currently in the design and engineering process. Construction is expected to last through 2028.

Additional Trail Development

Several trail projects are in various stages of development (L. Sewell pers. comm, 2022) in the vicinity of the study area:

- Blossom Hill VTA station has a trail project in development along Canoas Creek to connect to Martial Cottle Park. This particular trail segment is outside the study area, but may ultimately connect to the same regional trail network that includes the study area.
- San José Council District 9 is in the planning phase for a trail segment in Reach 11 (Capital to Branham). Thousand Oaks Park is along Reach 11, and would be a good destination for trail users.

2.2 Air Quality

The study area is located in Santa Clara County, which is part of the San Francisco Bay Area Air Basin (SFBAAB). The Federal Clean Air Act (CAA) established the National Ambient Air Quality Standards (NAAQS) for specific air pollutants to protect public health and welfare: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable particulate matter with an aerodynamic diameter of 10 micrometers or less (PM_{10}), fine particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less ($PM_{2.5}$), and lead (Pb). O_3 is a secondary pollutant that is not emitted directly into the atmosphere. Instead it forms by the reaction of two ozone precursors: reactive organic gases (ROG) and nitrogen oxides (NO_X). The standards create a margin of safety protecting the public from adverse health impacts caused by exposure to air pollution. The local air quality management districts are responsible for the enforcement of the SIP, as well as the NAAQS.

The Bay Area Air Quality Management District (BAAQMD) is the local air district that manages air quality issues in the SFBAAB. The EPA designates all areas of the United States as having air quality better than (attainment) or worse than (non-attainment) the NAAQS. A nonattainment designation means that a primary NAAQS has been exceeded more than three discontinuous times in 3 years in a given area. The Attainment status and associated Federal thresholds for each of the criteria pollutants for Santa Clara County are shown below.

Table 2. BAAQMD attainment status and Federal thresholds.

Criteria Pollutant	Attainment Status	Threshold
O_3	Non-Attainment - Marginal	100 tons/year
CO	Attainment	--
NO_2	Attainment	--
SO_2	Attainment	--
PM_{10}	Attainment	--
$PM_{2.5}$	Non-Attainment - Moderate	100 tons/year
Pb	Attainment	--

Sensitive receptors are people who are more susceptable to the adverse effects of exposure to impacts such as air quality, noise, or toxic chemicals. Generally sensitive receptors include land uses such as hospitals, schools, day care facilities, and elderly housing. Sensitive receptors in the study area are primarily local residents that are directly adjacent to the construction sites. Additionally, there are four schools within 500 feet of the study area: two in the Canoas Creek area and two in the Ross Creek Area. One preschool, in the Reach 7 study area, is approximately 550 feet from the river off Alma Avenue. There are no hospitals or elder care facilities in the study area. The residents and students attending classes at these facilities would be considered sensitive receptors under the air quality analysis.

Over the projected period of analysis for the study, the BAAQMD strives to improve regional air quality through goals established goals in their 2017 Clean Air Plan. Their strategies include implementing a multipollutant control strategy with 85 specific measures to reduce emissions of ozone, particulate matter, toxic air contaminants, and greenhouse gases (GHGs) (BAAQMD 2017a). With implementation of these strategies, the future without-project condition for air quality in the region would likely be an improved condition when compared to the existing conditions.

2.3 Geologic Resources and Seismicity

Elevations within the Upper Guadalupe River watershed range from sea level at the southern tip of the San Francisco Bay to over 3,790 feet at Loma Prieta Peak in the Santa Cruz Mountains. Within the study area, there is less than a 100-foot change in elevation. River bank elevations range from 107 feet at Willow Street upstream to 180 feet at Highway 85.

Geologic materials in the Santa Clara Valley may be classified as younger unconsolidated fill sediments. The valley is filled with thick layers of Plio-Pleistocene and Holocene unconsolidated alluvial fill. The alluvial fill ranges up to 1,500 feet thick in some places and lies over Jurassic-Cretaceous to Tertiary age bedrock of the Franciscan Formation. The fill material is composed of sand, gravel, silt, and clay that washed into the Santa Clara Valley from the bordering mountains. Deposition has been influenced by sedimentation rates and fluctuations in sea level due to glaciation. The study area is located in the upper portion of the alluvial plain where the Guadalupe River downcut into the older Pleistocene Age alluvial fan deposits and then filled in with Holocene age alluvium. Alluvial deposition still occurs during flood stages of the river. In general, the alluvial deposits have been characterized as unconsolidated well-graded, interbedded fine sands and silts with some gravel. Older Guadalupe River channel deposits vary locally and are composed of coarse grained or poorly graded sediments. These deposits are sometimes incised by the current river channel. Ross Creek and Canoas Creek have been excavated and channelized across natural levee deposits of the Guadalupe River.

The Santa Clara Valley has historically experienced significant land subsidence due to excessive pumping of groundwater aquifers causing increased vertical loads to compact the confining silt and clay aquitards. The maximum land subsidence between 1934 and 1968 was over 8 feet southeast of downtown San José. Historic groundwater overdraft caused up to 14 feet of permanent subsidence in the greater San José metropolitan area. This resulted in seawater intrusion, increased flood risk, and widespread damage to infrastructure. Because of the subsidence bowl that formed, residential communities, major businesses', campuses, and wastewater treatment facilities are currently below sea level and now protected from flooding by a levee system. The levees at the bay shore and bordering streams keep the San Francisco Bay from inundating about 19 square miles of Silicon Valley (Valley Water 2021b and Borchers and Carpenter 2014). Importing State water through the South Bay Aqueduct (SBA) starting in 1968 greatly reduced the demand for pumped groundwater, effectively controlling the subsidence due to over pumping of groundwater in the region. In addition, the percolation ponds constructed along the Guadalupe River provide substantial groundwater recharge. The Guadalupe Recharge Ponds are an important part of Valley Water's conjunctive water management system that effectively halted permanent subsidence around 1970. The historic cost to address subsidence is estimated to exceed $756 million in 2013 dollars, or roughly $947 million in 2021 dollars[7]. Some elastic (recoverable) subsidence occurs annually in response to seasonal pumping and recharge. This elastic subsidence could become inelastic, or permanent, if groundwater levels are lowered too much, or for too long. As groundwater pumping far exceeds natural replenishment, Valley Water works to ensure adequate recharge to prevent resumed subsidence, conducting extensive subsidence monitoring. Further subsidence is not likely as long as adequate supplies and recharge capability remain available. Under the future without project condition, it can be assumed that Valley Water would continue their successful efforts to ensure adequate groundwater recharge to ensure that subsidence does not resume.

The study area is located in a seismically active part of northern California. The San Andreas Fault runs through the Santa Cruz Mountains in the Guadalupe River watershed. The Santa Clara Valley and the Diablo Range are separated by the Hayward Fault zone, a branch of the San Andreas Fault zone. Many faults exist in the San Francisco Bay Area, which are capable of producing earthquakes. Significant earthquakes, which have occurred in this area, are generally associated with crustal movements along well-defined active fault zones. Faults in the vicinity of the study area with a moderate to high potential for surface rupture include the Hayward Fault, Calaveras Fault, San Andreas Fault, Greenville Fault, and Concord-Green Valley Fault. Smaller faults in the vicinity of the project include the Silver Creek Fault, Monte Vista-Shannon Fault, and Mission Fault.

The probability that an earthquake of magnitude 6.0 or larger will occur before 2043 is 98 percent. The probability of at least one earthquake of magnitude 6.7 or larger in the San Francisco Bay region is 72 percent, and for at least one earthquake of magnitude 7.0 or larger it is 51 percent. These probabilities include earthquakes on the major faults, lesser-known faults, and unknown faults. An earthquake of magnitude 6.7 or larger will cause strong shaking over a broad area. The faults in the region with the highest estimated probability of generating damaging earthquakes between 2014 and 2043 are the Hayward, Rodgers Creek, Calaveras, and San Andreas Faults. In this 30-year period, the probability of an earthquake of magnitude 6.7 or larger occurring is 22 percent along the San Andreas Fault and 33 percent for the Hayward or Rodgers Creek Faults (USGS 2016). As a result, there is a high probability of a significant earthquake over the study's period of analysis. In the future without project condition, seismicity would remain a significant concern in the San José area.

[7] Escalated based on the U.S. Bureau of Labor Statistic Consumer Price Index for the SF-Oakland-Hayward, CA Metropolitan Statistical Area from 2013 to 2021.

2.4 Water Resources

2.4.1 Watershed Characteristics

The Guadalupe River watershed drains approximately 171 square miles. The headwaters drain the eastern Santa Cruz Mountains near the summit of Loma Prieta in heavily forested unincorporated county land with pockets of low-density residential developments. The Guadalupe River begins at the confluence of Alamitos and Guadalupe Creeks. From here it flows north approximately 14 miles through the cities of San José and Santa Clara until it discharges to the South San Francisco Bay. Ross, Canoas, and Los Gatos Creek are the three main tributaries, with Las Gatos Creek joining the mainstem of the Guadalupe River downstream of the study area.

Flow and sediment supply to the Upper Guadalupe River are affected by the operation of several reservoirs in the upper watershed, including Almaden Reservoir on Alamitos Creek, Calero Reservoir Arroyo-Calero Creek, and Guadalupe Reservoir on Guadalupe Creek. Constructed in the 1930s and 1950s, these dams and reservoirs have a combined storage capacity of 15,360 acre-feet (ac-ft) and regulate runoff from 24.8 square miles of the upper watershed, or 47 percent of the drainage area to Reach 12. In 1997, new reservoir operating strategies were implemented to reduce flood damage while minimizing impact to water supply. These three reservoirs are kept below their maximum capacity due to seismic stability concerns and this limits their flood-control capacity. See Figure 3 above for a map of the reservoirs and other water supply facilities in the study area. Valley Water began implementing the Fish and Aquatic Habitat Collborative Effort (FAHCE) Plus Pilot Program on Stevens Creek and Guadalupe Reservoirs on October 1, 2020. As a pilot, the flow implementation is temporary and experimental in nature and, as originally intended, is scheduled to last for two years through September 30, 2022, but may be extended. This progream balances water supply while providing suitable conditions for all life stages of anadromous fish.

The presence of these dams in the watershed affects channel-forming flow magnitude and channel function by: (1) reducing flood peaks, especially for smaller, more frequent floods and thus reducing the magnitude of the channel-forming discharge, and (2) eliminating coarse sediment supply from the upper watershed to the project reaches. In addition to the dams and reservoirs, on Alamitos and Guadalupe creeks, coarse sediment that is supplied to the channel below Almaden and Guadalupe reservoirs is eventually trapped in Almaden Lake. Masson Dam on Guadalupe Creek also traps sediment, which is periodically excavated. Masson Dam and Alamitos Drop Structure provide important water management functions. Contemporary coarse sediment supply to the Guadalupe River, therefore, is limited to sources downstream of Almaden Lake and the Alamitos Drop Structure (USACE 2013).Sediment from upstream of the drop structure, Masson Dam, Almaden Expressway bridge, and Alamitos Creek is removed annually or biannually depending on flows and deposition and is not returned to the river due to its mercury content.

Urbanization also affects both flow and sediment supply to the river. Urbanization increases the area of impervious surface area in the watershed, and thus decreases water infiltration to the ground and increases runoff volume and magnitude (Dunne and Leopold 1978). As the impervious area in the watershed increases to 10–20 percent, runoff volume doubles, at 35–50 percent impervious area runoff increases threefold, and at 75–100 percent impervious area runoff increases fivefold (Paul and Meyer 2001). In the Guadalupe River watershed, the magnitude of urban development and relative area of the watershed covered by impermeable surfaces increases in a downstream direction. In the upper elevations (i.e., upstream of reservoirs), the watershed is free of urban development with virtually no impervious surface. Moving downstream into Santa Clara Valley, impervious surface area increases to 5–24 percent in the middle watershed (i.e., from the dams downstream to the Alamitos Creek/Guadalupe Creek confluence) and to 48−60 percent from the Alamitos Creek/Guadalupe Creek confluence to the downstream end of the river. Urbanization also reduces sediment supply in the long-term (after the land-clearing and construction

phases are complete). In response to increased flow and reduced sediment supply, urban low flow channels typically incise and widen.

2.4.2 Flooding

Flood control projects have been fairly extensive on the Guadalupe River, but insufficient within the project study area to contain many flood events. The Lower Guadalupe River Flood Protection Project was completed in 2004, and the downtown Guadalupe River Project was completed in 2004, with minor elements finished in 2018, which together provide capacity to contain the 1% AEP flow downstream of the study area. Section 1.8 above provides a reach by reach description of geomorphic characteristics.

The Guadalupe River causes downstream flows in tributary creeks to back up (a "backwater effect"). In the case of Ross Creek, water from the river can actually flow up the creek for a short distance (a "backflow effect"). The banks of Ross Creek are low compared to the Guadalupe River, so during a 1% AEP event, backflow could occur in Ross Creek. Backwater flooding is also expected to occur on Canoas Creek during the 1% AEP flood, worsening flooding effects.

During a 5% AEP flood event, floodwaters overflow from the west bank of the river in Reach 8, between the Western Pacific Railroad and Willow Glen Way, then flow downstream toward Interstate 280. Floodwaters also overflow the east bank in Reach 7, downstream of the Union Pacific Railroad, and flow downstream between the river channel and Highway 87 before reentering the channel at Virginia Avenue. Backwater effects cause Ross and Canoas creeks to overflow their banks and flood local streets. Flooding from Ross and Canoas creeks flows north and rejoins the river in Reaches 6 and 7.

The 2% AEP floodwaters overflow from the east bank in Reach 7, downstream of Alma Avenue, and flow toward Interstate 280 . Floodwaters also overflow from the west bank in Reaches 7 and 8, at Willow Street and between the Union Pacific Railroad and Willow Glen Way, then flow downstream to Interstate 280. Additionally, bank overflow occurs immediately upstream of Branham Lane. Backwater effects cause Ross Creek to flood with overflows from the north bank flowing through the floodplain toward Interstate 280. Canoas Creek also overflows its north bank and inundates subdivisions from Blue Jay Drive to Almaden Expressway and Highway 87.

During the 1% AEP flood event, the floodplain inundates an area approximately 2,310 acres in size. By comparison with the 2% AEP flood, the area of inundation is slightly greater for most areas affected, with much more flooding occurring in the southeastern portion of the study area. Under these conditions, floodwaters overflow the east bank in Reach 7, downstream of Alma Avenue, as well as in Reaches 11 and 12, around Branham Lane. Overflow of the east and west banks also occurs in Reaches 7 and 8 as it does under the 50-year flood event. Both Canoas and Ross creeks overflow both their north and south banks, although the north bank overflows are more important, especially for Ross Creek. These floodwaters flow through the floodplain toward Interstate 280. Reach by reach flood maps from the 1% AEP event are shown above in Section 1.8.

Although these are the flooding characteristics from historical hydrology, climate change will likely alter flood frequency in the study area. Recent research suggests that the frequency of smaller floods will decrease, while that of larger floods will increase (Brunner et al. 2021, Huang et al. 2020, Swain et al. 2020).

A climate assessment was completed to assess the potential impacts from climate change to the study area and their probability in order to make risk-informed decisions as they pertain to the planning process. The Upper Guadalupe project features are all well above sea level[8] and are not subject to tidal influence, nor are they expected to be impacted by sea level rise due to the distance from the San Francisco Bay. For more information, please see Appendix A1.

The USACE Climate Hydrology Assessment Tool was used to investigate trends in simulated historical and projected future precipitation, temperature, and streamflow for the study area. This analysis found a significant trend in the future for project hydrology to be impacted by climate change. Namely, average monthly streamflow is expected to increase the volume of flow going through the creek by roughly 24% on average over a roughly 100-year projection period. Importantly though, average extreme streamflow is not expected to change, which is relevant as extreme flows are what typically cause flooding. For more information, refer to the Appendix A1 – H&H and Climate Assessment.

2.4.3 Water Quality

Water quality data for the Guadalupe River are collected by the U.S. Geological Survey (USGS) at the closest sampling station to the study area, located approximately 100 feet north of the confluence with Los Gatos Creek. Additionally, Valley Water recently completed a study as part of their Nonpoint Source Pollution Control Program to estimate the annual loads of metals and organics to San Francisco Bay by watershed within the Santa Clara Valley. The study showed that the Guadalupe River watershed contributes an estimated 30 to 40 percent of the pollutant loads discharged to the Bay from Santa Clara County.

Recent data indicate that the river water is nearly saturated with dissolved oxygen (DO), pH of the water is slightly alkaline, and the water is very hard (i.e., high calcium carbonate concentration). Turbidity in the river water (measured in Nephelometric Turbidity Units [NTUs]) is highly variable, increasing greatly during the winter months with higher flows. Active erosion sites are present along the river channel and erosion occurs throughout the study area, which accounts for the increased turbidity during the rainy season. Water quality data show some evidence of metals and other trace pollutants. Organic and inorganic contaminant concentrations present in the river can come from a variety of sources within the watershed including agricultural production upstream, commercial and industrial activities (e.g., leaking underground storage tanks, spills, other discharges, etc.), land development, urban runoff, and transportation activities. The solubility and transport of these constituents vary with river flow and seasonal conditions.

Water quality of the river may also be affected by groundwater discharges. Under high groundwater conditions, groundwater flow may be directed toward the river and may transport chemicals from nearby hazardous waste sites. Some of these are currently being investigated and/or remediated and others have not yet been documented. Refer to Section 2.12 for further discussion on hazardous materials in the study area.

Another source of water quality pollution is trash and debris from unhoused encampments and littering in the study area. Following high flow events, there is frequently trash well up into the branches of riparian trees. There have also been notable disease outbreaks and quarentines on the river in the past.

[8] Project features are above 100 ft North American Vertical Datum (NAVD), as corrected in 1988. NAVD is a vertical control used as a reference for establishing varying elevations within the floodplain. When project features are below 50 ft NAVD they may be within the zone of tidal influence and warrant sea level rise consideration and evaluation for adequate resiliency of the features over time. Since these features are at a much higher elevation, there is not a concern that sea level rise will decrease the project's resiliency.

2.4.4 Groundwater

The Santa Clara Valley is a structural trough that is filled by unconsolidated alluvial fill deposits. These deposits are water-bearing and constitute a major groundwater basin. The water-bearing deposits consist of sand and gravel (the aquifers) and silt and clays (the aquitards, beds that are impediments to ground water flow). In the project study area, groundwater is generally encountered between 20 and 60 feet below the surface in unconfined aquifers or as a perched water table. In areas immediately adjacent to the Guadalupe River, the groundwater gradient historically sloped toward the river, but decades of regional groundwater pumping has contributed to groundwater levels falling below the base of the river channel. Perched zones above the base of the river channel still provide some seepage into the river, even in drought conditions, but now that the main water table is below the base of the channel, the flow is predominantly away from the river.

Valley Water has historically operated the Guadalupe and Los Gatos recharge systems within the Guadalupe River watershed to augment the groundwater supply and to reduce the threat of land subsidence caused by excessive groundwater pumping. The in-stream percolation ponds in Reach 12 were operated for many years, but have since ceased operation. Offstream recharge occurs at percolation ponds that are fed by water diverted from the creeks or by imported water pipelines and seasonal instream percolation occurs along both Guadalupe River and Los Gatos Creek. Valley Water's artificial recharge program is carried out within the unconfined forebay of the basin which extends from the basin boundary at the foothills downstream to about Willow Street. Downstream of Willow Street, the recharge would only benefit the uppermost aquifer.

2.4.5 Channel Geomorphology

Early anecdotal evidence, site photography, and aerial photography suggest the Guadalupe River was sinuous, directly connected to the floodplain, and connected to upland water and sediment sources. The riparian corridor was a sycamore alluvial woodland habitat from the present-day location of Willow Glen Way to the canyon areas upstream from Blossom Hill Road. A willow marsh extended from Willow Street to Willow Glen Way (SFEI 2010).

The river was not always a continuous water body that it is today. The pre-development headwaters of the Guadalupe River were not in the Santa Cruz Mountains, except during high flood events, but in a marshy willow grove near the present Willow Glen Way. At this location, an immense area of willow groves, wet meadow, springs and wetlands extended from around Highway 280 south to around Curtner Avenue. The terminus of Arroyo Seco de Guadalupe, present day Alamitos Creek, was located 1,500 ft to the east. The two were joined by the Lewis Canal in 1871. The half-mile long canal bypassed the willow marsh at the head of the Guadalupe River, creating the alignment as it exists today.

Large areas of the Guadalupe River floodplain were often inundated during the winter. The river channel was highly sinuous, winding its way through seasonal wetlands, ponds and willow groves. The wetlands were drained over time, as settlers used the water for irrigation and water supply, straightened the channels, and created canals linking the discontinuous channels to each other. Guadalupe Creek, Canoas Creek, and Ross Creek all flowed into distributary marshy willow groves before joining the Guadalupe River. The hydrologic system changed from perennial wetlands to agricultural production to urbanized development over the course of about 150 years. As a part of this transition, all of the tributaries of the upper Guadalupe River became directly connected to the main channel. Flow velocities are presumed to have increased as a result of channel connection, straightening, and floodplain disconnection.

The Guadalupe River has been realigned over time. The creeks that once entered the willow grove near Curtner Avenue have been connected to the Guadalupe River downstream from the willow grove. The willow grove has been lost and the Guadalupe River is now a continuous channel from the upper watershed to San Francisco Bay. Gravel mining has created what are now percolation ponds in Reach 12, Almaden Lake and percolation ponds along Guadalupe Creek. Figure 19 below shows the historical and current channel layouts in the study area.

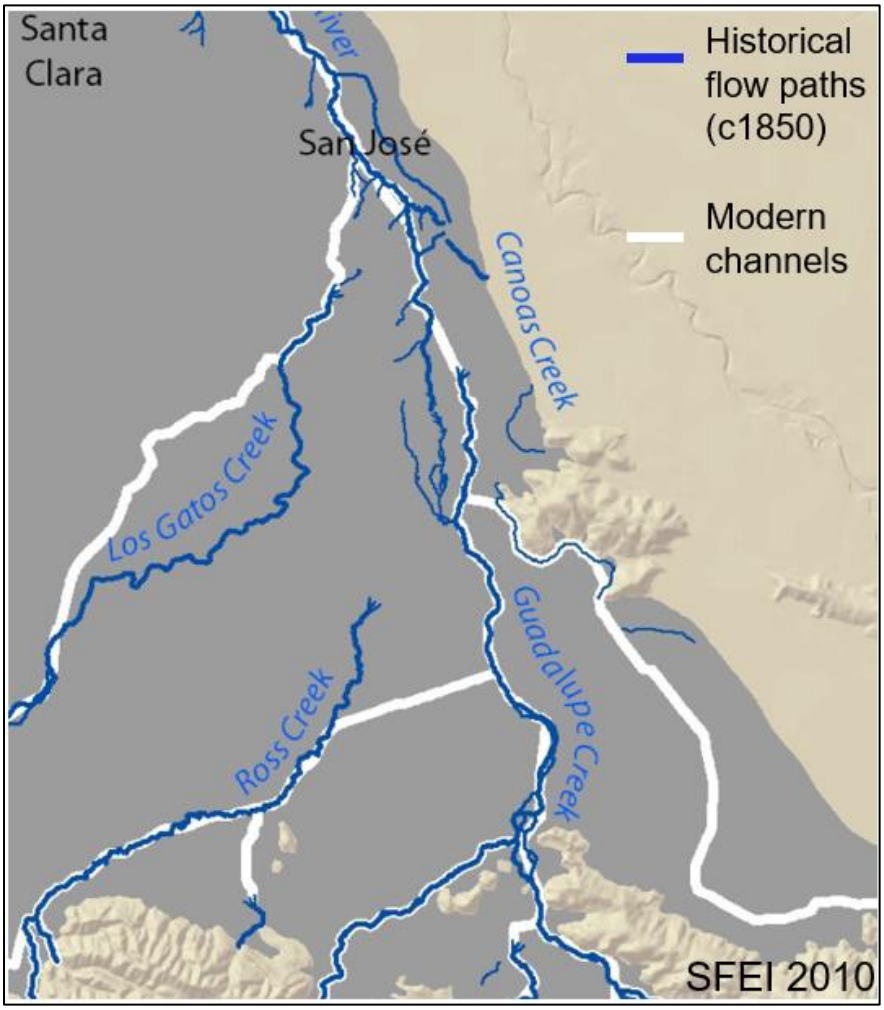


Figure 19. Comparison of historical and contemporary channel layout.
(Source: SFEI 2010)

Due to the combined effect of: (1) larger magnitude runoff events from urbanization in the watershed, (2) upstream dams that trap gravel from the upper watershed, (3) floodway confinement and higher flood flow energy from urban encroachment and levees, and (4) lack of gravel supply to the river downstream of Almaden Lake, gravel was transported out of the system at a faster rate than it entered, which has caused the channel incision and bed coarsening at many locations over time. In many areas, the channel has incised into clay, and the combination of the relatively high erodibility of the clay bed and increasing channel confinement as incision occurs perpetuated faster incision. Grade control structures limit incision in some locations; however, local scour and deposition likely continues in the different reaches.

2.5 Biological Resources

The Guadalupe River corridor is generally narrow, discontinuous and generally constrained on both sides by groundwater recharge ponds, groundwater wells, residential, commercial, and other urban development. However, the corridor does provide riparian and upland habitat for several species of wildlife ranging from dense, mature cottonwood forest to open herbaceous vegetation along disturbed channels.

2.5.1 Habitat

Habitat types have been categorized in varying ways throughout the project's history, but for the purposes of this document, the following categories are used: riparian (native), riparian (nonnative), ruderal grassland, urban forest (native), urban forest (nonnative), freshwater marsh, and aquatic. Table 3 summarizes the amount of each habitat type present in the vicinity of each reach in the study area and the following paragraphs give summary descriptions of the more prevalent habitats.

- **RIPARIAN FOREST.** Riparian forest (native and nonnative) along the river banks, is the most extensive and important vegetation community in the study area. The lower banks and sandbars are typified by Fremont cottonwood (*Populus fremontii*) and willows (*Salix spp.*). On middle and upper bank areas, the single most abundant tree is black locust (*Robinia pseudoacacia*), an invasive species that displaces native riparian forest trees. Native tree species in order of decreasing abundance include California black walnut (*Juglans hindsii*), blue elderberry (*Sambucus mexicana*), sycamore (*Platanus racemosa*), box elder (*Acer negundo ssp. califomicum*), California buckeye (*Aesculus californica*), coast live oak (*Quercus agrifolia*), and valley oak (*Quercus lobata*). Other abundant non-native trees include fruit trees (especially *Prunus spp.*) blue gum (*Eucalyptus globulus*), and California pepper tree (*Schinus molle*). The understory may be quite shrubby in places and is composed of tree saplings as well as blackberry (*Rubus spp.*) and poison oak (*Toxicodendron diversilobum*) along with underlying herbaceous and grass species.

  Riparian forest includes the overwater vegetation component of shaded riverine aquatic (SRA) cover. SRA cover is defined as the nearshore aquatic habitat, at the interface between the river and the adjacent riparian vegetation, consisting of overwater vegetation and instream woody cover. Willows, cottonwoods, and other shrubs and trees rooted within several yards of the water's edge overhang the river at different elevations, providing shade and visual screening. The vegetation closest to the water also supports aquatic habitat by providing bank stabilization, nutrient input, habitat for insects on which fish feed, and other functions.

- **RUDERAL GRASSLAND.** The ruderal communities are disturbed habitats consisting of native and introduced plants. These communities occur on and above the banks of the study area streams, occurring as a distinct habitat and also often extending into the riparian forest as an understory layer. The ruderal herbaceous community is dominated by a number of non-native and native herbaceous species, including black mustard (*Brassica nigra* [invasive]), field mustard (*B. campestris* [invasive]), cocklebur (*Xanthium strumarium*), fennel (*Foeniculum vulgare* [invasive]), horseweed (*Conyza canadensis*), Italian thistle (*Carduus pycnocephalus*), perennial peppergrass (*Lepidium latifolium* [invasive]), prickly lettuce (*Lactuca serriola*), and white clover (*Melilotus albus*). Dominant grasses in the herbaceous ruderal habitat are Bermuda grass (*Cynodon dactylon* [invasive]), ripgut brome (*Bromus diandrus* [invasive]), soft chess (*Bromus mollis*), and wild oat (*Avena barbata* [invasive]). The ruderal scrub communities are dominated by native and non-native shrubs such as coyote bush (*Baccharis pilularis*), California blackberry (*Rubus ursinus*), Himalaya blackberry (*R. discolor* [invasive]), castor-bean (*Ricinus communis* [invasive]), and poison oak.

- **URBAN FOREST.** The urban forest habitats are considered to be those trees and shrubs located in and around the residential and commercial lots which do not fit into the category of a riparian forest. They are mostly non-native garden, landscape plants plants and street trees with the common species being elm, tree-of-heaven (*Alianthus altissma* [invasive]), and black acacia (*Acacia melanoxylon,* [invasive]), as well as lemon (*Citrus limon*), orange (*C. sinensis*), and other fruit trees (*Prunus spp.*).

- **FRESHWATER MARSH.** The freshwater marsh community occurs sporadically on wet soils and shallow waters in the channels of the Guadalupe River, Ross Creek, and maybe scattered patches along Canoas Creek, although the channel is concrete. The freshwater marsh in the study area was previously located along Reaches 10B and 12, but this has since largely shifted to riparian habitat. The freshwater marsh in the study area was previously located along Reaches 10B and 12, but this has since largely shifted to riparian habitat. The marshes remaining are dominated by native and non-native forbs and grasses, including curly dock (*Rumex crispus* [invasive]), sedges (*Carex spp.*), bur-reed (*Sparganium eurycarpum*), creeping water-primrose (*Ludwigia peploides* [invasive]). Patches of cattail (*Typha* sp.) and tule (*Scirpus* spp.) are also present in some areas. Occasionally, cottonwoods and willows are found growing in among the marshes.

- **AQUATIC.** Aquatic habitats in the study area consist of open water environments with intermittent or perennial water. The narrowness of the River limits the suitability of this habitat for species that prefer large areas of open water. In addition, portions of the River may go dry especially with extensive periods of drought. The Guadalupe River, however, has adjacent ponds that provide important open water habitat for wildlife. Wildlife species known or expected to utilize aquatic habitats include the western pond turtles, bullfrog, Pacific treefrog, western aquatic garter snake, and a variety of wading birds and ducks including great blue heron, great egret, and mallards.

  Riffle habitats (shallow, fast-water areas with broken surface) are important spawning and food-producing areas, and pools (deep, slow-water areas) can provide cover and summer rearing habitat for juvenile steelhead. Aquatic habitats with a 1:1 ratio of pools to riffles generally provide optimum rearing conditions for juvenile salmon and steelhead. Previous stream surveys (Valley Water 1999) indicate that Guadalupe River habitats consists primarily of pools and runs (relatively fast flow with unbroken surface) in the lower reaches of the Guadalupe River, with riffles constituting less than 10 percent of the habitat.

Table 3. Habitat area (acres) in each reach.[A]

Reach	Riparian		Ruderal Grassland	Urban Forest		Freshwater Marsh [B]	Aquatic [B]
	Native	Nonnative		Native	Nonnative		
Reach 7	5.32	5.14	9.07	0.75	2.59	0.08	
Reach 8	2.47	1.17	0.51	0.04	3.28	0.01	
Reach 9	14.11		0.13				2.94
Reach 10A	3.36				0.02		1.10
Reach 10B [C]	4.27	0.96	1.12	4.14	5.25	0.73	3.06
Reach 10C	5.07	0.51	3.22				1.46
Reach 11	18.07		0.71				3.95
Reach 12 [C]	11.75	1.34	2.49			1.01	4.66
Ross			13.91				4.08
Canoas			4.53				0.91
TOTAL	**64.42**	**9.12**	**35.69**	**4.93**	**11.14**	**1.83**	**27.30**

[A] *Acreages for vegetated habitat types are derived from the Santa Clara Valley Water District Stream Maintenance Program Vegetation Map (2009) with the exception of reaches 7 and 8 which are derived from field mapping conducted by USFWS in 2015. Acreages for the aquatic habitat type are derived from the mapping used to support the 404b1 analysis (Appendix C5) and overlaps with the vegetated habitat types.*

[B] *The extent and persistence of freshwater marsh and aquatic environments are heavily dependent on hydrologic conditions that vary over time. This mapping is intended as a snapshot of habitat conditions to characterize general conditions and is not intended to supplant formal analyses such as wetland delineations.*

[C] *Reaches 10B and 12 have undergone modification in recent years since mapping was completed, including extensive planting which is still maturing and not captured in the previous mapping.*

Approximately 5.6 acres of riparian forest and 3,700 linear feet of SRA habitat were planted in Reaches 10B and 12 (previously described in Section 2.1.2). In addition to riparian habitat improvements, the compensatory mitigation actions included in-channel improvements including a low flow geomorphic channel and grade control structures (Reach 10B), and streamside wood structures intended to benefit fish and wildlife.

2.5.2 Fisheries

Populations of native fish in South San Francisco Bay streams began to decline around the tum of the 20th century, as agricultural development and other activities increased, and later after World War II when urbanization became more significant. The advent of urban encroachment, flood control structures, water diversions, urban discharges, and other activities resulted in reduced and degraded habitat (including a decline in water quality) and reduced peak flood flows, some or all of which may have contributed to the reduction of native fish and wildlife populations and increase in nonnative species. Today, 20 species of fish are known to occur in the Upper Guadalupe River area. Additional species are likely to occur downstream in brackish/estuarine habitats, and in upstream tributaries. Fish of the study area include five native species and 12 nonnative species. The populations are composed of three anadromous species (fish that spend their adult life in the ocean and migrate up freshwater streams to spawn) and 17 resident species (including rainbow trout). Introduced species are abundant in Guadalupe River and they compete with native species for food and space; some are alsopredators of juvenile salmonids.

Table 4. Documented occurrences* of fish species in the study area and the contributing watershed.

Common Name	*Scientific Name*	Native?	Study Area			Upper Watershed
ANADROMOUS						
Chinook salmon	*Oncorhynchus tshawytscha*	Native**		2	3	
Pacific lamprey	*Lampetra tridentata*	Native		2	3	
Steelhead	*Oncorhynchus mykiss****	Native		2	3	4
RESIDENT						
Southern coastal roach	*Hesperoleucus venustus subditus*	Native	1		3	4
Sacramento Hitch	*Lavinia exilicauda*	Native			3	
Prickly sculpin	*Cottus asper*	Native			3	4
Riffle sculpin	*Cottus gulosus*	Native				4
Sacramento sucker	*Catostomus occidentalis*	Native	1	2	3	4
Tule perch	*Hysterocarpus traskii*	Native				4
Black crappie	*Poxomis nigromaculatus*	Nonnative		2		
Bluegill	*Lepomis macrochirus*	Nonnative		2		
Brown bullhead	*Ictalurus nebulosus*	Nonnative			3	
Common carp	*Cyprinus carpio*	Nonnative		2	3	
Goldfish	*Carassius auratus*	Nonnative			3	
Green sunfish	*Lepomis cyanellus*	Nonnative	1		3	
Largemouth bass	*Micropterus salmoides*	Nonnative	1	2	3	4
Western mosquitofish	*Gambusia affinis*	Nonnative	1		3	
Pumpkinseed	*Lepomis gibbosus*	Nonnative			3	
Spotted bass	*Micropterus punctulatus*	Nonnative	1			
Striped bass	*Morone saxatilis*	Nonnative			3	

**1 = Documented occurrence in the study area during juvenile rearing monitoring surveys (Valley Water 2020a, 2022e) O. mykiss tracked into the project area during the pit tagging pilot project (Valley Water 2020b) 2 = Assumed occurrence in the study area based on passive monitoring of fish movement at the Alamitos Drop Structure (a 15-foot-high drop structure located near Blossom Hill Road), immediately upstream of the study area (Valley Water 2020c).*

3 = Fish species known to occur in the study area, as cited from the 1999 FEIS/EIR.

4 = Documented occurrence upstream of the study area during 2019 juvenile rearing monitoring surveys (Valley Water 2020a).

** *Evidence suggests that historically Chinook salmon may have occurred in the Guadalupe River Watershed opportunistically and sporadically as conditions allowed; however, the natural hydrology of the watershed is not in alignment with Chinook salmon run-timing and would not have supported a persistent Chinook salmon run in most years. Based on genetic analyses, Chinook salmon presently using the watershed are, or descended from, hatchery-raised fish that strayed into the watershed from the Central Valley (Valley Water 2018).*

*** *Steelhead and rainbow trout represent two separate life strategies of the species O. mykiss with rainbow trout being the resident form that stays in freshwater, while steelhead are anadromous.*

Two anadromous salmonids, Chinook (king) salmon and steelhead , occur in the study area. Despite anecdotal reports (USFWS 1977), there is no confirmed documentation that coho salmon occurred historically (San Francisco Estuary Project 1997) or at present in the Guadalupe River, which generally lacks suitable habitat for this species. Historically, the Guadalupe River probably supported self-sustaining populations of steelhead (Leidy 1984), and steelhead runs continue to persist in the Guadalupe River Watershed. . Small runs of adult Chinook salmon and steelhead persist in the Guadalupe River; however, genetic studies conducted on fish from the Guadalupe Watershed confirmed that they are

closely related to Central Valley fall-run Chinook salmon, indicating that the origin of these fish was Central Valley stocks with an affinity to the Feather River hatchery. The presence of fin-clipped hatchery fish with coded-wire tags also indicated straying of hatchery fish with a direct link to Central Valley hatcheries (Garcia-Rossi and Hedgecock 2002). Most Chinook salmon spawning in the Guadalupe River occurs downstream of the project study area, below Interstate 280. The populations of salmonids in the river fluctuate in response to precipitation years that create suitable environmental conditions for upstream migration of adults, adult spawning, and juvenile rearing.

Adult salmonids are seen annually in the Guadalupe River watershed. Chinook salmon and their redds have been observed at various locations along the Guadalupe River, especially in the reaches downstream of the study area (Valley Water 2018). While salmonid redds have been observed in the study area, summer water temperatures within this portion of the river system are often too high for steelhead/rainbow trout. As part of the adaptive management plan for the Valley Water EIR/EIS (Valley Water 2001) implemented by the Adaptive Management Team (AMT), successful spawning and rearing of both Chinook and steelhead was observed in various reaches of the Guadalupe River. It was found that after 14 passage improvements were implemented by the Downtown Guadalupe project, distribution of spawning and rearing has been improved throughout the accessible areas of the watershed. Spawning and rearing steelhead have been observed throughout the accessible watershed, with highest abundance in the Guadalupe and Alamitos Creek sub-watersheds. However, it is suspected that populations are still recovering from severe drought conditions in 2014–2016 (Valley Water 2019) and current drought conditions spanning 2020 to the present.

Habitat conditions within the action area are generally poor for steelhead rearing and spawning. Rearing habitat in the mainstem of the Guadalupe River is marginal due to anthropogenic inputs, stream dry-back, elevated water temperatures, decreased sediment supply downstream, and the presence of warm-water predatory fish species.

SRA cover is an important component of habitat complexity in riparian areas, especially for juvenile salmonids and regulating stream temperatures. SRA cover in Reaches 7 through l0A of the study area provide some suitable habitat features for juvenile salmonid rearing, with an overhanging riparian forest canopy, undercut banks, exposed roots, and pools. However, the channel in the study area is mostly characterized by a muddy channel bottom that lacks suitable spawning gravel (USFWS 1997). These reaches have little habitat complexity and so the spawning habitat is poor. Chinook salmon and steelhead juveniles may use this area for rearing, particularly in the spring. Conditions in Reaches 10B and 12 have improved since construction of the mitigation projects and now contain habitat suitable for both spawning and rearing. The headwater tributaries below the dams contain suitable spawning and rearing habitat that is now accessible thanks to efforts to remove in-channel migration barriers.

2.5.3 Wildlife

The riparian habitats of the Santa Clara Valley support some of the most important habitat for wildlife in the County. The riparian habitats in general, and riparian forest in particular, provide sites for water, food, cover, and breeding to birds, mammals, reptiles, and amphibians. Riparian forests areconsidered to be among the most productive habitats for wildlife in the Santa Clara Valley. In mature riparian forests, the complex vegetation structure creates a variety of microhabitats that provide niches for a diverse array of wildlife species. Large canopy trees, such as mature cottonwoods, sycamores, oaks, and willows, offer roost and nest sites for many bird and bat species. Dead trees or snags, which occur in some areas along the upper Guadalupe River, provide nest and den sites for a variety of birds and small mammals. Biodiversity is generally highest in riparian forests, though biodiversity, productivity, and functional riparian widths are limited considering the highly urbanized project study area.

The edge effects created by the juxtaposition of aquatic, riparian forest, and adjacent upland communities generally afford high levels of wildlife use, although linear configuration of these habitats is more

favorable to species that utilize edge habitats as opposed to forest interior inhabitants. The plants making up the riparian community, such as oaks and some of the non-native species, supply important forage items of wildlife. Riparian forests tend to supplythe resources that are required by many wildlife species, not the least of which is water. This concentration of resources presumably allows species to acquire their needs with a lower output of energy. Additionally, riparian forests offer the shelter and cover to function as important passages for wildlife movement. Linear connectivity is an important characteristic through the urban landscapes.

A California Department of Fish and Wildlife (CDFW) estimate of wildlife species regularly occurring in Santa Clara County indicates that approximately 69 percent of the species (218 out of 314 species) use riparian habitats. It has been reported that densities of birds in riparian habitats can be more than 10 times those in adjacent habitats and up to 43 percent of all California bird species reach their maximum densities in the state's Central Valley riparian habitats. The City of San José in the project study area has lost almost all of its riparian area to agricultural land use and connections to urban development.

Agriculture and urban development in the Santa Clara Valley has eliminated or narrowed most of the riparian forest in the region. The riparian forest along the Guadalupe River and Los Gatos, Coyote, Llagas, and Stevens creeks constitute the last remaining areas of significant riparian forest in the valley. Along the upper Guadalupe River the remaining riparian habitat has been reduced and degraded by channelization, gravel mining, and development along the banks of the river. The numerous road and railroad crossings create breaks in the riparian corridor, as do flood and erosion control structures constructed along the riverbanks. Despite the fragmented condition of its forest, the Guadalupe River is still an important area for wildlife. It supports a wide diversity of wildlife species, including some species that do not occur in adjacent habitats. The river also serves as a linear reserve, providing a refuge for wildlife in an urban environment, and a corridor for wildlife movement between the foothills and San Francisco Bay.

2.5.4 Rare, Threatened, and Endangered Species

An official species list requested from the USFWS Information for Planning and Consultation (IPaC) database included a list of 12 threatened, endangered or candidate species with potential to occur in the study area (Appendix C7) and cross-referenced against a similar search of the California Natural Diversity Database (CNDDB) (Table 5), but this does not include Chinook salmon under NMFS jurisdiction. There were no critical habitats that IPaC identified in the project footprint.

Special-Status Plants

Of the plant species listed for the study area, none of the special-status plant species known from the region are likely to occur due to the absence of suitable habitat.

Special-Status Animals

Of the animal species listed for the study area, only California red-legged frog (CRLF) and steelhead have the potential to occur in the study area based on presence of suitable habitat and known distribution range.

Table 5. Federally listed species potentially occurring in the study area*

Common Name	*Scientific Name*	Federal Status
San Joaquin Kit Fox	*Vulpes macrotis mutica*	Endangered
California Clapper Rail	*Rallus longirostris obsoletus*	Endangered
California Condor	*Gymnogyps californianus*	Endangered
California Least Tern	*Sterna antillarum browni*	Endangered
California Red-legged Frog	*Rana draytonii*	Threatened
California Tiger Salamander	*Ambystoma californiense*	Threatened
Foothill Yellow-Legged Frog (Central Coast DPS)	*Rana draytonii*	Proposed Threatened
Delta Smelt	*Hypomesus transpacificus*	Threatened
Steelhead (Central California Coast DPS)	*Oncorhynchus mykiss irideus*	Threatened
Monarch Butterfly	*Danaus plexippus*	Candidate
Bay Checkerspot Butterfly	*Euphydryas editha bayensis*	Threatened
Contra Costa Goldfields	*Lasthenia conjugens*	Endangered
Metcalf Canyon Jewelflower	*Streptanthus albidus ssp. albidus*	Endangered
Robust Spineflower	*Chorizanthe robusta var. robusta*	Endangered
Santa Clara Valley Dudleya	*Dudleya setchellii*	Endangered

** Chinook salmon are not listed under USFWS, but rather listed under NMFS jurisdiction and did not have any occurrences logged in CNDDB.*

- **California Red-legged Frog (CRLF):** Although not presently known to occur on the Guadalupe River, the California red-legged frog (*Rana draytonii*), a federally-listed threatened species, is known to occur at two locations in the Guadalupe River watershed: 1) at the head of Lexington Reservoir on Los Gatos Creek, about 11 miles upstream of the confluence of Los Gatos Creek with the Guadalupe River, which is about 2 miles downstream of the study area; and 2) 1.5 miles downstream of Guadalupe Reservoir on Guadalupe Creek, about 5 miles upstream of the study area (USFWS 1997).

  Previous USFWS protocol-level surveys conducted in 1997 covered 4.8 miles in Reaches 6–11 (excluding Reach 10B), Canoas and Ross Creek (Valley Water 1999). No red-legged frogs were observed during the surveys; however, bullfrog adults were observed in all survey areas. In addition, numerous predatory fishes such as bluegill and bass occur in the river. Bullfrogs and predatory fish are known to eat tadpoles and young CRLF, and the abundance of these exotic predators greatly reduces the potential for CRLF to occur in the study area.

  Areas far upstream do provide potentially suitable habitat (deep pools, vegetated slopes, and undercut banks) in some sections and could support CRLF that might serve as a source of future immigration into the study area if conditions are improved. However, based on the abundance of bullfrogs in the study area and the strong tendency for bullfrogs to displace and eliminate CRLF from otherwise suitable habitat, as well as the deleterious impact of exotic predatory fish (USFWS 1996), it is very unlikely that this species occurs in the study area.

- **Steelhead:** The Central California Coast distinct population segment (DPS) of steelhead, which includes fish in the upper Guadalupe River, has been listed as threatened by NMFS. This species was discussed previously under "Fisheries" (Section 2.5.2).

Under the future without project condition, it can be assumed that Valley Water would continue to maintain the channel for flood protection including periodic bank repairs, and pruning existing vegetation

to ensure flow conveyance. In-channel and terrestrial habitat conditions are expected would continue on the gradual decline without any enhancement work due to eroding banks, incision, and continued colonization by non-native invasive species.

2.6 Aesthetics and Recreation

2.6.1 Aesthetics

The meandering riparian corridor of the Upper Guadalupe River contrasts strongly with the more rigid grid of the urban landscape. The course of the Upper Guadalupe River has been altered by extensive urban development, water supply, and flood control measures. The river channel is presently narrow and mostly channelized through the valley. In some areas, it is devoid of vegetation. What remains of the original riparian corridor is a scarce and important visual resource of the Santa Clara Valley.

Visual appeal is affected by the contrast with the adjacent urban landscape, presence of riparian and wetland vegetation and water in the channel. The duration of a view also affects its value to the observer. The Guadalupe River riparian corridor provides visual relief from surrounding urban development. Through the study area, the mainstem channel conditions may vary slightly in width and density of vegetation, but the character remains largely the same—steep-banked, natural-looking channels, with sparse to dense groupings of vegetation, bordered by both residential and commercial development. Especially with the construction of vegetation enhancements in Reaches 10B and 12, most segments of the upper reaches of the Guadalupe River are lined with extensive vegetation (in varying width/extent and density) that is considered an important visual resource. Water reflections on the river and ponds and a general open space character provide an important visual quality.

Opportunities for public views of the river are are limited and generally restricted to back yards abutting the channel or front yards facing the channel, street corridors that run parallel to the river, bridge crossings, and limited trail access along the river. Although visual and physical access to the river is generally limited throughout the study area, residents, particularly on the west bank, have extended their backyard fences to incorporate river corridor areas, constructed decks and treehouses near the edge of the riparian forest corridor. The Willow Glen Way Bridge has a rustic quality that contributes to the neighborhood character.

While Reaches 7 and 8 do provide a high aesthetic quality there are very few viewers that benefit from the river due to a lack of public access. Some residents abut the river, but generally between their fenced yards and the steep banks due to the incised channel, plus degradation of the aesthetic character from unhoused encampments, the river does not provide a high value viewshed for the residents.

The Ross and Canoas Creeks tributaries within the study area are flood control channels with trapezoidal banks, forming narrow, straight channels with minimal riparian vegetation. They are bordered by residential development, but appear as drainage ditches. These sections of the creeks have overall a very low aesthetic value.

The overall river corridor adds to the visual experience of airline passengers departing and arriving to Norman Y. Mineta San José International Airport just north of the study area. Vandalism and unhoused encampments from unauthorized access to the channel negatively impact the visual appeal of the river.

Under the future without project condition, over the period of analysis there is not expected to be any change to aesthetics in the project area. Therefore, it is assumed future without project conditions are consistent with the existing condition.

2.6.2 Recreation

The study area corridor receives limited recreation use by the public due to lack of public access. Recreational trails are currently limited in the vicinity of the study area, in contrast to the Lower Guadalupe River from downtown San José to Alviso, which has an extensive trail network. Portions of the river along residential areas are used informally, as evidenced by existing paths along the banks. Most of the riverbank, however, is posted with "No Trespassing" signs, scattered with encampments, and developed trails or other recreational facilities along the river banks do not exist. The exception is in Reach 12, where existing trails adjacent to the river and Valley Water's percolation ponds are widely used for walking and jogging. The trails in this reach can be accessed via Chynoweth Avenue, however there are no formal, off-street parking facilities provided for recreationists in this area.

The City of San José has planned an extensive trail network in and around the study area (Figure 20). A continuous trail along the Guadalupe River is part of Santa Clara County's trail and pathways Master Plan. The City's goals include: preserving and restoring a natural creek environment; providing bicycle, pedestrian and equestrian access for neighborhood recreational use; integrating existing and proposed trails and parks within the city's planning area; and providing a continuous park and trails network. The Guadalupe River Trail is a planned recreational development throughout the study area; however, construction of the trail has been on hold pending implementation of the Upper Guadalupe River project.

The river is partly navigable by small watercraft such as canoes and kayaks at moderate to high flows throughout the feasibility study area (Western Waters Canoe Club 2011). However, during most of the year there are insufficient flows in the river for recreational use.

There are several small community parks near the Upper Guadalupe River that are operated by the City of San José. Sixteen parks are located within one mile of the study reaches. Eight of these parks are under two acres in size or are undeveloped. City-operated parks and open spaces adjacent to the project corridor include River Glen Park along Reach 8, Roy Avenue Mini Park beside Reach 9, Canoas Park in Reach 10, the Thousand Oaks Park near Reach 11, and the Valley Water lands surrounding their headquarters near Reach 12. At present, the major recreational resources in and near the study area are the Almaden Lake Park along the Guadalupe River south of Blossom Hill Road, the Guadalupe River Park downstream of Interstate 280 (downstream of the study area), and the upstream part of Reach 12 and the adjacent percolation ponds. The latter is property owned by the Valley Water which is available for undeveloped recreation. The percolation ponds are informally used for fishing and swimming. Santa Clara County owns and operates Martial Cottle Park, which is adjacent to Canoas Creek upstream of the project area.

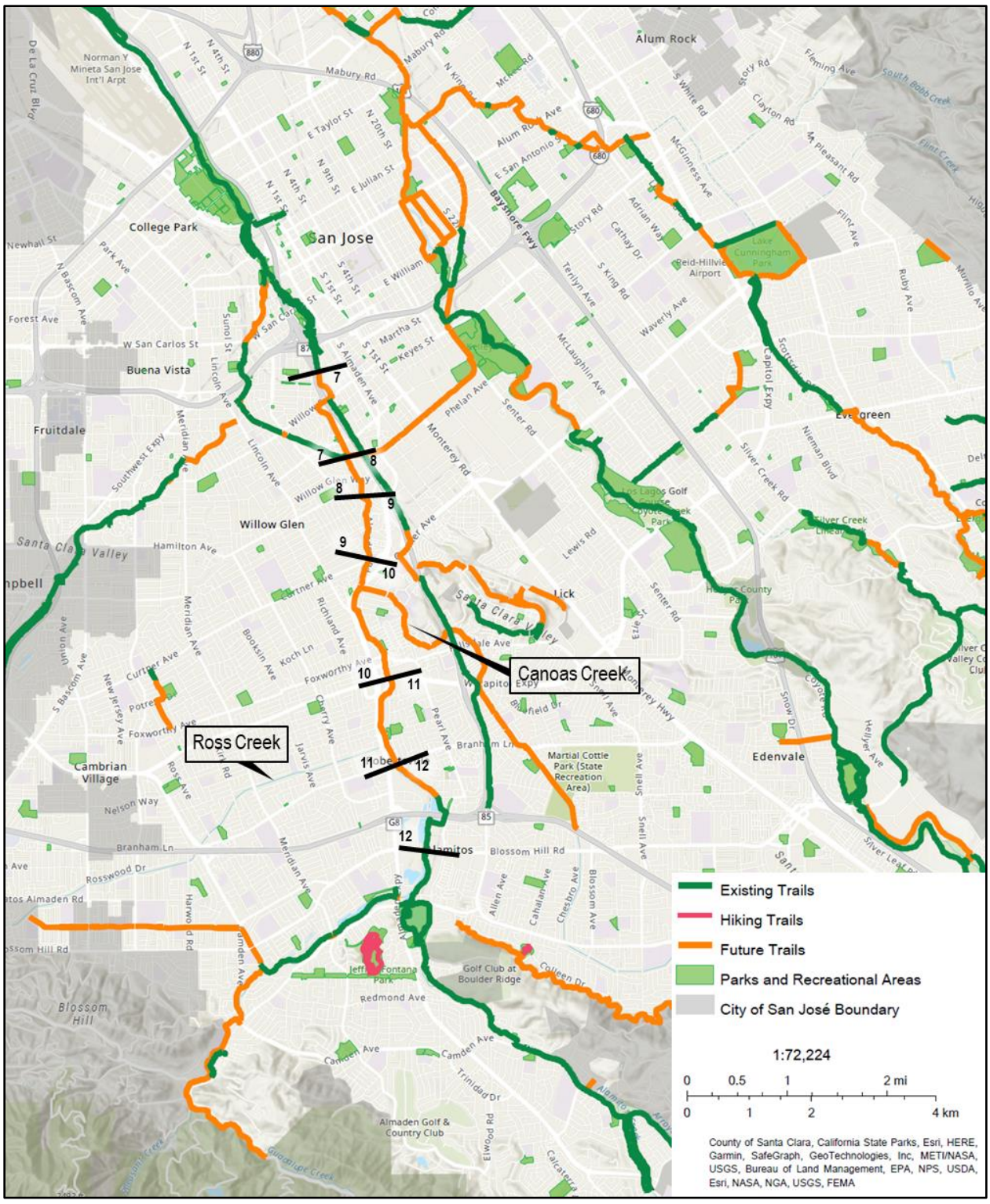


Figure 20. Existing and planned recreational areas in the study area.
(Source: City of San José Trail Network)

Due to rapid urbanization, there is a recognized need in the study area for open space recreation opportunities. Valley Water and the City of San José acknowledge the need to coordinate park master planning with flood control planning. The objective of coordinating the two planning activities is to balance the need to reduce flood damage from the Guadalupe River with the need to optimize public access and use of the river corridor. The downtown and lower Guadalupe River projects are examples of how this planning has been implemented.The downtown and lower Guadalupe River projects are examples of how this multipurpose planning has been implemented in the region.

Over the period of analysis, it can be assumed that the City of San José would continue to strive to develop trails in the study area adjacent to the river, consistent with the Guadalupe River Trail Master Plan. This development would be limited by funding constraints and opportunities could be intermittently implemented and/or only partially complete. However, any additional trail development would provide recreational benefits for the community that do not currently exist and would ensure that the future without project condition has improved recreation opportunities over the existing condition.

2.7 Noise

Noise is generally defined as sound that is loud, disagreeable, or unexpected. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). The decibel (dB) scale is used to quantify sound intensity. The human ear is not equally sensitive to all frequencies in the entire spectrum, so noise measurements are weighted more heavily for frequencies to which humans are sensitive in a process called "A-weighting". Since humans are less sensitive to low frequency sound than to high frequency sound, A-weighted decibel (dBA) levels de-emphasize low frequency sound energy to better represent how humans hear. Below are brief definitions of noise measurements and other terminology used in this section:

- Sound. A vibratory disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.
- Noise. Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- Ambient noise. The composite of noise from all sources near and far in a given environment exclusive of particular noise sources to be measured.
- Decibel (dB). A unitless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micro-pascals.
- A-weighted decibel (dBA). An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- Day-night level (Ldn). The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.

Noise can be generated by either mobile sources or stationary sources. Mobile sources include automobiles, trains, and airplanes, while stationary sources include construction sites, machinery, and industrial operations. Ambient or background noise sources can contribute substantially to the overall noise environment of an area. Background noise sources can include birds chirping, occasional vehicles passing by, or leaves rustling in the breeze. These background noises can determine the ambient noise environment in areas that are not dominated by a single major noise source.

Sound levels at a typical suburban single-family residence range from 45 dBA to 55 dBA. Sounds associated with freeway or highway traffic generally are louder, ranging from 65 dBA to 80 dBA,

depending on the type, number, and speeds of vehicles on the road, the distance from the noise source (traffic) to noise-sensitive receivers (homes), and the topographic condition.

Within the study area, noise conditions are typically consistent with those described above. The land uses surrounding the study area are primarily residential uses, with some commercial and industrial properties as well. Throughout all reaches of the study area, there are residents within 500 feet of the river. Additionally, there are four schools within 500 feet of the study area: two in the Canoas Creek area and two in the Ross Creek Area. One preschool, in the Reach 7 study area, is approximately 550 feet from the river off Alma Avenue. There are no hospitals or elder care facilities in the study area. The residents and students attending classes at these facilities would be considered sensitive receptors under the noise and air quality analyses.

As the study area is a typical urban/suburban environment, and the land use in the area is not anticipated to change over the period of analysis, it is reasonable to assume that noise under the future without project condition would likely remain consistent with the existing condition.

2.8 Transportation

The Envision San José 2040 General Plan establishes the policies for transportation planning in the study area, with further guidance provided by Move San José, the City's Department of Transportation specific plan. These plans establish the preferred trucking routes in the city and recommend minimization measures for projects that could negatively impact the circulation of vehicles in the city (City of San José, 2022).

The study area would be primarily accessed by major regional roadways and freeways. The major access roadways in the area include:

- **California State Route 87** – Also known as the Guadalupe Freeway, Highway 87 connects Highway 101 to Highway 85 through downtown San José and runs generally adjacent to the Guadalupe River. It is the primary major freeway that would be used to access the study area. The Average Annual Daily Traffic (AADT) on Highway 87 is approximately 127,000 vehicles.
- **Interstate 280** – Interstate 280 is an auxiliary interstate highway that generally connects San Francisco to San José via the San Francisco Peninsula. Interstate 280 connects with Highway 87 just south of Downtown San José. The AADT at the Highway 87 interchange is approximately 116,000 vehicles.
- **Interstate 880** – Interstate 880, also known as the Nimitz Freeway, is an auxiliary interstate highway that generally connects Oakland to San José via the East Bay shoreline. Interstate 880 does not have a direct interchange with Highway 87; however, vehicles can use North 1st Street to Taylor Street to connect between the two highways. The AADT at the North 1st Street exit is approximately 135,000 vehicles.
- **California State Route 85** – Also known as the West Valley Freeway, Highway 85 located entirely in Santa Clara County and connects Highway 101 in Mountain View to Highway 101 in South San José via Los Gatos, Cupertino, Campbell, Sunnyvale, and Saratoga. It allows access to suburban Santa Clara County communities without entering downtown San José. No trucks are permitted on Highway 85, but passenger vehicles can use it to access the southern terminus of the study area. The AADT on Highway 85 at Blossom Hill Road is approximately 125,000 vehicles.
- **U.S. Route 101** – Highway 101 is a major freeway that is part of the National Highway System. The Highway connects the states of California, Oregon, and Washington and generally runs from Los Angeles, California in the south to Port Angeles, Washington in the north. Within Santa Clara County, Highway 101 provides north/south access through the entire county, connecting with San Francisco via the Peninsula shoreline to the north, and continuing

south from San José to Gilroy and Salinas. Highway 101 connects with Highway 87 at its northernmost terminus near the Norman Y. Mineta San José International Airport. It connects to Highway 85 approximately 5 miles east of the study area. The AADT at Highway 87 is approximately 160,000 vehicles, and the AADT at Highway 85 is approximately 120,000 vehicles.

- **Almaden Expressway** – Almaden Expressway is a major arterial roadway operated by Santa Clara County. It provides direct access to the study area between Highways 87 and 85, and generally runs adjacent to the Guadalupe River. The AADT at Canoas Creek is approximately 60,000 vehicles.
- **Capitol Expressway/Hillsdale Avenue** – Capitol Expressway provides access to the study area from Highway 87 to Almaden Expressway. It is a major arterial roadway operated by Santa Clara County. To the west of the interchange between Capitol and Almaden Expressways, Capitol Expressway becomes Hillsdale Avenue, which is the primary arterial providing access to Ross Creek. The AADT at Highway 87 is approximately 51,760 vehicles

In addition to these major regional roadways, the study area could also be accessed via public transportation, pedestrian access, or bicycle commuters. Public transportation in Santa Clara County is provided by the Santa Clara County VTA. VTA provides both bus and light rail service to the study area. Additionally, CalTrain provides regional commuter rail service to the study area. CalTrain has connected Santa Clara County to San Francisco via the San Francisco Peninsula for over 150 years. Additional details about the public transit service in the study area is shown in Table 6 below.

Table 6. Public transit services in the study area.

Project Reach	Route	Service	Provider	Roadway
Reach 7	Blue Line	Light Rail	VTA	Tamien Station in Reach 7 Bridge over Guadalupe River just north of Willow Street Virginia Station just north of study area
Reach 7	CalTrain	Commuter Rail	CalTrain	Tamien Station in study area Bridge over Guadalupe River just north of Willow Street Virginia Station just north of study area
Reach 7	25	Bus	VTA	Frequent Service to Tamien Station via Willow Street and Lelong Street
Reach 7	56	Bus	VTA	Local Service to Tamien Station via Minnesota Avenue/Alma Avenue and Lelong Street
Reach 7	256	Bus	VTA	School Day Service between Tamien Station and Willow Glen High School via Minnesota Avenue/Alma Avenue and Lelong Street
Reach 9	Blue Line	Light Rail	VTA	Curtner Station 0.5 mile east of Guadalupe River
Reach 9	26	Bus	VTA	Frequent Service to Curtner Station (transfer to Blue Line) via Curtner Road
Reach 10	37	Bus	VTA	Local Service to Capitol Station via Hillsdale Ave and Foxworthy Ave
Reach 11	Blue Line	Light Rail	VTA	Branham Station 1 mile east of Guadalupe River
Reach 11	Blue Line	Light Rail	VTA	Capitol Station 0.75 mile east of Guadalupe River
Reach 11	CalTrain	Commuter Rail	CalTrain	Capitol Station 0.75 mile east of Guadalupe River
Reach 12	Blue Line	Light Rail	VTA	Ohlone/Chynoweth Station 0.5 mile east of Guadalupe River
Reach 12	102	Bus	VTA	Express Service to Ohlone/Chynoweth Station via Highway 85

Project Reach	Route	Service	Provider	Roadway
Reach 12	83	Bus	VTA	Local Service to Ohlone/Chynoweth Station via Winfield Blvd and Chynoweth Avenue
Ross Creek/ Reach 12	64A	Bus	VTA	Local Service on Almaden Expressway. Culvert over Ross Creek. Local Service to Ohlone/Chynoweth Station via Winfield Blvd and Chynoweth Avenue
Ross Creek	64B	Bus	VTA	Local Service on Meridian. Culvert over Ross Creek

Within the study area there are many bridges and culverts that provide access across the Guadalupe River, Ross Creek, and Canoas Creek. A summary of these crossings is provided in Table 7 below. Some of these roadways are major arterials that provide both passenger vehicle and public transportation options. Additional small local roadways may need to be used to access the study area. Some of these roads include: Willow Street, Alma Avenue, Lelong Street, Willow Glen Way, Almaden Avenue, Ironwood Drive, Cherry Avenue, Jarvis Avenue, Meridian Avenue, and Kirk Road.

Table 7. Bridges and culverts in the study area.

Waterway	Reach	Roadway	Structure	Agency
Guadalupe River	Reach 7	CalTrain/UPRR	Bridge	UPRR
Guadalupe River	Reach 7	Highway 87/Light Rail	Bridge	CalTrans/VTA
Guadalupe River	Reach 7	Willow Street	Bridge	Santa Clara County
Guadalupe River	Reach 7	West Alma Avenue	Bridge	Santa Clara County
Guadalupe River	Reach 7/8	Abandoned UPRR	Bridge	UPRR/City of San José
Guadalupe River	Reach 8	Willow Glen Way	Bridge	Santa Clara County
Guadalupe River	Reach 9	Malone Road	Bridge	Santa Clara County
Guadalupe River	Reach 9/10	Curtner Road	Bridge	Santa Clara County
Guadalupe River	Reach 10	Almaden Expressway (SB)	Bridge	Santa Clara County
Guadalupe River	Reach 10	Almaden Expressway (NB)	Bridge	Santa Clara County
Guadalupe River	Reach 10	Foxworthy Avenue	Bridge	Santa Clara County
Guadalupe River	Reach 10/11	Capitol Expressway	Bridge	Santa Clara County
Guadalupe River	Reach 11/12	Branham Lane	Bridge	Santa Clara County
Guadalupe River	Reach 12	Highway 85	Bridge	CalTrans
Guadalupe River	Reach 12	Blossom Hill Road	Bridge	Santa Clara County
Canoas Creek	Canoas/ Reach 10	Almaden Expressway (NB)/ Almaden Road	Culvert	Santa Clara County
Canoas Creek	Canoas	Nightingale Road	Culvert	Santa Clara County
Ross Creek	Ross	Almaden Expressway/ Briarglen Drive	Culvert	Santa Clara County
Ross Creek	Ross	Cherry Avenue	Culvert	Santa Clara County
Ross Creek	Ross	Jarvis Avenue	Culvert	Santa Clara County
Ross Creek	Ross	Meridian Avenue	Culvert	Santa Clara County
Ross Creek	Ross	Kirk Road	Culvert	Santa Clara County

As the study area is primarily built-out, there is not expected to be any changes to the roadway network during the period of analysis. Traffic conditions under the future without project condition, including public transportation, would likely remain consistent with the existing condition. It is anticipated that high speed rail will change the rail service through the study area, however, since high speed rail is

primarily intended to provide longer distance service it is unlikely to have a noticeable impact on the local roadway's typical traffic levels.

2.9 Land Use

The study area is primarily an urban area with commercial development, light industrial use, transit stations, residential neighborhoods, schools, and neighborhood parks. The river meanders through a riparian corridor populated with mature riparian trees, a mixture of thick vegetation and open grassy areas, steep embankments, and diverse wildlife. Significant portions of the property along the river corridor are owned by the City of San José, Valley Water, and San José Water.

Land use designations and policies in the study area are established in the Envision San José 2040 General Plan (City of San José 2022). Generally, the Guadalupe River and Ross Creek corridors are designated as Open Space, Parklands, and Habitat. Lands adjacent to the Guadalupe River and Ross Creek are primarily designated as Residential Neighborhood and Mixed-Use Neighborhood, with some limited parcels designated as Public/Quasi-Public Neighborhood/Community Commercial, and Regional Commercial. In addition to the above designations from the Envision San José General Plan, the Reach 7 study area is also covered by the land use policies in the Tamien Station Area Specific Plan (City of San José 1995).

Canoas Creek does not have a separate land use designation for the creek's corridor in the study area. Canoas Creek is designated as Residential neighborhood and Public/Quasi Public, with a small portion of the downstream extent of the creek designated as Neighborhood/Community Commercial just prior to the culvert under Almaden Expressway, where the Creek discharges into the Guadalupe River. In addition to these designations from the Envision San José General Plan, the Canoas Creek area is also covered by the land use policies in the Communications Hill Specific Plan (City of San José 1992).

Land use conditions in the study area are not likely to vary significantly from these plans, as they are intended to provide a long term outlook for the area, similar to the future without project condition. Infill development and urban improvements would continue to be implemented consistent with the Envision San José 2040 General Plan over the period of analysis.

2.10 Public Services and Utilities

Police service for the study area is provided by the San José Police Department. The area served by the Department is divided into districts, many of which are traversed by the Guadalupe River channel. The San José Fire Department, which serves a total area of 203 square miles, provides all fire protection services for the area covered by the flood control project. There are seven fire stations within the City that serve portions of the proposed Guadalupe River Flood Control study area.

Solid waste removal service is provided by Waste Management, Inc. A number of parks and open spaces adjacent to the project corridor are operated by the City of San José. Public utility lines along the flood control project corridor include water, sewer and storm drain lines, telephone and television cables, and gas and electricity lines.

Water mains which serve residences and commercial establishments are located along the entire study area. Water service in the study area is provided by the San José Water Company and the City of San José Municipal Water System.

Sanitary sewer and storm drain lines (including numerous outfalls, flapgates, and associated stormwater infrastructure in the channel) are also located along the entire study area. Both systems are operated by the City of San José. Underground telephone cables are maintained and operated by Pacific Bell and

AT&T. Underground gas and electricity lines are maintained by the Pacific Gas and Electric (PG&E) Company. In addition, there are vertical assets (e.g., streetlights, signal poles, light fixtures, cellular service) all along and adjacent to the river corridor.

Under the future without project condition, over the period of analysis there is not expected to be any change to public services and utitilities in the project area. Therefore, it is assumed future without project conditions are consistent with the existing condition.

2.11 Cultural Resources

Cultural resources are defined as several different types of properties: precontact and historic archaeological sites; architectural properties such as buildings, bridges, and infrastructure; and resources that have cultural or traditional importance to Native American tribes including landscapes, cultural keystone species, and sacred sites. This analysis considers the potential effects from ecological, aesthetic, historic, cultural, economic, social, and health effects towards cultural resources.

The methodology used for identifying cultural resources in the study area includes review of environmental, archaeological, ethnographic, and historical contexts associated with the Upper Guadalupe's cultural environment as well as meaningful consultation with the affiliated Tamien and neighboring Ohlone tribes.

2.11.1 Historic Contexts

Precontact cultural resources are archaeological sites that predate the period of time when Native Americans made contact with Europeans. This period of time in the Bay Area starts around the late 18th century on 1769 CE (Common Era). The Bay Area's precontact cultural sequences are understood within geological time segments based on the time scale of Before Present (BP). BP is used within archaeology and geology for the number of years before the present year of 1950 as a reference point. Each period is characterized by regional patterns through land use, subsistence strategies, and tool types.

Terminal Pleistocene (13,500–11,600 BP)
The Terminal Pleistocene is represented by mobile hunter-gatherers who hunted large game. This period of time is similar to the Clovis and Folsom periods of the Great Plains and the southwest with several Terminal Pleistocene sites being recorded along coastal environments.

Early Holocene (11,600–7700 BP)
The earliest archaeological evidence of human occupation for the Bay Area is from the Early Holocene. Archaeological sites from this period are uncommon in the Bay Area. Early Holocene recorded sites were located around Los Vaqueros Reservoir, the Coyote Narrows of the Santa Clara Valley, and Scott's Valley around the Santa Cruz mountains. Artifacts associated with this period of time include ground stone tools such as hand stones and milling slabs. Large lithic flaked cores, cobble tools, and bifaces (stone tools with flakes removed from both sides) were also documented.

Middle Holocene (7700–3800 BP)
Evidence from the Middle Holocene, including more waterfowl and shellfish recorded at archaeological sites, indicated an increase in population and exploitation of coastal resources within the Bay Area. The natural expansion of estuaries, mud flats, and freshwater tidal marshes was also prevalent during this time period (Byrd et al. 2010). Artifacts associated with Middle Holocene sites include ground stone tools, side-notched points, chopping, scraping, and pounding lithic tools, and shell beads and ornaments.

Late Holocene (3800–170 BP)
A majority of the Bay Area's archaeological sites were dated to the Late Holocene (3800 BP onward). This period of time includes the massive Bay Area shellmounds that were present by the time of European contact. This period is characterized by subsistence based heavily on marine resources to sustain a large population density of people. Artifacts associated with the Late Holocene includes the introduction of the bow and arrow, clamshell disk beads, ornamental Haliotis pendants, steatite pipes, bone whistles and tubes, "flower pot" mortars, and awls used for basketry (Milliken et al. 2007).

2.11.2 Ethnography

The Tamien people are the first documented inhabitants of the Santa Clara Valley. The boundaries of present-day Santa Clara County, California, and the Upper Guadalupe River fall within the territories of the indigenous Tamien people. Tamien Nation is routinely described or erroneously labeled as Ohlone. As there was no historic Ohlone tribe, most of the indigenous population of the Greater San Francisco Bay Area that were absorbed into the Spanish Mission system are grouped into a single entity that mischaracterizes them and ascribes further injustice.

The name Ohlone was created for anthropological categorization and is likely a mispronunciation of a Bay Miwok word meant to describe "western people" or derived from the name of a village on the lower San Gregorio and Pescadero Creeks. Regardless of the term's origin, it is critical to remember that tribes of the San Francisco and Monterey Bay Area were separate and independent nations. Linguistically, it is believed that the Tamien language and the neighboring Ramaytush and Chochenyo languages are dialects of the same language. Traditionally, the Tamien language was spoken in the Santa Clara Valley at the first and second Mission Santa Clara through the early 19th century.

The Santa Clara Valley offered a range of ecological diversity which supported the Tamien settlements near marine, tidal marsh, grassland prairie, oak grassland savanna, riparian, chaparral, mixed hardwood, and evergreen forest communities. As the original stewards of the land, the Tamien and their neighbors interacted with the environment to create significant and beneficial changes to local habitats, plants, and animals over time. Fire, for example, enhanced grass seed harvests and promoted flourishment of game animals as documented by researchers. In Santa Clara Valley, acorns were easily gathered and stored in granary features and encouraged robust trade among villages with the surplus (Basgall 1987). The Tamien people collected plants, herbs, and grass seeds in the meadow lands between the Coyote and Guadalupe Rivers (Milliken 1991).

Spanish colonization, the Spanish Mission system, and subsequent periods of Mexican rule and California statehood disrupted the Tamien people's traditional lifestyle, occupied their lands, and displaced and decimated their population. In 1777, two Santa Clara missions were established at the height of the

Spanish Colonial period. Colonial administrators, as early as 1793, prohibited the traditional practice of prescribed burning, particularly near colonial settlements (Lightfoot 2005). This prohibition continued through California statehood. Most of the Tamien people were absorbed into the missions ultimately to receive baptism and education to live as Catholic neophytes until the Mexican government secularized the Mission in 1833.

Disease and depredations claimed a majority of the Tamien at the missions, but many families persevered and remained intact eventually migrating to Santa Cruz after their lands were granted to Spanish and Mexican Immigrants. Tamien people later reportedly intermarried with Mexican landowners for security, safety, employment, and the opportunity to redevelop their community. Following California statehood in 1850 and the Land Claims Acts of 1851 and 1852, the United States observed claims granted under Spanish and Mexican law to American claimants without a single indigenous claim being lodged. The Tamien people were displaced with many migrating to the San Joaquin Valley, where hundreds of their people continue to reside.

2.11.3 Historic Properties

Following the Section 106 process to identify historic properties under the NHPA, the area of potential effects (APE) is defined under 36 Code of Federal Regulations (CFR) § 800.16 as the geographic area where the undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE covered the entire study area from Reaches 7 to 12 as well as Ross and Canoas Creek. This broad geographic area defined for the APE was necessary so that identification efforts could cover the study area and develop an inventory for the Upper Guadalupe area. Identification efforts and consultation was based on the geographic area displayed in Figure 21, which covers all reaches across the Upper Guadalupe study area.

USACE under Section 106 is identifying historic properties within the APE and the undertakings potential impacts towards them. A historic property must be evaluated for listing in the National Register of Historic Places (NRHP) (36 C.F.R. § 60.4) based on their quality of significance in local, regional, or American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association (U.S. Department of the Interior 1997). Historic properties must be at least 50 years of age and meet one or more of the following criteria's' of significance listed below:

a) That are associated with events that have made a significant contribution to the broad patterns of our history; or
b) That are associated with the lives of persons significant in our past; or
c) That embody the distinctive 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
d) That have yielded, or may be likely to yield, information important in prehistory or history.

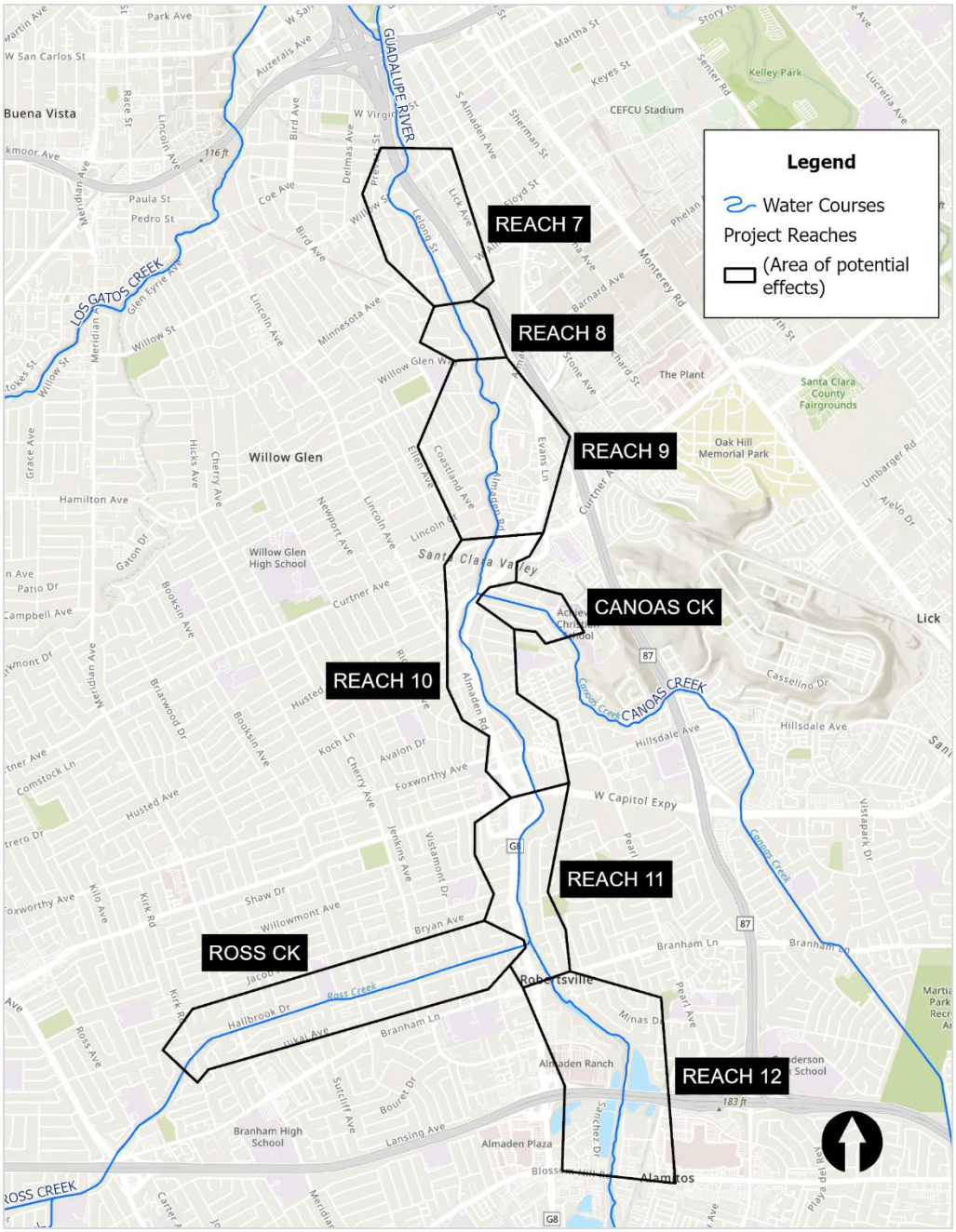


Figure 21. Area of potential effects map.

USACE has completed literature research across the entire study area to identify past recorded cultural resources evaluated to be listed on the NRHP as historic properties. A records search was conducted at the California Historical Resources Information System's Northwest Information Center on October 13, 2021 (NWIC File No. 21-0368) to supplement past inventories and data from the past iteration of this study. In addition to the records search, USACE used the NRHP database, the California Department of Parks and Recreation's California Inventory of Historic Resources, the California Office of Historic Preservations built environment resources directory, Caltrans database for bridge surveys, General Land Office and Rancho plat maps, and the Native American Heritage Commissions (NAHC) Sacred Lands File search and GIS database for tribal resources.

Within the APE covering the study area, 171 formally recorded resources were identified throughout the study reaches. A brief summary of these resources is provided below:

Table 8. Resources identified from the records search throughout the study area.

Resource Name	Resource Type	Description	Project Reach	Period	NRHP Eligibility
CA-SCL-690, P-43-001071	Archaeological	Precontact burial site with reburial of ancestral remains	Reach 7	Precontact	Eligible
SJ-1H, P-43-002234	Archaeological	Historic trash deposit with fragmented glass, animal bones, and metal	Reach 7	Historic	Unevaluated
SPRR Trestle, P-43-000881	Built Environment	Railroad bridge	Reach 7	Historic	Ineligible
Sacred Heart Church and School, P-43-001221	Built Environment	Commercial building	Reach 7	Historic	Unevaluated
Willow Street Underpass, P-43-003036	Built Environment	Structural underpass	Reach 7	Historic	Unevaluated
Elks Lodge, P-43-003161	Built Environment	Commercial building	Reach 7	Historic	Ineligible
Pepitone Grocery, P-43-003169	Built Environment	Commercial building	Reach 7	Historic	Unevaluated
Alma Bowl, P-43-003160	Built Environment	Commercial building	Reach 7	Historic	Unevaluated
Christian Manufacturing Company, P-43-003166	Built Environment	Commercial building	Reach 7	Historic	Unevaluated
Guadalupe Washington Conservation Area District, P-43-002278	Built Environment	Historic Chicano and Mexican American district for Downtown San José	Reach 7	Historic	Unevaluated
WPRR Trestle on Padres Drive, P-43-000882	Built Environment	Railroad bridge	Reach 8	Historic	Unevaluated
Various residential and business buildings located near the Ardis, Creek, El Rio, Mackey, Malone, Spadafore, Thousand Oaks, and Wellington neighborhoods*	Built Environment	Buildings located near the Upper Guadalupe River and within various neighborhood drives and squares	Reaches 7, 8, 9, 10 and 11	Historic	All evaluated to be ineligible
Willow Glen Way Bridge, P-43-000880	Built Environment	Bridge structure	Reach 9	Historic	Unevaluated
Valley View Packing Company, P-43-000829	Built Environment	Commercial building	Reach 10	Historic	Unevaluated
YMI Hall, P-43-000689	Built Environment	Commercial building	Reach 10	Historic	Unevaluated
CA-SCL-635H, P-43-001020	Archaeological	Historic retaining wall from 1860s	Reach 10	Precontact	Unevaluated
CA-SCL-202, P-43-000213	Archaeological	Precontact midden and burial site	Reach 10	Precontact	Unevaluated
CA-SCL-636, P-43-001021	Archaeological	Midden site with lithic tools	Reach 11	Precontact	Unevaluated

Resource Name	Resource Type	Description	Project Reach	Period	NRHP Eligibility
13958 Almaden Expressway, P-43-000830	Built Environment	Structure	Reach 11	Historic	Unevaluated
Oliveri House, P-43-000691	Built Environment	Residential building	Reach 11	Historic	Unevaluated
Bonetti House, P-43-000692	Built Environment	Residential building	Reach 11	Historic	Unevaluated
Scott House, P-43-000694	Built Environment	Residential building	Reach 12	Historic	Unevaluated
Withers Ranch, P-43-000696	Built Environment	Residential building	Reach 12	Historic	Unevaluated
Morrone Ranch, P-43-000693	Built Environment	Residential building	Reach 12	Historic	Unevaluated

** Despite there being only 24 listed resources in the table, the other 147 resources identified from the records search consisted of residential and commercial buildings. These resources were grouped into a single row within the table. All 147 buildings were determined to be ineligible for the NRHP.*

Much of the Santa Clara Valley is underlain by Pleistocene and Holocene alluvium deposited by streams and rivers flowing from the Coast Ranges towards the San Francisco Bay. Most archaeological sites located near the Guadalupe River were covered under alluvial deposits from sediment transported by the river and burying the sites for hundreds of years. This formation of the land and riverbanks along the Upper Guadalupe River explains the high sensitivity for archaeological sites being discovered.

2.11.4 Traditional Cultural Properties

The National Register Bulletin 38 has defined a category of protected cultural resources known as Traditional Cultural Properties (TCP). This guidance defines a TCP as a historic property eligible for inclusion in the NRHP because of significance associated with cultural practices or beliefs for a living community's history and maintaining their cultural identity (Parker and King 1990).

In order to identify and evaluate historic properties having traditional and cultural significance, the USACE obtained a tribal consultation list from the NAHC in February and August 2021. The result of the NAHC's Sacred Lands File search was positive for sacred lands within the general study area. The USACE shared the results of the search with the tribes in a formal Section 106 letter and requested to consult on the sacred site to ensure alternatives will avoid impacts.

2.12 Hazardous Materials

2.12.1 Contaminated Sites

The team obtained an inventory of contaminated sites from the California State Water Resources Control Board's GeoTracker database (accessed in August 2022, Table 9). This database lists sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater. It contains records for sites that require cleanup, such as Leaking Underground Storage Tank (LUST) Sites, Department of Defense Sites, and Cleanup Program Sites. The database search returned 38 sites in the study area, the majority of which are in a "completed – case closed" status and no longer constitute a risk to the public. The few sites not in a closed status have either had their cleanups completed and are currently in a monitoring stage, or are located well outside the boundaries of potential grading footprints described below. Table 9 and Figure 22 provide the details for the database-identified sites.

A search of EPA's GeoTracker database found that there are no Superfund sites located in the study area that would be regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

Table 9. Contaminated sites located in the study area.

SITE NAME	GLOBAL ID	SITE TYPE	STATUS	ADDRESS
ALMADEN UNOCAL	T0608501870	LUST CLEANUP SITE	Completed - Case Closed	3010 Almaden Exp
BENNETT'S AUTO SHOP	T0608500234	LUST CLEANUP SITE	Completed - Case Closed	385 Willow St
CHEVRON #9-6888	T0608500365	LUST CLEANUP SITE	Completed - Case Closed	2302 Almaden Rd
FAHRNER PROPERTY	T0608502016	LUST CLEANUP SITE	Completed - Case Closed	495 Minnesota Ave
GUADALUPE RIVER PROJECT - BRUZZONE PROPERTY	T0608523726	CLEANUP PROGRAM SITE	Completed - Case Closed	458 Willow St
GUADALUPE RIVER PROJECT - GUADALUPE RIVER PROJECT	T10000003264	CLEANUP PROGRAM SITE	Completed - Case Closed	Willow Street and Lelong Avenue
SCOTLAND YARD	T0608580668	LUST CLEANUP SITE	Completed - Case Closed	1735 Almaden Rd
SCVTA - TAMIEN	T0608501217	LUST CLEANUP SITE	Completed - Case Closed	1193 Lick Ave
SKYLARK SAN JOSÉ	60001949	VOLUNTARY AGREEMENT	Active	2482 Almaden Road
SPRIG ELECTRIC	T0608504753	LUST CLEANUP SITE	Completed - Case Closed	1303 Lick Ave
STAR CLEANERS (FORMER)	T10000008356	CLEANUP PROGRAM SITE	Open - Site Assessment	2910 Almaden Expressway
TAMIEN PARK (FORMERLY ROCKETSHIP TAMIEN)	T10000004294	CLEANUP PROGRAM SITE	Completed - Case Closed	1197 Lick Avenue
TAMIEN STATION TOD	T10000013116	CLEANUP PROGRAM SITE	Open - Site Assessment	1197 Lick Ave.
TEXACO/PARAGON IMPORTS	T0608501032	LUST CLEANUP SITE	Completed - Case Closed	1095 Foxworthy Ave
THRIFTY #039 (ARCO #5384)	T0608501436	LUST CLEANUP SITE	Completed - Case Closed	545 West Alma Avenue
1190 HILLSDALE	T10000003664	CLEANUP PROGRAM SITE	Open-Verification Monitoring	1190 Hillsdale Avenue
ALMADEN EXPRESSWAY RESIDENTIAL SERVICES	T10000016993	CLEANUP PROGRAM SITE	Open-Assessment/ Interim Remedial Action	3315 Almaden Expressway
ALMADEN PROPERTIES	T10000009095	CLEANUP PROGRAM SITE	Completed - Case Closed	4954 Almaden Expressway
ALMADEN UNOCAL	T0608501870	LUST CLEANUP SITE	Completed - Case Closed	3010 Almaden Exp
ARCO #2114	T0608500180	LUST CLEANUP SITE	Completed - Case Closed	4995 Almaden Expy
ATRIUM VENTURES	T0608500195	LUST CLEANUP SITE	Completed - Case Closed	999 Blossom River Dr
BUBBLE MACHINE CAR WASH	T0608501743	LUST CLEANUP SITE	Completed - Case Closed	1045 Blossom Hill Rd

SITE NAME	GLOBAL ID	SITE TYPE	STATUS	ADDRESS
BUBBLE MACHINE CARWASH	T0608553816	LUST CLEANUP SITE	Completed - Case Closed	1045 Blossom Hill
CHEVRON #9-6888	T0608500365	LUST CLEANUP SITE	Completed - Case Closed	2302 Almaden Rd
DODGE COUNTRY	T0608500521	LUST CLEANUP SITE	Completed - Case Closed	1050 W Capitol Expy
MAYFAIR PACKING PLANT	T0608548216	LUST CLEANUP SITE	Completed - Case Closed	1095 Hillsdale Ave
PARNELLI JONES TIRE	T0608502036	LUST CLEANUP SITE	Completed - Case Closed	995 Blossom Hill Rd
ROTTEN ROBBIE #38	T0608501990	LUST CLEANUP SITE	Completed - Case Closed	4962 Almaden Exp
SCOTLAND YARD	T0608580668	LUST CLEANUP SITE	Completed - Case Closed	1735 Almaden Rd
STAR CLEANERS (FORMER)	T10000008356	CLEANUP PROGRAM SITE	Open - Site Assessment	2910 Almaden Expressway
TAYLOR DEVELOPMENT CO.	T10000007715	LUST CLEANUP SITE	Completed - Case Closed	Winfield Blvd/ Blossom Hill Rd.
TEXACO/PARAGON IMPORTS	T0608501032	LUST CLEANUP SITE	Completed - Case Closed	1095 Foxworthy Ave
THRIFTY #039 (ARCO #5384)	T0608501436	LUST CLEANUP SITE	Completed - Case Closed	545 West Alma Avenue
UNOCAL #7186	T0608501956	LUST CLEANUP SITE	Completed - Case Closed	968 Blossom Hill Road
UPTON PROPERTY	T10000007364	CLEANUP PROGRAM SITE	Completed - Case Closed	3278 Almaden Expressway
VALLEY VIEW PACKING	T0608501553	LUST CLEANUP SITE	Completed - Case Closed	1095 Hillsdale Ave
WARREN'S SHELL GASOLINE	T10000001817	LUST CLEANUP SITE	Completed - Case Closed	3150 Almaden Expressway

(Source: GeoTracker)

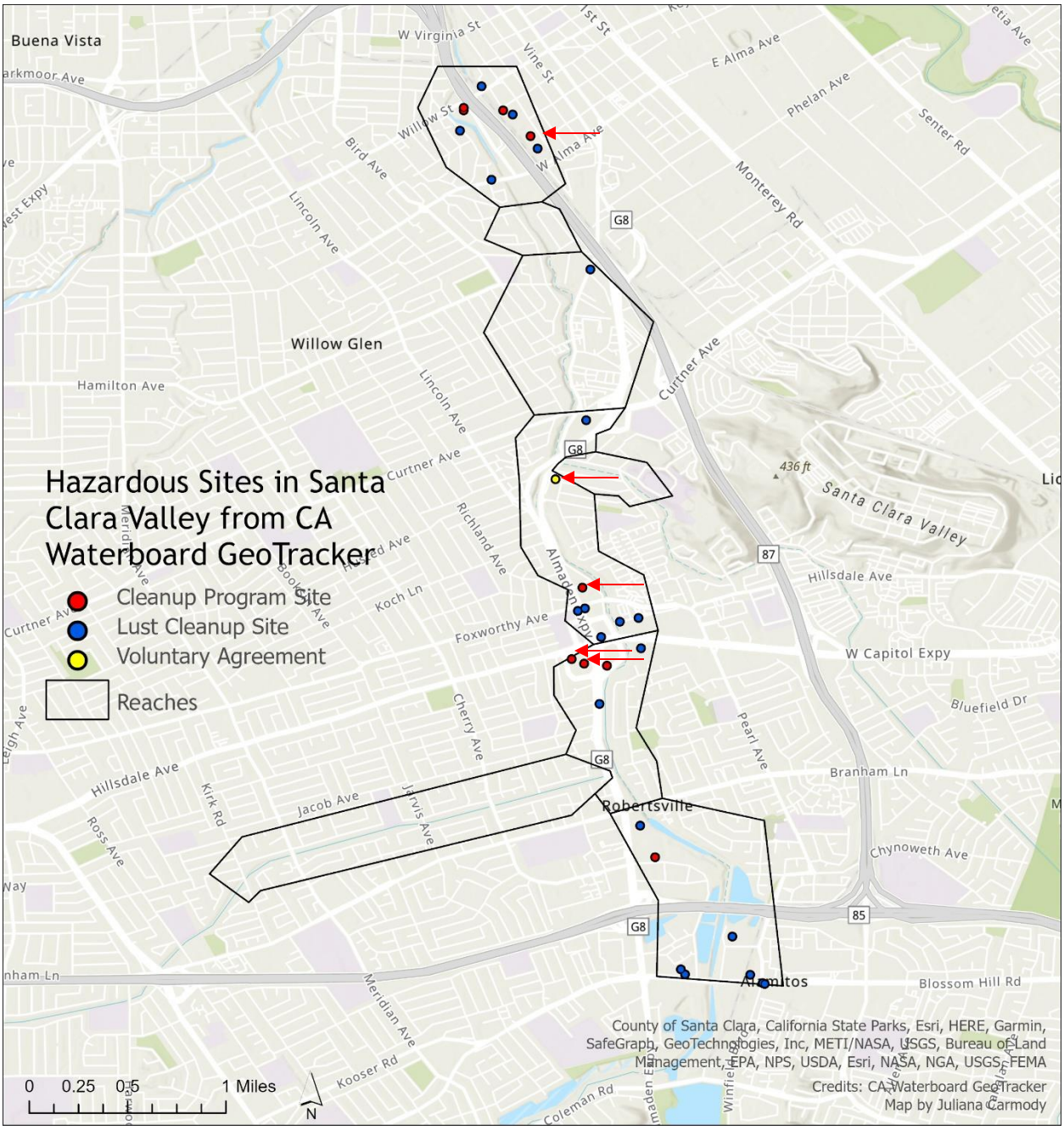


Figure 22. Potentially hazardous sites identified in the study area.
Red arrows indicate sites that are not in a "Closed" status as described above. (Source: GeoTracker).

2.12.2 Mercury

From 1845 until 1975, mercury mining of cinnabar was performed in the New Almaden District of the Santa Cruz Mountains, which is located partly within the Guadalupe and Alamitos creeks watersheds. Elevated concentrations of mercury have been detected in samples analyzed from creek sediment collected within the study area. Under the direction of the Department of Toxic Substances Control (DTSC), some remediation work has been completed at the mine site, and Valley Water removed

mercury-laden calcine from creek sites, but there remain elevated concentrations of mercury in soils throughout the Guadalupe River Watershed.

Sediment sampling conducted over the past two decades has found varying elevated concentrations of mercury in the soils of the study area. A sediment investigation in 2018 drilled 32 bore holes in Reaches 7 and 8 and collected both environmental and geotechnical samples from the borings. These soil samples were analyzed for a variety of metals and other environmental contaminants. Leachate testing found that there were several sampling locations that could be problematic if the soils are disposed offsite (Table 10). The full sampling report is not included as an appendix to this document, but can be provided upon request.

Table 10. Summary of 2018 metals leachate samples in Reaches 7 and 8.

Constituent	Number of Exceedances	Maximum Detection*
Arsenic	1	1,600 ug/L at UG78-5-1 at 4.5 feet bgs
Copper	8	7.8 ug/L at UG78-2-5 at 2.5 feet bgs
Mercury (total)	65	1,890 ug/L at UG78-3-6 at 3.0 feet bgs
Mercury (dissolved)	8	22 ug/L at UG78-5-3 at 2.5 feet bgs
Nickel	4	88 ug/L at UG78-4-6 at 18.0 feet bgs

** bgs – below ground surface; ug/L – micrograms per liter*

Due to the legacy of mining in the watershed, the San Francisco Bay Regional Water Quality Control Board (Water Board) has adopted a Total Maximum Daily Load (TMDL) for the watershed under Section 303(d) of the Clean Water Act. The TMDL is a calculation of the maximums that a water body can accept and still meet water quality standards.There is a threshold of 20 mg/kg (dry weight) above which mercury-containing soils are considered a hazardous waste under the Resource Conservation and Recovery Act (RCRA) if they are disposed of at a landfill. As shown in Table 10, not all exceedances of total mercury led to elevated concentrations in leachate. For soils remaining on-site designs can consider the mercury concentrations of soils to reduce exposures to levels which are protective of the environment. A similar issue was encountered during the construction of Reaches 10B and 12, and the team was able to work with the Water Board and EPA to establish placement sites outside of the most frequent flooded areas but within the project footprint that minimized environmental exposure of these soils.

2.13 Public Safety

Safety concerns in the Guadalupe River channel are primarily associated with potential flooding along the River. Because the existing channels within the study area cannot accommodate a 1% AEP flood event, portions of the project site and vicinity are subject to flooding and damage. Historical floods on the Guadalupe River caused extensive damage to the San José and Alviso areas and near bankfull conditions and minor flooding have occurred in several recent storms. Property damage has been the major impact from flooding, rather than loss of life.

However, the City of San José has a significant unhoused population in and around the study area (see also Section 2.14). Channels (especially areas with vegetation or bridge crossings) are common areas of refuge for the unhoused population, and people living in encampments instead of solid structures are more at-risk during flood events. In other instances, the general public may perceive the presence of unhoused communities as a safety concern. Unhoused communities living in the channel corridor often results in environmental degradation, such as water contamination from human waste and trash; habitat destruction; and the accumulation of garbage, drug paraphernalia, and other hazardous materials (Abt Associates 2020). Complaints from neighborhood residents cite the impacts of unsheltered persons on property values, safety, and cleanliness (Abt Associates 2020).

Currently, access to the river channel is largely limited by fences and gates at the top of the channel banks to discourage public access from adjacent residential and commercial uses and reduce security problems in many areas. Rivers and canals are an attractive nuisance and unsupervised entry to the channel and other flood control facilities could result in injury or death.

Under the future without project condition, over the period of analysis public safety in the project area would continue on the same trajectory of gradual degradation. Flooding events would continue to impact the surrounding area. The unhoused population is expected to increase resulting in additional communities seeking refuge in and along the channel corridor, both putting them at risk during flood events and leading to additional safety concerns for the surrounding businesses and residents.

2.14 Socioeconomics

The City of San José is located in Santa Clara County, California. It is considered part of the Bay Area (comprised of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Solano, Sonoma, and Santa Clara Counties), which has a total population of over seven million people (2020 estimates). Between 2000 and 2020, the City of San José's population increased from 894,943 in 2000 to 1,013,240 in 2020 (increase of approximately 13.22 percent), which is somewhat below county, national, and state averages for population growth. Prior to 2000, the population increased according to the 1970, 1980, and 1990 censuses for the city of San José, Santa Clara County, the state of California, and the United States in its entirety. The population grew by 24% by 1980 and 41% by 1990. This is due to the boom of the technology industry during this time.

The employment level of both Santa Clara County and California closely follow that of the United States. Employment increased steadily from 1975 to 2000 where there is then a decrease in employment level in 2010 for all three regions (Table 12). The most notable is an increase in employment for Santa Clara County between 1975 and 1980 of 63%. In 2020, the largest-employing private high-level industries in Santa Clara County were service-producing, followed by professional and business services and goods-producing industries. Average annual wages per employee were highest for the information industry, followed by manufacturing and goods-producing industries. Major private-sector employers in the region include Adobe Inc, Advanced Micro Devices Inc, Applied Materials Inc, and Cisco Systems Inc, amongst others.

The unemployment rate of Santa Clara County between 1990 and 2020 was generally lower than the unemployment rate of California and the nation. In 2010, the unemployment rate of Santa Clara County and California far exceeded that of the United States (See Table 13).

Historically, the City of San José had a lower household income than Santa Clara County, but a higher median income than the State of California and the United States (See Table 14). Per capita income was lower in the City of San José than Santa Clara County, but higher than state and national averages between the same period. Poverty rates were higher in San José than Santa Clara County, but lower than in California and the United States.

Table 11. Study area population data (1970–2020).

Total Population 1970 - 2020						
	1970	**1980**	**1990**	**2000**	**2010**	**2020**
City of San José	445,779	629,442	782,225	894,943	945,942	1,013,240
Santa Clara County	1,064,714	1,295,071	1,497,577	1,682,585	1,781,642	1,936,259
California	19,953,134	25,667,565	29,760,021	33,871,648	37,253,956	39,538,223
United States	203,211,926	226,545,805	248,709,873	281,421,906	308,745,538	331,449,281

Source: Bay Area Census, Census Bureau (BOC), 1970-2020

Table 12. Persons employed (1975-2020).

Total Persons Employed Over Time, 1975 – 2020						
	1975	**1980**	**1990**	**2000**	**2010**	**2020**
Santa Clara County	414,715	676,834	855,974	1,036,582	842,581	1,051,175
California	6,870,760	10,112,450	13,262,696	14,905,055	14,414,461	16,378,059
United States	67,801,400	89,183,700	108,603,565	129,879,584	127,820,442	139,103,773

Source: Bureau of Labor Statistics, QCEW, 1975-2020

Table 13. Average annual unemployment rate (1990-2020).

Average Annual Unemployment Rate, 1990 – 2020				
	1990	**2000**	**2010**	**2020**
Santa Clara County	3.97%	3.06%	10.66%	7.23%
California	5.79%	4.93%	12.46%	10.28%
United States	5.62%	3.97%	9.6%	8.09%

Source: Federal Reserve Bank of St. Louis (FRED), 1990-2020

Table 14. Study area income and poverty levels.

Regional Income and Poverty Data	**City of San José**	**Santa Clara County**	**California**	**United States**
Median Household Income (in 2020 dollars)	$117,324	$130,890	$78,672	$64,994
Per Capita Income in Past 12 months (in 2020 dollars)	$49,207	$59,297	$38,576	$35,384
Persons in Poverty	8.3%	6.6%	12.3%	11.6%

Source: U.S. Census Bureau, 2016-2020 ACS data

2.15 Environmental Justice

Executive Order (EO) 12898, Federal Actions to Address Environmental Justice for Minority and Low-Income Populations, directs all Federal agencies to determine whether a proposed action would have a disproportionately high and adverse impact on minority (persons of color) and low-income populations (people experiencing poverty). Disproportionate effects refer to circumstances where there exists significantly higher and more adverse health and environmental effects on people of color and people experiencing poverty (EPA 2019). The objective of the environmental justice policy is to ensure that people of color and people with lower incomes are fully and equitably considered during the project development process. According to the EPA's Environmental Justice (EJ) Promising Practices document, a community is considered under EO 12898 if the community has 50 percent or greater persons of color and/or 20 percent or greater persons experiencing poverty. Additionally, EO 13985, Advancing Racial Equity and Support for Underserved Communities Through the Federal Government, directs federal agencies to pursue a "comprehensive approach to advancing equity for all, including people of color and others who have been historically underserved, marginalized, and adversely affected by persistent poverty and inequality. Affirmatively advancing equity, civil rights, racial justice, and equal opportunity is the responsibility of the whole of our Government. Because advancing equity requires a systematic approach to embedding fairness in decision making processes, executive departments and agencies (agencies) must recognize and work to redress inequities in their policies and programs that serve as barriers to equal opportunity." EO 14031, Advancing Equity, Justice, and Opportunity for Asian Americans, Native Hawaiians, and Pacific Islanders, specifically calls out Asian Americans, Native Hawaiians, and Pacific Islanders as groups for whom equity, justice, and opportunity need to be further advanced.

According to most recent census estimates, most of the people living in the City of San José are Asian (37.2 percent) and Hispanic/Latinx[9] (31 percent) (Table 15), followed by White only (not Hispanic or Latinx) (25.1 percent). The City of San José as a whole has much higher percentages of Asian persons living in the area than county, state and national figures, and smaller percentages of White and Black/African American persons than state and national figures, but more than the county. The total percentage of white only (non-Hispanic or Latinx) in the City of San José is 25.1%, indicating this is a majority community of color population. The study area population has neighborhoods with lower and higher concentrations of people of color, as shown in Figure 23. In the City of San José 8.7% percent of the population is experiencing poverty. Several census tracts in flooding impact area one experience poverty rates of over 20%, as shown in Figure 24. In Santa Clara County 6.6% of the population is experiencing poverty. There is a significant difference between the right and left banks of the Guadalupe River in terms of EJ; the right bank has higher percentages of minority and low income persons than does the left bank. See Table 14 in Section 2.14 for detailed description of regional income and poverty and the City of San José and Santa Clara County. See Appendix B Section 10 for specific details on development of flooding impact areas as it relates to environmental justice.

[9] *Latinx*—relating to people of Latin American origin or descent (used as a gender-neutral or nonbinary alternative to Latino or Latina).

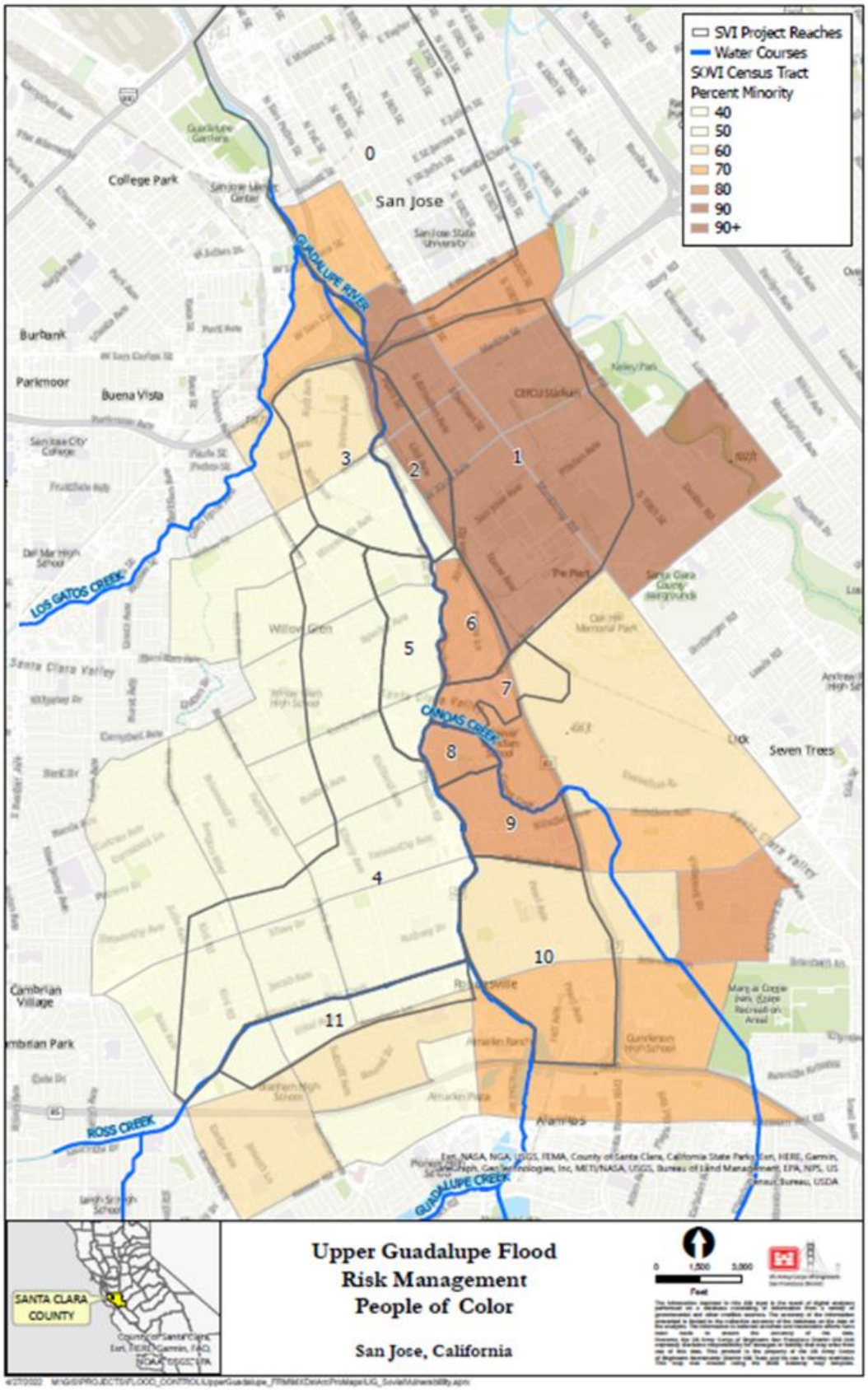


Figure 23. Map of study area racial demographics, San José, CA.

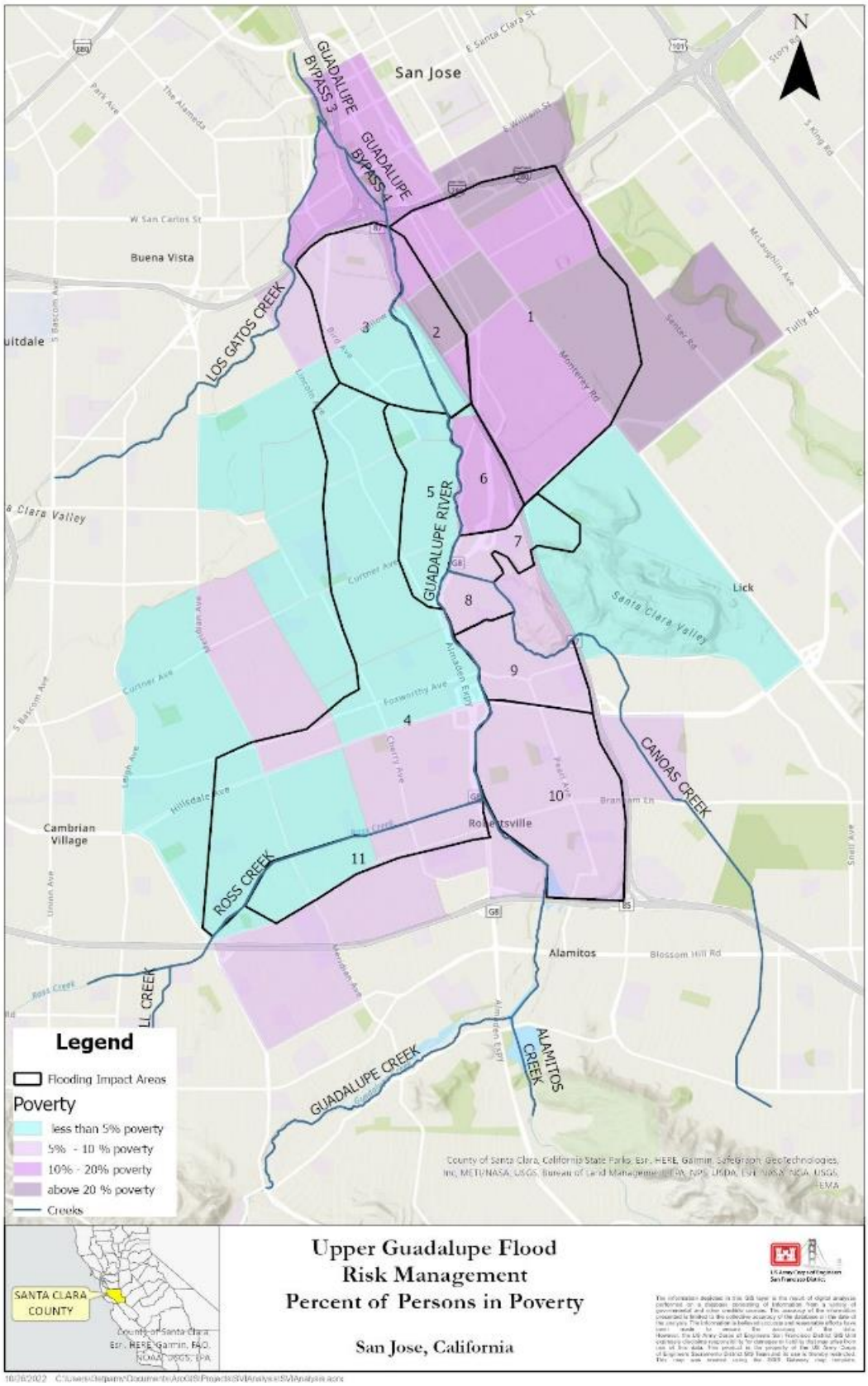


Figure 24. Map of Persons Experiencing Poverty in the Study Area.

Table 15. Study area racial demographics.

Race	City of San José	Santa Clara County	California	United States
White alone, not Hispanic or Latino	25.1%	82.2%	35.2%	59.3%
Black or African American	2.9%	1%	6.5%	13.6%
American Indian and Alaskan Native	0.6%	1.1%	1.7%	1.3%
Asian alone	37.2%	2.5%	15.9%	6.1%
Native Hawaiian and Other Pacific Islander alone	0.5%	0%	0.5%	0.3%
Hispanic or Latino	31%	8.5%	40.2%	18.9%

Source: U.S. Census Bureau Population Estimates, July 2021, ACS data

In addition to typical measures of environmental justice, the City of San José has a significant unhoused community in and around the study area. People living in encampments instead of solid structures are more at-risk during flood events. In 2019, the unhoused population in the City of San José was approximately 6,097 persons, which is a significant increase from prior years (Table 16). Of the persons surveyed in 2019, 84 percent were unsheltered, and 16 percent were sheltered. Of those, 476 individuals were veterans (60 percent of which were unsheltered). In 2019, the Santa Clara County Homeless Census and Survey found that Black/African Americans and Hispanic/Latinx populations experiencing houselessness were overrepresented in the overall population. Of the unhoused population surveyed, nineteen percent were Black/African American. However, Black/African Americans constituted only 3 percent of the total general population of Santa Clara County. Nearly 43 percent of Hispanic/Latinx persons were unsheltered and constituted only 26 percent of the total population (Applied Survey Research 2019). This study also found that within Santa Clara County, 3.6% of the unhoused population were individual children or families under 18 years of age, and 6.8% were individuals 65 years and over who are more vulnerable during flood events.

Table 16. Unsheltered Persons, City of San José.

Year	Population
2007	4,309
2009	4,193
2011	4,043
2013	4,770
2015	4,063
2017	4,350
2019	6,097

Source: Santa Clara County Homeless Census & Survey comprehensive report (2019) conducted by Applied Survey Research, a social research firm.

2.16 Climate Change

San José is classified as warm and temperate, with an average temperature of 59.2 degrees Farenheit (°F) and 26.2 inches of annual average rainfall. The winters are rainier than the summers and the least amount of rainfall occurs in July, while the greatest amount of precipitation occurs in February, with an average of 5.5 inches. Temperatures are highest on average in September, at around 68.9 degrees F, with the lowest average temperatures in the year occurring in January when it is around 49.6 °F (Climate-data.org, 2022).

Warming of the climate system is now considered to be unequivocal (IPCC 2014). Global average surface temperature has increased approximately 1.4 °F over the last one hundred years, with the most severe warming occurring in the most recent decades (NASA 2018). In the twelve years between 1995 and 2006, eleven years ranked among the warmest years in the instrumental record of global average surface temperature (going back to 1850). Continued warming is projected to increase global average temperature between 2 and 11°F over the next 100 years and delaying mitigation efforts is estimated to substantially increase the difficulty of the shift to low, longer-term emission levels and narrows the range of options consistent with maintaining temperature change below 2ºC relative to pre-industrial levels (IPCC 2014). The causes of this warming have been identified as both natural processes and as the result of human actions. Increases in greenhouse gas (GHG) concentrations in the Earth's atmosphere are thought to be the main cause of human-induced climate change.

GHG emissions are expected to result in changes to climate conditions in the San José region over the next century, including sea level rise and associated storm surge from the San Francisco Bay, increased riverine flooding, and more frequent and higher tempurates, particularly inland, which could result in extreme heat events and wildlifes. The climate conditions are expected to affect critical assets throughout Santa Clara County, including regionally significant highways, water and wastewater treatment plants, electricity substations, business, agriculture, homes, vulnerable populations, and the ecosystem (Santa Clara County 2015).

3 PLAN FORMULATION AND EVALUATION

Plan formulation is a structured and iterative process to develop and refine a reasonable range of alternative plans, then narrow down to a final array of feasible plans, from which a single plan may be recommended for authorization and implementation. The formulation, evaluation, and comparison of alternative plans comprises the third, fourth, and fifth steps of the USACE planning process (Figure 1), referred to collectively as Plan Formulation. Plan formulation for the Upper Guadalupe River General Reevaluation Study is being conducted in accordance with the six-step planning process described in *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (1983) and the *Planning Guidance Notebook* (ER 1105-2-100, dated April 2000).

3.1 Planning Framework

The planning framework for conducting the general reevaluation was multifaceted and included 1) reevaluating previous measures, 2) looking at natural and nature-based features to "engineer with nature," 3) assessing alternatives based on the benefits they provide across many categories, 4) considering new information and using that remove constraints, where possible. The team also 5) sought input from USACE subject matter experts, and 6) thoroughly reexamined nonstructural measures. Nonstructural measures are where flood flows are not altered, but flood damages are reduced by flood proofing, or relocating structures, and more.

3.1.1 Reevaluating Previous Measures

Channel widening was identified as the most efficient alternative in the 1989 Reconnaissance Study completed by USACE. However, the concept of channel widening at the time was largely thought of as channelization, with a focus on needed capacity for flood waters, stable side slopes, and minimizing construction costs and real estate takings by taking a straight path. Channelization was often hand-in-hand with creating a wider and/or deeper trapezoidal channel, which might be lined with concrete to reduce channel roughness and Operation and Maintenance (O&M) costs. These anthropogenic changes to rivers were effective means of reducing the risk of flooding, but had devastating impacts on riverine ecosystems, degrading or removing habitat. The USACE and Valley Water team in the 1998 FS/EIS/EIR, working closely with the USFWS, recognized that this concept of widening would not be acceptable in habitat for federally listed steelhead, and it still is not. However, incorporating geomorphic and process-based considerations into a nature-based design for channel widening is an approach that has garnered increasing acceptance and enthusiasm due to the many different benefits this approach can yield.

The 1998 FS/EIS/EIR notes that floodwalls were considered, and low floodwalls of less than five feet were retained for further analysis. High floodwalls were deemed to have excessive safety, local drainage, and aesthetic impacts. The Reformulation team reconsidered floodwalls along Ross Creek and Canoas Creek, and decided to no longer only retain low floodwalls, but to optimize, or scale, floodwall heights based on what would maximize the net benefits for reducing flood damage and improving life safety. Floodwall designs have significantly improved since the late 1990s, with better understanding of how to add resiliency features, design footings and bases, etc., such that failure, even with overtopping, is very unlikely. Since current fence heights to backyards adjoining the creeks are already higher than five feet in many instances, the benefits from risk reduction were deemed to outweigh any aesthetic impacts from medium to high floodwalls. Local drainage can also be incorporated into the floodwall design, including flap gates and minimum facility improvements to local drainage to offset any impacts to drainage incurred by the project. Reevaluating floodwalls in this way removed a rather significant former constraint to alternative design.

Finally, nonstructural measures which had previously been screened during the initial screening, such as relocating structures and adding a flood warning system were carried through to reevaluate, and new nonstructural measures, such as risk communication and evacuation planning were added. This gave the

team an opportunity to look at nonstructural alternatives more thoroughly. Nonstructural measures reduce human exposure or vulnerability to a flood hazard without altering the nature or extent of that hazard. Nonstructural measures reduce damage by removing people and property out of risk areas. They include both physical and nonphysical measures such as elevated structures, property buyouts, permanent relocation, zoning, subdivision, and building codes.

3.1.2 Engineering with Nature (EWN) and Comprehensive Benefits

In 2016 the Water Infrastructure Improvements for the Nation (WIIN) Act (WRDA), Section 1184 directed the USACE, with consent of the NFS, to consider natural features and human-designed, nature-based features engineered and constructed to provide risk reduction by acting in concert with natural processes; and nonstructural measures in addition to structural. The USACE intensified research and development around NNBFs and set up an EWN team in the USACE Engineering Research and Development Center (ERDC)[10], establishing pilot projects and proving grounds to advance the understanding and utilization of NNBFs, and to develop technical guidance and assessment tools. In 2021, the San Francisco District became the first west coast EWN proving ground, joining four other districts nationwide, plus the South Pacific Division, which the San Francisco District is part of, which soon became a Division EWN proving ground as well. An EWN proving ground is a district or division committed to broad implementation of EWN principles and practices.

In January, 2021, then Assistant Secretary of the Army (Civil Works), Mr. R.D. James, issued a policy directive requiring a comprehensive assessment and documentation of benefits in USACE water resources development project planning. In essence, this directive requires teams to assess benefits equally across all benefit categories regardless of the authorized purpose of the project, and identify a plan which maximizes comprehensive benefits within the authorized purposes of the project. For the Upper Guadalupe River FRM Reformulation which had just kicked off, this inspired the team to take a more holistic EWN approach in the reformulation, looking to maximize benefits to the environment and society while managing flood risk. Doing traditional FRM in this river system had a long history of delays and costly mitigation in the tens of millions of dollars, and extensive coordination for environmental compliance that spanned decades. The EWN framework was also a bid at reducing the cost and time associated with environmental compliance and incorporating lessons learned up front.

3.1.3 Considering New Information and Approaches To Remove Constraints

Part of incorporating lessons learned started with seeing which constraints or previously screened measures could be reconsidered using updated understanding or newly developed best practices to broaden the array of alternatives considered.

Channel Widening

The original 1998 FS/EIS/EIR identified several planning constraints associated with avoiding negative impacts to habitat. The largest and most impactful on the plan formulation was the focus on limiting channel widening to preserve existing riparian and fish habitats on the existing west bank. The rationale at the time was that the impacts to habitat would be unacceptable and unmitigable due to the heavy clay soils that were thought to limit revegetation possibilities. Since 1998, however, the USACE and Valley Water have successfully established mature riparian tree cover via trenching, adding soil amendments, and utilizing adaptive management measures while trees established. Furthermore, the USACE and Valley Water were exploring ways to EWN or use NNBFs to deliver FRM in a way that worked with, rather than against natural processes that were occurring . By considering habitat requirements during design, as well as channel capacity to reduce the risk of flooding, teams can greatly reduce the mitigation required for projects. The NEPA requires project teams to avoid, minimize, and mitigate impacts, which EWN has the ability to do. But EWN goes beyond that, looking to maximize Environmental Quality (EQ)

[10] https://ewn.erdc.dren.mil/

benefits within the FRM objective. This profound shift in the concept of widening, combined with the demonstration that revegetation in clay soils can in fact be accomplished in this system, allowed the team to remove a key constraint to plan formulation and reincarnated the original channel widening alternative identified in 1989, but this time as an environmentally responsive version of itself.

Floodwall Height

The 1998 FS/EIS/EIR notes that floodwalls were considered, and low floodwalls of less than five feet were retained for further analysis. High floodwalls were deemed to have excessive safety, local drainage, and aesthetic impacts. The reformulation team reconsidered floodwalls along Ross Creek and Canoas Creek, and decided to no longer only retain low floodwalls, but to optimize, or scale, floodwall heights based on what would maximize the net benefits for reducing flood damage and improving life safety. Floodwall designs have significantly improved since the late 1990s, with better understanding of how to add resiliency features, design footings and bases, etc., such that failure, even with overtopping, is very unlikely. Since current fence heights to backyards adjoining the creeks are already higher than five feet in many instances, the benefits from risk reduction were deemed to outweigh any aesthetic impacts from medium to high floodwalls. Local drainage can also be incorporated into the floodwall design, including flap gates and minimum facility improvements to local drainage to offset any impacts to drainage incurred by the project. Reevaluating floodwalls in this way removed a rather significant former constraint to alternative design.

3.1.4 Framing the Reformulation

USACE National River Engineering Committee Consultation Input

The USACE National River Engineering Committee is a team of USACE international subject matter experts for river engineering. They spent a week consulting with the Upper Guadalupe Project Delivery Team (PDT), including an all-day site visit. For framing the reformulation, they advised the team to focus on the hydraulic constrictions, or pinch points, in the system, which constrict flows during larger events, causing channel overtopping, such as if one were to shoot a hose through a steel straw opening. They also advised the team to focus on areas of existing breakout flowss with low channel capacity, such as reaches 7 and 8 and Ross and Canoas Creeks. The committee also noted that upstream reaches 8 through 12 where widening or bypass features had previously been proposed appeared to have existing capacity. They cautioned that widening or increasing capacity in these reaches may not garner FRM benefits. The committee advised the team to reconsider detention options. Finally, they affirmed the team's strategy of formulating an EWN approach in the mainstem reaches 7 and 8, concurring that this would indeed provide both FRM and EQ benefits and was worth exploring.

Because the previously authorized plan was thought to no longer be economically justified, the team also endeavored to identify a low scope plan that was the smallest possible plan which could still provide benefits. With both of the new structural alternatives, the team started with measures in the most constricted reaches and looked to add or increase features as necessary to more completely address the problems and meet objectives. Pinch points were addressed, to varying degrees, and engineering with nature designs were employed in the sensitive habitat mainstem area. By decreasing the extent of capacity increasing work in the mainstem, impacts were also greatly reduced, which significantly lowered the mitigation costs associated with the new structural alternatives compared to the old.

Reconsidering Nonstructural Measures

Finally, nonstructural measures which had previously been assessed during the initial screening, such as relocating structures and adding a flood warning system were carried through to reevaluate, and new nonstructural measures, such as risk communication and evacuation planning were added. This gave the team an opportunity to look at nonstructural alternatives more thoroughly.

3.2 Assumptions

A few critical assumptions that were used in the plan formulation process are highlighted below:

- Under this GRR, new alternatives will be considered, which will be analyzed in a new supplemental EA. The supplemental EA will incorporate the previous NEPA analyses by reference, to allow for comparison of the previously authorized project to the new alternatives.
- Existing mercury-containing soils can be reused onsite without triggering Hazardous, Toxic and Radioactive Waste (HTRW) compliance issues. This approach has been taken on previously constructed reaches and in other USACE projects with buy-in from EPA and the Water Board.
- Assume a high level of archaeological and cultural resources in the study area. A Programmatic Agreement along with a cultural resources' treatment plan will need ot be developed with the SHPO and the affiliated Tamien and neighboring Ohlone tribes identified through the NAHC.
- Assume that newly planted vegetation will be able to establish in clay soils, using best practices such as trenching, soil amendments, and initial water, as appropriate.
- Independently justified recreation can be added to the Tentatively Selected Plan (TSP), not to exceed ten percent of the total project cost, and will be targeted on maintenance roads, and where recreation can connect to existing trail networks and/or parks, as well as where loops can be created.

3.3 Management Measures

In general, measures are types of actions that accomplish the objectives when implemented. A variety of structural, nonstructural, and natural and nature-based features were considered to satisfy the study objectives and constraints in consultation with the NFS, Valley Water. Consideration of the various measures was conducted consistent with Federal water resources policies and practices. Measures were evaluated for compatibility with local conditions and relative effectiveness in meeting planning objectives, avoiding constraints, their economic performance, and environmental impacts. An integrated approach can reduce flood risks while providing fish and wildlife habitat and opportunities for recreation (e.g., fishing, bird watching, hiking). A strategy that combines approaches, such as combining NNBFs[11] with nonstructural and structural measures, represents an integrated approach to flood risk management that can deliver a broad array of ecosystem goods and services to local communities.

3.3.1 Initial Screening of Measures

Measures were brainstormed by the USACE team, including regional USACE staff, San Francisco District leadership, resource agencies, City of San José, and Valley Water at the outset of the reformulation effort and preliminarily considered. Overall, 38 measures were brainstormed for initial consideration (Table 17). Of these, 14 structural measures were retained for further consideration, including 10 NNBF measures and 14 nonstructural measures.

Measures deemed ineffective at achieving project objectives, unlikely to be cost-effective, or otherwise unacceptable because they do not adhere to Federal laws, authorities, and policies, were screened out. These included groundwater recharge, gabion walls, deepening underground utilities, and construction of freshwater wetlands. Flood insurance and land use regulations were screened as they are part of the existing condition. Reservoir construction and existing reservoir reoperation were also screened. These measures were studied and evaluated previously and the rationale for screening them is still valid and is

[11] NNBFs are landscape features that are used to provide engineering functions relevant to flood risk management, while producing additional economic, environmental, and/or social benefits. Examples of NNBF include fluvial flood plains, freshwater wetlands, and off-channel habitat development where water can be bypassed or stored, among others. These features may occur naturally in landscapes or be engineered, constructed and/or restored to mimic natural conditions.

summarized in the screening table below. Reoperating existing reservoirs was found to not provide sufficient storage to eliminate the need for extensive channel modifications in the downstream reaches. Additionally, in order to allow for sufficient storage in advance of large rainfall events to prevent flooding, reservoirs would need to be kept empty, which would have an unacceptable and very expensive impact to water supply. Existing reservoirs in the study area do not cover a large enough section of the watershed to be fully effective on their own at preventing flooding, given the low capacity of existing Ross and Canoas Creeks, and portions of reaches 7 and 8. A more detailed discussion is available in Valley Water's 2001 EIR/EIS.

In the table below, pale red cells indicate the measure was screened from further consideration. Pale yellow is if a measure was borderline but retained. Orange indicates the measure was retained, but has significant potential issues affecting its viability.

Table 17. Summary of the Initial Screening of Management Measures.

Measure	Effective	Efficient	Acceptable	Result	Notes
Structural Measures					
Levees man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide reasonable assurance of excluding temporary flooding from the leveed area.	Yes	Yes	Yes	Retained	Space and real estate costs are consideration.
Setback Levees levees placed away from the river channel to maintain some or all of its natural floodplain.	Yes	Yes	Yes	Retained	Space and real estate costs are consideration.
Floodwalls concrete or steel wall constructed along the banks of a stream to prevent floodwaters from reaching the area behind the structure.	Yes	Yes	Yes	Retained	All but low floodwalls less than 5 feet high were screened in 1998. Improvements to floodwall designs since then allowed the team to reconsider.
Detention Basins excavated areas designed to collect and hold stormwater and releasing it at a rate that will not cause damage downstream.	Yes	Maybe	Yes	Retained	High cost. Targeted in open spaces (parks, parking lots, or playgrounds). Consideration of detention options was a key recommendation by the USACE River Engineering Committee.
Channel Widening increase channel capacity by increasing the width of the channel at selected locations.	Yes	Yes	Yes, if done in a nature-based fashion	Retained	Space and real estate costs are considerations. Channel widening was previously screened in 1998 due to unacceptable impacts to mature riparian vegetation. By widening in an environmentally sensitive manner, this measure can be made acceptable.
Flood Detention at Percolation Ponds ponds that store runoff and allow it to percolate downwards for groundwater recharge.	Yes	Unlikely	Unlikely	Tentatively Retained	Percolation ponds in Reach 12 are used to recharge groundwater and prevent a reoccurance of the previously devastating ground subsidence that occurred due to overpumping in the 1930s-1960s.

Measure	Effective	Efficient	Acceptable	Result	Notes
					Groundwater recharge is subject to water rights and losses to recharge must be made whole to users to pay water fees. This measure was tentatively retained despite the issues with implementation because the size and location of the ponds can make it a very effective flood detention basin for attenuating peak flows.
Crib Walls gravity retaining structure made by using on-site fill material held within a constructed framework which may be of different materials.	Yes	Maybe	Maybe	Retained	Erosion control features that impact habitat to threatened steelhead have costly mitigation associated with them.
Culvert Replacement / Modification replace or modify culverts to alleviate or remove hydraulic constrictions	Yes	Yes	Yes	Retained	
Bridge Removal, Rehabilitation, or Replacement remove or replace bridges	Yes	Yes	Yes	Retained	While costly, undersized bridges cause much of the flooding in the study area and removing hydraulic constrictions is an efficient way to reduce flood damages.
Bypass Channels constructed channels that divert flows upstream and discharge back into the same river downstream.	Yes	Maybe	Yes	Retained	Space and real estate costs are consideration. Bypass channels are costly and provide less EQ benefits than floodplain benches. They avoid impacts to existing high quality riparian trees.
Improved Public Access/Recreational Opportunities creation of trails or maintenance roads to increase recreational opportunities along the riparian corridor.	Yes	Yes	Yes	Retained	This measure has strong support from the public and stakeholders.
Reservoir Reoperation, Modification, or Construction change reservoir operations or modify existing reservoirs to increase storage capacity.	Yes	No	Maybe	Screened	No effective sites for upstream FRM reservoirs due to high cost and environmental impacts. Existing reservoirs are for water supply and provide incidental FRM benefits. Existing reservoirs do not have sufficient capacity for both water

Measure	Effective	Efficient	Acceptable	Result	Notes
construct new upstream reservoirs for FRM.					supply and flood control purposes and the cost to offset water supply losses makes this measure not cost effective.
Groundwater Recharge downwards percolation of water from the surface to groundwater, often recharging the water table.	No	No	Yes	Screened	Construction of new groundwater recharge facilities is a less cost effective form of floodwater detention than detention basins, which were retained, and there are scare suitable locations remaining.
Gabion Walls type of retaining wall used for erosion control or water flow diversion.	Yes	Yes	No	Screened	Gabion walls degrade over time and can spear fish navigating the channel. Degrading gabion walls also pose safety hazards to recreators of people traversing the channel.
Natural and Nature-Based Features					
Floodplain Connectivity/ Reestablishment restore or create floodplains to help attenuate floods while providing potential ecosystem benefits.	Yes	Yes	Yes	Retained	Opportunity to utilize real estate purchased for the implementation of the previously authorized Bypass Plan.
Multi-stage Channel a channel that is not just a trapezoid and may have flood *benches* or floodplains that get activated at different flood stages.	Yes	Yes	Yes	Retained	By creating space at different stages, the water is allowed to spread out and slow down, reducing shear stress and thereby erosion.
Gravel Augmentation additional gravel and cobbles added to the river channel to mitigate upstream declines in sediment supply and promote aquatic habitat diversity.	Yes	Yes	Yes	Retained	Pilot study initiated in October 2021 by Valley Water, Gravel Augmentation Study, and Reach 12 augmentation performed by USACE during PED phase provide opportunity to incorporate existing information and future lessons learned.
Riparian Forest Plantings planting native riparian forest species along the river corridor for environmental benefits and erosion control.	Yes	Yes	Yes	Retained	Reduces required mitigation. Opportunity to use culturally significant plants to support tribal gathering and traditional lifeways for the Tamien and Ohlone tribes.
Invasive Vegetation Removal removal of nonnative species to improve environmental quality.	Yes	Yes	Yes	Retained	Removing nonnative vegetation prior to riparian plantings, creates comprable roughness to ensure channel capacity.

Measure	Effective	Efficient	Acceptable	Result	Notes
Off-Channel Habitat Development habitat restoration away from the immediate riparian corridor.	Yes	Yes	Yes	Retained	
Grade Control stabilize the banks and channel to reduce in-channel flows and reduce erosion risk.	Yes	Yes	Yes	Retained	
Large Wood Structures/Bioengineering large wood structures to enhance ecosystem benefits and reduce velocities.	Yes	Yes	Yes	Retained	
Green Infrastructure for Stormwater Management engineered plant/soil systems which harvest and reuse, store, infiltrate, or evapotranspire stormwater to reduce flows to the stormwater system, while providing environmental and social benefits.	Maybe	Yes	Yes	Retained	Stormwater management is a local responsibility and is planned in the FWOPC. This measure was retained for future consideration as part of the minimum facilities assessment for local drainage of the preferred plan. Effectiveness was categorized as "maybe" due to the large scale at which this measure must be implemented to capture and store sufficient peak flows to be effective.
Freshwater Wetlands creation or expansion of wetlands to reduce channel velocities, improve ecosystem function, create aquatic habitat, and store excess stormwater.	No	No	Yes	Screened	Insufficient suitable space is available for this to be a viable measure. Landscape historically supported pockets of freshwater marsh, however, the channel has incised up to 25 feet deep, and the altered hydrology and modifications of the built environment mean that a freshwater marsh is not a suitable in this location and is also not an FRM focused measure.

Measure	Effective	Efficient	Acceptable	Result	Notes
Nonstructural Measures					
Flood Warning Systems an enhanced flood warning system, or components of a system, such as gages, software, and threat recognition system.	Yes	Yes	Yes	Retained	
Floodplain Mapping identifies flood risk, whether in the form of a map portraying flood boundaries, or inundation levels	Yes	Yes	Yes	Retained	
Flood Emergency Preparedness Plans develop or enhance plans for flood response actions.	Yes	Yes	Yes	Retained	There are existing emergency preparedness plans, however there is an opportunity to update them following the project to further reduce residual risk.
Zoning determine that certain areas are too hazardous for human habitation and restrict development from occurring.	Yes	Yes	Yes	Retained	Other areas may be determined to be lower risk. This is a long-term investment tool for alleviating flood risk.
Evacuation Plans emergency preparedness measure for moving people from a dangerous place to somewhere safe.	Yes	Yes	Yes	Retained	When used in conjunction with flood warning systems, evacuation planning can provide significant life safety and flood risk managemement benefits. Plan should include: conditions that activate the plan; chain of command; emergency functions and who will perform them; specific evacuation procedures, including routes and exits; and procedures for accounting for people, equipment, and plan reviews.
Risk Communication enhancing the existing flood educational outreach program for the public and policy makers.	Yes	Yes	Yes	Retained	
Elevation reduce the risk to structures by elevating them above the base flood elevation.	Yes	Yes	Yes	Retained	

Measure	Effective	Efficient	Acceptable	Result	Notes
Relocation reduce the risk to life and property by moving (relocating) structures and residents outside of the floodplain.	Yes	Yes	Yes	Retained	Opportunity to investigate risk communication and coordinate with local agencies on relocation of encampments outside of the highest hazard areas.
Buyout/ Acquisition reduce the risk to life and property damage by removing structures, creating open space with no damageable property.	Yes	Yes	Yes	Retained	Can be used in conjunction with structural to optimize an overall plan. Generally more cost effective in rural areas with less dense development.
Dry Flood Proofing sealing building walls with waterproofing compounds, impermeable sheeting, or other materials to prevent the entry of floodwaters into damageable structures.	Yes	Yes	Yes	Retained	Dry flood proofing is applicable in areas of shallow, low velocity flooding.
Wet Flood Proofing allows floodwater to enter the structure, vulnerable items such as utilities appliances and furnaces are relocated or waterproofed to higher locations.	Yes	Yes	Yes	Retained	By allowing floodwater to enter the structure hydrostatic forces on the inside and outside of the structure can be equalized reducing the risk of structural damage.
Land Use Regulations principles of these tools are based in the National Flood Insurance Program (NFIP) which requires minimum standards of floodplain regulation.	Yes	Yes	Yes	Screened	Part of the existing condition.
Flood Insurance provides insurance to assist in recovery from a flood event.	Yes	Yes	Yes	Screened	Part of the existing condition.
Deepening Underground Utilities	No	No	No	Screened	Cost and disturbance would be very high. Unlikely to have sufficient storage to be effective.

**Color coding:*
red = measure was screened from further consideration
yellow = measure was borderline but retained
orange = measure was retained, but has significant potential issues affecting its viability
white / no shading = measure was retained

The retained measures are listed in Table 17 and include ten structural measures, plus flood detention at the percoloation ponds which was tentatively retained, nine NNBF measures, and eleven nonstructural measures, both physical and non-physical.

3.3.2 Second Measures Screening

After the initial screening of measures, the team had the opportunity to consult with the USACE River Engineering Committee on the development of alternatives for this project. This committee is comprised of riverine subject matter experts from across the USACE. One of the recommendations of the committee was to relook more closely at potential storage or flood detention options, which the team did. The analysis and findings are discussed here.

Percolation Ponds as Flood Detention

The groundwater recharge percolation ponds to the west of the mainstem of the river in Reach 12 are of sufficient size, and a suitable location adjacent to the channel to serve as flood detention during a storm event. Storing flood waters outside of the channel would help reduce peak flows through the channel and reduce the risk of channel overtopping and cause flooding.

The history behind the need for these ponds to prevent a repeated incidence of severe land subsidence due to over-pumping of groundwater is discussed in Section 2.3 on Geologic Resources. The percolation ponds are also discussed in Section 2.4.4 on Groundwater. In assessing the feasibility of adding flood risk management purpose to these ponds, the cost associated with lost groundwater recharge capacity to the water supply system had to be considered. Since the ponds are operated as part of a water utility enterprise, and their construction and operation were paid by retail water users, the value of the services lost would need to be made whole.

The elevation of the bottom of the ponds is below the elevation of the river bottom, and the percolation ponds drain slowly, about one to two inches per day when they are full. It takes roughly three months to fully empty the ponds naturally which occurs annually October through December to clean and maintain them. There is not a good location to feasibly pump to in order to drain them more quickly in advance of a storm, which come on quickly in this flashy system. Pumping into the river risks exacerbating downstream flooding if the river stage is already high. The recharge system is not flexible enough to be able to ascertain available storage for flood detention unless the ponds were to be kept empty through the rainy season (until the end of March) to be used for FRM.

These ponds are a very productive part of the groundwater recharge system and currently serve as an excellent recharge facility. Extensive research and testing over years went into selecting and developing this location. Finding another recharge facility in this area may not be possible. Valley Water estimates that adding an FRM purpose to the ponds would result in an annual recharge loss of 2,636 acre-feet of water. The cost to offset this loss by purchasing water from the State Water project of the Central Valley Project by importing water from the Sacramento-San Joaquin River Delta is estimated to be $2.1 million per year (2021 dollars). An additional $2.1 million (2021 dollars) is estimated for cleaning up the ponds after any flood event which utilizes them. This is an extrapolation based on the most recent pond cleanup in 2014 and includes labor, equipment rental transportation to haul the material to a disposal site, and the disposal fee.

Finally, the role that these ponds play in preventing subsidence and regional water supply must be considered. The groundwater basin in northern Santa Clara County managed by Valley Water is vulnerable to land subsidence, with historic groundwater overdraft causing up to 14 feet of permanent subsidence in the greater San José metropolitan area. This resulted in seawater intrusion, increased flood risk, and widespread damage to infrastructure. Historic costs to address subsidence were about $947 million (2021 dollars). The Guadalupe Recharge Ponds are an important part of Valley Water's conjunctive water management system that effectively halted permanent subsidence around 1970.

However, the current extreme drought conditions have taxed groundwater levels, underscoring the importance of the recharge ponds in avoiding future permanent subsidence. Additional permanent subsidence would increase regional flood risk by decreasing the bottom elevations of structures at risk for flooding and increasing the likely flood depths and frequency of flooding.

The team determined that flood detention at the percolation ponds in Reach 12 was not cost effective and carried substantial risks to impacting permanent land subsidence and water supply that could be difficult to mitigate for.

Almaden Lake Reoperation

Almaden Lake was assessed as a potential flood detention location and determined to be unsuitable. Almaden Lake never completely empties naturally. As a former quarry, it was mined to hard pan bottom and combined with the remnant pits, does not percolate or circulate well. The high groundwater table in this area encourages Almaden Lake to remain full. Since its formation, mercury-laden sediment from historic cinnabar mines has deposited into Almaden Lake and accumulated at its bottom. The lake also suffers from high nutrient and organic matter loadings from algal blooms and waterfowl. This condition contributes to the bottom waters seasonally experiencing low oxygen or anoxic conditions. In those conditions, certain microbes transform mercury into methylmercury, a strong neurotoxin that accumulates in the tissues of organisms, such as fish, in Almaden Lake. The San Francisco Bay Regional Water Quality Control Board has adopted specific water quality objectives contained in its 2008 Basin Amendment Plan. Mercury conditions in Almaden Lake currently exceed the objectives set by the Water Board .

There is a current proposal (discussed in Section 2.12.2) to clean up mercury pollution in Almaden Lake and separate Almaden Lake from Alamitos Creek. This environmental stewardship project was originally planned to begin in 2023, the project is delayed with construction starting as early as 2024, but potentially starting in 2025. The team determined that flood detention at Almaden Lake is incompatible with the objectives of this planned and funded project.[12]

Detention Basins

The team conducted a desktop search to identify additional potential locations where detention basins could be constructed. Martial Cottle Park was identified along Canoas Creek, and three schools and one park were identified adjacent to Ross Creek as potential locations where detention basins could be constructed. Martial Cottle Park is owned and operated by Santa Clara County. The team met with the County and analyzed and discussed the feasibility of converting parts or all of the park to dual purpose FRM and recreation or agricultural facilities. Ultimately, the County determined that flood detention was incompatible with their land use objectives and opted not to participate in the FRM project.

The Ross Creek detention sites were carried forward and analyzed (as discussed in Section 3.4.2).

3.4 Arrays of Alternatives*

Subsequent to the initial screening of measures, the team developed formulation strategies that were used to combine measures into alternatives. An alternative is one or more measure(s) combined in order to address objectives together. Measures are the building blocks of alternatives.

[12] More information can be found at: https://www.valleywater.org/project-updates/almaden-lake-improvement-project.

3.4.1 Plan Formulation Strategies

Conceptual alternatives in the initial array were formulated by combining management measures that were carried forward from the initial screening and utilizing plan formulation strategies. The following strategies were applied to formulate the initial array of alternatives:

- Create a self-sustaining channel
- Create a self-mitigating project
- Maximize ecosystem/environmental quality outputs
- Improve life safety
- Vary the scale and cost of measures
- Maintain functional consistency with constructed reaches such that reaches function as a synergistic system once constructed, i.e. design where reaches merge considers effects on one another and overall function
- Reduce flood risk
- Integrate with existing regional plans (recreation, education, and open space)

3.4.2 Initial Array of Conceptual Alternatives

Using these strategies yielded nine discrete alternative plans that met at least one objective. Preliminary conceptual alternatives are presented in Table 18 and combine measures into alternatives based on the concept identified and one or more of the identified formulation strategies. Table 18 indicates which planning objectives are met by each conceptual alternative. The planning objectives are set in Section 1.10.1. These alternatives do not violate the constraints laid out in Section 1.10.2.

All alternatives except the No Action Plan and the Nonstructural Only Plan would include recreation features, where feasible, and they would be scaled based on optimization to maximize net benefits, not to exceed ten percent of the total project cost. Recreation measures will attempt to integrate with existing regional plans, where practicable and feasible, prioritize underserved areas of the community for recreation/open space, and provide connections between existing or planned trails. Recreation features must demonstrate a positive benefit to cost relationship.

Table 18. Initial Array of Conceptual Alternatives.

ALTERNATIVE	Obj 1: Reduce flood risk /damages	Obj 2: Reduce life safety risk	Obj 3: Realize EQ benefits	Obj 4: Reduce channel maintenance requirements	Obj 5: Increase recreation opps
Alternative 1: No Action Plan					
Alternative 2a: Valley View Plan (NED Plan from 1998 FS/EIS/EIR)	✓	✓	meets objective, but not very well		✓
Alternative 2b: Valley View Plan updated with new info/understanding developed in PED	✓	✓	meets objective, but not very well		✓
Alternative 3a: Bypass Channel Plan (Locally Preferred and Authorized Plan from 1998 FS/EIS/EIR and 2005 LRR)	✓	✓	meets objective, but not very well		✓
Alternative 3b: Bypass Channel Plan with adjustments	✓	✓	meets objective,		✓

ALTERNATIVE	Obj 1: Reduce flood risk /damages	Obj 2: Reduce life safety risk	Obj 3: Realize EQ benefits	Obj 4: Reduce channel maintenance requirements	Obj 5: Increase recreation opps
to address velocity & erosion concerns identified in Reaches 7 & 8			but not very well		
Alternative 4: Nonstructural Plan	✓				
Alternative 5: Engineering with Nature (EWN)—Maximize Nature-Based Features	✓	Very costly on creeks to execute EWN at scale large enough to fully manage risk	✓	✓	✓
Alternative 6: Traditional FRM Features Plan	✓	✓			✓
Alternative 7: Low Scope FRM	✓	does not meet objective well	✓	✓	✓
Alterative 8a: Combination EWN & Traditional FRM Features with Detention Basins on Ross Creek	✓	✓	✓	✓	✓
Alternative 8b: Combination EWN & Traditional FRM Features (w/o Detention Basins)	✓	✓	✓	✓	✓
Alternative 9: Separable Reach Investigation, Reaches 7 & 8 separable from Reaches 9-12	✓	✓			✓

Table 19 lays out which measures were included in which conceptual alternative.

Table 19. Measures in Initial Array of Alternatives.

	ALTERNATIVES											
Retained Measures	**Alt 1**	**Alt 2a**	**Alt 2b**	**Alt 3a**	**Alt 3b**	**Alt 4**	**Alt 5**	**Alt 6**	**Alt 7**	**Alt 8a**	**Alt 8b**	**Alt 9**
Structural Measures												
Levees				✓	✓			✓				
Setback Levees								✓				
Floodwalls		✓	✓	✓	✓			✓	✓	✓	✓	
Channel Widening		✓	✓	✓	✓			✓	✓	✓	✓	✓
Flood Detention at Percolation Ponds								✓				
Detention Basins										✓		
Crib Walls				✓	✓			✓				✓
Culvert Replacement / Modification		✓	✓	✓	✓			✓	✓	✓	✓	
Bridge Removal / Rehab / Replacement		✓	✓	✓	✓			✓	✓	✓	✓	✓
Bypass Channels		✓	✓	✓	✓			✓				✓

	ALTERNATIVES											
Retained Measures	**Alt 1**	**Alt 2a**	**Alt 2b**	**Alt 3a**	**Alt 3b**	**Alt 4**	**Alt 5**	**Alt 6**	**Alt 7**	**Alt 8a**	**Alt 8b**	**Alt 9**
Recreational Opportunities		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
NNBF Measures												
Floodplain Connectivity / Floodplain Bench Reestablishment		✓	✓				✓		✓	✓	✓	
Multi-stage Channel							✓		✓	✓	✓	
Gravel Augmentation				✓	✓		✓		✓	✓	✓	✓
Riparian Forest Plantings							✓					
Invasive Species Removal			✓		✓		✓		✓	✓	✓	
Off Channel Habitat Development							✓		✓	✓	✓	
Grade Control				✓	✓		✓		✓	✓	✓	
Large Wood Structures			✓		✓		✓		✓	✓	✓	
Green Infrastructure*							✓					
Nonstructural Measures												
Flood Warning Systems						✓			✓	✓	✓	
Floodplain Mapping**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Flood Emergency Preparedness Plans**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Zoning*						✓						
Evacuation Plans						✓			✓	✓	✓	
Risk Communication						✓			✓	✓	✓	
Elevation*						✓						
Relocation*						✓						
Buyout-Acquisition*						✓						
Dry Flood Proofing						✓			✓	✓	✓	
Wet Flood Proofing						✓			✓	✓	✓	

** These measures will be further evaluated during Feasibility Level Design as potential means to further improve life safety, or for green infrastructure as part of the minimum facilities requirement analysis performed for tying the plan in with local drainage infrastructure for stormwater.*
***These measures are part of the existing condition but were or will be updated as part of this project. Updated floodplain mapping informed this General Reevaluation and potential improvements to flood emergency preparedness will be coordinated with local agencies, including a new development of evacuation plans informed by with and without project floodplain mapping.*

The initial array of alternatives was assessed and screened using the rationale described in Table 20. During the assessment phase of the initial array of alternatives the study team had the opportunity to consult with the USACE National River Engineering Committee. Input from this consultation is discussed in the Planning Framework Section 3.1 and is referred to in the formulation narrative to highlight how this consultation helped to shape and inform the alternatives.

Table 20. Initial Array of Alternatives Screening.

SCREENED ALTERNATIVES	RATIONALE
Alternative 5: Engineering with Nature Alternative—Maximize Nature-Based Features (SCREENED)	Ross Creek and Canoas Creek Reaches do not have good opportunity for NNBFs due to high costs for implementation/lack of space/straightened channels, one of which is concrete lined, and thus did not meet the planning objective to maximize environmental benefits. Input from the USACE River Committee included indicated that Reaches 7 & 8 had good NNBF opportunity, but that other reaches would have EQ benefits, but no FRM benefits. The team decided to screen this alternative and incorporate NNBF measures in the Alt 8 Combination and Alt 7 Low Scope Alternatives where feasible, but use traditional FRM measures where NNBFs are infeasible and FRM is needed.
Alternative 6: Traditional Flood Risk Management Features Plan (SCREENED)	A stand-alone traditional FRM approach would be unacceptable due to adverse impacts to listed species. Aspects of this plan (floodwalls, detention basins, crib walls, bridge/culvert replacements) combined with NNBFswere carried forward and incorporated in the Alternative 8 Combination Plan, and Alternative 7 Low Scope Plan.
Alternative 9: Separable Reach Investigation, Reaches 7 & 8 separable from Reaches 9-12 (SCREENED)	Initially, the PDT sought to develop a lower scope/lower cost alternative that might provide a justifiable solution due to hydraulic separability. Reaches 7 and 8 were the focus of this analysis because they appeared to have some of the highest cost of the unconstructed reaches. This approach evolved during the formulation process. The USACE National River Committee recommended that the study focus on flood drivers such as hydraulic constrictions, or 'pinch points', as well as where the majority of the flood damages are found. Reaches 7 and 8 are the most constricted reaches and Ross and Canoas Creeks provide the majority of the flood damages. The Committee also thought that widening, benching, or capacity increasing measures in Reaches 9, 10, 11, and 12 would not provide FRM benefits, though bridge/culvert removal/replacement in these reaches may have FRM benefits. Thus, the exclusion of widening in Reaches 9, 10, and 11 was incorporated into the Alt 8 Combination Plan and Alt 7 Low Scope Plan.

Additionally, Alternatives 2a and 3a were screened from the final array. The modified versions of Alternative 2 Valley View Plan and Alternative 3 Bypass Plan represent a further advanced design, based on analysis and refinement made in PED. Some of the changes were required for implementation, either through permits or to address new information developed in PED. The costs associated with these refinements needed to be captured in the GRR in order to ensure a realistic comparison based on the most up to date understanding of an implementable version of the plan. Using the unmodified plans would underestimate the true cost of these plans, so Alternatives 2a and 3a were screened in favor of retaining Alternatives 2b and 3b.

Evaluation of Detention Basins on Ross Creek

The Combination Plan originally included detention basins along Ross Creek. Detention basins were proposed at four locations on Ross Creek: Challenger School, Stratford School. Branham Park, and Reed Elementary School (Figure 25). Analysis determined that detention basins would need to be dug to 10-feet below the ground surface elevation in order warrant consideration, and that two of the four basins would require a floodwall to prevent leakage. Existing ball fields at the proposed locations would then be reconstructed at the lower elevation to preserve usage.

Figure 25. Location of detention basins evaluated along Ross Creek.

These measures were costly and had environmental concerns associated with them, including the aesthetic impacts to recreation areas and schools. Detention basins were modeled for 1% and 2% AEP events and showed little to no benefits. At the same time as the detention basins were modeled, the Combination Plan was also modeled without detention and found to be very effective at reducing flooding without detention. Thus, the detention basins were screened from the Combination Plan, producing a pared back Alternative 8b. Combination Plan without Detention, while Combination Plan with Detention Basins is referred to as Alternative 8a to distinguish between them. More information on this analysis can be found in Appendix A.1.

3.4.3 Final Array of Alternatives

Modified Valley View Plan (Alt 2b)

The Modified Valley View Plan consists of a proposed a channel widening measure on the eastern bank of the Upper Guadalupe River with new bypass at crossings. During the original Upper Guadalupe River Feasibility Study, this plan was identified as the NED Plan. The current version of the Valley View Plan is described in the following sections and shown in Figure 26.

Reach 7

Reach 7 is approximately 3,845 feet spanning from the active Caltrain/Union Pacific Railroad (UPRR) Bridge upstream to the abandoned UPRR bridge. The proposed design for the Upper Guadalupe River includes widening the eastern bank and implementing new bypass channels at crossings. The project will tie into the soon-to-be constructed Caltrain/UPRR Crossing (STA 739+00 to STA 741+40) with a new concrete lined bypass adjacent to the existing channel. At Willow Street (STA 749+00 to STA 751+00) and Alma Ave Crossing (STA 773+00 to STA 774+00) new bridges would be built over the new adjacent bypass channels. The channel would be widened below the existing Route 87/VTA Light Rail Crossing to incorporate a proposed floodplain, maintenance road, access ramp, and a revegetation area. The proposed

floodplain would have a 5% to 1% slope. A new 18-foot wide maintenance road would be located at the toe of the widened channel and would be accessed from the new access ramp. Existing gabion walls will be replaced by cribbed walls to help stabilized the new 1:1 channel slope. In addition to the floodplain and maintenance road, a new 4-foot tall, 700-foot long floodwall would be built adjacent to the Elks Lodge (STA 774+00 to STA 781+00) to match the top of bank elevation of the western side. Hydroseeding and vegetation would be used to stabilize the new floodplains.

Reach 8
Abandoned UPRR Bridge to Willow Glen Way (STA 781+00 to STA 795+00):
Reach 8 is approximately 1,300 feet from the abandoned UPRR bridge upstream to the Willow Glen Way Bridge. The primary measure proposed for this reach is a continuation of the channel widening from Reach 7, including a proposed floodplain, maintenance road, and an access ramp. A new 12-foot-wide pedestrian/bicycle bridge would be constructed over the bypass channel at the abandoned UPRR Bridge to provide recreation access and connectivity to the abandoned UPRR bridge.

Reach 9
Willow Glen Way to Curtner Avenue (STA 795+00 to STA 845+00):
Reach 9 is approximately 4,800 feet from the Willow Glen Way Bridge upstream to the Curtner Avenue Bridge. The primary measure proposed for this reach is a continuation of the channel widening from Reaches 7 and 8, including a proposed floodplain, maintenance road, and an access ramp. Cribwalls will be used for slope protection where areas have steeper slope. A shotcrete wall is proposed to be used at the Malone Road Bridge Crossing to widen the existing bypass.

Reach 10A
Curtner Avenue to Canoas Creek (STA 845+00 to STA 857+00):
Reach 10A is approximately 1,330-feet long and stretches from the Curtner Avenue Bridge upstream to Canoas Creek. Reach 10A measures consist of a proposed floodplain bench with a maintenance road. Riparian forest would be planted on the toe of the bench where space allows. The new top of the bank would be along the shoulder of Almaden Road. Cribwalls are proposed to be used in this area due to the narrow space and steeper slope.

Reach 10B
Canoas Creek to Berkshire Drive (STA 857+00 to STA 888+00):
No flood control modifications are proposed for Reach 10B. The continuation of the maintenance road is proposed. The maintenance road will have a minimum of a 2% slope. There is a low flow geomorphic channel which has already been constructed for mitigation, as well as streamside vegetation plantings and installation of large woody debris structures for habitat.

Reach 10C
Berkshire Drive to Capitol Expressway (STA 888+00 to STA913+50):
Reach 10C is approximately 1800-ft in length, stretching from Berkshire Drive upstream to Capitol Expressway. In this reach the proposed channel widening continues, but both sides of the channel would be widened. The proposed maintenance road would continue to run along the eastern side of the channel. Riparian forest would be restored at the toe of the benches. Cribwalls would be used along this portion of the channel widening to help with the steep slopes.

Reach 11
Capitol Expressway to Branham Lane (STA 913+50 to STA 961+00):
Reach 11 is approximately 4,750 feet long and stretches from Capitol Expressway upstream to Branham Lane. No flood control modifications are proposed for the first 2,100-feet of this reach. Modifications start at the intersection of Almaden Expressway and Carrie Lee Way. The first 200 feet consist of widening the east bank followed by 250 feet of widening both banks with a maintenance road. There is a maintenance road along the channel with access ramps at each crossing. The top of the cut slope would

extend into an existing Valley Water easement that abuts the adjacent residential area. Additionally, a waterwell on the east bank would be relocated. The last 100-ft of this reach would include widening the east bank with a maintenance road and access ramp. Cribwalls would be incorporated throughout of Reach 11 to stabilize the 1:1 slope. The toes of the benches would be revegetated to partially mitigate riparian forest losses. Within the downstream portion of this reach, riparian forest creation or enhancement is proposed in five discrete areas of predominantly ruderal herbaceous habitat along the upper part of the west bank adjacent to Orchard Drive and Almaden Expressway. Large oak trees along the roadside would be avoided.

Canoas Creek
Almaden Expressway to Nightingale Drive: (50-year, 3000 cfs) (STA 858+00)
Canoas Creek modifications would include widening the channel in addition to adding low floodwalls approximately 2,800-feet long to both creek banks approximately 1- to 3-feet tall. Additional box culverts would be added to the existing double box culverts at Almaden Expressway and Nightingale Drive. The wingwalls would be adjusted to incorporate the additional box culverts. The existing 24-in and 48-in sanitary sewer lines would need to be relocated at Almaden Expressway and Nightingale Drive, respectively, to incorporate the new additional box culverts.

Ross Creek
Almaden Expressway to Jarvis Avenue: (50-year, 1950 cfs) (STA 950+75)
The proposed modifications for Ross Creek consist of constructing a 27-ft wide concrete-lined trapezoidal channel from the Upper Guadalupe River to 750-ft upstream of Jarvis Ave. In addition to the new channel design, low floodwalls approximately 1-ft to 3-ft high would be constructed on both creek banks. Additional box culverts are proposed at both the Briarglen Drive/Almaden Expressway and Jarvis Avenue crossings. These new culverts would include a low-flow channel. The existing eastern box culvert at Cherry Avenue would be updated with a low-flow channel.

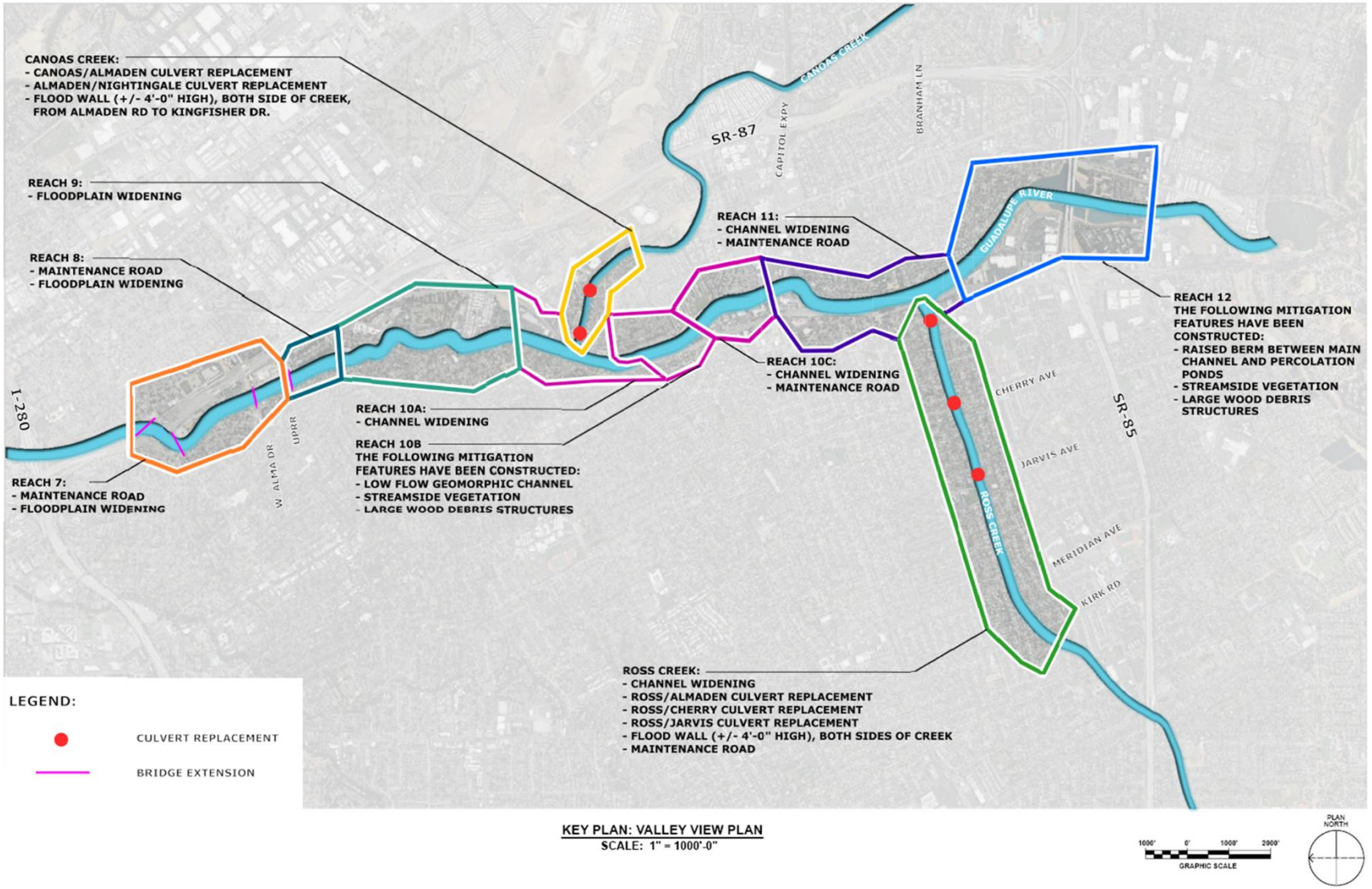


Figure 26. Summary of the key components of the Modified Valley View Plan (Alt 2b).

Modified Bypass Plan (Alt 3b)

The Modified Bypass Plan proposes a channel widening on the eastern bank of the Upper Guadalupe River with new bypass at crossings with four strategically placed alcoves (Figure 27). This plan would include gravel augmentation. During the original Upper Guadalupe River Feasibility Study, this plan was identified as the Locally Preferred Plan (LPP) and eventually became the Authorized Project. The current version of the Bypass Plan is described in the following sections.

Reach 7

Caltrain/UPRR Bridge to Abandoned UPRR Bridge (STA 741+00 to STA 781+00):

The existing Reach 7 is approximately 3,845 ft in length that spans from an active existing Caltrain/UPRR Crossing to an abandoned UPRR bridge. The proposed design for Upper Guadalupe River in Reach 7 includes a two-part design, the widening of the eastern bank and implementing new bypass channels at crossings and implementing rip rap at the existing channel. A widening proposed at the UPRR Crossing means that a new railroad bridge extension is needed to replace the existing MT1 Track. The proposed bypass channel will utilize the existing vegetation to mitigate and reduce the water flow. The rip rap implemented in the existing channel will help further reduce the velocity of water flow and create a barrier to reduced erosion and scouring of the channel. The bypass channel will range 80-ft to 120-ft wide for approximately one mile and will be adjacent to the existing channel. A new street bridge will be constructed at Willow Street to encompass the new bypass channel. In addition to the bypass channel, a fishpond is proposed to act as a detention basin to allow water to dry out naturally just downstream of the Willow Street crossing.

Reach 8

W. Alma Ave to Willow Glen Road (STA 781+00 to STA 795+00):

At Reach 8, the proposed bypass design is continued through to STA 794+50. From STA 794+50, the channel is then widened. Similar to Reach 7, rip rap is place at areas where there are visible erosion and scour present. An alcove and fishpond are proposed at Upper Guadalupe River adjacent the intersection of Dawson Avenue and Mackey Avenue.

Reach 9

Willow Gen to Curtner Avenue (STA 795+00 to STA 845+00):

Reach 9 will also continue the proposed channel widening. The channel widening will consist of a proposed floodplain, maintenance road and an access ramp. The east bank of the river will be widened up to 60-ft with a 20-ft to 70-ft wide floodplain. A maintenance road will be placed along the bench. Two short bypasses constructed on the eastern side of the river will help to avoid areas of high-quality riparian forest and to reduce ecological impacts. Cribwalls will be used for slope protection where areas have a 1H:6V slope. To ensure erosion control, portions of the excavated floodplains will be revegetated. A cribwall wall is proposed to be used at the Malone Road Bridge Crossing to widen the existing bypass. Note that in this area, six homes, two partial backyards, and two businesses will be impacted.

Reach 10A

Curtner Avenue to Canoas Creek (STA 845+00 to STA 857+00):

The proposed design for Reach 10A is to continue the widening of the eastern bank. The channel widening will consist of a proposed floodplain and maintenance road. A cribwall is used for the widening of the bypass crossing at Curtner Avenue.

Reach 10B

Canoas Creek to Berkshire Drive (STA 857+00 to STA 888+00):

For Reach 10B, a proposed 4-ft high levee with a top width from 15-ft to 18-ft and 2H:1V side slope is constructed on the west bank between the Northbound and Southbound of Almaden Expressway. The

existing channel will be upgraded with a realignment of the low-flow channel and the existing gabion walls will be replaced with Cribwalls.

Reach 10C
Berkshire Drive to Capitol Expressway (STA 888+00 to STA913+75):
At Reach 10C, the east bank will be excavated creating a widening approximately 20-ft to 58-ft wide and 8-ft above the present channel bottom. A new maintenance road will be constructed. At the Capitol Expressway, crib walls will be implemented for slope protection for the 1H:6V slope.

Reach 11
Capitol Expressway to Bryan Avenue (STA 913+00 to STA 937+60):
For Reach 11 STA 913+00 to STA 920+00, the proposed bypass channel widening will consist of a proposed floodplain, maintenance road, new pedestrian trail, and a crib lock retaining wall. The proposed widen rock-lined channel will be approximately 60-ft wide with an18-ft wide maintenance road. On the eastern side of the channel slope, a proposed 0-ft to 85-ft revegetation area will help stabilize the slope for the trail at the top of the levee. A cribwall will be constructed to help retain the existing grade. On the western side of the channel slope, a cribwall will be constructed to hold the 1:1 slope.

Reach 12
Branham Lane to Blossom Hill Road (STA 961+00 to STA 1017+35):
Reach 12 is where there is high concentration of mercury. With this information, soil from this area needs to be contained into 3 different areas. First area will need to be over-excavated of 2-ft below finish grade and backfilled with clean soil. Second area is where it is heavily mercury concentrated soil which areas of 0-ft to 20-ft from low-flow channel will need to be covered with minimum of 2-ft of clean soil. Third area can be used to store excavated mercury concentrated soils that do not exceed the concentrations of more than 20 PPM. Within this reach, floodwalls are placed at specified locations west of the maintenance road.

Canoas Creek
Almaden Expressway to Nightingale Drive (STA 858+00): (Accommodates a 1% AEP flow, 3300 cfs)
Canoas Creek modifications consists of widening of the channels in addition to adding low floodwalls to both creek banks approximately 1-ft to 3-ft spanning at 2,800-ft. Additional box culverts will be added to the existing double box culverts at Almaden Expressway and Nightingale. The wingwalls will be adjusted to incorporate the additional box culvert. The existing 24-in and 48-in sanitary sewer line will need to be relocated at the Almaden Expressway and Nightingale Drive, respectively, to incorporate the new additional box culvert.

Ross Creek
Almaden Expressway to Jarvis Avenue (STA 950+75): (Accommodates a 1% AEP flow, 2350 cfs)
The proposed modifications for Ross Creek consist of constructing a 35-ft wide articulated concrete mats in a trapezoidal design from the main river to 750-ft upstream of Jarvis Ave. In addition to the new channel design, a depressed maintenance road will also be constructed. New widened culverts are proposed at both Briarglen Drive/Almaden Expressway and Jarvis Avenue. The Ross Creek culvert entering the Guadalupe River in Reach 11C would be extended 80-ft with a concrete apron. The existing sanitary sewer under Almaden Expressway will be relocated in coordination with the city of San José.

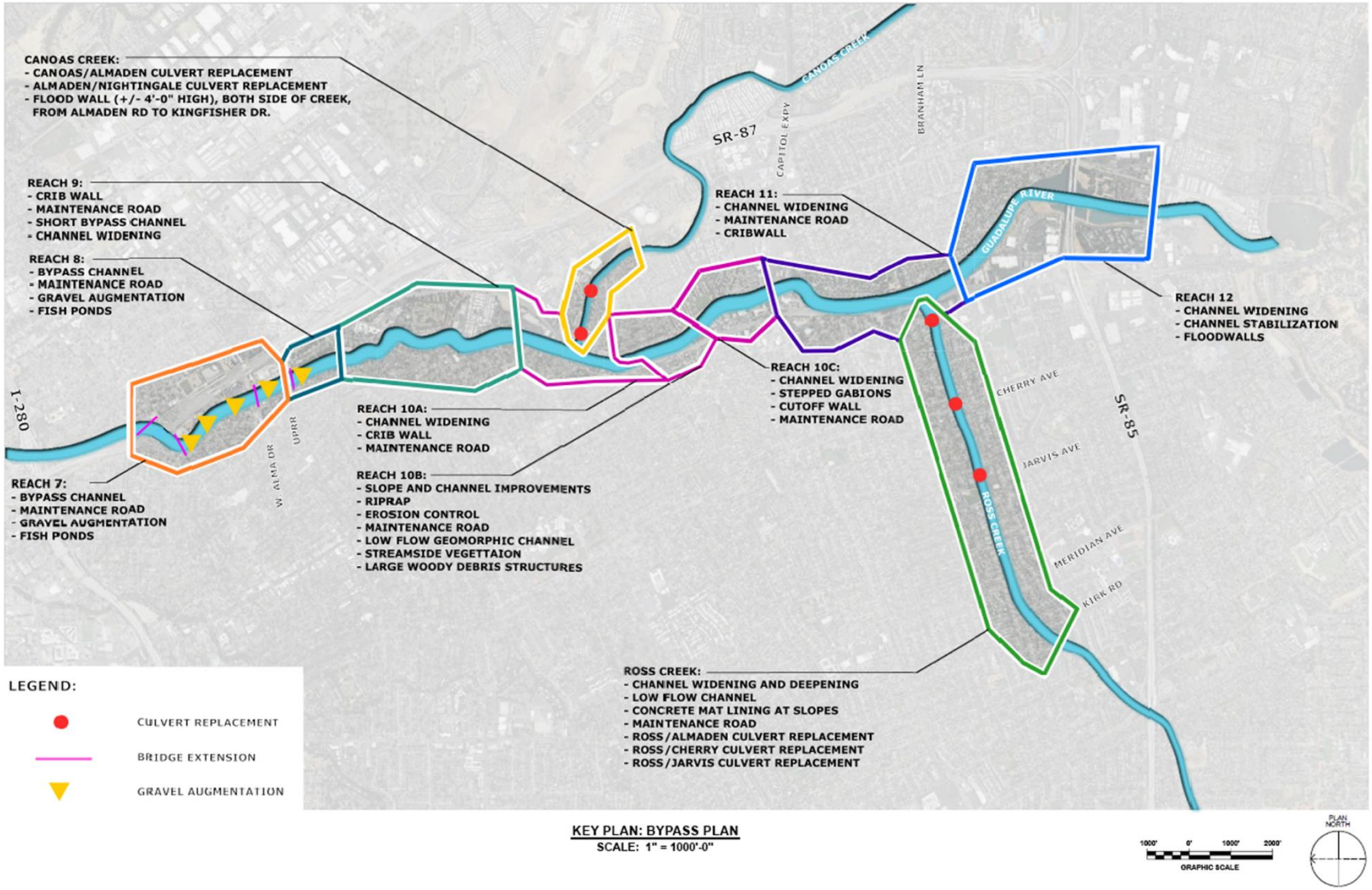


Figure 27. Summary of the key components of the Modified Bypass Plan (Alt 3b).

Nonstructural Plan (Alt 4)

Nonstructural measures reduce human exposure or vulnerability to a flood hazard without altering the nature or extent of that hazard. Nonstructural measures reduce damage by removing people and property out of risk areas. They include both physical and nonphysical measures such as elevated structures, property buyouts, permanent relocation, zoning, subdivision, and building codes.

Alternative 4 Nonstructural Plan includes elevating residential structures and dry floodproofing nonresidential structures up to 3ft for all structures included in the 4% AEP flood event. The nonstructural plan was optimized to include socially vulnerable structures located within the 2% AEP. Roughly 700 structures are expected to be eligible for elevation or floodproofing. Implementation of the nonstructural features requires home/business owners opt-in. Structure owners may elect to non adopt the proposed nonstructural measures on their buildings.

Elevation involves raising the buildings in place so that the structure sees a reduction in frequency and/or depth of flooding during high-water events. Elevation can be done on fill, foundation walls, piers, piles, posts or columns. Selection of proper elevation method depends on flood characteristics such as flood depth or velocity.

Dry Flood Proofing involves sealing building walls with waterproofing compounds, impermeable sheeting, or other materials to prevent the entry of floodwaters into damageable structures. Dry flood proofing is applicable in areas of shallow, low velocity flooding.

Alternative 4 Nonstructural Plan also includes the following nonphysical measures: evacuation plans, early warning systems, risk communication, and flood emergency preparedness plan.

Low Scope Plan (Alt 7)

Reach 7

UPRR Bridge to UPRR Bridge (STA 741+00 to STA 781+00):

The existing Reach 7 is approximately 3,845 ft in length that spans from an active existing Caltrain/UPRR Crossing to an abandoned UPRR bridge. Caltrain/UPRR Bridge will be extended to encompass a proposed widened channel. The proposed design for Upper Guadalupe River includes an expanded floodplain bench configuration on the east bank of the river with a 2% slope towards the existing channel. Gravel augmentation is incorporated along the existing channel to provide spawning substrate for migratory fish and a coarse sediment supply for downstream reaches. At the Willow Street Crossing and Alma Avenue Crossing, the channels will be widened with a trapezoidal channel adjacent to the existing channel. The proposed design at Willow Street Crossing consists of an 85-ft wide trapezoidal channel that includes a pilot channel which can be accessed from the 18-ft ramp. The proposed Alma Avenue Crossing will consist of a 60-ft wide concrete lined channel with an 18-ft wide maintenance road with 1.5H:1V side slope to help provide erosion protection. At both locations, a new bridge will be built across the span of the new bypass channel.

There are 2 permanent placement sites within Reach 7: Willow Street & Lelong Street and W Alma Avenue (Elks Lodge). These sites will also act as construction staging areas which will help reduce the truck trips during construction reducing the environmental impact of transporting all the earthwork.

Reach 8

Abandoned UPRR Bridge to Willow Glen Way (STA 781+00 to STA 795+00):

The proposed design for Upper Guadalupe River at Reach 8 will consist of a combination of widening the eastern bank and creating a bypass channel utilizing natural mitigation islands. The existing UPRR Bridge will be rehabilitated to provide recreation access and connectivity across the Guadalupe River. A new 3-cell box culvert is proposed to be installed below the existing UPRR tracks. The widened portion of the design will consist of an expanded floodplain, maintenance road with access ramp, rip rap and a pilot

channel for low flow activities. The bypass portion of the design will consist of an adjacent channel, separated by a mitigation island, with a maintenance road, access ramp, and a pilot channel to allow for low flow activities. The permanent placement site within Reach 8 is along Mackey Avenue.

Canoas Creek

Almaden Expressway to Nightingale Drive:

The proposed design for Canoas Creek, consist of widening the channel on the eastern bank. An additional box culverts are proposed at both Almaden Expressway and Nightingale Drive Crossing. At Almaden Expressway Culvert Crossing, a new box culvert will be constructed on the eastern side adjacent to the existing double culverts. While the new box culvert at Nightingale Drive Crossing will be built on the western side adjacent to the existing double culverts. New eastern wingwall at Almaden Expressway and new western wingwall at Nightingale Drive will be built to incorporate the additional culverts. Utilities will be protected and adjusted in coordination with implementing these new culverts at both locations. There will be an approximately 4 ft tall flood wall on both banks between Almaden and Nightingale.

Ross Creek

Almaden Expressway to Kirk Road:

Culverts at Almaden Expressway, Cherry Avenue, and Jarvis Avenue are being widened to help with the flooding along Ross Creek. A new adjacent box culvert will be implemented at Almaden Expressway, Cherry Avenue, and Jarvis Avenue. The wingwalls at all the new crossing will be updated to incorporate the new culverts. Floodwalls will start at Almaden and Briarglen Drive and continue upstream to Cresthaven Lane. The floodwall heights will be approximately 6-ft from existing grade.

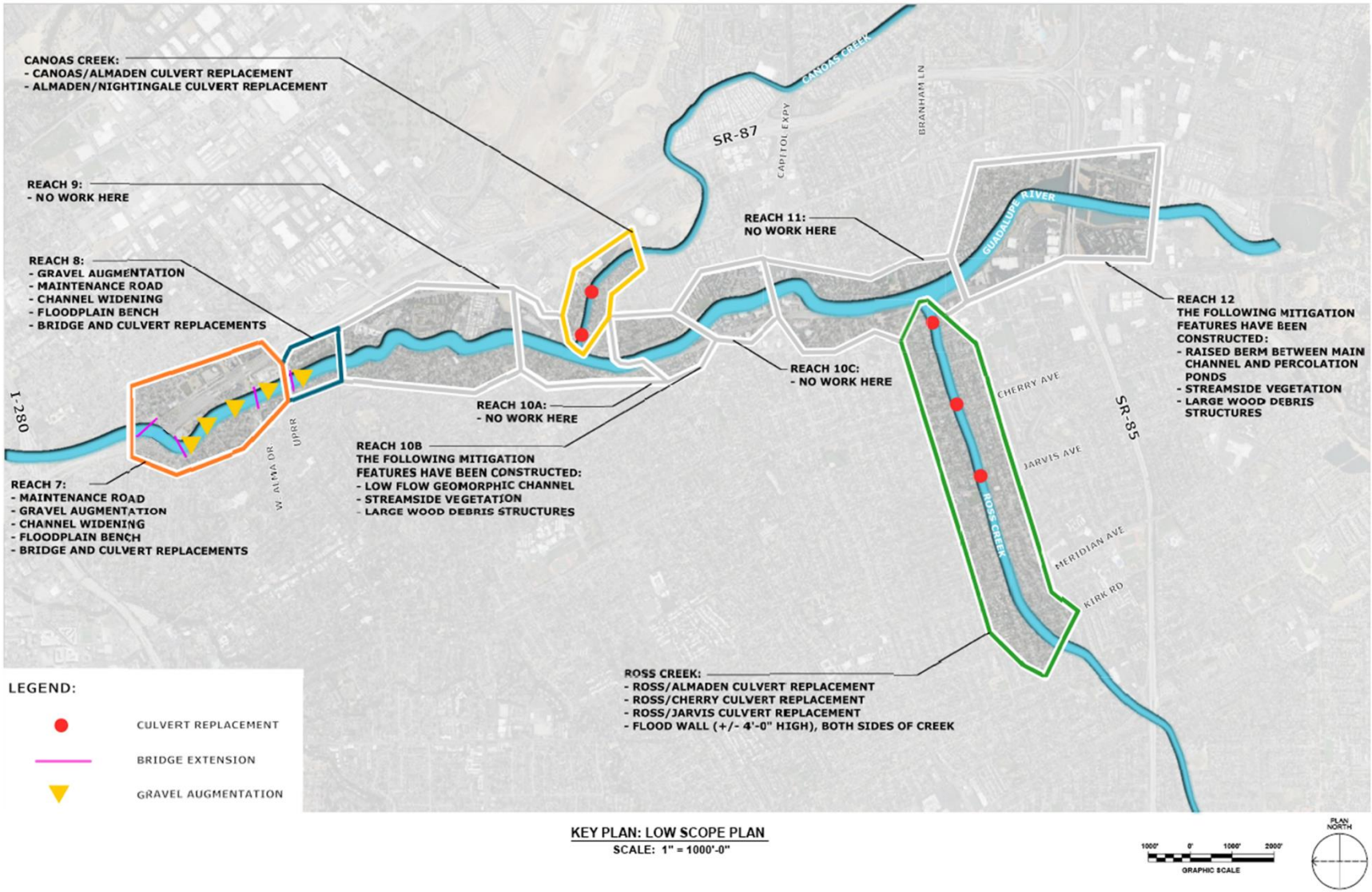


Figure 28. Summary of the key components of the Low Scope Plan (Alt 7).

Combination Plan (Alt 8b)

Reach 7

UPRR Bridge to UPRR Bridge (STA 741+00 to STA 781+00):

The existing Reach 7 is approximately 3,845 ft in length that spans from an active existing Caltrain/UPRR Crossing to an abandoned UPRR bridge. Caltrain/UPRR Bridge will be extended to encompass the proposed widened channel. The proposed design for Upper Guadalupe River includes a widening the eastern bank and implementing new bypass channels at crossings which comprise of an expanded floodplain, maintenance road with access ramps, gravel augmentation, and a pilot channel for low flow activities. The proposed extended floodplain will have a 2% slope towards the existing channel. A 50 to 100-ft wide floodplain bench will include riparian vegetation along the low-flow channel.

Islands will be left in place to preserve some of the existing vegetation on the east bank. Biotechnical bank stabilization, large wood structures and rip rap (if needed) will also be included to help reduce erosion and scours where necessary. Gravel augmentation is incorporated along the existing channel to provide spawning substrate for migratory fish and a coarse sediment infusion for downstream reaches.

The new 18-ft wide maintenance road will be located at the toe of the new eastern channel which can be accessed from the new access ramp. The 2H:1V slopes will be stabilized by natural plantings. At the Willow Street Crossing and Alma Avenue Crossing, a new bridge and bypass have been proposed at both locations. Both bypasses consist of a maintenance road and expanded floodplains with a 2% slope that lead to low-flow pilot channels.

There are two permanent fill placement sites within Reach 7: Willow Street & Lelong Street and W Alma Avenue (Elks Lodge). These sites will also act as construction staging areas which will help reduce the truck trips during construction reducing the environmental impact of transporting all the earthwork.

Reach 8

Abandoned UPRR Bridge to Willow Glen Way (STA 781+00 to STA 795+00):

Continuation of the channel widening to be constructed at Reach 8. The proposed design for Upper Guadalupe River will include a floodplain bench on eastern bank while leaving some natural mitigation islands in place. The existing UPRR Bridge will be rehabilitated to provide recreation access and connectivity across the Guadalupe River. A new 3-cell box culvert is proposed to be installed below the existing UPRR tracks. The permanent fill placement site within Reach 8 is along Mackey Avenue.

Canoas Creek

Almaden Expressway to Nightingale Drive:

The proposed design for Canoas Creek, consist of widening the channel on the eastern bank. An additional box culverts are proposed at both Almaden Expressway and Nightingale Drive Crossing. At Almaden Expressway Culvert Crossing, a new box culvert will be constructed on the eastern side adjacent to the existing double culverts. While the new box culvert at Nightingale Drive Crossing will be built on the western side adjacent to the existing double culverts. New eastern wingwall at Almaden Expressway and new western wingwall at Nightingale Drive will be built to incorporate the additional culverts. Utilities will be protected and adjusted in coordination with implementing these new culverts at both locations. Floodwalls are proposed along both creek banks between. Almaden and Nightingale (each floodwall approximately 2800-ft in length), and floodwall is proposed along the west bank for 750 ft upstream of Nightingale, to increase the channel height. The floodwalls heights will vary between 4-ft to 6-ft from existing grade.

Ross Creek

Almaden Expressway to Kirk Road:

Culverts at Almaden Expressway, Cherry Avenue, Jarvis Avenue, Meridian, and Kirk Road are being widened to help with the flooding along Ross Creek. A new adjacent box culvert will be implemented at Almaden Expressway, Cherry Avenue, Jarvis Avenue, and Kirk Road. The culvert at Meridian Avenue will be replaced with a 3-box culvert. The wingwalls at all the new crossing will be updated to incorporate the new culverts. Floodwalls are proposed to be constructed along both creek banks near certain culverts. At Almaden Crossing, the floodwalls on the northern side will approximately be 325-ft from Briarglen Drive and the southern side will be 125-ft from Briarglen Drive. At Cherry Avenue Crossing, the northern floodwall will be placed approximately 712-ft upstream from Cherry Avenue and the southern floodwall will run approximately 359-ft upstream from Cherry Avenue. At Jarvis Avenue Crossing, the northern floodwalls are 516-ft (upstream) and 334-ft (downstream) and the southern floodwall is approximately 530-ft upstream from Jarvis Avenue. The floodwall heights will be approximately 4-ft from existing grade.

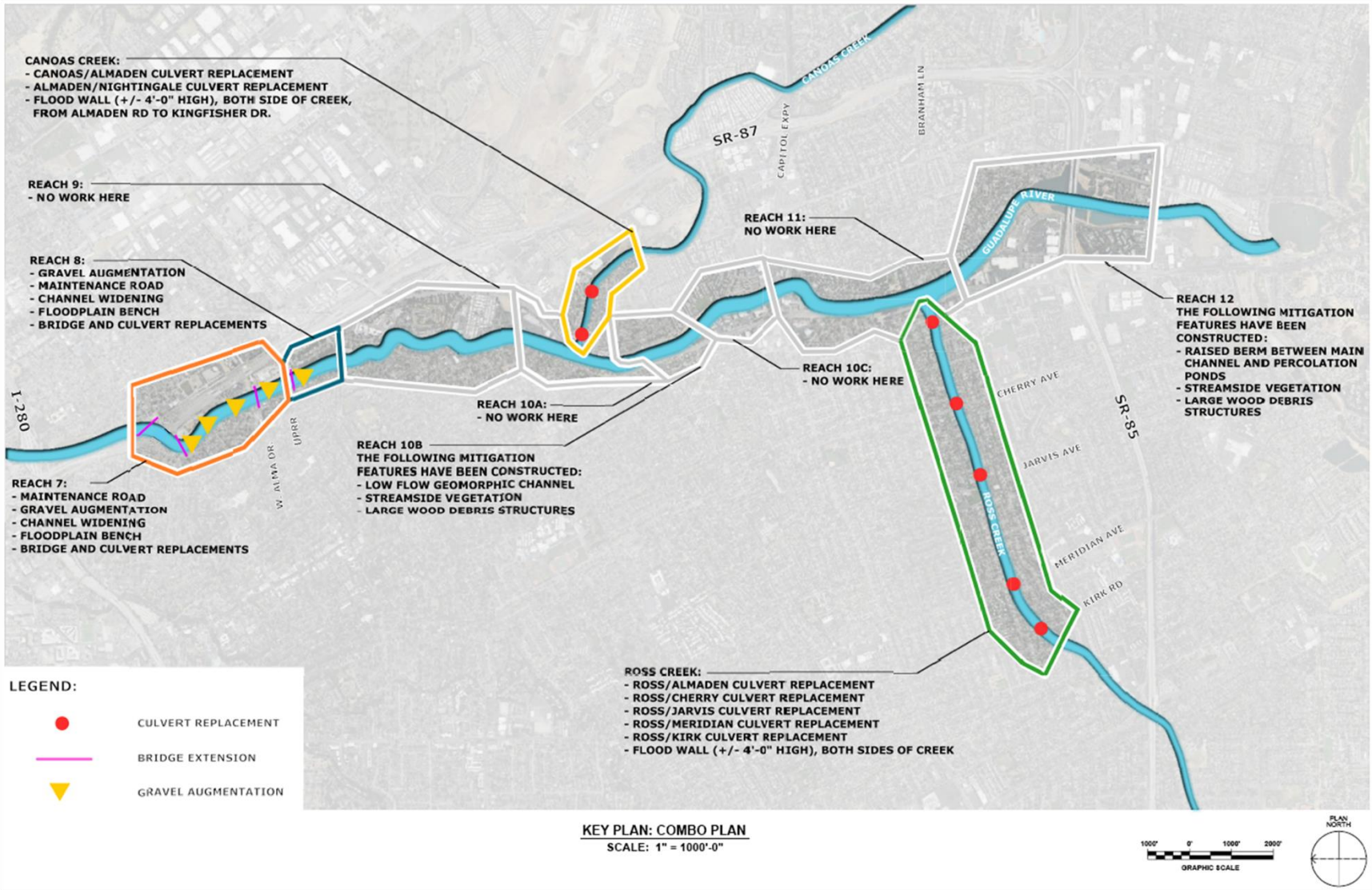


Figure 29. Summary of the key components of the Combination Plan (Alt 8b).

3.5 Plan Evaluation

The focused array of alternatives, as described above, was evaluated by projecting and comparing the with project and without project conditions. Plan formulation focused on addressing the identified problems and meeting study objectives, including those responsive to national, state, and local concerns. Consideration of state and local objectives in concert with national objectives necessitates the inclusion and assessment of a broad range of benefits and impacts, both qualitative and quantitative. Alternative plans were assessed to determine if they have net benefits in total and by type. The set of plans judged to be likely to have net benefits were candidates for further analysis and included in the final array. The four action-alternatives carried into the final array were evaluated on the *Principles and Guidelines Criteria* of:

- Efficiency – The potential benefits/outcome of the measure are greater than what could be provided by another measure/plan of equal or greater cost.
- Effectiveness – Extent to which a measure or alternative alleviates problem areas and meets planning objectives.
- Acceptability – Viability and appropriateness of an alternative from the perspective of the general public and consistency with existing Federal laws, authorities, and public policies.
- Completeness – Extent to which an alternative provides and accounts for all features, investments, and/or other actions necessary to realize the planned effects, including any necessary actions by others.

Additionally, plans were assessed on the *Principles and Guidelines* four accounts:

- National Economic Development (NED) – the value of national output of goods and services
- Regional Economic Development (RED) – changes in regional income and employment
- Environmental Quality (EQ) – riparian habitat, aquatic habitat, cultural resources, and trucking air emissions from sediment disposal offsite
- Other Social Effects (OSE) – life safety, environmental justice, and critical infrastructure resiliency

Comprehensive documentation of total benefits of project alternatives, including equal consideration of economic, environmental, and social categories has been undertaken in accordance with the Assistant Secretary for the Army for Civil Works (ASACW) Policy Directive on the "Comprehensive Documentation of Benefits in Decision Document," dated 5 January 2021.

3.5.1 National Economic Development (NED) Analysis

The final array alternatives were evaluated for their cost effectiveness, measured in terms of net benefits, calculated by subtracting the annual costs from the expected annual economic benefits (Table 21). The Combination Plan had the highest net annual benefits of the alternatives considered in the final array.

NED analysis assesses how the alternatives in the final array may reasonably maximize expected net benefits. The net benefits are computed as the annualized flood damage reduction benefits gained minus the annualized cost of construction and Operations, Maintenance, Repair, Rehabilitation and Replacement (OMRR&R). Expected annual damages were estimated using the HEC-FDA computer program. Net benefit computations for the focused array were evaluated based on October 2023 price levels.

Table 21. Economic net benefits and benefit cost ratio (BCR) of alternatives carried forward.

Alternative	Average Annual Costs	Average Annual Benefits	Net Annual Benefits	Benefit to Cost Ratio
2b – Modified Valley View Plan (NED Plan from 1998 FS/EIS/EIR)	$14.0M	$22.1M	$8.1M	1.6
3b – Modified Bypass Plan (previous authorized plan, partially constructed)	$21.2M	$21.9M	$0.7M	1.0
4 - Nonstructural Plan	$9.9M	$9.2M	$0.7M	1.1
7 – Low Scope Plan	$5.5M	$20.1M	$14.6M	3.7
8b – Combination Plan	**$6.4M**	**$21.6M**	**$15.2M**	**3.4**

Fiscal Year (FY) 2023 price levels, 50-year period of analysis, 2.5% discount rate

Effectiveness of alternative plans was measured in percent of flood damages reduced. The alternatives were modeled using economic modeling software (HEC-FDA), and the results are shown in Table 22. More information on the modeling process and inputs are described in Appendix B. The Valley View Plan, Bypass Plan, and Combination Plan are most effective at reducing damages, while the Lower Scope Plan and Nonstructural Plan show the greatest remaining residual risk (i.e. risk that remains after the project is in place).

Table 22. With-Project expected annual damages (residual risk) by damage category ($1,000s) for final array of alternatives.

Alternative	Total With-Project Damages	Damages Reduced	% Damages Reduced
1. No Action	$22,528	–	–
2b – Modified Valley View Plan (NED Plan from 1998 FS/EIS/EIR)	$467	$22,061	98%
3b – Modified Bypass Plan (previous authorized plan, partially constructed)	$649	$21,879	97%
4 - Nonstructural Plan	$12,610	$9,918	43%
7 – Low Scope Plan	$2,457	$20,071	87%
8b – Combination Plan	$939	$21,589	95%

The Valley View and Bypass plans may be difficult to identify sufficient space for required mitigation. The Combination, Low Scope, and Nonstructural plans were found to be highly acceptable and implementable. Mitigation is expected to be contained within the flood risk management footprint.

All alternative plans in the final array are expected to be complete plans that would not require further action from other to implement. For nonstructural measures on private properties, i.e. elevation of residences and dry floodproofing of privately owned commercial properties, individual property owners must opt-in to participate in the plan to manage flood risk at their property. The rate at which property owners participate, or participation rate, affects the effectiveness of the plan. As such, the participation rate will affect benefits and residual risk of the Nonstructural Plan.

3.5.2 Regional Economic Development (RED) Analysis

The RED analysis estimates number of jobs and other economic measures such as labor income, value added, and sales that are supported by future implementation of alternative plans. The team completed modeling to evaluate the regional economic impact and project expenditures, activities, and infrastructure. The results of this analysis are presented in Table 23Table and Table 24, and Appendix B provides additional details.

Construction costs were used to estimate the regional economic impacts of all alternatives in Santa Clara County. Generally, the higher the cost of construction, the higher the RED benefits for that alternative. Table 23 shows the construction costs for all plans. The Bypass Plan (Alt 3b) produces the highest amount of output ($373.1 M), followed by the Nonstructural Plan (alt 4) ($304.6 M), the Valley View Plan (Alt 2b) ($233.7 M), the Combination Plan (Alt 8b) ($83.9 M), and the Lower Scope Plan (Alt 7) (59.4 M) (Table 24). Table 24 shows a comparison of RED results for all plans.

Table 23. Construction costs, 2020 price level.

Alternative	Construction Cost
2b – Modified Valley View Plan (NED Plan from 1998 FS/EIS/EIR)	$200.1 M
3b – Modified Bypass Plan (previous authorized plan, partially constructed)	$319.4.M
4 - Nonstructural Only Plan	$260.8 M
7 – Low Scope Plan	$50.9 M
8b – Combination Plan	$71.8 M

Table 24. Comparison of alternatives in RED, local impacts, 2022 price level.

Alternative	Output	Jobs	Labor Income	Gross Regional Product*
2b – Modified Valley View Plan (NED Plan from 1998 FS/EIS/EIR)	$233.7 M	1,543.5	$147.4 M	$164.5 M
3b – Modified Bypass Plan (previous authorized plan, partially constructed)	$373.1M	2,463.3	$235.3 M	$262.5 M
4 – Modified Nonstructural Only	$304.6 M	2,011	$192 M	$214.3 M
7 – Low Scope Plan	$59.4 M	392.8	$37.5 M	$41.8 M
8b – Combination Plan	$83.9 M	554.5	$52.9 M	$59 M

**Gross Regional product is defined as the sum of employee compensation, proprietor income, other property type income, and indirect business taxes.*

3.5.3 Environmental Quality (EQ) Analysis

To characterize net changes to the Environmental Quality (EQ) account, the study evaluated impacts to existing habitat and benefits from creation of new habitat for aquatic and riparian species, while maximizing use of existing data and previously certified models. The analysis combined two separate elements: 1) a hydraulic modeling based aquatic habitat suitability evaluation, and 2) a habitat suitability index (HSI) for the yellow warbler (Figure 30). The yellow warbler HSI is an already USACE-certified model, and the team worked with the Ecosystem Restoration Planning Center of Expertise (ECO-PCX) to obtain single-use authorization for a hydraulic habitat suitability analysis for steelhead habitat.

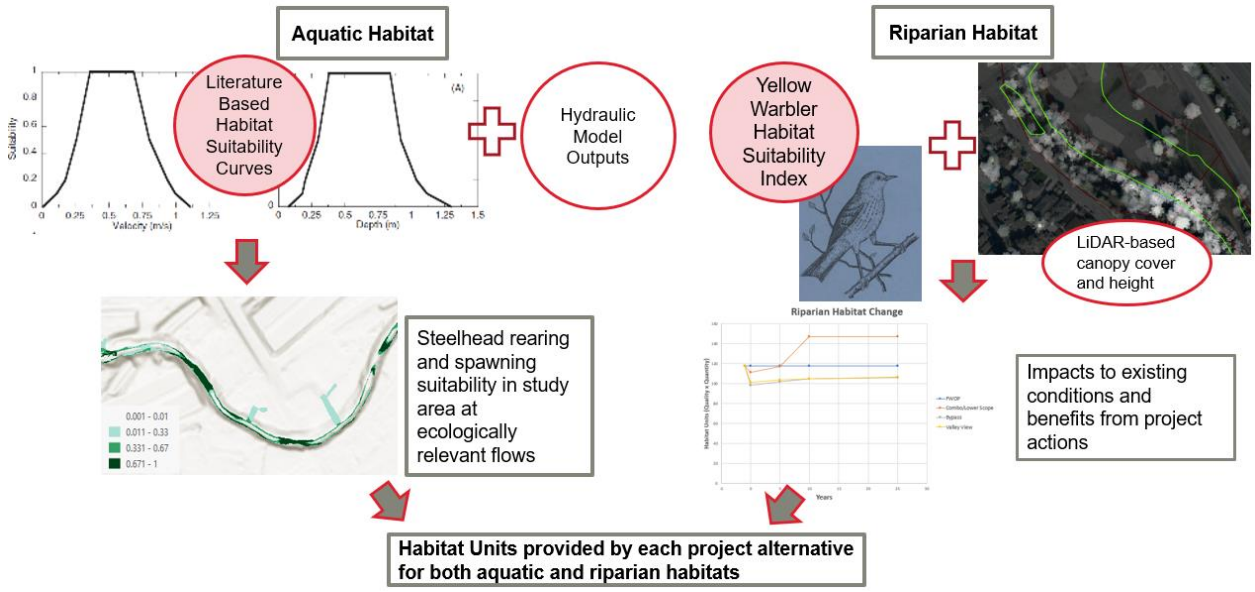


Figure 30. Generalized habitat modeling methodology schematic.

Representative evaluation species were selected for each habitat type based on several criteria: (1) species known to be sensitive to specific land- and water- use actions; (2) species that play a key role in nutrient cycling or energy flow; (3) species that utilize a common environmental resource; (4) species that are associated with important resource problems, such as anadromous fish and migratory birds; (5) species that have existing habitat response models suitable for the evaluation of proposed alternatives; (6) habitat data available or easily collected to support modeling; (7) species that provide relevant evaluation throughout the geographic range of proposed alternatives and across the broad range of effects of proposed alternative. Table 25 below summarizes the habitats, species, and variables used in this analysis. The results of the analyses are briefly summarized below, and a complete write-up of the habitat analysis can be found in Appendix C1.

Table 25. Habitat type, species, and habitat variables used in the EQ analysis.

Habitat Type	Evaluation Species	Habitat Variables
Riverine	rearing and spawning steelhead	Depth, velocity, substrate and cover
Riparian Forest	yellow warbler	Percent canopy cover, average canopy height

In general, the analysis found that the Combination and Lower Scope plans improve riparian habitat, while the Bypass and Valley View plans cause some riparian habitat degradation over time. For the Combination Plan, there is some reduction in habitat with the initial clearing and grubbing, but this habitat comes back within 5 years and then is substantially improved after 10 years of vegetation growth.

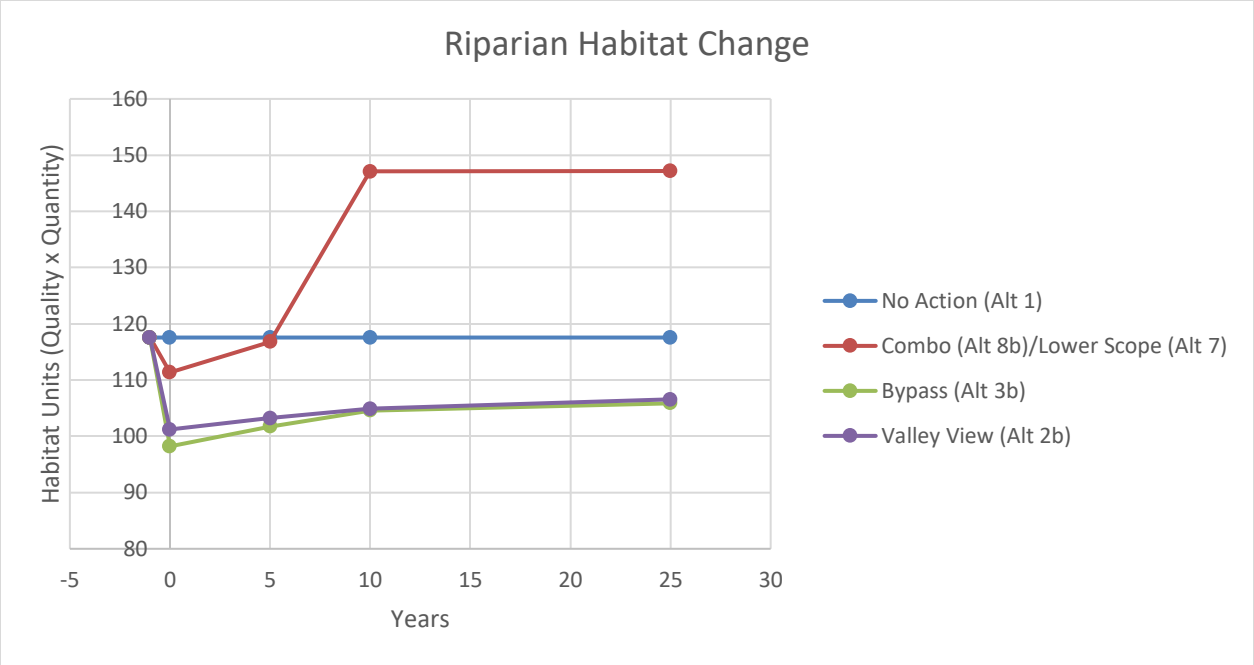


Figure 31. Riparian habitat change from the project action alternatives.

For aquatic habitat, the analysis found that the alternatives generally perform somewhat similar to each other (Table 26). The Bypass and Valley View plans provide the most habitat as analyzed here because they widen the low-flow channel throughout the study area. This appears favorable because the analysis used depths and velocities during relatively low flows (mean winter and mean spring flow for spawning and rearing, respectively) to evaluate habitat. There is significant opportunity to refine designs to improve the provision of aquatic habitat, particularly through the use of selective floodplain grading and pool-forcing large wood structures in Reaches 7 and 8. Structures like this have been discussed with resource agencies, but have not yet been designed in detail.

Table 26. Results of rearing habitat analysis for project alternatives.

Acreage of Steelhead Rearing Habitat by HSI Class					
Plan	**Low HSI (0.01 to 0.33)**	**Medium HSI (0.33 to 0.67)**	**High HSI (0.67 to 1)**	**Total med and high habitat (acres)**	**Change med and high (acres)**
FWOP	6.58	11.25	3.29	14.54	0
2b – Modified Valley View	6.14	13.77	3.25	17.02	+2.47
3b – Modified Bypass	6.00	12.77	3.27	16.04	+1.49
7 -Low Scope	6.58	11.16	3.31	14.47	-0.08
8b- Combo	6.26	12.01	3.47	15.47	+0.93

The Nonstructural Plan (Alternative 4) is not expected to affect the EQ as it does not include in-channel work which would impact rearing nor aquatic habitat. Thus, it was not included in the EQ modeling.

3.5.4 Other Social Effects (OSE) Analysis

In March 2022, the Assistant Secretary of the Army office issued implementation guidance for the Biden administration's Environmental Justice (EJ) and Justice40 initiatives. The implementation guidance directs the USACE planning teams to go beyond "doing no harm" and to focus on outreach activities to integrate and involve disadvantaged communities early on in and throughout the planning process. In addition, the memorandum directs the USACE to provide at least 40 percent of investments in climate, critical clean water, and waste infrastructure (benefits) to disadvantaged communities (Office of the Assistant Secretary Civil Works 2022).

Because the Administration's default Quality Climate and Economic Justice Screening Tool (CEJST) is still in beta version, the CDC's Social Vulnerability Index (SVI) tool was used to screen for and identify disadvantaged communities for the Upper Guadalupe Flood Risk Management Project. The tool was used to measure impacts to the OSE account from the no-action, nonstructural, and structural alternatives.

SVI data was used to identify socially vulnerable communities and to see how various alternatives would affect the people in each socially vulnerable group (either positively or negatively) as part of the OSE assessment (Figure 32). The SVI uses U.S. Census data to determine the relative social vulnerability of every census tract. It ranks each tract on 14 social factors and identifies and maps communities most likely needing support during and after a hazardous event such as flooding. These factors are aggregated into four main "themes:" Socioeconomic, Household Composition and Disability, Minority Status and Language, and Housing Type and Transportation. The sum of all four themes reflects the overall percentile tract summary ranking, or overall theme, for each Census tract.

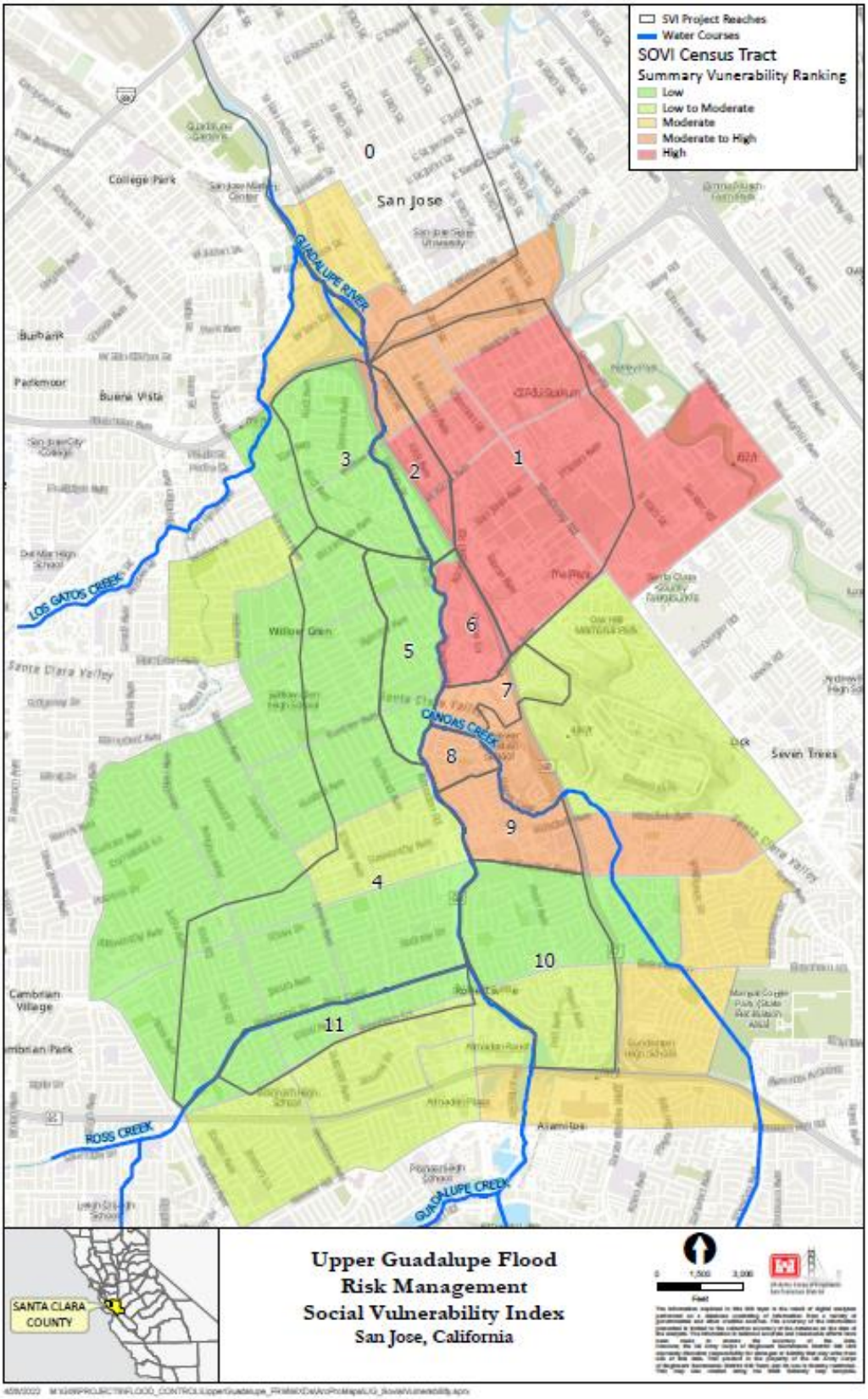


Figure 32. Socially vulnerable flooding impact areas.

The population at risk (PAR) is approximately 3,490 persons in the 1% ACE floodplain and 5,726 persons in the 0.2 % floodplain (excluding unhoused persons). There is a large population of socially vulnerable people residing in the 1% AEP event; approximately half of the PAR reside in moderate to high socially vulnerable areas, which are identified as Flooding Impact Areas 1, 2, 6, and 7. Table 27 shows the structure distribution, PAR, maximum depths, and total damages at structure by occupancy type at the 1% AEP and the 0.2% AEP events.

Table 27. Population at risk (PAR), structure distribution, maximum depth, and total damages for the 1% and 0.2% AEP flood events.

Occupancy Type	POPULATION AT RISK BY TYPE OF STRUCTURE OR BY AUTO		MAX DEPTH of FLOODING (ft)		TOTAL DAMAGES	
	1% AEP	0.2% AEP	1% AEP	0.2% AEP	1% AEP	0.2% AEP
Autos	7,553	9,996	8.3	9.4	$72 M	$118 M
Commercial	81	136	3.3	4.7	$35 M	$93 M
Industrial	118	174	4.4	5.5	$82 M	$130 M
Public	21	29	2.5	3.3	$63 M	$88 M
Residential	1,175	1,928	6.4	7.9	$323 M	$472 M
Population at Residential Structures	3,490	5,726				

Another component of the PAR is comprised of encampments living in or near the channel, where velocities, depths, and velocity-depth combinations pose a significant life safety hazard to transient, vulnerable persons. There are approximately 33 unhoused encampments and over 130 persons that will likely be touched by open floodwater at the 1% AEP event. Figure 33 shows the distribution of unhoused encampments in the study area that could be impacted by floodwater. Ten of the 33 affected camps are likely to experience moderate or high risk flood velocities and depths, and those are noted with a dark red circle in the figure below.

Life safety was evaluated using LifeSim 2.0 criteria. This analysis does not consider the life safety risk to persons in structures or in vehicles on roadways; rather, the analysis assumes a “worst case scenario” event where persons are openly caught in fast-moving and deep floodwater. The LifeSim default stability criteria function was used to classify depth, velocity, and velocity-depth combinations into “low,” “high,” and “moderate” life safety hazard zones. The critical threshold for velocity was set to 9.8 ft/s, while the critical threshold for velocity*depth was set to 6.46 ft squared/s. The critical threshold for depth is 4 ft. Exceeding any one of these criteria would compromise pedestrians’ safety if caught in open flood waters. If the velocity and velocity*depth thresholds are exceeded, this would constitute a “high” life safety hazard zone. If the depth threshold is exceeded, this would constitute a “moderate” life safety hazard zone because the risk to life would be dependent upon if pedestrians could or could not swim. The PDT fully intends to implement a LifeSim 2.0 assessment post-TSP and will conduct a breach analysis to determine the incremental life loss of project implementation.

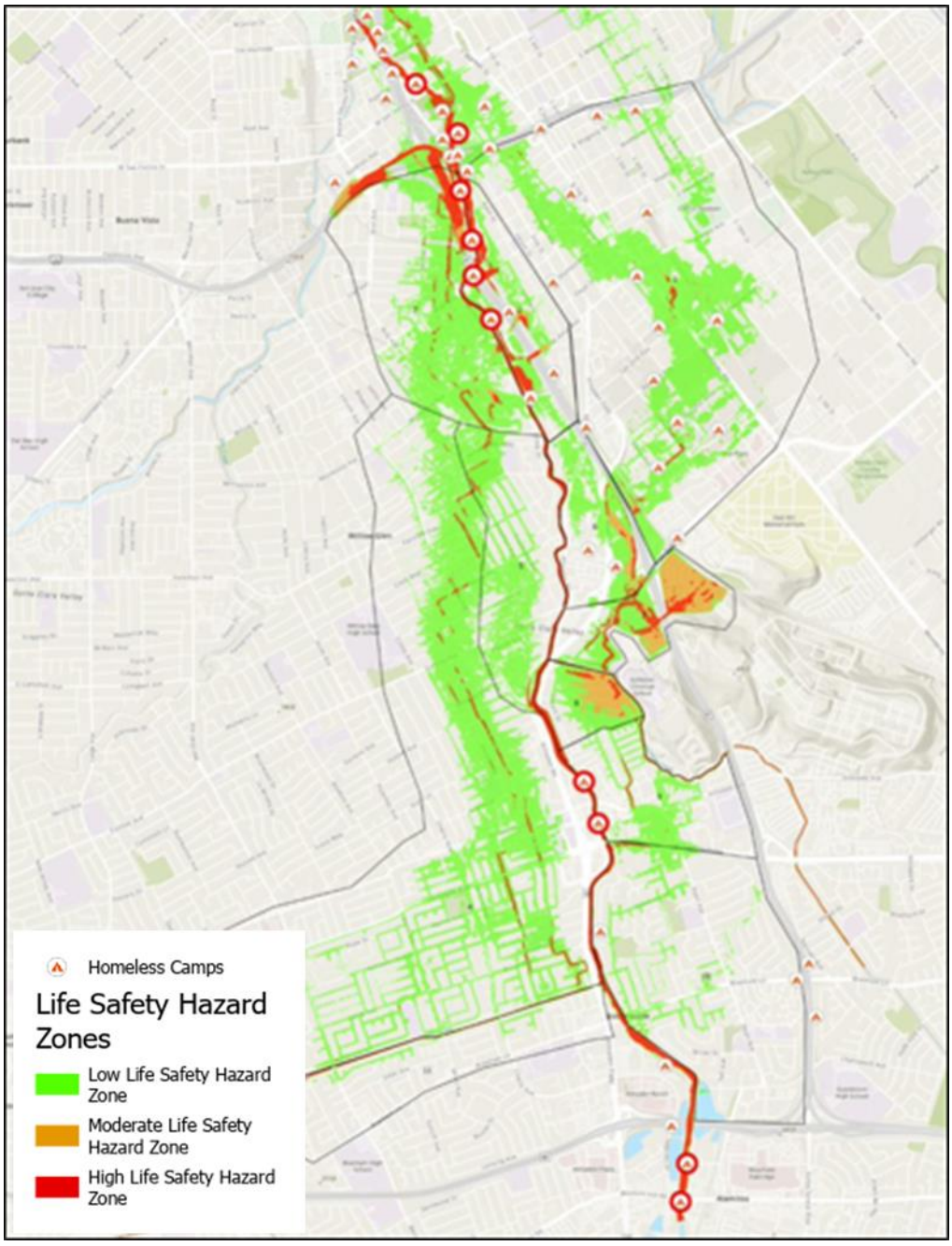


Figure 33. Distribution of unhoused communities that could be impacted by the 1% AEP Event.

The nonstructural alternative considers the elevation of residential structures to the 1% AEP event and 3ft dry floodproofing on commercial structures. While this option would be highly effective at reducing flood risk to damageable property, it would likely not reduce the amount of high and moderate hazard life safety pockets in the area. In addition, such activities would significantly disrupt the community by dispersing residents and business activity. This would adversely impact hundreds of families and relationships in the community. While targeted nonstructural activities could be pursued intentionally in socially vulnerable areas, this could disrupt community cohesion, social connectedness, identity, and other factors.

While floodproofing and elevation may yield some benefits, signage and early flooding warning systems may be more cost-effective nonstructural measures to pursue and can even be more effective than traditional nonstructural methods in reducing the life safety risk to vulnerable populations. It is important to note that all structural plans considered in this analysis include nonstructural measures such as those listed above.

In general, all structural alternatives are expected to contribute positively to the OSE factors, as defined in the *USACE OSE Primer*.[13] To assess the impact of each alternative on socially vulnerable groups, the change in the number of persons removed from the 1% AEP floodplain by plan was assessed. All alternatives, excluding the nonstructural alternative[14], significantly reduce the PAR (Table 28).

Table 28. Percent of persons and structures removed from the 1% AEP by Plan, $0 Damages or Greater (SVI Tool).

Alternative	Population at Residential Structures in Socially Vulnerable Flooding Impact Areas (Reaches 1, 2, 6, and 7)	Population at Residential Structures in all Other Flooding Impact Areas (3, 4, 5, 8, 9, 10, and 11)	Total Population at Residential Structures in Study Area
2b - Valley View Plan (NED Plan from 1998 FS/EIS/EIR)	-99.3%	-97.9%	-98.6%
3b - Bypass Plan (previous authorized plan, partially constructed)	-100.0%	-99.8%	-98.9%
4 - Nonstructural Only	-74.8%	-32.5%	-54.0%
7 – Low Scope Plan	-100.0%	-80.3%	-71.2%
8b – Combination Plan	-99.7%	-99.1%	-99.4%

All structural alternatives successfully minimize the high and moderate life safety hazard zones in the study area (Figure 34 and Figure 35). While this is not a substitute for LifeSim 2.0, the analysis is informative of the magnitude of potential consequences related to life safety hazards in the study area and what each plan does to reduce the residual risk of flooding. Most of the residual flooding has shallow depths and low velocities, but the Lower Scope plan does have residual life safety hazard zones in flooding impact area 8. There is also a lingering hazard in the northern portion of flooding impact areas 2 and 3 where there is a highway underpass and light rail station.

The OSE analysis also considered critical infrastructure resiliency. There are 11 structures flagged as critical infrastructure in the FWOP 0.2% AEP event floodplain, including the Canoas Creek Elementary School that will be impacted by flooding at less than 3ft of flood depths. The nonstructural alternative removes two critical structures from the floodplain while the other nine remain unprotected. The structural alternatives remove all 11 critical structures from the floodplain.

[13] In the *OSE Primer*, there are seven social factors assessed: health and safety, economic vitality, social connectedness, identity, social vulnerability and resiliency, participation, and leisure and recreation.
[14] This analysis excludes impacts on unhoused encampments because most at-risk encampments are located in the channel; no alternative will reduce the high velocity and velocity-depth combinations within the channel.

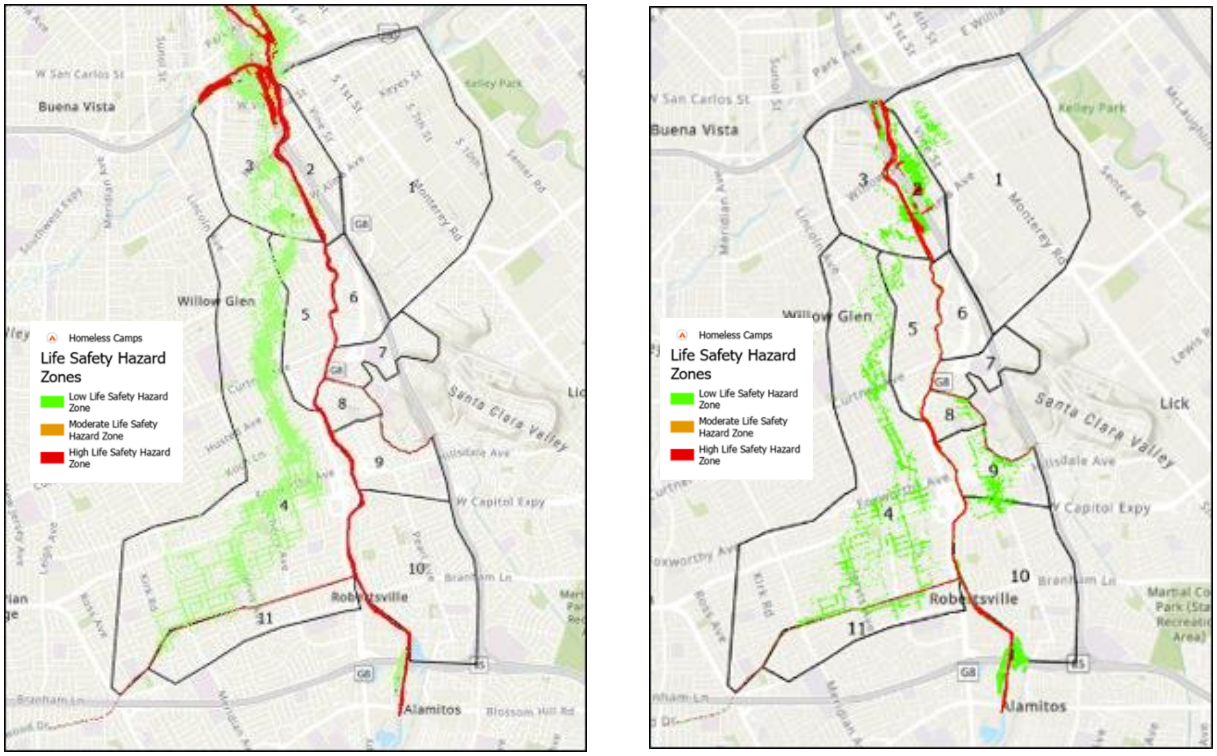


Figure 34. Life Safety Hazard Zones for the Valley View (left) and Combination (right) Plans, 1% AEP.

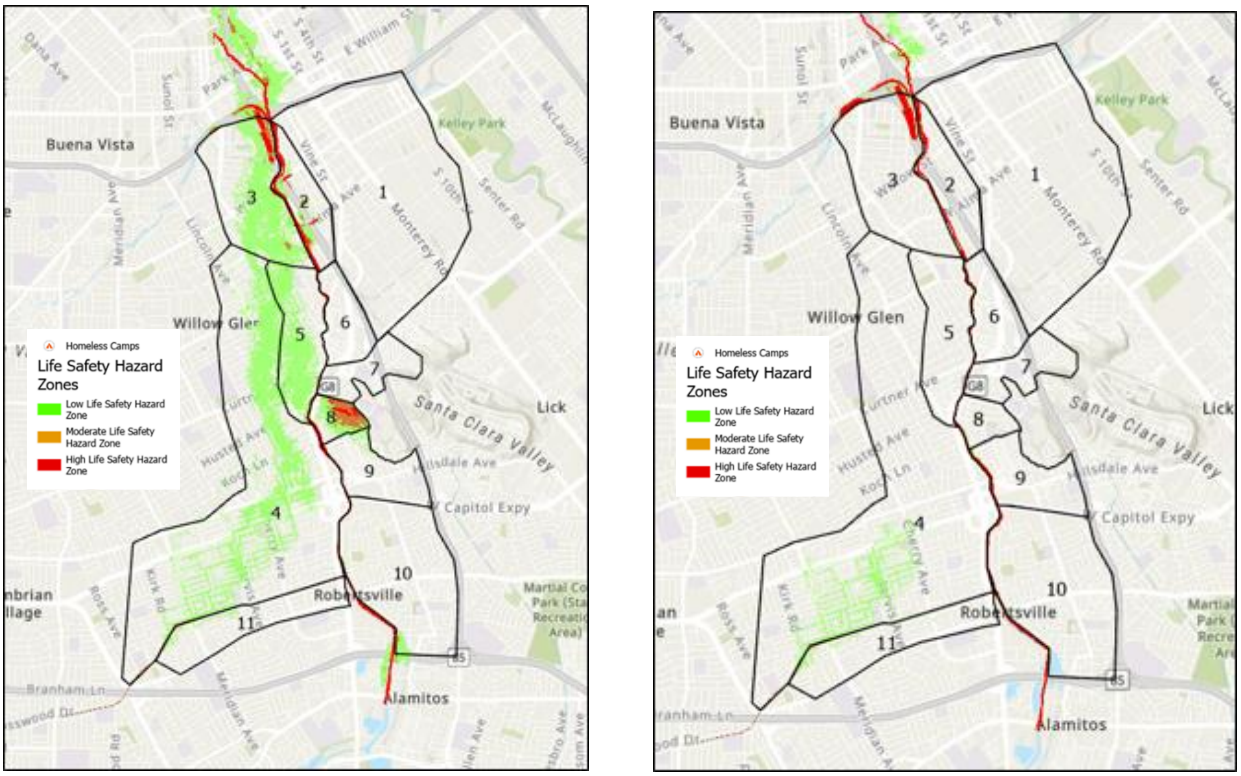


Figure 35. Life Safety Hazard Zones for the Lower Scope (left) and Bypass (right) Plans, 1%AEP.

4 ENVIRONMENTAL CONSEQUENCES*

4.1 Introduction

The following sections discuss the environmental effects and significance of the effects of the alternatives. Since this document is a supplemental Environmental Assessment to the 1998 FS/EIS/EIR, the environmental consequences of the Valley View and Bypass plans are generally incorporated by reference from the 1998 FS/EIS/EIR, except when stated otherwise in the resource analysis introduction. Each resource section below includes an introduction establishing the framework of the analysis, followed by identification of the criteria to determine whether effects are significant or less than significant. Analysis of the No Action alternative is then provided as a basis of comparison for the action alternatives. Since the Combination Plan and the Low Scope Plan have very similar proposed actions, and the highest benefit-cost ratio of the four plans, they have been preliminarily identified as the preferred action and are analyzed together under the "Preferred Action" section. Any differences in effects between the Combination Plan and Low Scope Plan will be called out within the analysis for a particular resource, should a difference between the effects of two exist relative to that resource. Finally, any measures being implemented to reduce or mitigate for effects discussed under the Preferred Action analysis are proposed. A comparison of the four action alternatives is displayed at the end of each section.

4.1.1 Alternatives Eliminated from Further Consideration Under NEPA

The Assistant Secretary for the Army for Civil Works (ASACW) Policy Directive on "Comprehensive Documentation of Benefits in Decision Document," establishes a required list of alternatives that must be incorporated into the final array of alternatives for plan formulation studies. This includes the No Action alternative, a Comprehensive Benefits Plan that maximizes net comprehensive benefits (as discussed in Section 3.5), and the NED Plan. Additionally, for flood risk management studies, USACE is required to include a nonstructural plan by this policy directive. While the nonstructural plan is incorporated in the final array of alternatives, as required by this directive, this alternative has been eliminated from further consideration under NEPA. This plan is not viable under NEPA because it has a lower effectiveness when compared to the other plans (43% of flood damages reduced versus 87-98% for the other alternatives) and leaves the study area with high residual risk, so it therefore does not meet the purpose and need under NEPA. As a result, this alternative has been eliminated from further NEPA analysis.

4.2 Air Quality

The U.S. Environmental Protection Agency (USEPA) is responsible for enforcing the NAAQS, primarily through their review of the State Implementation Plans (SIPs) for each state. SIPs are prepared by States to establish how they will implement, maintain, and enforce the NAAQS. In the State of California, the California Air Resources Board (CARB) is responsible for the establishment of the SIP. In States that are not meeting (or "attaining") the NAAQS, SIPs must include additional requirements to demonstrate how they will reduce emissions and strive to meet the NAAQS. Based on the Federal emissions thresholds established by EPA using NAAQS, an emissions inventory and air quality analysis was performed to determine if project emissions would exceed de minimus thresholds and therefore require a general conformity analysis. Under the CAA, Federal agencies are subject to the General Conformity Rule, which requires all Federal actions to ensure that they are not interfering with any State plans to attain or maintain the NAAQS. The thresholds above represent the maximum allowable emissions in the study area based on Santa Clara County's attainment status. If a Federal Action violates these thresholds, they must prepare a General Conformity Report that establishes how the project would mitigate their emissions to zero.

The action alternatives would generate temporary, short-term increases in criteria pollutant emissions during construction activities. Due to the quantitative nature of air quality analysis, and a change in the attainment status in the study area, all four action alternatives are assessed below. The full emissions

analysis, including a discussion of the methodology and assumptions that contributed to the analysis, is included in Appendix C6. Since Federal conformity analysis thresholds are established in tons per year of criteria pollutant emissions, it is reasonable to assess the construction year with the highest emissions for each alternative. In order to complete this analysis, assumptions were developed regarding construction sequencing for each of the action alternatives. The assumptions used for the analysis are included in Appendix C6. For all alternatives, construction of Reaches 7 and 8 had the highest emission estimates. The annual emissions for each alternative are shown by construction year in Appendix C6.

4.2.1 Basis of Significance

For the purposes of this analysis, an effect on air quality would be considered significant if an alternative would:

- Substantially contribute to an existing or projected air quality standard violation;
- Result in proposed construction or operational activities that exceed the Federal General Conformity thresholds;
- Expose sensitive receptors to substantial pollutant concentrations; or
- Create objectionable odors affecting a substantial number of people.

4.2.2 No Action

Under the No Action Alternative, the GRR would not be approved and a new alternative would not be authorized and constructed. As a result, no criteria pollutants associated with construction activities would be emitted and the air quality conditions in the study area would likely remain consistent with the existing condition moving forward. Should a flood event occur, there could be an increase in emissions associated with flood fighting, rescue operations, and other flood-related emergency response actions. These emissions would not likely incorporate any mitigation or minimization measures due to the emergency nature of the action and would likely result in a temporary reduction in air quality in Santa Clara County.

4.2.3 Valley View Plan

Construction of the Valley View Plan would result in emissions of the criteria air pollutants described in Section 2.2. Emission sources associated with project construction would include the off-road construction equipment operating at project sites, on-road vehicles traveling to and from the project sites, and fugitive dust associated with earthmoving and soil-disturbance activities at the project sites. The estimated peak construction year emissions projected for construction of Reaches 7 and 8 of the Valley View Plan are shown below.

Table 29. Peak Construction Year Emissions for Valley View Plan.

	ROG	**CO**	**NO_X**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**
Peak Daily Emissions (lbs/day)	10.34	60.59	78.41	0.34	3.62	3.27
Total Project Emissions (tons/year)	0.68	3.97	5.14	0.02	0.24	0.21
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Federal Threshold	No	No	No	No	No	No

Based on the construction assumptions for Reaches 7 and 8, no criteria pollutants are expected to exceed the General Conformity thresholds for the Valley View Plan. The emissions estimates are also displayed in daily pounds per day emissions as these are the calculations used for State and local thresholds. The emissions estimates also do not exceed any local or State thresholds (BAAQMD 2017b) and therefore would not substantially contribute to any air quality violation or create an inconsistency with any state or local plan. As a result, effects from the emission of criteria pollutants would be less than significant.

Sensitive receptors were established in Section 2.2. There are no hospitals or elderly care facilities in the study area. The closest schools more than 500 feet away from construction sites and therefore would not be significantly affected by air quality emissions or odors that may disperse from the construction site. Residents living adjacent to the construction sites would likely be affected by emissions of pollutants during construction and/or minor temporary odors from construction equipment. Best management practices, described below in Section 4.2.7, would be implemented to reduce these effects to less than significant.

4.2.4 Bypass Plan

Construction of the Bypass Plan would result in emissions of the criteria air pollutants described in Section 2.2. Emission sources associated with project construction would include the off-road construction equipment operating at project sites, on-road vehicles traveling to and from the project sites, and fugitive dust associated with earthmoving and soil-disturbance activities at the project sites. The estimated peak construction year emissions projected for construction of Reaches 7 and 8 of the Bypass Plan are shown below.

Table 30. Peak Construction Year Emissions for Bypass Plan.

	ROG	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Peak Daily Emissions (lbs/day)	11.39	62.59	82.78	0.35	3.86	3.44
Total Project Emissions (tons/year)	0.75	5.30	4.1	0.02	0.25	0.23
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Federal Threshold	No	No	No	No	No	No

Similar to the Valley View Plan, no criteria pollutants are expected to exceed the General Conformity thresholds for the Bypass Plan. The emissions estimates for Reaches 7 and 8 are also displayed in daily pounds per day emissions as these are the calculations used for State and local thresholds. The emissions estimates also do not exceed any local or State thresholds (BAAQMD 2017b) and therefore would not substantially contribute to any air quality violation or create an inconsistency with any state or local plan. As a result, effects from the emission of criteria pollutants would be less than significant.

The closest sensitive receptors (students at schools identified in Section 2.2) are more than 500 feet away from construction sites and therefore would not be significantly affected by air quality emissions or odors that may disperse from the construction site. Residents living adjacent to the construction sites would likely be affected by emissions of pollutants during construction and/or minor temporary odors from construction equipment. Best management practices, described below in Section 4.2.7, would be implemented to reduce these effects to less than significant.

4.2.5 Low Scope Plan

Construction of the Low Scope Plan would result in emissions of the criteria air pollutants described in Section 2.2. Emission sources associated with project construction would include the off-road construction equipment operating at project sites, on-road vehicles traveling to and from the project sites, and fugitive dust associated with earthmoving and soil-disturbance activities at the project sites. The estimated peak construction year emissions projected for construction of Reaches 7 and 8 of the Low Scope Plan are shown below.

Table 31. Peak Construction Year Emissions for Low Scope Plan.

	ROG	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Peak Daily Emissions (lbs/day)	10.62	59.28	78.32	0.35	3.68	3.26

Total Project Emissions (tons/year)	0.70	3.88	5.13	0.02	0.24	0.21
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Federal Threshold	No	No	No	No	No	No

The Low Scope Plan's estimated emissions are consistent with the Combination Plan below because the "worst case scenario" construction year for both of these plans is the emissions associated with Reaches 7 and 8, which are the same for both of these alternatives. The emissions associated with Ross and Canoas Creeks are not the same for both plans, since the Low Scope Plan has shorter floodwalls on Canoas Creek, longer floodwalls on Ross Creek, and two fewer culvert replacements. The differences between the emission estimates for each plan are shown in the full emission estimate spreadsheets in Appendix C7. Overall, these differences result in lower annual emissions projected for the Low Scope Plan versus the Combination Plan, with the maximum construction emissions occurring during construction of Reaches 7 and 8, as shown above. No single construction year would exceed the General Conformity thresholds for the Low Scope Plan. The emissions estimates also do not exceed any local or State thresholds (BAAQMD 2017b) and therefore would not substantially contribute to any air quality violation or create an inconsistency with any state or local plan. As a result, effects from the emission of criteria pollutants would be less than significant.

Sensitive receptors are more than 500 feet away from construction sites and therefore would not be significantly affected by air quality emissions or odors that may disperse from the construction site. Residents living adjacent to the construction sites would likely be affected by emissions of pollutants during construction and/or minor temporary odors from construction equipment. Best management practices, described below in Section 4.2.7, would be implemented to reduce these effects to less than significant.

4.2.6 Combination Plan

Construction of the Combination Plan would result in emissions of the criteria air pollutants described in Section 2.2. Emission sources associated with project construction would include the off-road construction equipment operating at project sites, on-road vehicles traveling to and from the project sites, and fugitive dust associated with earthmoving and soil-disturbance activities at the project sites. The estimated peak construction year emissions projected for construction of Reaches 7 and 8 of the Combination Plan are shown below.

Table 32. Peak Construction Year Emissions for Combination Plan.

	ROG	**CO**	**NO_X**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**
Peak Daily Emissions (lbs/day)	10.62	59.28	78.32	0.35	3.68	3.22
Total Project Emissions (tons/year)	0.70	3.88	5.13	0.02	0.24	0.21
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Federal Threshold	No	No	No	No	No	No

The Combination Plan's estimated emissions are consistent with the Low Scope Plan because the "worst case scenario" construction year for both of these plans is the emissions associated with Reaches 7 and 8, which have the same features for both of these alternatives. The emissions associated with Ross and Canoas Creeks are not the same for both plans. The Combination Plan has longer floodwalls on Canoas Creek, intermittent floodwalls on Ross Creek, and two additional culvert replacements. The differences between the estimates for each plan are shown in the full emission estimate spreadsheets in Appendix C7. Overall, these differences result in lower annual emissions projected for the Low Scope Plan versus the Combination Plan, with the maximum construction emissions occurring during construction of Reaches 7 and 8, as shown above. No single construction year would exceed the General Conformity thresholds for the Combination Plan. The emissions estimates also do not exceed any local or State thresholds

(BAAQMD 2017b) and therefore would not substantially contribute to any air quality violation or create an inconsistency with any state or local plan. As a result, effects from the emission of criteria pollutants would be less than significant.

Sensitive receptors are more than 500 feet away from construction sites and therefore would not be significantly affected by air quality emissions or odors that may disperse from the construction site. Residents living adjacent to the construction sites would likely be affected by emissions of pollutants during construction and/or minor temporary odors from construction equipment. Best management practices, described below in Section 4.2.7, would be implemented to reduce these effects to less than significant.

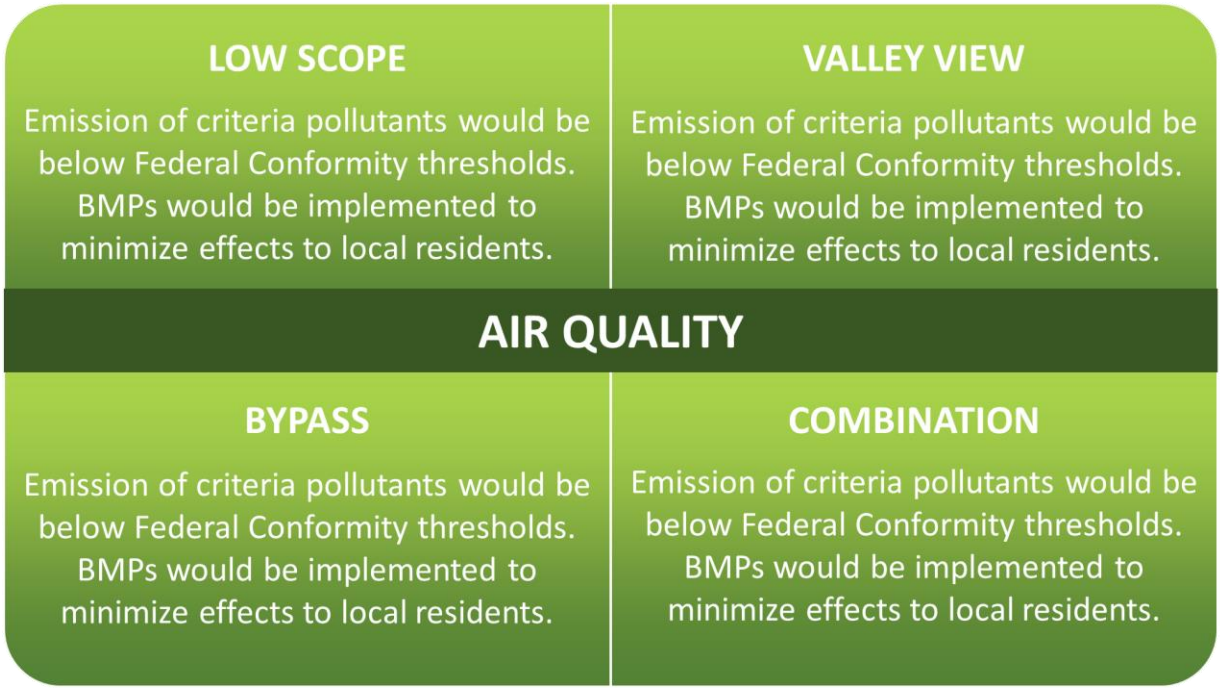
Operations and Maintenance

The activities required for operations and maintenance of the project features would result in minor, temporary emissions from pickup trucks and construction equipment, with peaks far below both local and Federal thresholds. These activities would be required to ensure the function of the proposed project. Any emissions from these limited annual activities would be insignificant in the context of the emissions analyes discussed above and would not affect the determinations for the action alternatives.

4.2.7 Avoidance and Mitigation Measures

The following minimization and mitigation measures would be implemented to reduce potential effects from air quality emissions to less than significant. The BAAQMD recommends implementation of these measures for all projects:

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered a minimum of two times per day, or as needed to ensure that fugitive dust is controlled on the construction site.
- All haul trucks transporting soil, sand, or other loose material offsite shall be covered.
- All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- All vehicle speeds on unpaved roads shall be limited to 15 mph.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturer’s specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
- Post a publicly visible sign with the telephone number and person to contact regarding dust complaints. This person shall respond and take corrective action within 48 hours.



4.3 Geologic Resources and Seismicity

The action alternatives would generate temporary, short-term increases in sedimentation during construction activities. The geologic resources analysis for the Valley View and Bypass Plans is incorporated by reference from the 1998 FS/EIS/EIR. Since there are negligible differences between the analysis for the Combination Plan and Low Scope Plan for this resource, they are discussed together as the Preferred Action below. The No Action and Preferred Action are assessed in detail below.

4.3.1 Basis of Significance

For the purposes of this analysis, an effect on geologic resources may be considered significant if an alternative would expose people or structures to substantial effects involving:

- Rupture of a known earthquake fault, strong seismic shaking, or seismic-related ground failure, including liquefaction; or
- Landslides, substantial soil erosion, or permanent loss of topsoil.

Additionally, an alternative would be considered significant if the project features are:

- Located on an unstable geologic unit;
- Likely to cause a geologic unit to become unstable; or,
- Located on expansive soils, as defined in the Uniform Building Code.

4.3.2 No Action

Under the No Action Alternative, the GRR would not be approved and a new alternative would not be authorized and constructed. As a result there would be no change to geologic hazards to the public from the construction of project features. The geologic conditions in the study area would remain consistent with the existing conditions, and the public, including unhoused populations living along the river, would remain at risk due to the potential for bank failure during high flow events and seismic events.

4.3.3 Preferred Action

Construction of the Combination Plan would excavation of approximately 300,000 cubic yards of material in Reaches 7 and 8 of the mainstem Upper Guadalupe River in order to widen the river channel and create the floodplain benches. Generally, this earthwork would benefit these reaches by stabilizing the channel banks, which are currently overly steep due to channel incision. Initially, there could be a temporary impact due to increased erosion from the exposure of topsoil immediately following the construction period. However, with successful revegetation of the channel banks, and implementation of natural and nature-based features, the channel banks would become stabilized, and velocities would be slowed, resulting in a long-term benefit to channel erosion beyond the existing conditions (Li et al. 2006, Gurnell 2013). Additional best management practices (BMPs), as described in Section 4.3.4 below, would be implemented through the development of a stormwater pollution prevention permit (SWPPP) to ensure that soil erosion is appropriately captured to prevent excessive sedimentation effects to the waterways in the project area. With implementation of these measures, effects to geologic resources would be less than significant

Seismic ground shaking is an unavoidable hazard for facilities within the Bay Area. It is likely the proposed project would experience at least one major earthquake within the life of the project. Design, construction, and maintenance must comply with the regulatory standards of the Corps, the latest industry standards and Uniform Building Code requirements for seismic design. The design and construction of the floodwalls and/or levees would meet or exceed applicable design standards for static and dynamic stability, seismic ground shaking, liquefaction, subsidence, and seepage, minimizing the potential for significant damage. With these design considerations incorporated into the project features, the project is not likely to increase the risk of exposure of people and structures to effects resulting from seismic events. Additionally, implementation of the channel improvements in Reaches 7 and 8 should stabilize the banks and reduce the risk of seismic-related bank failure. With implementation of these design considerations, seismic effects would be less than significant.

The Low Scope Plan does not incorporate different features that would result in additional effects to geologic resources and seismicity beyond those discussed for the Combination Plan above.

Operations and Maintenance

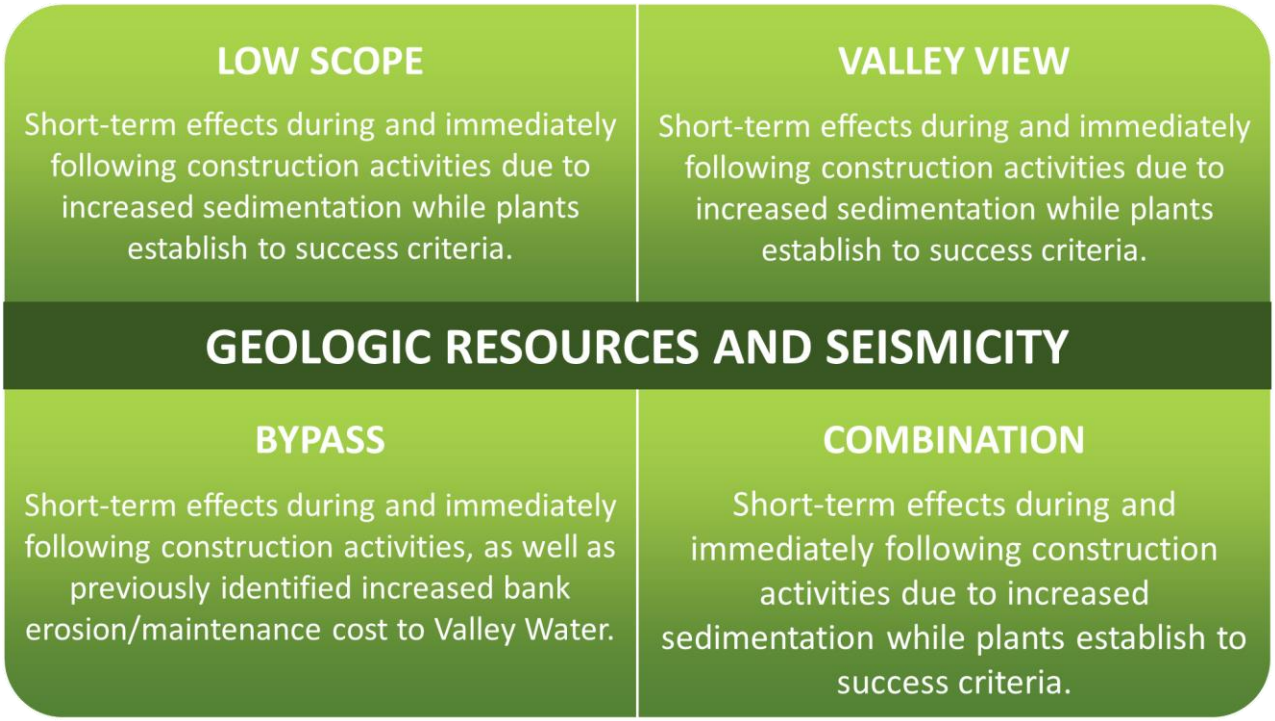
The activities required for operations and maintenance of the project features would result in minor ground disturbance from pickup trucks and construction equipment. These activities would not cause a change in significance determination for any of the action alternatives. Regular inspections of project structures such as bridges, culverts, and floodwalls would be required to identify any cracks or other damages that could result in damage during a future seismic event. If any damage is identified during inspections, repairs would be required to ensure the safety of the public during seismic events. With these regular inspections and any needed repairs, long term operation and maintenance of project features would continue to meet required building codes and would reduce the risk of failure during future seismic events.

4.3.4 Avoidance and Mitigation Measures

The following measures would be implemented to minimize potential geologic effects to less than significant. The measures may include, but would not be limited to, the following:

- Prior to construction, USACE or its contractor would be required to acquire all applicable permits for construction.
- Prior to construction, a Stormwater Pollution Protection Plan (SWPPP) would be prepared, and best management practices (BMPs) would be proposed to reduce potential erosion and runoff during rain events.

- Ground and vegetation disturbance would be minimized during project construction by establishing designated equipment staging areas, ingress and egress corridors, spoils disposal and soil stockpile areas, and equipment exclusion zones prior to the commencement of any grading operations.
- Sediment barriers (e.g., silt fences, fiber rolls, and straw bales) would be installed around the base of stockpiles to intercept runoff and sediment during storm events. If necessary, stockpiles would be covered with geotextile fabric to provide further protection against wind and water erosion.
- Sediment barriers would be installed on graded or otherwise disturbed slopes as needed to prevent sediment from leaving the project site and entering nearby surface waters.
- Plant materials would be installed to stabilize cut and fill slopes and other disturbed areas once construction is complete. Plant materials could include an erosion control seed mixture or shrub and tree container stock. Temporary structural BMPs, such as sediment barriers, erosion control blankets, mulch, and mulch tackifier, would be installed as needed to stabilize disturbed areas until vegetation becomes established.
- All structural features would be constructed in accordance with required seismic Uniform Building Code specifications.



4.4 Water Resources

The action alternatives would generate temporary, short-term increases in sedimentation during construction activities. The water resources analysis for the Valley View and Bypass Plans is incorporated by reference from the 1998 FS/EIS/EIR. The hydraulic modeling analysis for all action alternatives was updated for this GRR/EA, and so with-project floodplains are presented for all four action alternatives below. Additional detail is presented for the No Action, Low Scope, and Combination Plans.

4.4.1 Basis of Significance

For the purposes of this analysis, an effect on water resources may be considered significant if an alternative would result in:

- Increased effects on the community from flooding;
- Degradation of surface or groundwater quality to a point of exceeding water quality standards or objectives under the Federal Clean Water Act; or,
- Violation of laws or regulations adopted to protect or manage the water resource system in the study area.

4.4.2 No Action

Under the No Action Alternative, the GRR would not be approved and a new alternative would not be authorized and constructed. As a result there would be no change to water quality or water resources from the construction of project features. The water resource conditions in the study area would remain consistent with the existing conditions, and the public, including unhoused populations living along the river, would remain at risk from flooding. The Upper Guadalupe River would remain a deeply incised channel with high velocities, increasing the risk of erosion and other water quality impacts. Furthermore, peak streamflows and correspondingly the flood risk in the study will likely increase with climate change. See the hydraulics appendix A1 for information.

4.4.3 Valley View Plan

The Valley View Plan eliminates 98% of flood damages. There is some residual flooding on the Ross Creek floodplain, as well as in the Highway 87 underpass. Figure 36 belows show the residual flooding during a 1% AEP event. Though the flood plain mapping has been updated, there has been no changes to the effects analysis, therefore it is incorporated by reference from the 1998 FS/EIS/EIR.

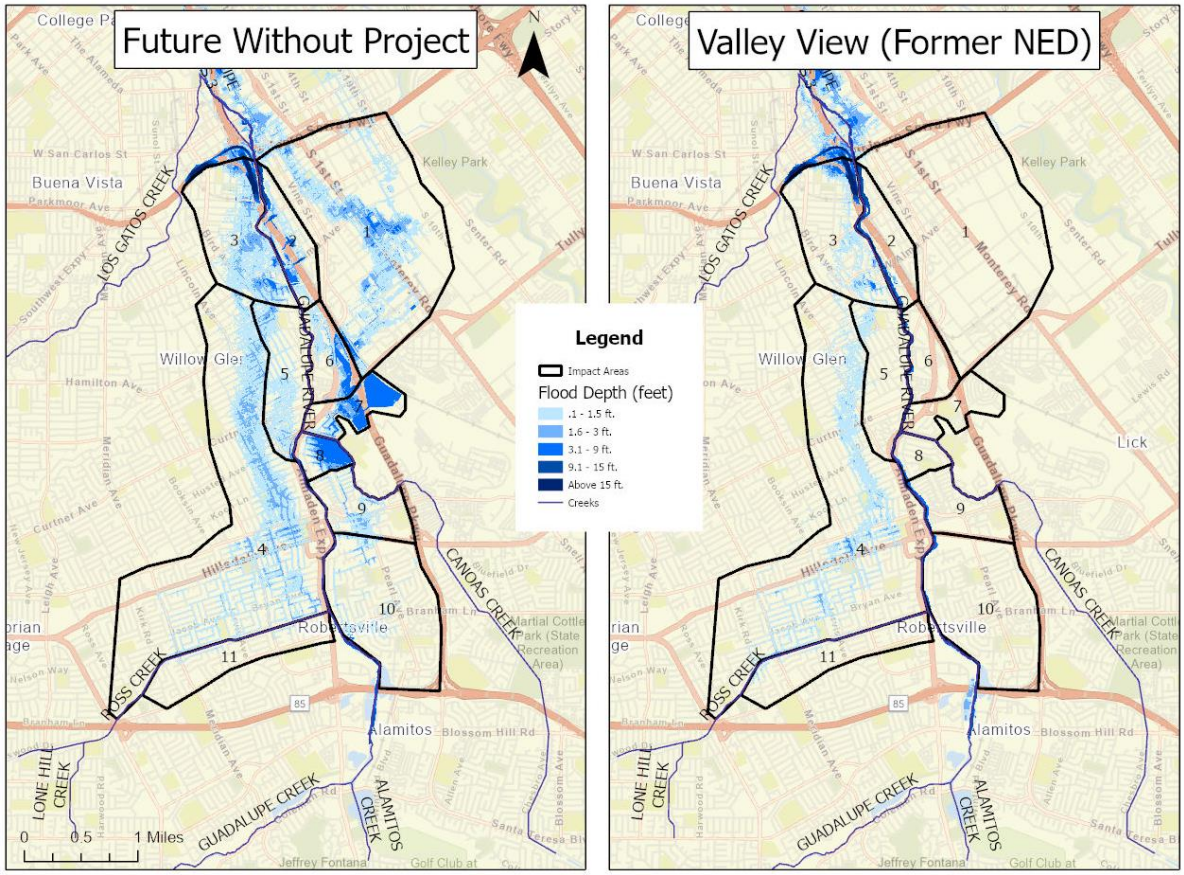


Figure 36. Comparison of without and with-project flooding during a 1% AEP event with implementation of the Valley View Plan.

4.4.4 Bypass Plan

The Bypass Plan eliminates 96% of flood damages. There is some residual flooding on the Ross Creek floodplain, although less street flooding than with the Valley View Plan. The flooding in the Highway 87 underpass remains. Figure 37 belows show the residual flooding during a 1% AEP event. Though the flood plain mapping has been updated, there has been no changes to the effects analysis for the Bypass Plan, therefore it is incorporated by reference from the 1998 FS/EIS/EIR.

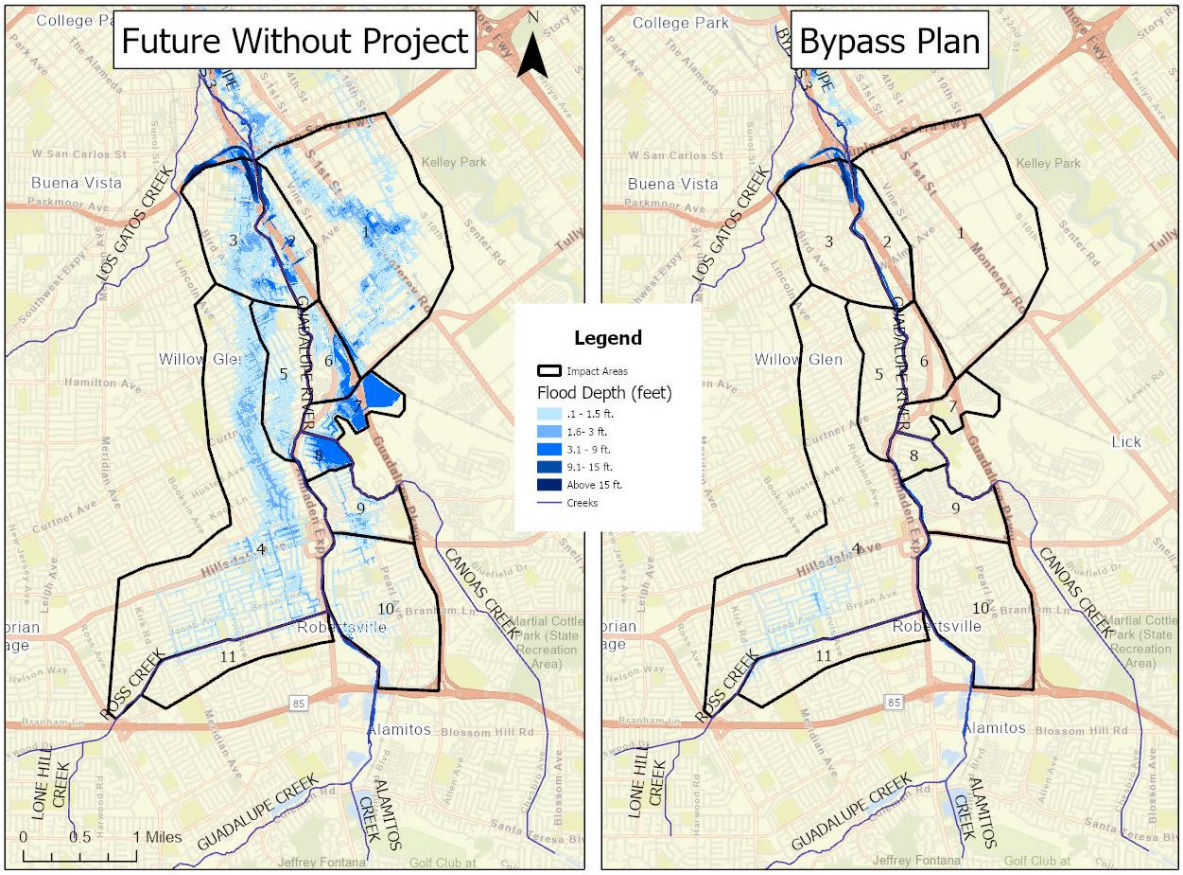


Figure 37. Comparison of without and with-project flooding during a 1% AEP event with implementation of the Bypass Plan.

4.4.5 Low Scope Plan

The Low Scope Plan eliminates 87% of flood damages. There continues to be widespread residual flooding on both sides of the Guadalupe River, including relative deep (approximately 9 ft) waters on the left bank of Canoas Creek. Aside from the differences in the flood damages reduced, the effects to water resources are the same as those presented for the Combination Plan below. Figure 38 below shows the residual flooding during a 1% AEP event.

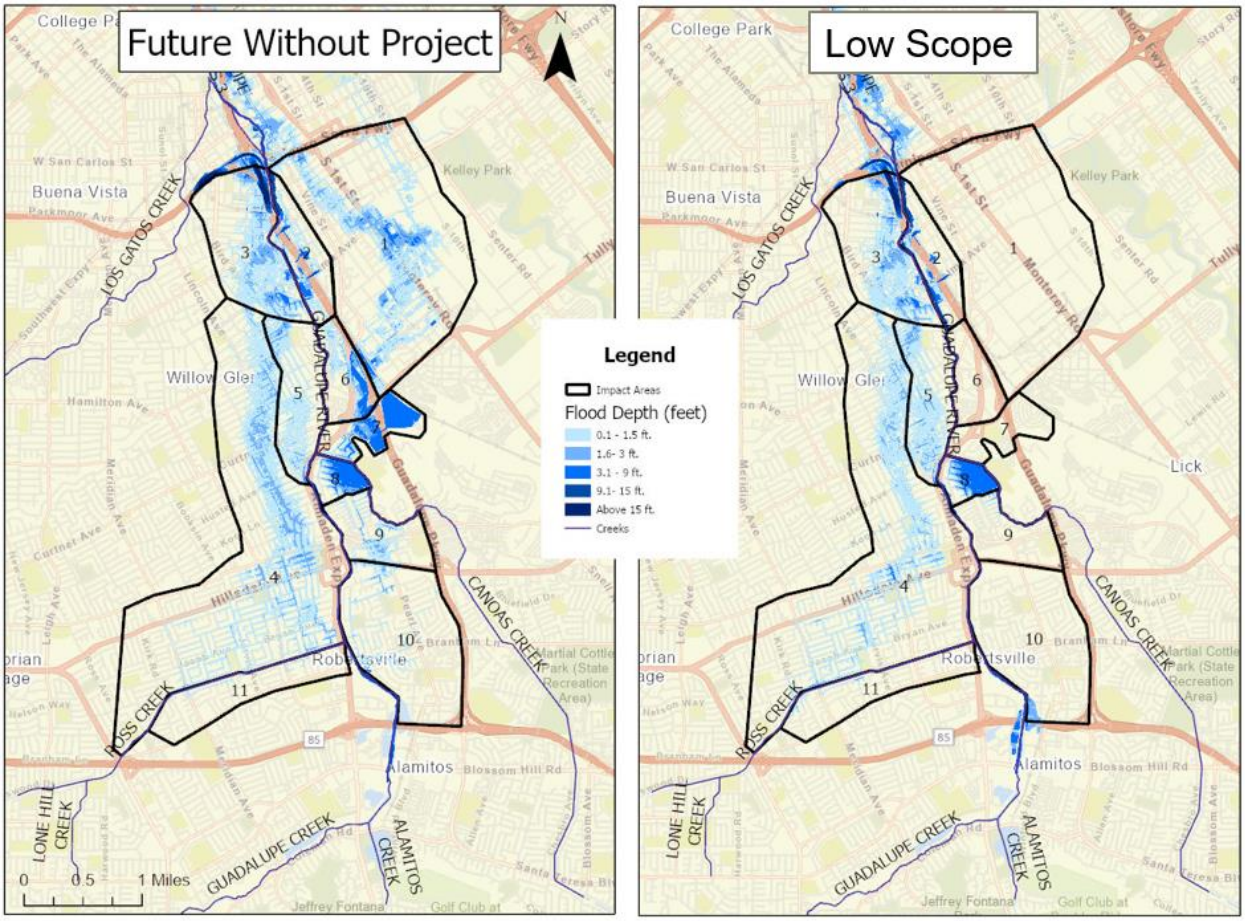


Figure 38. Comparison of without and with-project flooding during a 1% AEP event with implementation of the Low Scope Plan.

4.4.6 Combination Plan

Construction of the Combination Plan would significantly reduce flood risk in the study area. The Combination Plan reduces 95% of the damages due to flooding, but some residual flooding still remains. However, there will be opportunities in the optimization phase of this GRR and design phase of the project to further refine the designs and reduce residual flooding. The minor pockets of remaining flooding include street flooding on the Ross and Canoas Creek floodplains, flooding on the eastern bank of Reach 7, and flooding of the Highway 87 underpass.

The hydrology and hydraulics team specifically investigated the erosion and maintenance issues that triggered the need for the GRR to see whether the Combination Plan would be problematic from this perspective. They found that maximum velocities could be as high as 15 feet per second in a 1% AEP event (Figure 39), but this is well within the limits that both traditional erosion protection and biotechnical bank stabilization measures can stabilize for (Fischenich 2001). Groundwater and the general watershed characteristics would be unaffected by project actions. See the hydraulics appendix (Appendix A1) for more information on the project's effects on water resources.

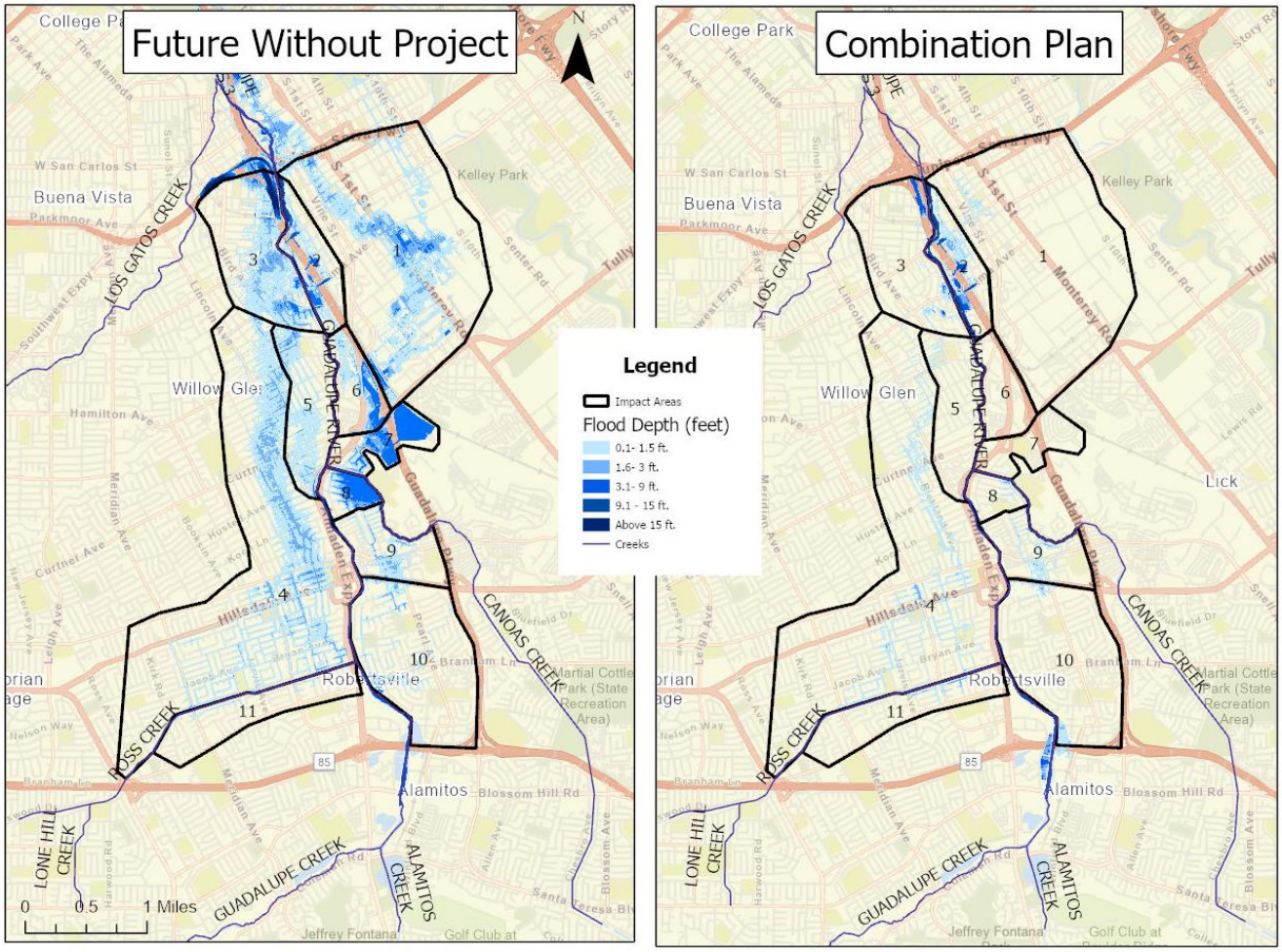


Figure 39. Comparison of pre- and post-project floodplain during a 1% AEP event with implementation of the Combination Plan.

Initially, there could be a temporary impact to water quality associated with increased turbidity due to sediment inputs from the constructed banks in the winters immediately following construction as the site settles. However, with successful revegetation of the channel banks, and implementation of natural and nature-based features, the channel banks would become stabilized, and velocities would be slowed, resulting in a long-term reductions in sediment inputs from incision, lateral erosion, or bank failures and thus long-term reductions in turbidity.

Through the use of a large floodplain bench and biotechnical bank stabilization in Reaches 7 and 8, the Combination Plan would help reset natural physical and ecological processes and shift the channel away from an incised, eroding system to a dynamic, more-functional river corridor. This will reduce long-term operations and maintenance costs, as well as provide additional habitat benefits, described in more detail in Section 4.5 below. Moreover, the Clean Water Act Section 404(b)(1) analysis found that the Combination Plan is the Least Environmentally Damaging Practicable Alternative, because it has the smallest impact on jurisdictional wetlands and Waters of the U.S.

Coordination with the Water Board is ongoing to determine whether the Combination Plan is in compliance with the project's existing Clean Water Act Section 401 Water Quality Certification (WQC), which was issued in December 2003 to cover construction of the Bypass Plan. If the Water Board determines that the Combination Plan requires a new WQC, then a new one would be issued prior to

construction with similar provisions. The existing WQC established provisions for ensuring the protection of water quality, including: effluent limitations for dewatering discharge water, design review and approval requirements, and seasonal restrictions that are consistent with those found in the project's biological opinion. The existing WQC also laid out requirements for a series of technical studies, which were completed prior to the GRR and the results of which have been incorporated into the plan formulation for the GRR. Continuing to follow the requirements of the WQC will ensure that the project is protective of water quality to the maximum extent practicable. These requirements would also apply to the Low Scope Plan. In addition, the avoidance an minimization measures listed in section 4.4.7 would be implemented for the combination or low scope plans to reduce the effects of those plans on water quality and resources. Overall, the action alternatives would result in a beneficial effect on water resources in the study area

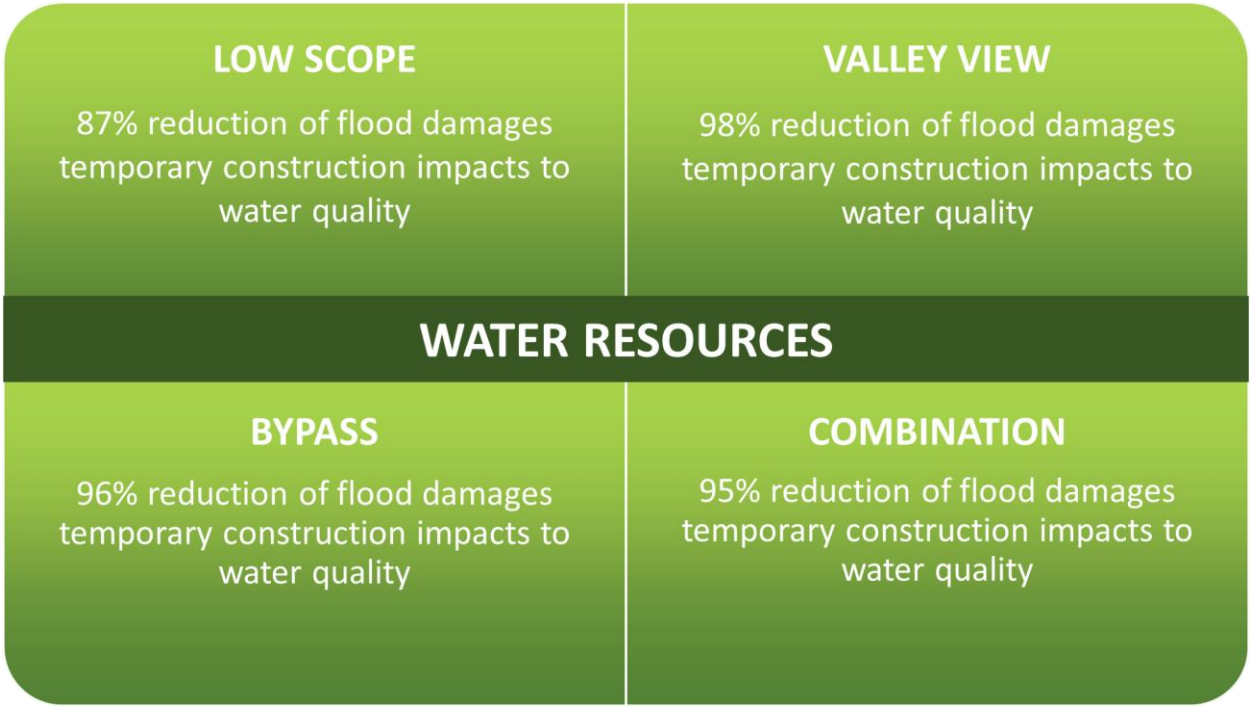
Operations and Maintenance

The activities required for operations and maintenance of the project features would result in minor ground disturbance from pickup trucks and construction equipment that could cause temporary increases in turbidity if maintenance activities are occurring while the river is flowing. These activities would be necessary to maintain the project's flood risk management benefits and would not cause a change in significance determination for the action alternatives.

4.4.7 Avoidance and Mitigation Measures

The following measures would be implemented to reduce temporary effects to water quality during construction to less than significant:

- A SWPPP would be implemented during construction and post-construction to reduce the project's impacts on water quality in the study area. Erosion and sedimentation control BMPs, as discussed in Section 4.3.4 above, would be incorporated into the SWPPP.
- Implement reasonable and prudent measures from the Biological Opinion related to minimizing instream construction impacts, and minimizing sediment, turbidity, and pollutant inputs to the Guadalupe River (Appendix C3).
- Implement applicable provisions from the project's Clean Water Act Section 401 Water Quality Certification, including: limiting construction below the ordinary high water mark to the summer dry season between June 1st and October 15th, implementing erosion and sediment control BMPs described above, and complying with dewatering discharge pollutant limitations (Appendix C4)



4.5 Biological Resources

The action alternatives would generate temporary, short-term decreases in riparian vegetation during construction activities, but would result in long-term improvements to riparian habitat in the Upper Guadalupe River corridor. The biological resources analysis for the Valley View and Bypass Plans is incorporated by reference from the 1998 FS/EIS/EIR. Since there are negligible differences between the analysis for the Combination Plan and Low Scope Plan for this resource, they are discussed together as the Preferred Action below. The No Action and Preferred Action are assessed in detail below.

4.5.1 Basis of Significance

For the purposes of this analysis, an effect on biological resources may be considered significant if an alternative would result in:

- Permanent net loss of native riparian forest or freshwater emergent wetland; removal, filling, grading, or substantial disturbance of a sensitive vegetation type (riparian vegetation and wetlands);
- Substantial net degradation of aquatic habitat for federally listed salmonids;
- A substantial adverse effect, either directly or through habitat modifications, on any species listed as federally threatened or endangered under, or otherwise protected by, the ESA;

4.5.2 No Action

Under the No Action Alternative, the GRR would not be approved and a new alternative would not be authorized and constructed. As a result there would be no effects to biological resources in the project area from construction of the proposed alternatives. The biological resource conditions in the project area would remain consistent with the existing conditions, marginal to sub-optimal habitat for terrestrial and aquatic species, including for federally listed species. The project area would remain at risk of flooding and high velocities that would continue to incise the channel.

4.5.3 Preferred Action

Construction of the Combination Plan would involve a substantial amount of ground disturbance in Reaches 7 and 8 of the mainstem Upper Guadalupe River in order to widen the river channel and create the floodplain benches. All existing vegetation would be eliminated along the banks of the river in areas that are graded to provide a wider channel. The Combination Plan preserves several "islands" of mature riparian vegetation in both Reaches 7 and 8, but there would be temporary, short-term losses of mature riparian vegetation in the study area. Extensive planting (7.25 acres) is included in the project which by year 5 is expected to return riparian tree canopy cover to pre-project levels, and by year 10 should exceed pre-project levels (Appendix C). A design goal is to reduce less desirable nonnative riparian habitat and increase higher functioning native riparian habitat.

The Combination Plan includes large floodplain benches in Reaches 7 and 8 in lieu of a bypass channel or conventional channel widening, in addition to conversion of paved areas to riparian vegetation. The result is in a significant net increase in riparian habitat following project implementation. Overall, the amount of native riparian is expected to increase to significantly under the Combination Plan.

No impacts to freshwater marsh are anticipated. No substantial impacts are expected to total acreage of spawning and rearing habitat for federally listed salmonids. The quality of habitat for federally listed salmonids is expected to improve (Appendix C1). This is due in part to gravel augmentation incorporated along the existing channel to provide spawning substrate for migratory fish and an infusion of coarse sediment . Temporary impacts to fish and fish habitat are expected during construction due to dewatering or flow diversions.

The Combination Plan should result in improved aquatic habitat conditions for wildlife and federally listed salmonids. Channel widening, the inclusion of floodplain benches, and the proposed gravel augmentation is expected to provide more topographic complexity and a return of the underlying channel dynamics and physical processes that support healthy aquatic ecosystems and spawning and rearing for federally listed salmonids.

Some of the vegetation outside but adjacent to grading and construction areas may be injured or stressed during construction (e.g., by unintended collisions with construction equipment, compaction of soil) if not specific measures are taken to avoid such impacts. Construction during nesting bird season may affect nesting birds in and around construction areas. Coffer dams or dewatering activities could result in short term temporary impacts to instream conditions in the form of minor channel modifications and sedimentation. Instream construction activities also have the potential to impact fish and other species using the channel. The avoidance and minimization measures described in section 4.5.4 below would be implemented to lessen these effects from the preferred alternative.

Initially, there could be a temporary impact to water quality and biological resources that utilize the aquatic habitat due to sediment inputs from the constructed banks in the winters immediately following construction as the site settles which could affect habitat conditions for these species. However, with successful revegetation of the channel banks, and implementation of natural and nature-based features, the channel banks would become stabilized, and velocities would be slowed, resulting in a long-term benefit to vegetation channel beyond the existing conditions.

As part of feasibility level design and plan optimization, additional habitat benefits will be assessed such as the extent and location of preserved mature vegetation "islands," or refining planting details (e.g., tree spacing/density, understory component) in accordance with more detailed hydraulic and flood modeling for inclusion in the final recommended plan.

Canoas Creek and Ross Creek are lined almost entirely by residential properties with fenced backyards that abut the creek. The floodwalls along Canoas Creek would parallel the channel and the existing

fencing, both of which create preexisting migratory barriers. While some existing fencing is more "permeable" than a floodwall for smaller wildlife (various types of chainlink fencing), construction of the 4–6 ft tall floodwalls would not create a new migratory barrier. The floodwalls at Ross Creek are only in select locations (at street crossings) and approximately 4 ft tall so wildlife movement should not be significantly hindered.

Under the Low Scope Plan, the floodwalls along Ross Creek would extend the full length of the proposed project area, unlike the select locations proposed under the Combination Plan. However, consistent with the analysis above for Canoas Creek, these floodwalls would not create a new migratory barrier, as they would parallel the channel, existing houses, and backyard fences, which already create a preexisting barrier for wildlife. Other effects discussed above for the Combination Plan would also apply to the Lower Scope Plan, as both plans propose the same measures in Reaches 7 and 8.

Neither the Combination nor the Low Scope would result in the permanent net loss of riparian forest or other sensitive habitat, nor would they cause a substantial degradation of habitat for listed salmonids or other species listed under the ESA Taken together, the proposed alternatives, including the avoidance and minimization measures identified in section 4.5.4 below, would result in short-term less than significant adverse effects during construction, but would have a long-term beneficial effect on biological resources in the study area.

A biological opinion was issued and subsequently supplemented by NMFS for the originally authorized project (Bypass Channel Plan) (Appendix C3). The opinion found that the project and its revisions were not likely to jeopardize continued existence of the threatened Central California coast steelhead. It also found that the project would result in take of listed species and therefore issued an Incidental Take Statement. Temporary impacts to stream temperatures during construction were one of the more significant impacts addressed in the opinions. The supplemental opinion shortened the construction period from 25 to 9 years, and also included several other project changes that were later themselves changed as part of the resource agency coordination process. NMFS has indicated that the existing biological opinion should be sufficient to cover impacts of the Combination or Low Scope Plans. USACE has requested correspondence documenting this decision during public review of the draft report, and will incorporate that documentation into Appendix C3 of the final report.

Operations and Maintenance

After MAMP criteria are met (See Section 6.6 and Appendix C5), operations and maintenance of project features would be required to realize the long-term biological benefits included in the project. The activities required for operations and maintenance of the project features would result in minor ground disturbance from pickup trucks and construction equipment that could cause temporary disturbances to habitat. They also may necessitate the removal of some vegetation that provides habitat in order to maintain the project's target flood capacity and maintain project features. These activities would be necessary to maintain the project's flood risk management benefits and would not cause a change in significance determination for the action alternatives. Any potential mitigation for these operations and maintenance activities would fall under the Valley Water Stream Maintenance Program (Valley Water 2019).

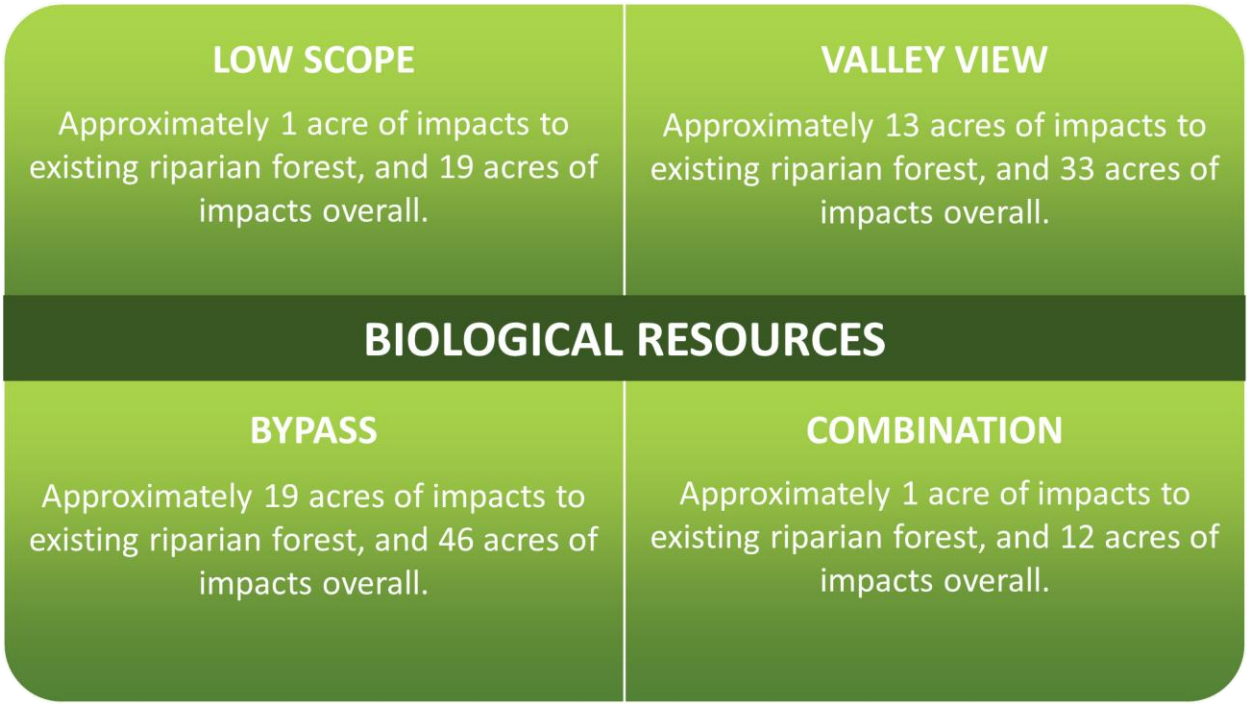
4.5.4 Avoidance and Mitigation Measures

The following measures would be implemented to minimize potential biological effects to less than significant. The measures may include, but would not be limited to, the following:

- The mitigation completed in Reach 10B and 12 is expected to address all mitigation needs of the Combination Plan. The completed mitigation reaches account for 5.6 acres of riparian forest, well over the expected impacts under the Combination Plan (approximately 0.97 acres)

therefore the Combination Plan is covered by the existing mitigation per the USACE's existing permitting agreements.

- Tree and shrub species will be selected that are native to the local riparian system and priority will be placed on locally-sourced plant material. In addition, native plant material will be incorporated into seed mixes of herbaceous plants used for erosion control.
- Best practices shall be put in place to protect fish and wildlife species, including pre-construction biological surveys to document the presence of wildlife species (including nesting birds protected under the Migratory Bird Treaty Act) , and appropriate protection measures to take if species are discovered (e.g., establishing buffers around nests or similar protection areas). Best practices may also include monitoring by a qualified biologist, or a worker education program (i.e., tailgate talks) to highlight the biological resources on site, the protection measures in place, and the proper monitoring and reporting process if issues with biological resources are encountered during construction.
- During construction, Best Management Practices (BMPs) would be implemented to protect biological resources on site and inspected periodically to ensure the BMPs (e.g., exclusion fencing, fish rescues, buffers around nests, protective barriers around trees, invasive species management measures, phytophthora management) are functioning as intended.
- A vegetation protection plan shall be prepared and implemented to protect vegetation that does not need to be removed from inadvertent damage during project construction. This plan would incorporate standard construction practices used and described in the project description and may include things like a pre-construction survey to identify and flag specific trees near or within construction areas that are to be saved. The vegetation protection plan would also account for in advertent or unplanned damages to trees marked for preservation or trees outside the grading footprint that have been affected by project construction.
- The construction schedule will be constrained based on the project biological opinion, which limits in-water work to the period between June 1st and October 15th of any given year, with some exceptions.
- Reasonable and prudent measures from the Biological Opinion related to minimizing instream construction impacts; minimizing impacts to instream and riparian habitat; utilizing a biological monitor during construction; minimizing water quality impacts; and conducting monitoring and reporting would be implemented (Appendix C3).



4.6 Aesthetics and Recreation

The action alternatives would generate temporary, short-term impacts to the aesthetic qualities during construction activities but long-term benefits through enhanced and expanded areas of vegetation and inclusion of a formal trail that improves regional trail connectivity. The aesthetic and recreational resources analysis for the Valley View and Bypass Plans is incorporated by reference from the 1998 FS/EIS/EIR. Since there are negligible differences between the analysis for the Combination Plan and Low Scope Plan for this resource, they are discussed together as the Preferred Action below. The No Action and Preferred Action are assessed in detail below.

4.6.1 Basis of Significance

For the purposes of this analysis, an effect on aesthetics and recreation may be considered significant if an alternative would:

- Substantially and permanently reduce high visual quality views from residences, businesses, or well-traveled roads located near the project;
- Permanently block, disrupt, or remove existing public scenic views or reduce public opportunities to view scenic resources, high-quality views of vegetation, or other elements of the landscape;
- Result in a permanent, substantial decrease or loss of public access to any waterway or public recreational land.

4.6.2 No Action

Under the No Action Alternative, the GRR would not be approved and a new alternative would not be authorized and constructed. As a result the aesthetic and recreation conditions in the study area would likely remain consistent with the existing condition moving forward. The planned trail through the study area, and associated connections to adjacent parks and open space areas might not be implemented as

currently laid out by the City. The visual quality and recreational value would remain largely unchanged, and the Upper Guadalupe River would remain a deeply incised channel at risk of flooding.

4.6.3 Preferred Action

In general, the Combination Plan would provide for expanded riparian habitat along the Upper Guadalupe River and provide for additional opportunities for views of this habitat through the establishment of new recreation trails in Reaches 7 and 8. Currently, the river in Reaches 7 and 8 does not provide any formal public access or recreation opportunities and therefore, the viewers of these reaches are primarily from residents abuting the river channel and transitory views by drivers or pedestrians crossing the river at one of the roadways.

Construction activities would temporarily reduce the visual quality in Reaches 7 and 8. Activities that reduce visual quality include earthwork activities (e.g., clearing, grading, and excavating); building flood control features; siting temporary offices, fences, sanitary facilities, and other structures; building temporary access roads; and establishing staging areas to store equipment, construction materials, excavated material, and debris. Impacts of construction-related activities would terminate following completion of construction, removal of equipment and materials, and cleanup of storage and construction areas.

The removal of mature vegetation in some areas would degrade the natural-appearing aesthetic character of the river corridor in Reaches 7 and 8. The project was designed to leave patches of mature vegetation intact (the "islands" approach) but some removal of riparian vegetation will occur that would reduce the availability of views that viewers find attractive. Short-term impacts on visual resources would result from removal of vegetation along the eastern bank. This near-term impact would be minimized by the additional plantings incorporated as part of the project and by year 5, as planted vegetation is allowed to mature, riparian canopy is expected to recover to pre-project levels. Widening the channel and decreasing the steepness of side slopes would broaden the stream corridor cross section, creating a more open appearance that would substantially alter the stream's present topographic character and return it to a condition that mimics a more natural condition. While there would be temporary effects associated with the construction of the new channel, the implementation of the project would result in long term improvements to the aesthetic character of the river, including by opening up the corridor for more public users to enjoy.

The avoidance and minimization measures included in section 4.6.4 would be implemented to lessen effects to visual resources under the preferred alternative. With establishment of vegetation and appropriate monitoring and maintenance of the plantings, existing views from existing residences would not be permanently reduced, and would be similar to the existing viewshed or improved. Additionally, public views would not be permanently blocked, disrupted, or removed, but would be increased by allowing recreation, and thus public viewing, in areas the public could not previously view. Therefore, aesthetic impacts from the preferred alternative would be less than significant.

Widening the channel and decreasing the steepness of side slopes would broaden the stream corridor cross section, creating a more open appearance that would substantially alter the stream's present topographic character and return it to a condition that mimics a more natural condition. While there would be temporary effects associated with the construction of the new channel, the implementation of the project would result in long term improvements to the aesthetic character of the river, including by opening up the corridor for more public users to enjoy.

There would be no impacts to recreation from implementation of the preferred alternative because there are no formal recreation features in the project area. There would be long term benefits from implementation of the trails in Reaches 7 and 8 by providing recreation access to a portion of the city that currently does not have access to those recreation features. Under the preferred alternative, new trails in

Reaches 7 and 8 will formally allow the public into the river corridor. As the vegetation matures, and the site settles, the natural character and visual appeal of the site should improve for the new trail users. The newly planted trees will provide more shade as they mature, improving comfort levels especially during the summer.

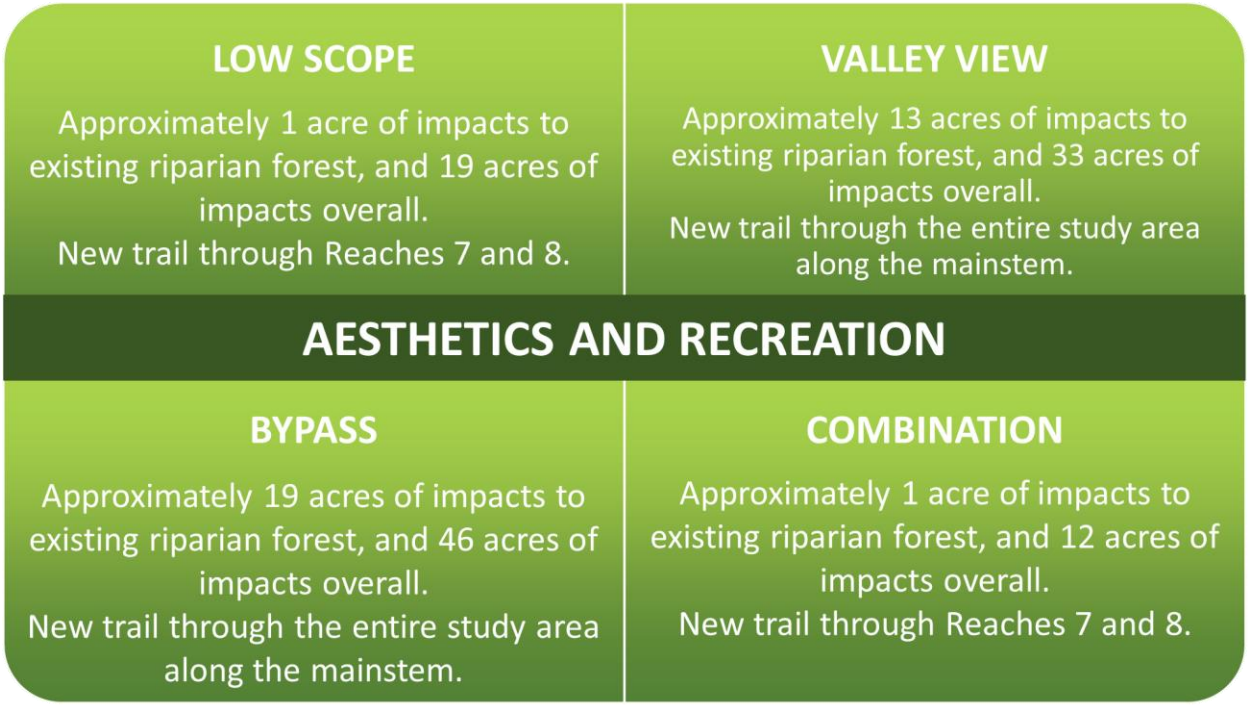
Operations and Maintenance

The activities required for operations and maintenance of the project features would result in minor disturbances from pickup trucks and construction equipment that could cause temporary trail closures and aesthetic impacts. These activities would be necessary to maintain the project's flood risk management benefits and would not cause a change in significance determination for the action alternatives.

4.6.4 Avoidance and Mitigation Measures

Potential impacts to visual and aesthetic quality would be mitigated by successful implementation of the mitigation measures listed below.

- Staging, heavy equipment and construction material storage areas would be located outside visually sensitive areas. If staging areas cannot be located outside visually sensitive areas, these areas would be screened from general viewing.
- Where possible, new structures or alterations to existing structures would blend with their surroundings by using forms, lines, colors, and textures that are consistent with the surroundings. Forms and lines would be broken up to avoid straight edges and forms that are out of scale with their surroundings.
- The design of the project, particularly the structural components such as bridges and walls, where possible incorporate an urban or thematic element reflecting the rich archaeological and cultural history of the area at a reasonable cost. This would include aesthetic treatments, shapes, and forms, and be accomplished through collaboration with urban and city planners and local interest groups during the design phase.



4.7 Noise

The action alternatives would generate temporary, short-term increases in noise levels during construction activities. The noise analysis for the Valley View and Bypass Plans is incorporated by reference from the 1998 FS/EIS/EIR. Since there are neligible differences between the analysis for the Combination Plan and Low Scope Plan for this resource, they are discussed together as the Preferred Action below. The No Action and Preferred Action are assessed in detail below.

4.7.1 Basis of Significance

For the purposes of this analysis, an effect on noise may be considered significant if an alternative would:

- Exceed Federal Transit Authority (FTA) construction noise guidelines criteria of 90 dBA during daytime hours or 80 dBA during nighttime hours at residential receptors;
- result in a readily perceivable difference in traffic noise by causing an increase in existing traffic noise levels of 5 dB or more; or,
- exposure of sensitive receptors to noise levels excessively above acceptable levels in the San José Community Guidelines (Table 30).

4.7.2 No Action

Under the No Action Alternative, the GRR would not be approved and a new alternative would not be authorized and constructed. As a result the noise conditions in the study area would likely remain consistent with the existing condition moving forward. Sound levels typical of the exterior environment surrounding the study area are generated from sources that can be variable, especially from mobile sources such as freeway traffic. Despite this normal variance, the soundscape in the vicinity of the study area would likely not undergo much change in the foreseeable future from sources that are already typically observed, since zoning of the various neighborhoods and commerce centers surrounding the study area are not likely to change.

4.7.3 Preferred Action

Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 dB represents a ten-fold increase in acoustic energy, a 20-dB increase is 100 times more acoustic energy, a 30-dB increase is 1,000 times more acoustic energy, and so on. There is a relationship between the subjective noisiness or loudness of a sound and its decibel level. Each 10-dB increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities (Bies and Hansen 2009). A healthy human ear can typically perceive a 3-dBA change in sound levels, while smaller changes are typically imperceptible (Table 33).

Noise is regulated in the study area through noise ordinances established by the City of San José Municipal Code. Title 20 of the City of San José Municipal Code provides exterior noise standards for specific land-use districts. Noise-level standards vary from a maximum noise level of 60 dBA (decibels on the A-weighted scale) (e.g., residential) to 70 dBA (e.g., industrial or open space next to industrial uses) unless a conditional-use permit is granted. The City of San José Municipal Code does not specify noise exemptions for construction activities (City of San José 2021).

Table 33. Land use compatibility guidelines for community noise in San José.

LAND USE CATEGORY	EXTERIOR NOISE EXPOSURE (DNL IN DECIBELS (DBA)) 55 60 65 70 75 80
1. Residential, Hotels and Motels, Hospitals and Residential Care[1]	
2. Outdoor Sports and Recreation, Neighborhood Parks and Playgrounds	
3. Schools, Libraries, Museums, Meeting Halls, Churches	
4. Office Buildings, Business Commercial, and Professional Offices	
5. Sports Arena, Outdoor Spectator Sports	
6. Public and Quasi-Public Auditoriums, Concert Halls, Amphitheaters	

[1]Noise mitigation to reduce interior noise levels pursuant to Policy EC-1.1 is required.

Normally Acceptable:

- Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable:

- Specified land use may be permitted only after detailed analysis of the noise reduction requirements and needed noise insulation features included in the design.

Unacceptable:

- New construction or development should generally not be undertaken because mitigation is usually not feasible to comply with noise element policies.

Source: San José 2022

In addition to the municipal code, Envision San José 2040 General Plan also has a policy that specifically addresses construction-related noise. Policy EC-1.7 states that the City considers significant construction noise impacts to occur if a project located within 500 feet of residential uses or 200 feet of commercial or office uses would involve substantial noise-generating activities (such as building demolition, grading, excavation, pile driving, use of impact equipment, or building framing) continuing for more than 12 months. (San José 2022)

The Santa Clara County General Plan (1994) sets noise compatibility standards for land use within the county as well as strategies and policies to keep residents free from noise that would affect their health and well-being. Satisfactory noise levels range from 45 to 55 Ldn for residential uses, hotel uses, parks, open space reserves, and wildlife refuges; 65 Ldn for public or semipublic facilities (churches, hospitals, nursing homes, schools, libraries, and civic buildings); 65 Ldn for other non-hotel commercial uses and agricultural uses; and 70 Ldn for industrial uses.

Under the Preferred Alternative,there would be temporary, short-term increases in noise levels in the vicinity of the study area during the construction period. In order to determine the significance of the anticipated noise impacts during construction, a quantitative assessment was conducted to determine noise levels generated by typical construction equipment at various distances from the study area. Initial data was developed of noise levels 50 feet from the source. Then using a logarithmic decay model the sound level at distances of 300 and 600 feet were calculated, which show the attenuation of sound from source levels as they decrease over a distance to sound levels averaging 60 dB, which is the maximum noise level for exterior residential zones in the study area per Title 20 of the City of San José Municipal Code (San José 2021).

Table 34 below displays the results of the assessment, and the sound levels expected to be generated by construction equipment at each distance from the source.

Using the ESRI ArcMap geographic information system (GIS), a land use analysis was conducted looking at a 50-foot, 300-foot, and a 600-foot buffer from the river corridor. Within these buffers the land use was determined as being either business, residential, or public parks. Major streets were generally excluded from the analysis, although smaller residential streets were included in the residential category. As noted in Section 2.7 above, there are five schools located within the 600-foot buffer from the river corridor.

This basic noise analysis shows that none of the noise levels would be expected to exceed the FTA daytime noise threshold of significance, and as noted in the minimization measures below, construction activities would not take place between 7PM and7AM so the nighttime FTA threshold would not be applicable. However, there is potential for land designated for business, residential, and public parks to be exposed to noise levels above the City of San José's guidelines for acceptability of 60 dB. Under the City's guidelines, noise levels up to 75 dB are conditionally acceptable with the implementation of mitigation measures to reduce impacts. Based on the analysis conducted above, though, residents, businesses, and parks within 50 feet of the river corridor would be exposed to sound levels that would be above 75 dB. In order to reduce these levels, USACE would implement the mitigation measures discussed below. With the implementation of the proposed mitigation measures the noise impacts associated with the preferred alternative would be less than significant.

Additional local guidelines consider noise effects that persist for 12 months or more to be significant. Since construction would be limited to outside of the flood season, it is anticipated that this 12-month period would not be exceeded, and therefore this duration impact is considered to be less than significant. Implementation of the mitigation measures discussed below would further reduce these noise effects.

Table 34. Sound levels expected by typical construction equipment.

Equipment	Sound Pressure Level "Noise Level" at 50 ft (dB)	Sound Pressure Level "Noise Level" at 300 ft (dB)	Sound Pressure Level "Noise Level" at 600 ft (dB)
Backhoe	80	64	58
Compactor (ground)	80	64	58
Concrete Mixer Truck	85	69	63
Concrete Pump	82	66	60
Crane (mobile or stationary)	85	69	63
Dozer	85	69	63
Dump Truck	84	68	62
Excavator	85	69	63
Front End Loader	80	64	58
Generator (25 KVA or less)	70	54	48
Generator (more than 25 KVA)	82	66	60
Grader	85	69	63
Pumps	77	61	55
Scraper	85	69	63
Tractor	84	68	62
Average	82	66	60

KVA = kilivolt amps
Source: FHWA

Calculation of Sound Pressure Level (dB):

$$SPL_2 = SPL_1 - 10LOG(r_2/r_1)$$

Where:

SPL_2 = sound pressure level (dB) at distance r_2

SPL_1 = sound pressure level (dB) at distance r_1

r_2 = distance from source

r_1 = distance from source

$r_1 < r_2$

Operations and Maintenance

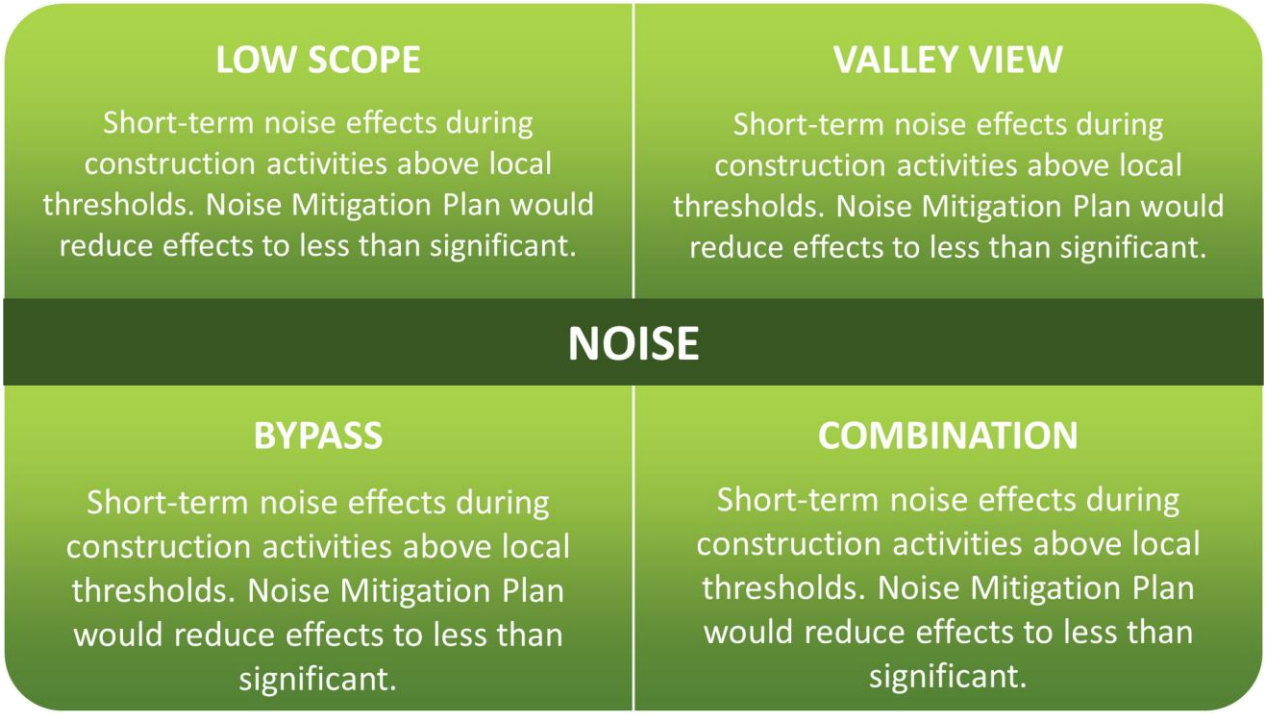
The activities required for operations and maintenance of the project features would result in minor and temporary increases in noise from pickup trucks and construction equipment that could be a nuisance to residents and future trail users. These activities would be necessary to maintain the project's flood risk management benefits and would not cause a change in significance determination for the any of the proposed action alternatives.

4.7.4 Avoidance and Mitigation Measures

Noise control measures would be implemented to minimize potential effects from noise to less than significant. The measures may include, but would not be limited to, the following:

- Construction equipment shall be equipped with manufacturer's standard noise control devices, such as mufflers and/or engine enclosures.
- All construction equipment shall be inspected periodically to ensure proper maintenance and confirm compliance with the Envision San José 2040 General Plan (City of San José, 2022).
- In residential areas, no construction shall occur between the hours of 7:00 p.m. and 7:00 a.m. without approval from the City of San José.

- The use of temporary plywood barriers for noise reduction shall be determined on an individual basis by location, particularly in areas where construction activities would be within 200 feet of residents and other sensitive receptors.
- Pavement breakers shall be used in place of jackhammers.
- Truck routes shall avoid heavily populated residential streets whenever possible. Prioritize use of truck routes identified in the Envision San José 2040 General Plan, and/or commercial and industrial streets (City of San José 2022).



4.8 Transportation

The action alternatives would generate temporary, short-term increases in traffic levels during construction activities. In addition, replacement of bridges and culverts throughout the study area under all action alternatives would require temporary road closures. The traffic analysis for the Valley View and Bypass Plans is incorporated by reference from the 1998 FS/EIS/EIR. Since there are negligible differences between the analysis for the Combination Plan and Low Scope Plan for this resource, they are discussed together as the Preferred Action below. The No Action and Preferred Action are assessed in detail below.

4.8.1 Basis of Significance

For the purposes of this analysis, an effect on transportation may be considered significant if an alternative would:

- Substantially increase traffic in relation to existing traffic load and capacity of the roadway system;
- Substantially disrupt the flow of traffic;
- Expose people to significant public safety hazards resulting from construction activities on or near the public road system;
- Reduce the supply of parking spaces sufficiently to increase demand above supply;

- Cause substantial deterioration of the physical condition of nearby roadways;
- Disrupt railroad services for a significant amount of time.

4.8.2 No Action

Under the No Action Alternative, the GRR would not be approved and a new alternative would not be authorized and constructed. As a result there would be no effects to transportation features in the study area from construction of the proposed alternatives. The study area would remain at risk of flooding, and during severe flood events, roadways in the area would likely be flooded, causing access issues and potentially in some cases, life loss issues as well.

4.8.3 Preferred Action

Under the Combination Plan, there would be the potential for significant effects to transportation services. Widening the river channel would not directly impact any road configuration, however, roads in the study area could see an increase in traffic volumes due to the presence of construction vehicles in the area. Increased traffic volumes could also result in delays to public transit services such as local and frequent bus routes in the area. Light rail service would not be impacted by construction of the Combination Plan, because the VTA trains run on the median of Highway 87, and therefore do not engage directly with vehicular traffic. Additionally, since the Highway 87 bridge does not require improvements associated with the widened river channel, there would be no impact to light rail service in this reach. It is estimated that there will be an average of 130 daily truck loads while hauling material off-site is taking place. For the major arterials of Almaden Expressway and Capitol Expressway, the average daily traffic counts are 60,000 and 51,760, respectively. The traffic from hauling material would cause an approximately 0.2% increase in daily traffic on either of the roads, which would not constitute a substantial increase in traffic load relative to roadway capacity or a substantial disruption to the flow of traffic.

An increase in heavy vehicular traffic, such as haul trucks, could also result in an increase in damage to roadways, primarily from increased potholes and/or debris on roadways. Construction contractors would be required to mitigate any roadway damage by ensuring that debris is cleaned up and any damage to roadways is restored following construction.

As part of the Combination Plan, a portion of the Elks Lodge parking lot would be converted to the river corridor. While this does take parking spaces away from the Elks Lodge facility, it would not decrease regular supply of parking spaces beyond the intermittent need of the facility. As a result, effects to parking supply would be less than significant.

In addition to the potential impacts from hauling and access to the study area, the Combination Plan would require temporary closures of multiple culverts and bridges to construct features associated with the project. In particular, bridge extensions are planned to accommodate the widened Upper Guadalupe River channel in Reaches 7 and 8 at Willow Street, Alma Avenue, and at the CalTrain/UPRR and abandoned UPRR Bridges. The Willow Glen Way bridge in Reach 8 was previously improved by Valley Water and is not anticipated to require further improvements. Additional culvert replacements would be constructed at the Almaden Expressway and Nightingale Avenue crossings over Canoas Creek. On Ross Creek, culvert improvements are proposed for Almaden Expressway, Cherry Avenue, Jarvis Avenue, Meridian Avenue, and Kirk Road.

During construction of these culvert and bridge improvements, it is anticipated that there would be notification, signage, and temporary detours around the area to minimize impacts associated with temporary road closures at these locations. It is also anticipated that the road closures would be offset from each other to ensure that no adjacent road closures occur at the same time. Detours may include the following options:

- **Willow Street** – Westbound vehicles could be detoured from Willow Street to Alma Avenue via Vine Steet. Northbound traffic on the east side of the river could also use Vine Street to access West Virginia Street. Bicycles and pedestrians can use Lick Street to Alma Avenue. Eastbound vehicles could be detoured from Willow Street to Alma Avenue via Lelong Street. Northbound traffic on the west side of the river could also be detoured to Bird Avenue.
- **Alma Avenue** – Alma Avenue detour routes would be the same routes described for Willow Street, only in reverse. When the Alma Avenue bridge is closed, Willow Street would be the primary alternative route over the Guadalupe River.
- **Almaden Expressway/Almaden Road (Canoas Creek)** – As noted above, closure of lanes of Almaden Expressway must be minimized to the maximum extent practicable. As a result, it is anticipated that a full detour would not be necessary during construction of the new culverts at Canoas Creek under the northbound lanes of Almaden Expressway. However, if limited closures are necessary, they would need to occur at non-peak hours or overnight. A detour could likely be provided via the southbound lanes of Almaden Expressway, with appropriate safety measures to enable two-way traffic.
- **Nightingale Drive** – During the replacement of the culvert at Nightingale Drive, a detour could be provided over Canoas Creek at Almaden Road, which runs parallel to, and shares a bridge with, Almaden Expressway. Almaden Road can be accessed on the north side of the creek via Ironwood Drive, and on the south side of the creek via Redbird Road. Additional access directly to Almaden Expressway on the south side of the creek can occur via Wren Drive.
- **Almaden Expressway/Briarglen Drive (Ross Creek)** – As noted above, closure of lanes of Almaden Expressway must be minimized to the maximum extent practicable. As a result, it is anticipated that a full detour would not be necessary during construction of the new culverts at Ross Creek under Almaden Expressway. However, if limited closures are necessary, they would need to occur at non-peak hours or overnight. A detour could likely be provided via the opposite lanes of Almaden Expressway, with appropriate safety measures to enable two-way traffic.
- **Cherry Avenue** – During replacement of the culvert at Cherry Avenue, traffic could be detoured either to Jarvis Avenue to the west, or Almaden Expressway to the east. Southbound traffic can access either Jarvis or Almaden via Hillsdale Avenue. Northbound traffic can access Jarvis or Almaden via Branham Lane.
- **Jarvis Avenue** -- During replacement of the culvert at Jarvis Avenue, traffic could be detoured either to Meridian Avenue to the west, or Cherry Avenue to the east. Southbound traffic can access either Meridian or Cherry via Hillsdale Avenue. Northbound traffic can access Meridian or Cherry via Branham Lane.
- **Meridian Avenue** -- During replacement of the culvert at Meridian Avenue, traffic could be detoured either to Kirk Road to the west, or Jarvis Avenue to the east. Southbound traffic can access either Kirk or Jarvis via Hillsdale Avenue. Northbound traffic can access Kirk or Jarvis via Branham Lane.
- **Kirk Road** -- During replacement of the culvert at Kirk Road, traffic could be detoured either to Ross Avenue to the west, or Meridian Avenue to the east. Southbound traffic should access Meridian Avenue via Hillsdale Avenue. Northbound traffic can access Ross Avenue or Meridian Avenue via Branham Lane.

In addition, there could be temporary disruption to CalTrain or UPRR service during construction of the bridge widening in Reach 7. Prior to construction, USACE would coordinate directly with UPRR and CalTrain to ensure that impacts to the railroad is minimized to the maximum extent practicable. With the implementation of mitigation measures listed below, the effects to transportation from implementation of the Combination Plan would be reduced to less than significant.

Under the Low Scope Plan, the effects to transportation would be consistent with the analysis above for the combination plan, with the exception that there would be slightly less effects under the Low Scope Plan, as the Kirk Road and Meridian Avenue culverts are not proposed to be replaced under this plan.

Similar to the Combination Plan, the mitigation measures described below would be implemented to reduce effects to transportation to less than significant.

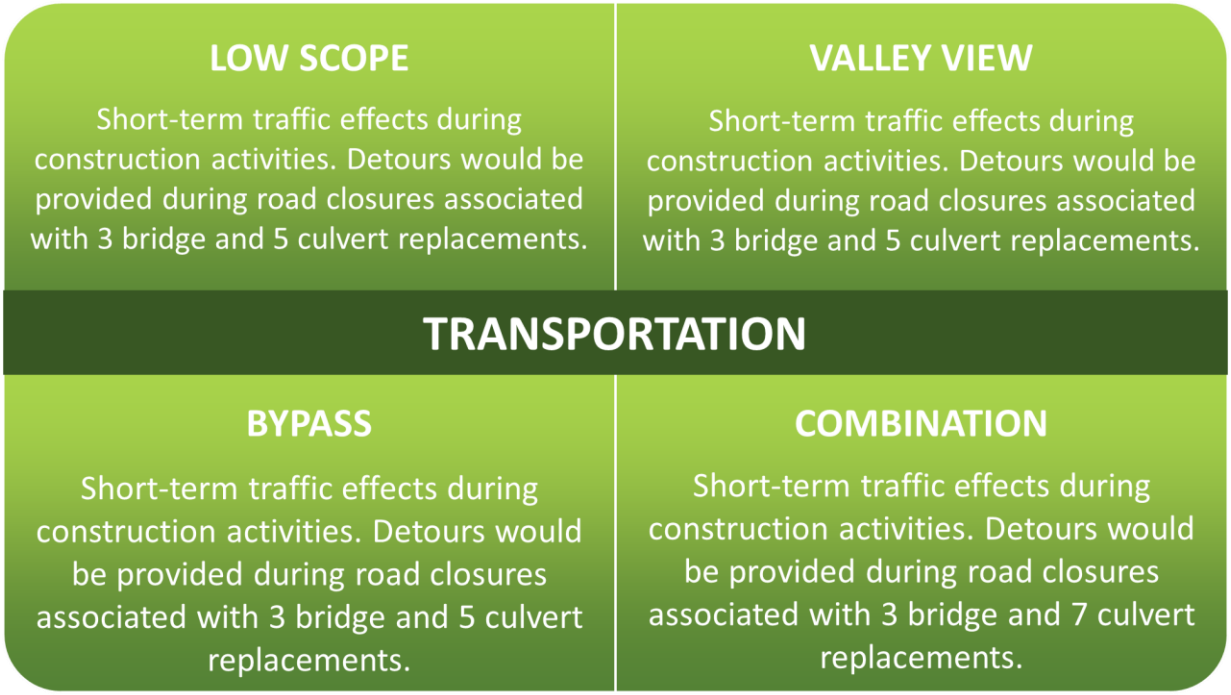
Operations and Maintenance

The activities required for operations and maintenance of the project features would result in minor traffic increases from pickup trucks and construction equipment that would be neglible relative to both construction-related traffic and existing traffic on the area roadways. These activities would be necessary to maintain the project's flood risk management benefits and would not cause a change in significance determination for any of the action alternatives.

4.8.4 Avoidance and Mitigation Measures

Traffic control measures would be implemented to minimize potential effects to less than significant. The measures include, but would not be limited to, the following:

- Prior to construction the contractor shall prepare a detailed Construction Traffic Management Plan, which will be approved by USACE and implemented during construction. The VTA and the City of San José will be invited to participate in development of the plan.
- No two adjacent bridges shall be closed at the same time.
- Traffic management techniques such as the use of barricades and warning signs shall be applied as described in the California Manual on Uniform Traffic Control Devices (Caltrans 2014) and the Manual on Uniform Traffic Control Devices (FHWA 2022).
- Construction haul routes and other measures shall restrict truck traffic on residential streets to only those streets where project activities occur. USACE shall monitor the movements of construction vehicles to ensure that trucks use only the designated routes. Work on or near residential streets shall be limited to between 7:00 A.M. and 6:00 P.M. to prevent night-time disruption to nearby residents.
- The Santa Clara VTA shall be notified in advance of any planned bridge closures. Notification shall occur so that bus lines can be rerouted and disruption to bus schedules can be minimized. The VTA Bus Stop Coordinator will be contacted at least 72 hours prior to the start of any construction work affecting bus stops or transit operations.
- The Corps shall comply with all railroad company regulations and instructions governing railroad operations and property including the following:
  - Use signals and flags for all railroad property, including directing train traffic, as a protection against accidents;
  - Conduct operations adjacent to the railroad facilities and within the railroad right-of-way in such a manner as to maintain structures and other facilities in good and safe conditions; and
  - Construction activities that require track removal and replacement shall be scheduled on weekends or at other times coordinated with the railroad.
- Traffic detours, including bus route detours, shall be established to minimize the disruption of traffic caused by construction. Impacted areas shall be notified regarding alternate traffic and pedestrian routes at least 72 hours prior to the start of construction work. Detours should maximize use of major roadways and trucking routs and generally should follow one of the route options discussed in the effects analysis above.



4.9 Land Use

The action alternatives would result in the permanent conversion of land uses adjacent to the river corridor from the residential and commercial land uses described in Section 2.9 to Open Space, Parklands, and Habitat. The land use analysis for the Valley View and Bypass Plans is incorporated by reference from the 1998 FS/EIS/EIR. Since there are very few differences between the analysis for the Combination Plan and Low Scope Plan, they are discussed together as the Preferred Action below. The No Action and Preferred Action are assessed in detail below.

4.9.1 Basis of Significance

For the purposes of this analysis, effects on Land Use would be considered significant if the alternatives result in:

- Conversion of public open space into urban- or suburban-scale uses;
- Conversion of residential zoned areas to the extent that construction of replacement housing is necessary; or,
- The creation of incompatible land use types.

4.9.2 No Action

Under the No Action Alternative, the GRR would not be approved and a new alternative would not be authorized and constructed. As a result the land use in the study area would not change from the existing conditions. There would be no additional conversion of land use associated with the project if it is not constructed. The previous conversion of lands associated with Valley Water purchasing the real estate for the Bypass Plan is now part of the existing condition in the study area. This past action converted lands adjacent to the river from the various residential and commercial designations to Open Space, Parklands, and Habitat, resulting in vacant properties adjacent to the river which would not be used for project development under the No Action Alternative. The conversion of these lands was covered by the 1998 FS/EIS/EIR and therefore would not constitute a new significant impact under the No Action Alternative.

Any future development of these properties would be required to comply with land use policies and floodplain management criteria.

4.9.3 Preferred Action

Under the Combination Plan, the channel widening measures in Reaches 7 and 8 would require the permanent conversion of properties from residential and commercial uses to Open Space, Parklands, and Habitat, which would be an adverse effect on land use. It should be noted that the Combination Plan does have a significantly lower impact on land use than the Bypass or Valley View Plans. The widening of the river corridor under the previous plans requires land use conversion in Reaches 7 through 12, whereas the Combination Plan only proposes this work in Reaches 7 and 8. This is a reduction of approximately 3.5 miles of river corridor lands that would not change land uses under the Combination Plan versus the Bypass or Valley View Plans.

All lands required for construction of the action alternatives are adjacent to the waterways in the study area. Lands converted under the project would contribute to an increase in the size of the river corridor and create additional parklands allowing for the incorporation of trails and recreational use of the area. There would be no incompatible uses created as a result of this land conversion. As a result, there would be no effect from incompatible use associated with the preferred action.

Valley Water initiated the acquisition of these properties over the past few decades, in anticipation of constructing the previously authorized project. The footprint of the Combination Plan would not include any additional properties in Reaches 7 and 8 beyond those identified and assessed in the 1998 FS/EIS/EIR. Nearly 75% of the properties needed for construction of the Combination Plan have already been acquired by Valley Water, with approximately 25% remaining for conversion in the future. With the majority of these properties already acquired and only limited individual parcels remaining, the land acquisition would not result in conversion of residential zones substantial enough to require additional or replacement housing to be provided for the community, and effects to land use associated with the loss of residential zoning would be less than significant.

All property acquisitions would be conducted in compliance with Federal and State relocation laws, and relocation services would be accomplished in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1960. This law requires that appropriate compensation be provided to displaced residential and nonresidential landowners and tenants, and that residents are relocated to comparable replacement housing and receive relocation assistance. By complying with these relocation laws, and providing appropriate compensation to impacted landowners, this effect would be less than significant, with mitigation measures.

The construction footprint for the Combination Plan at Ross and Canoas Creeks is slightly longer than under the Bypass and Valley View Plans, as the proposed floodwalls on Canoas Creek would be longer under the Combination Plan, and there would be additional culvert replacements at the road crossings further upstream on Ross Creek. However, it is not anticipated that any properties would need to be acquired for the construction along the Creeks, and there is not expected to be any permanent conversion of land uses in these areas. As a result, impacts to land use along Ross and Canoas Creek would be less than significant.

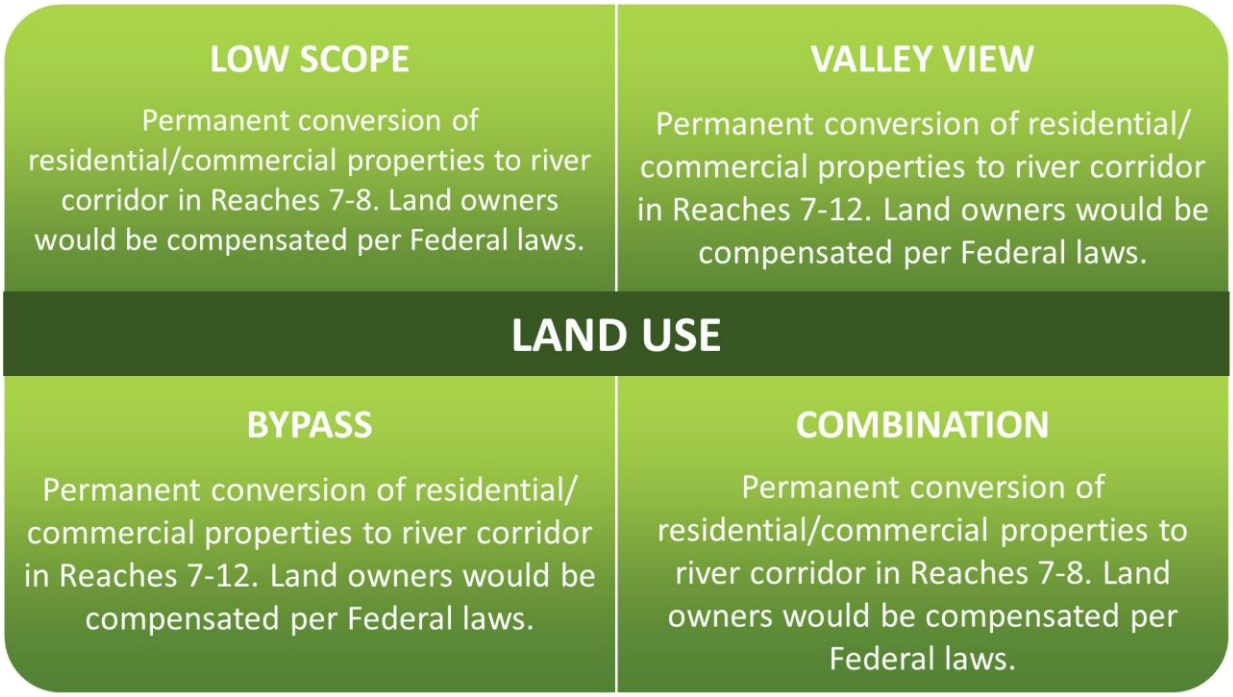
The Low Scope Plan differs from the Combination Plan on both Ross and Canoas Creeks. The proposed floodwalls on Canoas Creek do not incorporate the additional length that was added for the Combination Plan and are consistent with the floodwall footprint under the Bypass and Valley View plans. The proposed floodwalls on Ross Creek are also consistent with the lengths proposed for the Bypass and Valley View Plans, whereas they are proposed to be more intermittent under the Combination Plan. Regardless of these differences, there would be no conversion of land use types along Ross and Canoas Creeks, and therefore the impacts from these differences would be less than significant.

Operations and Maintenance

The activities required for operations and maintenance of the project features would result in minor disturbances from pickup trucks and construction equipment that would not result in any further changes to land use. These activities would be necessary to maintain the project's flood risk management benefits and will not cause a change in significance determination for any of the action alternatives.

4.9.4 Avoidance and Mitigation Measures

As discussed above, compliance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1960, and any associated compensation for properties needed to construct the Combination Plan, would mitigate effects to land use to less than significant.



4.10 Public Services and Utilities

The action alternatives would generate temporary, short-term service interruptions to surrounding areas construction activities during construction and relocation of utilities. The public services and utilities analysis for the Valley View and Bypass Plans is incorporated by reference from the 1998 FS/EIS/EIR. Since there are negligible differences between the analysis for the Combination Plan and Low Scope Plan, they are discussed together as the Preferred Action below. The No Action and Preferred Action are assessed in detail below.

4.10.1 Basis of Significance

For the purposes of this analysis, effects on public services and utilities would be considered significant if the alternatives:

- Interfere with emergency response plans or emergency evacuation plans;
- Result in inadequate emergency access or impediments to emergency services;
- Result in the net reduction in utility services provided, or

- Result in the net increase in public services required.

4.10.2 No Action

Under the No Action Alternative, the GRR would not be approved and a new alternative would not be authorized and constructed. As a result there would be no effects to public services and utilities near the study area. High velocities within the deeply incised channels of the Upper Guadalupe River would remain a deeply incised channel at risk of flooding. The study area would continue to flood on a regular basis causing flood damages to residential and commercial areas requiring emergency response and creating difficulties for first responders to provide assistance through flooded areas.

4.10.3 Preferred Action

The City of San José (City) Emergency Operations Plan (EOP) (2019) provides an overview of the jurisdiction's approach to emergency operations and identifies flooding as a hazard of concern with medium risk. To provide planning support to the EOP the City has developed Support Annexes for each of the critical functions the City must manage, coordinate, and/or perform following an emergency. The Evacuation Support Annex describes the overall process of conducting mass evacuations and re-entry during an emergency or large-scale disaster. In the City of San José, evacuation is the responsibility of the San José Police Department, with significant support from many other departments. As the lead, the Police Department is responsible for coordinating, delegating, and/or overseeing evacuation activities with the understanding that supporting departments responsible for an aspect of evacuation will perform their duties as directed. The Combination Plan would not interfere (no impact) with implementing the EOP or the evacuation procedures.

Security problems requiring police protection may arise following implementation of the new trail, which would increase public access to the site. However, unauthorized access to the channel (i.e., encampments) is expected to remain relatively the same. Several encampments exist throughout the study area and the number of encampments may increase with easier access to the channel, but may also be deterred by increased numbers of recreational trail users. The presence of a public trail may also facilitate the ability to patrol the area, and therefore discourage established encampments or other unwanted activity; however, anecdotal evidence from Valley Water suggests this is not the case (Diez, pers. Comm. 2022). Unwanted activity that sometimes results from encampments in the riparian corridor include trash, biowaste, and other hazardous materials into the channel affecting aesthetics, the trail user experience, safety (real or perceived), and habitat value. Valley Water does not have enforcement patrol abilities and depends on coordination with local law enforcement to address encampments on Valley Water property before clean up actions can be implemented.

Following completion of the flood control project, the overall effect on fire service would be beneficial. Fire responses would not be subject to the difficulties and delays currently encountered in these areas due to flooding and companies operating in these areas would likely be more efficient in their emergency and firefighting responsibilities (Osby 1990). Presence of encampments could result in occasional fires, but that risk is not expected to be more than existing conditions.

Impacts to traffic and circulation could result in short-term adverse impacts to first response timeframes or temporarily increase need for first response. During construction, the project is anticipated to temporarily impede traffic and circulation around the construction zone, and occasional trespassing in vacant land and within the construction zone, and incidental events could warrent police services. During construction, response times for fire protection would be temporarily increased (by approximately 1 minute) in some areas. Management of bridge closures and establishment of detours during construction, which would reduce this impact to less than significant, are discussed in Section 4.8.4 (Transportation).

During construction, a number of utilities such as stormwater infrastructure (e.g., outfalls, gravity mains, pump stations, storm lateral lines) and PG&E power poles would require retrofitting or relocation. Underground utilities such as gas and power lines would require relocation during channel and bridge construction. Relocation of utilities may result in significant short-term service interruptions to surrounding areas. No impacts to solid waste services are anticipated as a result of this project.

With implementation of the avoidance and mitigation measures proposed below, the preferred alternative would have less than significant effects on public utilities and services.

Operations and Maintenance

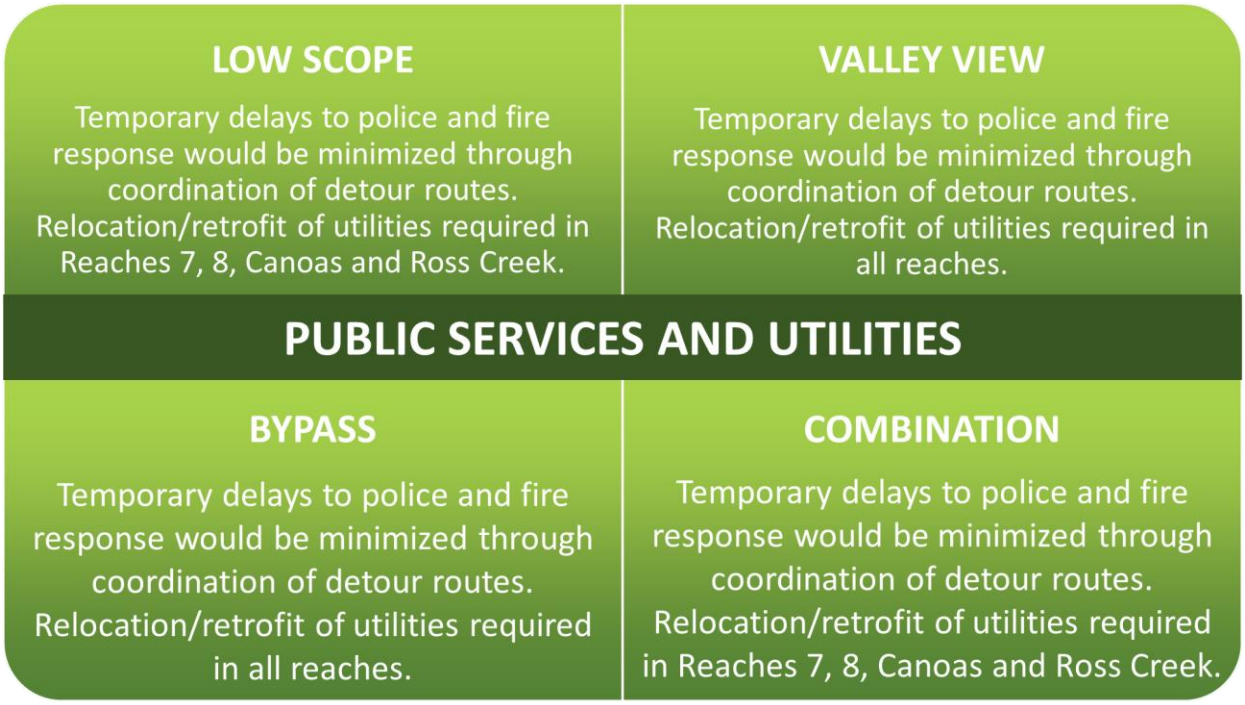
The activities required for operations and maintenance of the project features would result in minor disturbances from pickup trucks and construction equipment that could cause temporary impacts similar in nature to those from the construction effort. These activities would be necessary to maintain the project's flood risk management benefits and would not cause a change in significance determination for any of the action alternatives.

4.10.4 Avoidance and Mitigation Measures

Impacts to public service and utilities identified above would be reduced to a less-than-significant level with implementation of the following recommended mitigation measures.

- During the construction period, the City of San José Police Department would be notified regarding road closures or other activities that would be likely to impede delivery of police, fire or other emergency response services. Detours would be coordinated with emergency services to ensure that no unanticipated delays would occur. Contact would also be made with the Crime Prevention Unit to ensure that the project site and residents in the vicinity are visible and accessible by emergency vehicles. The City's Fire Department requests similar notice of road closures during the construction period. The Department would need a 60-day advance notice to plan for modified responses to accommodate the constrictions or road closures. County Communications would also be notified of all road closures.

- Appropriate notification and coordination would be undertake with utility companies to reduce impacts from services interruptions to less than significant. Whenever utilities are moved or modified, a Utility Excavation Permit must be obtained from the San José Public Works Department prior to the initiation of project construction. The general conditions and requirements of such permits include the project's working hours, necessary traffic control devices, trench backfill and pavement restoration methods and coordination with other construction projects in the general vicinity. In addition, both standard and special encroachment permits would need to be secured from the department. Utility excavation permits would be issued to utility companies with franchise agreements with the City of San José (Khouzam 1990). Relocation of utilities would be coordinated with the appropriate utility company. All utilities relocation would be performed by the appropriate utility company unless directed otherwise by the company. Any damage to utilities would be repaired.



4.11 Cultural Resources

The action alternatives could alter, damage, or destroy cultural resources during project implementation and construction activities. The cultural resources analysis for the Valley View and Bypass Plans is incorporated by reference from the 1998 FS/EIS/EIR. Since there are negligible differences between the analysis for the Combination Plan and Low Scope Plan, they are discussed together as the Preferred Action below. The No Action and Preferred Action are assessed in detail below.

4.11.1 Basis of Significance

The analysis for cultural resources in this NEPA document was coordinated with Section 106 of the National Historic Preservation Act (NHPA) which requires Federal agencies to consider the effects of a proposed undertaking on properties that have been determined to be eligible for listing or are listed in the NRHP.

An effect to a cultural resource would be considered significant if it rose to the level of an adverse effect, as defined under Section 106 of the NHPA. Section 106 outlines the process in which Federal agencies are required to determine the effects of their undertakings on historic properties. Analysis of the potential impacts was based on evaluation of the changes to historic properties within the area of potential effects (APE) that would result from implementation of the project.

Following the Section 106 process to identify historic properties under the NHPA, the APE is defined under 36 CFR § 800.16 as the geographic area where the undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE currently covers Reaches 7 to 12 as well as Ross and Canoas Creek. The APE is expected to be refined in consultation with SHPO based on the footprint of the Combination Plan, with the horizontal extent and vertical depth of the geographic boundary to match areas where ground-disturbing activity will occur.

In making a determination of the effects to historic properties, consideration was given to:

- specific changes in the characteristics of historic properties in the study area;
- the temporary or permanent nature of changes to historic properties;
- the introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's historical features; and
- the existing integrity considerations of historic properties in the study area and how the integrity was related to the specific criterion mentioned in Section 2.11.3 that makes a historic property eligible for listing in the NRHP.

The threshold also applies to any cultural resource that has not yet been evaluated for its eligibility to the NRHP or if the proposed action disturbs a TCP. Potential impacts to cultural resources may be the result of physically altering, damaging, or destroying all or part of a resource, altering characteristics of the surrounding environment by introducing visual or audible elements that are out of character for the period the resource represents, or neglecting the resource to the extent that it deteriorates or is destroyed. Analysis considers both direct and indirect impacts. Direct impacts refer to the causality of the effect to historic properties.

This means that if the effect comes from the undertaking at the same time and place with no intervening cause, it is considered "direct" regardless of its specific type (e.g., whether it is visual, physical, auditory, etc.). Indirect impacts to historic properties are those caused by the undertaking that are later in time or farther removed in distance but are still reasonably foreseeable. Any adverse effects on historic properties are considered to be significant. Effects are considered to be adverse if they alter, directly or indirectly, any of the characteristics of a cultural resource that qualify that resource for the NRHP so that the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association is diminished.

Due to the study area being situated in an alluvial environment with a high likelihood of historic properties being buried underneath alluvial deposits, USACE will implement a Programmatic Agreement pursuant to 36 CFR 800.16(a)(1) along with a Tribal Cultural and Archaeological Monitoring Treatment Plan before construction occurs. The document will be developed in collaboration with Section 106 consulting parties and tribes to agree upon avoidance, minimization, and mitigation measures for buried historic properties that remain undocumented at this time. This agreement document and cultural reources treatment plan will resolve potential adverse effects for unanticipated historic properties discovered during construction and thus any impacts to cultural resources would be less than significant.

The Programmatic Agreement will also allow the USACE and Valley Water to defer further identification efforts into the design phase of the study. Subsurface testing as well as ground-penetrating radar and cadaver survey dogs will be explored to determine the potential location of buried historic properties and to ensure the preferred action alternative can avoid the resource.

4.11.2 Section 106 Tribal Consultation

A formal Section 106 letter was sent to Tribes identified through the NAHC on March 4th, 2022, inviting them to be a Section 106 consulting party and to aid in the identification of historic properties, TCPs, or significant resources with traditional, cultural, or religious importance to them within the study area. Tribal consultation is currently ongoing. The latest Section 106 letter sent to tribes was on October 4th, 2022. The letter invited the tribes to consult and to review USACE's updated identification efforts. The letter proposes to develop a Programmatic Agreement to defer further identification efforts along with a finding of effects during the design phase of the study and before construction occurs.

USACE consulted with the Ohlone Indian Tribe early on May 5th, 2021 and November 12th, 2021, and during a Resource Agency Working Group Meeting held on July 28th, 2022. Chairman Andrew Galvan

from the Ohlone Indian Tribe confirmed the area was culturally significant and that USACE and Valley Water should expect significant cultural resources to be uncovered from any ground-disturbing work near the river banks. Future testing efforts was also recommended to determine the presence or cultural sites before construction occurs.

USACE consulted with the Tamien Nation on September 27th, 2022, providing a high level overview on the project goals along with the planning timeline. Chairwoman Quirina Luna Geary from the Tamien Nation mentioned a traditional trail used by the Tamien and neighboring Ohlone tribes for thousands of years leading to the San Francisco Bay that USACE should consider in its cultural resources inventory. Chairwoman Geary also mentioned that Tribal and archaeological monitoring was necessary, however subsurface testing would potentially create an impact for cultural resources. Based on this input, USACE and Valley Water will consider non-disturbing methods of survey, such as ground penetrating radar or cadaver dogs to identify sensitive cultural sites buried underneath the river banks.

The consultation also identified opportunities for the Tamien Nation to be involved in signage and education based on the recreational features being proposed, along with the opportunity for the Tamien Nation to select certain culturally significant native plants to enhance and restore with the Upper Guadalupes wetland habitats. For example, certain willow types were identified as a useful resource in their traditional gathering practices, along with tule roots which are edible for the tribe and viewed as a filter for keeping their ancestral waterway clean. The waterway was also viewed as a living being and should be addressed as such within the cultural impact analysis. USACE is continuing consultation with tribes, with the goal of inviting them to be concurring parties to the Programmatic Agreement and critical partners in developing the Tribal Cultural Archaeological Monitoring and Treatment Plan.

4.11.3 No Action

Under the No Action Alternative, the GRR would not be approved and a new alternative would not be authorized and constructed. As a result, there would be no ground-disturbing activities. The likelihood for construction disturbing or uncovering unanticipated cultural resources would not be present. High velocities within the deeply incised channels of the Upper Guadalupe River would increase the risk of erosion and expose or wash away cultural deposits or ancestral remains associated with any buried precontact or historic period sites. Exposure of such sites to the public can also put them at risk of being vandalized or looted.

4.11.4 Preferred Action

The area of ground disturbance for the Preferred Action alternative follows the centerline of the Upper Guadalupe River in Reaches 7 and 8 along with Canoas and Ross Creek with a 100-foot buffer on both sides of the river to account for ground-disturbing work from project activities. No historic properties were identified within the horizontal and vertical footprint of the Combination Plan.

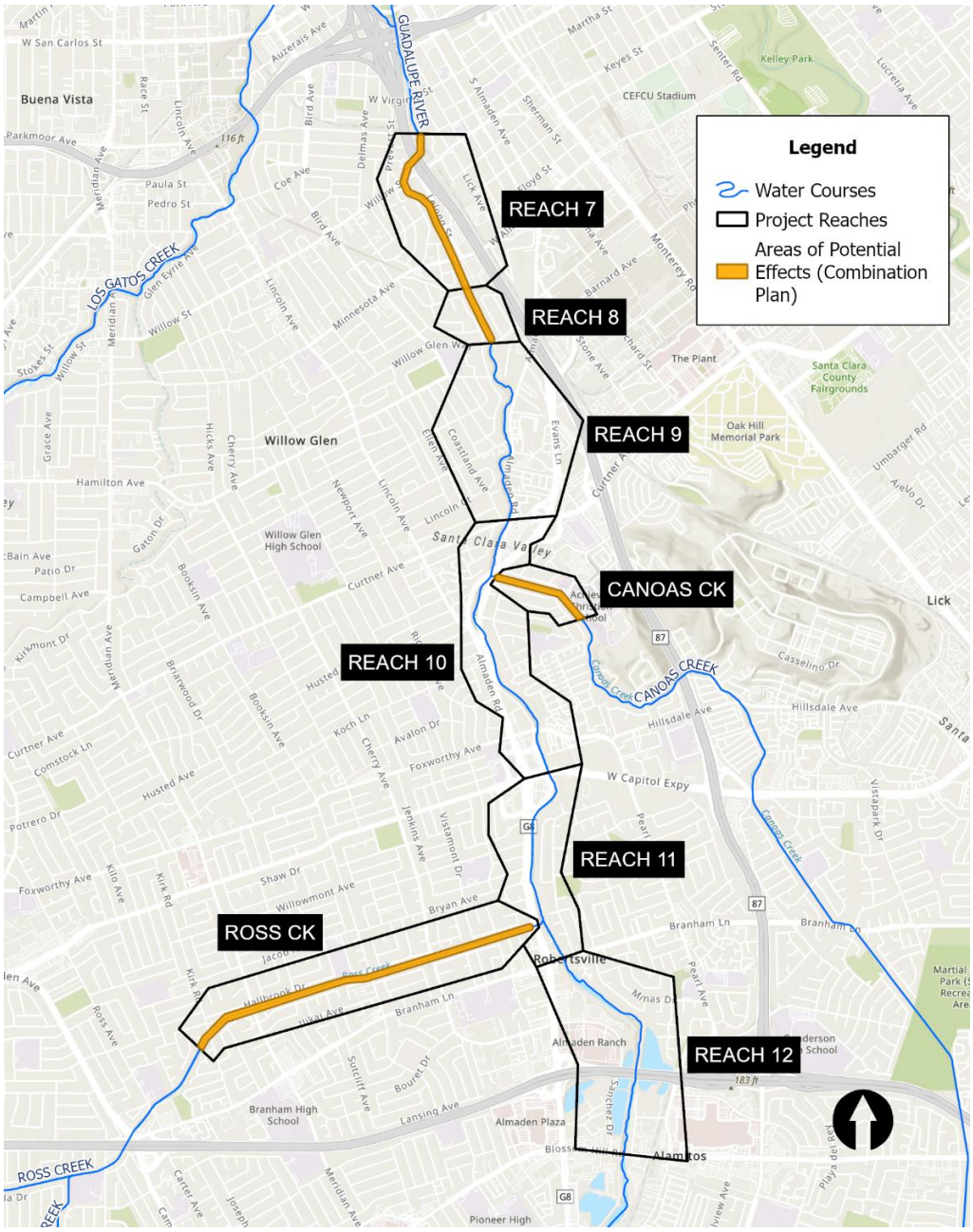


Figure 40. Ground disturbance expected based on the footprint of the Preferred Action alternative.

Under the Combination Plan, ground-disturbing work from widening of the banks, implementing new bypass channels across an expanded floodplain, gravel augmentation, and culvert replacement will involve deep excavation which may alter the characteristics or existing integrity of a historic property. Buried archaeological sites and cultural resources face potential direct impacts from project activities physically altering, damaging, or destroying a site that could be considered eligible as a historic property for the NRHP. Such an impact from ground-disturbing work would be considered an adverse effect and significant impact, if it were to occur.

Although no previously recorded historic properties were identified within the surfaces and subsurface of the preferred action alternatives footprint, that does not preclude buried cultural resources still being situated within areas of ground disturbance. Buried sites may lie underneath areas of fill or alluvial

deposits and could be evaluated as a historic property for the NRHP based on their contributions to understanding the past as well as retaining cultural and traditional significance to the Tamien and neighboring Ohlone people. These buried historic properties can be characterized as precontact burial sites, village settlements, occupational sites, and sacred sites. However, the programatic agreement and cultural reources treatment plan, and the associated components described in the avoidcance and mitigation measures section 4.11.5 below, would avoid potential adverse effects for unanticipated historic properties discovered during construction and thus any impacts to cultural resources would be less than significant.

The Low Scope Plan has a consistent ground disturbance area as the Combination Plan and is not anticipated to result in any further effects to cultural resources beyond those identified above.

Operations and Maintenance

The activities required for operations and maintenance of the project features would result in minor disturbances from pickup trucks and construction equipment that could cause temporary impacts similar in nature to those from the construction effort. There will not be further ground disturbing activities outside of the construction grading footprint. These activities would be necessary to maintain the project's flood risk management benefits and would not cause a change in significance determination for any of the action alternatives.

4.11.5 Avoidance and Mitigation Measures

The inadvertent discovery of archaeological sites and physical disturbance from project activities represents a significant impact. Adverse effects as outlined in Section 4.11.1 from the Preferred Action alternative would include ground-disturbing work that can physically alter, disturb, or destroy an unanticipated archaeological sites integrity, if determined to be an eligible historic property for the NRHP. To reduce this impact to less than significant levels, USACE will ensure that archaeological and tribal monitors are present to halt construction for such a discovery and evaluate its historic significance and eligibility for the NRHP. A Tribal Cultural and Archaeological Monitoring Treatment Plan (TCAMTP) will be developed with concurring parties as well as the SHPO. Avoidance, minimization, and mitigation measures for certain types of cultural resources discovered during construction will be included in the TCAMTP and be developed collaboratively with concurring parties. The implementation of a TCAMTP as well as having monitors present during ground-disturbing work reduces the significant impact to unanticipated cultural resources buried within the footprint of the Combination Plan to less than significant.

To address the overall cultural sensitivity of the Upper Guadalupe area, USACE will develop and implement a Programmatic Agreement to defer additional identification efforts and resolution of adverse effects for the Preferred Action alternative to the design phase of the study and before construction occurs. The Programmatic Agreement commits USACE and Valley Water to additional identification efforts before construction occurs. All Section 106 consulting parties will be invited as concurring parties to the Programmatic Agreement, including historic organizations as well as the Tamien and neighboring Ohlone tribes.

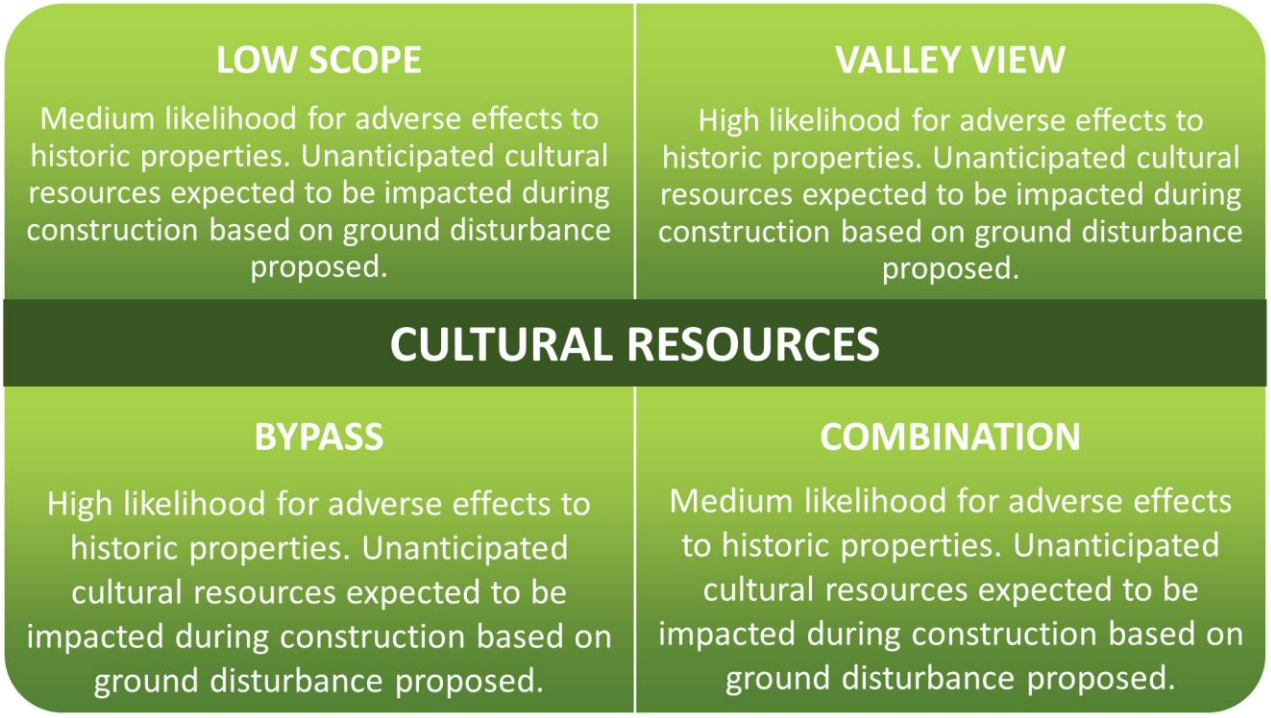
All ground-disturbing work will require an archaeological monitor and tribal monitor to be present. Monitors will have the authority to temporarily halt construction in the event of an inadvertent discovery. The archaeological monitor will maintain a work log for each monitoring day including the date and time of work, area of work, soil unit monitored, type of work and equipment present, construction activities performed, archaeological finds observed (if applicable), and representative photos of areas being monitored. The monitors will also provide pre-construction training for all construction personnel focusing on the potential for exposing archaeological sites and procedures for unexpected discoveries.

If previously unknown archaeological resources or components of previously documented archaeological resources are encountered during monitoring, the archaeological monitor will follow the procedures established in the TCAMTP. A temporary 100-foot buffer will be placed around the discovery along with clearly marked temporary fencing. No earth moving activities are allowed inside the area before completing the post-review discovery process.

If precontact cultural materials are discovered during monitoring, a tribal monitor will be alerted to provide recommendations. If the find is archaeological, both archaeological and tribal monitors will contact USACE to follow the discoveries process outlined in the Programmatic Agreement and TCAMTP pursuant to 36 CFR § 800.13(a)(1).

The inadvertent discovery of human remains and associated funerary objects may also be discovered and represents a potential impact. If any discoveries are made of human remains or funerary objects, monitors will direct construction crew to stop ground-disturbing activities within a 100-foot radius of the find. Protective measures agreed upon with tribes within the TCAMTP will be followed until a qualified archaeologist and tribal monitor can provide an assessment before contacting the County Coroner.

Based on the Coroner's determination of the human remains being Native American associated, USACE will notify the NAHC who will appoint a Most Likely Descendent (MLD) to complete their inspection and make a recommendation or preference for treatment of their ancestral remains (Public Resources Code Section 5097.98). The development and implementation of a burial recovery plan will be developed between USACE, the MLD, and Valley Water. This process will be included in the TCAMTP and would reduce the potential for significant impacts to burial sites and ancestral remains to less than significant levels.



4.12 Hazardous Materials

The hazardous materials resources analysis for the Valley View and Bypass Plans is incorporated by reference from the 1998 FS/EIS/EIR. Since there are very few differences between the analysis for the

Combination Plan and Low Scope Plan, they are discussed together as the Preferred Action below. The No Action and Preferred Action are assessed in detail below.

4.12.1 Basis of Significance

For the purposes of this analysis, effects resulting from project construction or operation that would be considered significant include:

- Public exposure to hazardous waste encountered in soils or groundwater from project construction activities.
- Contaminant migration into the river or other sensitive areas due to exposure of subsurface contamination during project construction.
- Project construction or operation inhibiting investigative or remedial actions at known hazardous waste sites within the project alignment.

4.12.2 No Action

Under the No Action Alternative, the GRR would not be approved and a new alternative would not be authorized and constructed. As a result there would be no effects to hazardous sites and materials near the study area. High velocities within the deeply incised channels of the Upper Guadalupe River would continue to erode mercury-containing soils and transport them to San Francisco Bay.

4.12.3 Preferred Action

Under the Combination Plan, there would be extensive excavation of a floodplain bench in Reaches 7 and 8, as well as other ground-disturbing activities that could expose the public to hazardous sites if they were located within the excavation footprint. Following a review of the sites identified in Figure 22 above, there are no known hazardous sites located within the Combination Plan grading footprint, and thus the project would have no effect on these sites. There would be no increase in risk of public exposure to these sites as a result of the project.

Due to the ubiquitous nature of mercury-containing soils in the watershed, the project will not be able to avoid handling these soils. Generally, the strategy for the Combination Plan is to leave the soils with highest mercury concentrations undisturbed if possible, and if not, then use them in permanent placement sites within the project footprint (outside of the floodplain) where exposures can be limited, potentially with the use of cover fill and vegetation. During the design phase, the PDT will seek out beneficial use opportunities where possible, but for conservative cost assumptions the PDT has assumed that any excavated material not permanently placed on-site will need to be hauled to an appropriate landfill. The air quality analysis has incorporated trucking the fill to a Class II landfill in Pittsburg, CA as a conservative assumption. Some of the material could be suitable for placement as foundation material at the South San Francisco Bay Shoreline Project or at the South Bay Salt Ponds Restoration Project. Potential locations for placement of some the soils with higher mercury concentrations include a levee at Ogier Ponds near Anderson Dam and a lagoon closure project at the City of San José's Regional Wastewater Facility. All soils will be placed in accordance with applicable regulations. The PDT has been coordinating these issues with the Water Board, but will need to conduct more soil sampling and additional design work prior to development of a final placement plan and agreement with agencies. Taken together, these measures, along with the avoidance and mitigation measures below, will ensure that the public and sensitive environmental receptors have limited exposure to mercury-containing soil, resulting in a less than significant effect.

The Bypass and Valley View plans have significantly more excavation and although soils testing has not been done for most of Reaches 9, 10 and 11, it can be assumed that these plans would need to deal with an even greater quantity of mercury-containing soils. The Low Scope Plan has a consistent grading

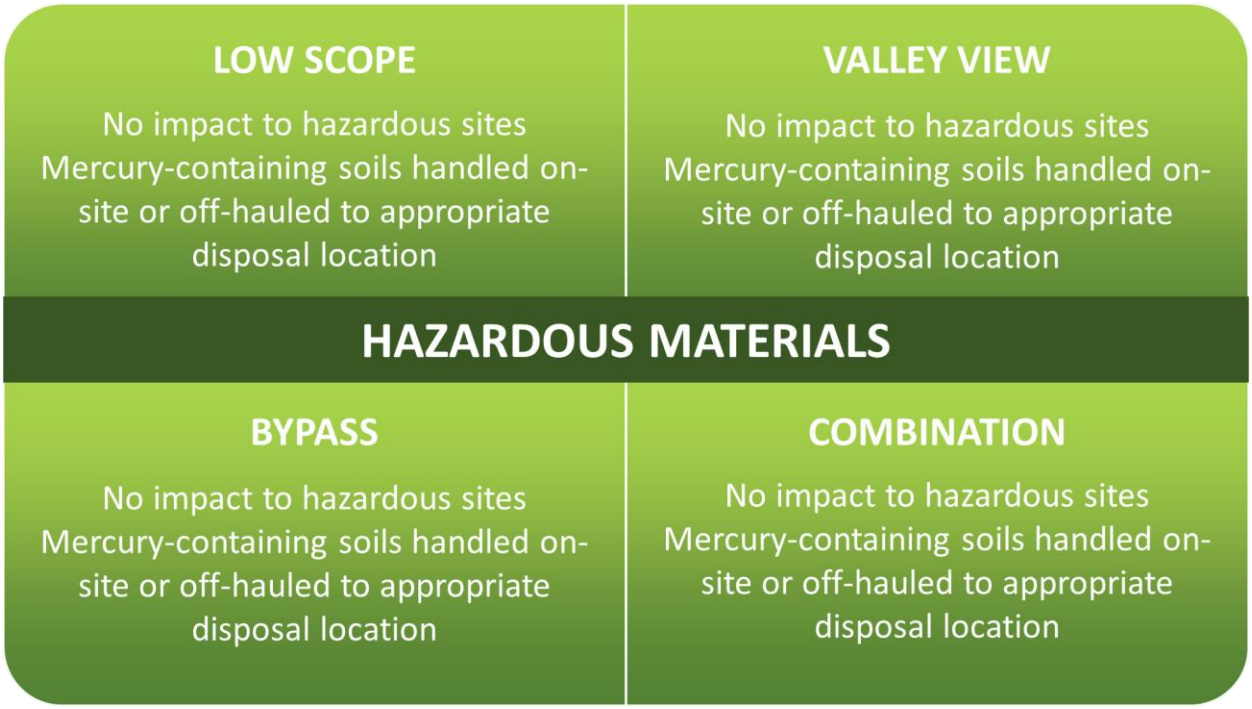
footprint with the Combination Plan and therefore would have consistent effects with those discussed above.

Operations and Maintenance

The activities required for operations and maintenance of the project features would result in minor disturbances from pickup trucks and construction equipment that could cause temporary impacts similar in nature to those from the construction effort. These activities would be necessary to maintain the project's flood risk management benefits and would not cause a change in significance determination for any of the action alternatives.

4.12.4 Avoidance and Mitigation Measures

- Minimize excavation footprint in locations with high mercury concentrations to the maximum extent practicable.
- Seek beneficial reuse opportunities to the maximum extent practicable.
- Conduct confirmatory testing during design phase and implement ways to reduce exposures to elevated mercury concentrations.
- If leaving soil on-site that has total mercury concentrations higher than 15 mg/kg, it will be covered with at least 3 ft of soils with mercury concentrations less than 15 mg/kg. 15 mg/kg is used as a threshold because it is listed in the Water Board's environmental screening levels as being harmful to freshwater organisms.



4.13 Public Safety

The public safety analysis for the Valley View and Bypass Plans is incorporated by reference from the 1998 FS/EIS/EIR. Since there are very few differences between the analysis for the Combination Plan and Low Scope Plan, they are discussed together as the Preferred Action below. The No Action and Preferred Action are assessed in detail below.

4.13.1 Basis of Significance

For the purposes of this analysis, effects on public safety would be considered significant if the alternatives result in:

- New substantial public safety hazards.

4.13.2 No Action

Under the No Action Alternative, the GRR would not be approved and a new alternative would not be authorized and constructed. As a result there would be no construction-related public safety impacts. The existing potential for public safety impact from flooding and unauthorized access would remain the same as the existing condition. The study area would continue to flood on a regular basis causing flood damages to residential and commercial areas.

4.13.3 Preferred Action

Public safety concerns of the preferred alternative would be associated with the following: 1) temporary hazards related to construction activities in and around residential and commercial areas, and 2) potential hazards associated with public access to the river channel corridor after completion of the project.

Public access and unauthorized entry into project construction areas might result in public safety hazards, despite existing limitations on access to the channel. Rivers and canals are an attractive nuisance to children and unsupervised entry to the river and other flood control facilities could result in injury or death including to unsheltered communities in the floodplain.

Construction in and adjacent to roadways, bridges and pedestrian walkways could create hazards for passing vehicles and pedestrians. Constricted roadways, large construction vehicles, and detours could present traffic hazards.

The Combination Plan would include development of a recreational trail within the floodway of Reaches 7 and 8, which would encourage public access along the river. Public access off the trail would be deterred except at designated locations where picnic tables and other public facilities (e.g., rest rooms, drinking fountains, a par course, interpretive signs, and benches) may be located. After project completion, public safety hazards could result from newly opened public access offering greater potential for unauthorized entry into the river channel and other flood control facilities. Public safety issues could result from increased public accessibility and possible unauthorized entry into the river channel and associated flood control facilities, such as culverts. Culvert and bypass inlets and outlets that are accessible to the public could create an attractive nuisance which could result in misdemeanors and potential injuries. This effect would be reduced to less than significant with implementation of the mitigation measures described below in Section 4.13.4.

Moreover, completion of the project would have an overall positive effect on public safety by reducing flooding hazards in the Upper Guadalupe River corridor. Therefore, the preferred alternatie would have less than significant effects on public safety.

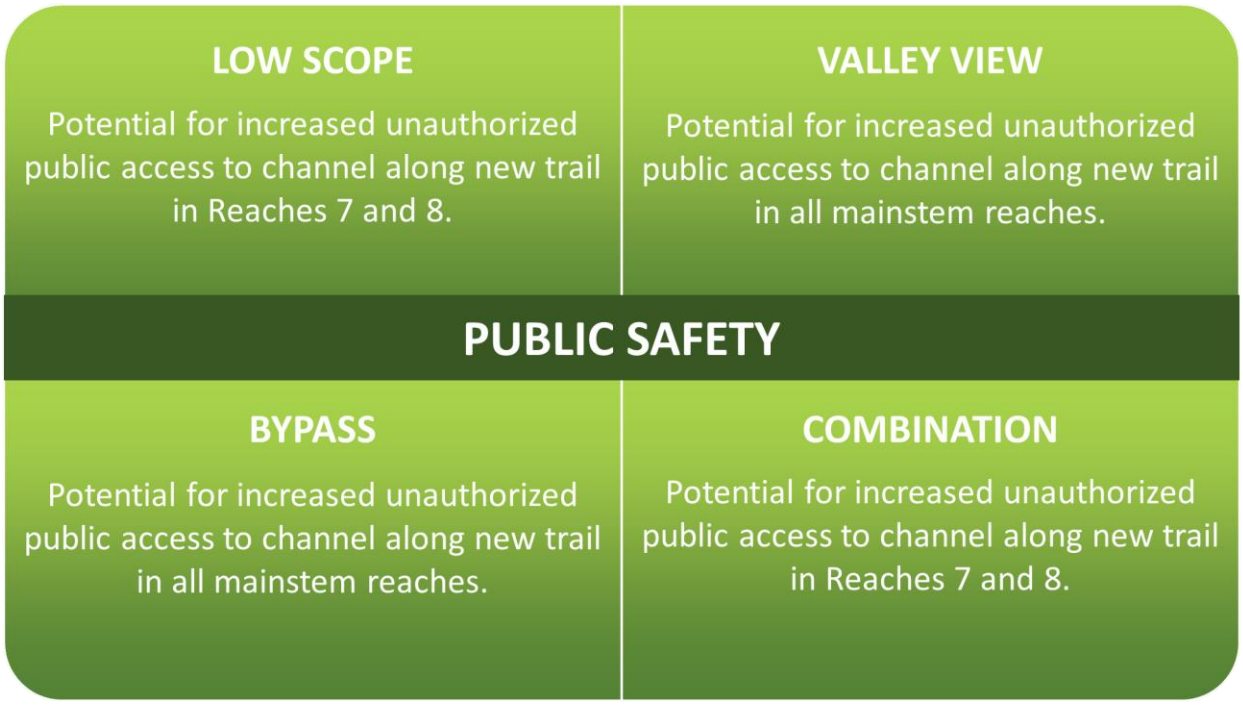
Operations and Maintenance

The activities required for operations and maintenance of the project features would result in minor disturbances from pickup trucks and construction equipment that could cause temporary impacts similar in nature to those from the construction effort. These activities would be necessary to maintain the project's flood risk management benefits and ensure continued function and safety of recreational features, and therefore would not cause a change in significance determination for the action alternatives.

4.13.4 Avoidance and Mitigation Measures

Public safety impacts identified above would be reduced to a less-than-significant level with implementation of the recommended mitigation measures.

- Project construction areas would be posted with warning signs and would be adequately fenced and barricaded or equipped with other security measures to prevent unauthorized access during construction.
- Prior to commencing construction activities for any phase of the project, access routes for construction truck traffic would be identified and posted and approved by Valley Water, the City of San José, and VTA. Routes into construction areas would, to the maximum extent practical, avoid residential areas. Construction zones would be clearly marked and posted, and flag personnel used wherever necessary to direct traffic.
- Notification would be given to residents and businesses in the surrounding area before construction begins. Alternate traffic and pedestrian routes for impacted areas would be posted.
- Permanent warning signs (e.g., no entry, no swimming or diving), fencing, barricades and/or other access control measures would be erected in areas along the channel, where necessary, to restrict or prohibit public access.
- A system for trail closures and other early warning notifications would be put in place to restrict or prohibit public access in advance of flood events. The same system would include advanced inspections and evacuation notifications for any unhoused populations in the floodplain for life safety purposes.



4.14 Socioeconomics

The action alternatives are not anticipated to induce substantial population growth, nor result in effects that divide established communities. The socioeconomics analysis for the Valley View and Bypass Plans is incorporated by reference from the 1998 FS/EIS/EIR. Since there are very few differences between the

analysis for the Combination Plan and Low Scope Plan, they are discussed together as the Preferred Action below. The No Action and Preferred Action are assessed in detail below.

4.14.1 Basis of Significance

For the purposes of this analysis, effects on socioeconomics would be considered significant if the alternatives result in:

- Substantial population growth induced in the study area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure);
- Change in the demographic or economic conditions in a way that would be harmful for surrounding communities and residents; and,
- Physical division of an established community or neighborhood.

4.14.2 No Action

Under the No Action Alternative, the GRR would not be approved and a new alternative would not be authorized and constructed. As a result trends in population, housing, employment, and income would remain the same as the existing condition. The region of influence would continue to flood on a regular basis causing flood damages to residential and commercial areas.

4.14.3 Preferred Action

Implementation of the Combination Plan would result in temporary, short term benefits during construction due to the creation of jobs associated with project implementation. However, these would be temporary construction jobs and the project is not expected to result in any new permanent jobs. Additionally, the project would not result in the inducement of any population growth in the region. It is anticipated that the Bay Area labor force can provide sufficient resources to account for the temporary jobs needed to implement the project. These temporary jobs and the associated temporary increase in local income would only occur for the duration of construction.

While the Combination Plan does propose construction of new features that represent physical barriers, such as floodwalls, the preferred action would not contribute to the division or physical arrangement of any communities. All features proposed for the project are adjacent or parallel to the river corridor, which already acts as a natural division between neighborhoods and communities in the study area.

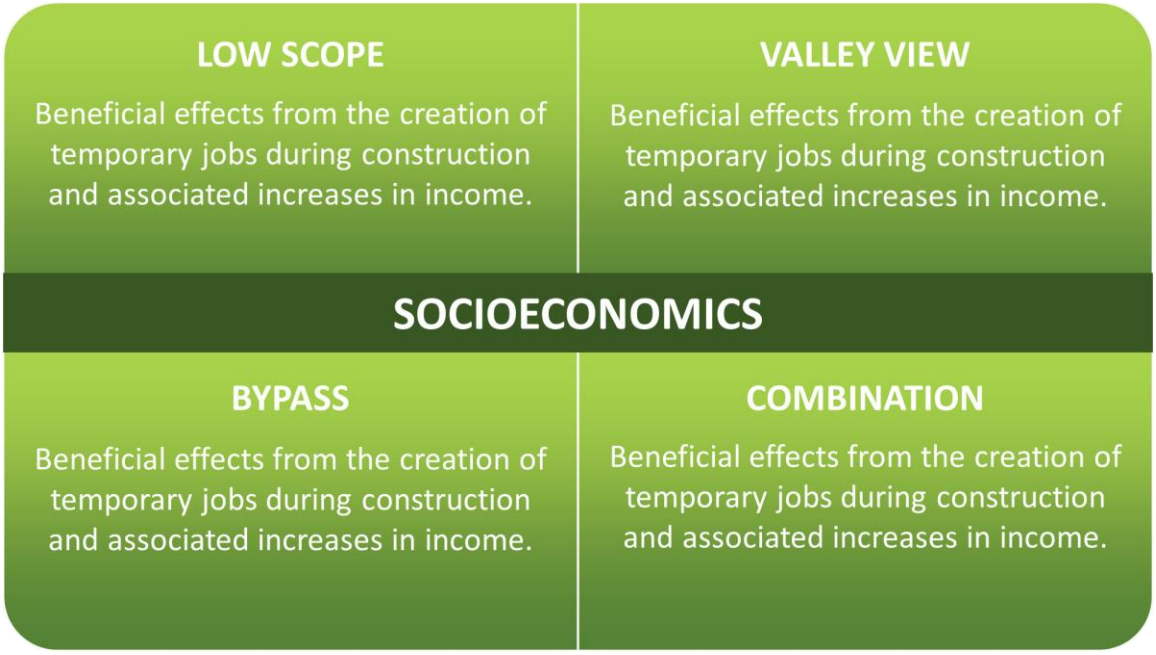
Based on the factors discussed above, the Combination Plan would not significantly impact socioeconomics. The Low Scope Plan would not result in any effects beyond those discussed for the Combination Plan.

Operations and Maintenance

The activities required for operations and maintenance of the project features would result in minor disturbances from pickup trucks and construction equipment that would cause temporary impacts similar in nature to those from the construction effort. These activities would be necessary to maintain the project's flood risk management benefits and would not cause a change in significance determination for any of the action alternatives.

4.14.4 Avoidance and Mitigation Measures

Since the proposed action alternatives would only result in beneficial impacts to socioeconomics, no mitigation would be required.



4.15 Environmental Justice

The action alternatives would generate temporary, short-term impacts to both environmental justice communities and more affluent communities equally from construction activities; however, they would also provide important benefits to environmental justice communities by reducing the potential impacts to these communities from flooding. As the there was no environmental justice analysis included in the 1998 FS/EIS/EIR, the effects analysis is discussed below for all four action alternatives in full, as well as the No Action alternative. The potential effects from the four action alternatives are summarized below.

4.15.1 Basis of Significance

For the purposes of this analysis, effects on socioeconomics would be considered significant if the alternatives result in any of the following:

- Disproportionally high and adverse human health or environmental effects on minority populations, low-income populations, or tribes.
- New or substantially increased levels of exposure of environmental hazards to minority, low-income, or tribal communities that appreciably exceeds or is likely to appreciably exceed the risk or rate to the general population or other appropriate comparison group;
- Increase vulnerability for minority, low income, or tribal communities, such as reducing access to infrastructure, health care, evacuation routes, and other resources; or,
- Physical disruption or division of an established minority, low income, or tribal community.

4.15.2 No Action

Under the No Action Alternative, the GRR would not be approved and a new alternative would not be authorized and constructed. As a result environmental justice communities, including unhoused communities living in and around the channel, will continue to be exposed to potential flood risk hazards.

4.15.3 Valley View Plan

The implementation of the Valley View Plan will have positive long-term effects on the environmental justice communities in study area. The Valley View Plan minimizes flood hazards in the flooding impact areas of environmental justice concern by removing 99.3% of residential population in environmental justice communities from the 1% AEP event thereby reducing the environmental effects and exposure of flooding on environmental justice communities, and reducing the community's vulnerability. For information on the calculations of environmental justice communities removed from the floodplain see Economic Appendix section 10.3.4 and Table 28.

The Valley View Plan will not result in physical disruption or division of environmental justice communities. Streets and waterways (e.g., Guadalupe River) are established features of the landscape that defines community boundaries and in some cases fragment communities. Flooding can also contribute to disruption and isolation of communities, hindering evacuation, and exacerbating existing vulnerabilities. The Valley View Plan will not result in additional physical disruption or division of existing communities.

The current locations of the unhoused encampments pose a serious life safety threat. In a high-water event deep, fast-moving waters leave the unhoused population vulnerable to hazardous conditions. The construction of the Valley View Plan will remove the hazardous conditions from the locations of unhoused encampments but will also displace the unhoused communities living in and around the channel. The implementation of the Valley View Plan will have short-term adverse effects due to displacement during construction and long-term beneficial effects on the life safety of the unhoused population living in and around the channel. Coordination with the City of San José would occur to relocate unhoused peopulations to minimize any effects associated with this alternative.

Taken together, the impact would be less than significant.

4.15.4 Bypass Plan

The implementation of the Bypass Plan will have positive long-term effects on the environmental justice communities in study area. The Bypass Plan minimizes flood hazards in the flooding impact areas of environmental justice concern by removing 100% of residential population in environmental justice communities from the 1% AEP event thereby reducing the environmental effects and exposure of flooding on environmental justice communities, and reducing the community's vulnerability. For information on the calculations of environmental justice communities removed from the floodplain see Economic Appendix section 10.3.4 and Table 28.

The Bypass Plan will not result in physical disruption or division of environmental justice communities. Streets and waterways (e.g., Guadalupe River) are established features of the landscape that defines community boundaries and in some cases fragment communities. Flooding can also contribute to disruption and isolation of communities, hindering evacuation, and exacerbating existing vulnerabilities. The Bypass Plan will not result in additional physical disruption or division of existing communities.

The current locations of the unhoused encampments pose a serious life safety threat. In a high-water event deep, fast-moving waters leave the unhoused population vulnerable to hazardous conditions. The construction of the Bypass Plan will remove the hazardous conditions from the locations of unhoused encampments but will also displace the unhoused communities living in and around the channel. The implementation of the Bypass Plan will have short-term adverse effects due to displacement during construction and long-term beneficial effects on the life safety of the unhoused population living in and around the channel. Coordination with the City of San José would occur to relocate unhoused peopulations to minimize any effects associated with this alternative.

Taken together, the impact would be less than significant.

4.15.5 Low Scope Plan

The implementation of the Low Scope Plan will have positive long-term effects on the environmental justice communities in study area. The Low Scope Plan minimizes flood hazards in the flooding impact areas of environmental justice concern by removing 100% of residential population in environmental justice communities from the 1% AEP event thereby reducing the environmental effects and exposure of flooding on environmental justice communities, and reducing the community's vulnerability. Despite this promising statistic, there is substantial residual flood risk that is not present in the other plans. This is because flood waters are detained within a community not identified as socially vulnerable in the economic analysis. For information on the calculations of environmental justice communities removed from the floodplain see Economic Appendix section 10.3.4 and Table 28.

The Low Scope Plan will not result in physical disruption or division of environmental justice communities. Streets and waterways (e.g., Guadalupe River) are established features of the landscape that defines community boundaries and in some cases fragment communities. Flooding can also contribute to disruption and isolation of communities, hindering evacuation, and exacerbating existing vulnerabilities. The Low Scope Plan will not result in additional physical disruption or division of existing communities.

The current locations of the unhoused encampments pose a serious life safety threat. In a high-water event deep, fast-moving waters leave the unhoused population vulnerable to hazardous conditions. The construction of the Low Scope Plan will remove the hazardous conditions from the locations of unhoused encampments but will also displace the unhoused communities living in and around the channel. The implementation of the Low Scope Plan will have short-term adverse effects due to displacement during construction and long-term beneficial effects on the life safety of the unhoused population living in and around the channel. Coordination with the City of San José would occur to relocate unhoused peopulations to minimize any effects associated with this alternative.

Taken together, the impact would be less than significant

4.15.6 Combination Plan

The implementation of the Combination Plan will have positive long-term effects on the environmental justice communities in study area. The Combination Plan minimizes flood hazards in the flooding impact areas of environmental justice concern by removing 99.7% of residential population in environmental justice communities from the 1% AEP event thereby reducing the environmental effects and exposure of flooding on environmental justice communities, and reducing the community's vulnerability. For information on the calculations of environmental justice communities removed from the floodplain see Economic Appendix section 10.3.4 and Table 28.

The Combination Plan will not result in physical disruption or division of environmental justice communities. Streets and waterways (e.g., Guadalupe River) are established features of the landscape that defines community boundaries and in some cases fragment communities. Flooding can also contribute to disruption and isolation of communities, hindering evacuation, and exacerbating existing vulnerabilities. The Combination Plan will not result in additional physical disruption or division of existing communities.

The current locations of the unhoused encampments pose a serious life safety threat. In a high-water event deep, fast-moving water leave the unhoused population vulnerable to hazardous conditions. The construction of the Combination Plan will remove the hazardous conditions from the locations of unhoused encampments but will also displace the unhoused communities living in and around the channel. The implementation of the Combination Plan will have short-term adverse effects due to displacement during construction and long-term beneficial effects on the life safety of the unhoused

population living in and around the channel. Coordination with the City of San José would occur to relocate unhoused peopulations to minimize any effects associated with this alternative.

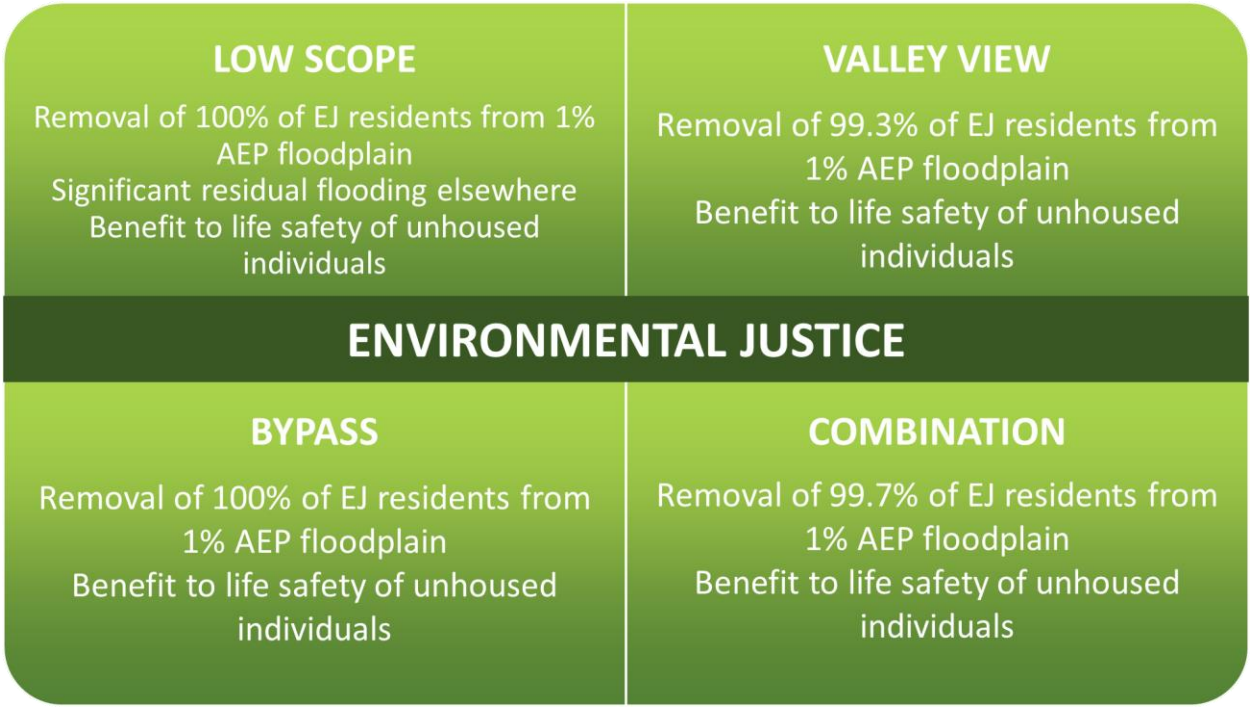
Taken together, the impact would be less than significant.

Operations and Maintenance

The activities required for operations and maintenance of the project features would result in minor disturbances from pickup trucks and construction equipment that could cause temporary impacts similar in nature to those from the construction effort. These activities would be necessary to maintain the project's flood risk management benefits, including the benefits to environmental justice communities, and would not cause a change in significance determination for any of the action alternatives.

4.15.7 Avoidance and Mitigation Measures

It will be necessary to coordinate with the City of San José to ensure that unhoused communities are relocated outside of the flood hazard zone in order to facilitate construction of the project.



4.16 Climate Change

The action alternatives would generate temporary, short-term emissions of GHGs during construction activities. As the there was no climate change analysis included in the 1998 FS/EIS/EIR, the effects analysis is discussed below for all four action alternatives in full, as well as the No Action alternative. The potential effects from the four action alternatives are summarized below.

In general, there are two ways to consider climate change with regards to project implementation: how climate change affects your proposed action, and how your proposed action could have an impact on climate change. USACE considers the potential effects from climate change on proposed actions through use of the Climate Hydrology Assessment Tool, which simulates potential climate change effects on either inland hydrology or sea level. Consideration of potential project effects on climate change is typically incorporated through the consideration of GHG emissions.

USACE Engineering and Construction Bulletin (ECB) 2018-04, Guidance For Incorporating Climate Change Impacts To Inland Hydrology in Civil Works Studies, Designs, and Projects, requires consideration of climate change in all current and future studies to reduce vulnerabilities and enhance the resilience of communities. It provides guidance for incorporating climate change information in hydrologic analyses. In accordance with this guidance, an inland hydrology climate change analysis was conducted for the Upper Guadalupe study and is included in Appendix A. The purpose of this analysis is to ensure that appropriate climate change considerations are incorporated into the alternatives formulation process. The results of this analysis are summarized in Section 2.4.2 above.

GHGs naturally trap heat by impeding the exit of solar radiation that has hit the Earth and is reflected back into space. The six principal GHGs of concern are CO2, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons, and perfluorocarbons. In order to more easily make comparisons for GHGs released by different projects, these GHGs are often combined into carbon dioxide equivalents (CO_2e), by using the global warming potential of each gas as it relates to carbon dioxide (40 C.F.R. § 98, Table A-1). In this way, all emissions from a given project could be converted to CO_2e and used for comparing to a given threshold to determine whether GHG project emissions would represent a significant impact. Although the scientific community largely agrees on GHGs as a major driver of climate change and how to use CO_2e to compare the total GHG emissions from various projects, CEQ and many air quality management districts have not yet issued a threshold for determining whether mobile source emissions from a project would result in a significant impact.

4.16.1 Basis of Significance

There are no established Federal thresholds to evaluate climate change impacts. Although there is no federal or USACE specific guidance for the evaluation of climate change through the accounting of GHG emissions, nor is there an established federal threshold for significant effects to climate change/emission of GHGs, the evaluation of project related effects to climate change and establishment of thresholds of significance are within the discretion of the lead NEPA agency.

Locally, within the Bay Area, the BAAQMD has established a threshold of 1,100 metric tons of GHGs per year for development projects under their jurisdiction. It should be noted though that these thresholds are based on a typical residential or commercial project and may not be appropriate for other types of projects (BAAQMD 2022). Additionally, in their Justification Report for their GHG emissions, the BAAQMD indicates that, “There is no proposed construction-related climate impact threshold at this time. Greenhouse gas emissions from construction represent a very small portion of a project’s lifetime GHG emissions. The proposed thresholds for land use projects are designed to address operational GHG emissions which represent the vast majority of project GHG emissions (BAAQMD 2022). For these reasons, while relevant as a general point of comparison, these thresholds are not applicable to the Upper Guadalupe River project.

4.16.2 No Action

Under the No Action Alternative, the GRR would not be approved and a new alternative would not be authorized and constructed. As a result there would be no GHG emissions associated with construction of the preferred alternative and the project would not contribute to the ongoing climate crisis. As a result, the future climate change conditions in the study area would continue to reflect the conditions described in Section 2.16, including any long term improvements projected by the BAAQMD.

4.16.3 Valley View Plan

Construction of the Valley View Plan would result in GHG emissions associated with project construction, including off-road construction equipment operating at project sites and on-road vehicles

traveling to and from the project sites. The estimated peak construction year emissions projected for construction of Reaches 7 and 8 of the Valley View Plan are shown below.

Table 35. Peak Year Greenhouse Gas emissions from the Valley View Plan.

Total CO2e (lbs/day)	33,861.30
Total CO2e (tons/year)	2,217.92

GHG emissions resulting from construction of the Valley View Plan would be above the local thresholds for operational emissions associated with land use development projects. However, as discussed above in Section 4.16.2, these thresholds are not applicable to the project. With no jurisdictional threshold available as a point of comparison, there is no quantitative way to establish the level of significance for these emissions. In order to ensure that the project is not contributing to a cumulatively considerable impact on climate change, the minimization measures discussed in Section 4.16.7 below would be implemented to reduce GHG emissions resulting from the Valley View Plan to the maximum extent practicable.

4.16.4 Bypass Plan

Construction of the Bypass Plan would result in GHG emissions associated with project construction, including off-road construction equipment operating at project sites and on-road vehicles traveling to and from the project sites. The estimated peak construction year emissions projected for construction of Reaches 7 and 8 of the Bypass Plan are shown below.

Table 36. Peak Year Greenhouse Gas emissions from the Bypass Plan.

Total CO2e (lbs/day)	40,641.20
Total CO2e (tons/year)	2,662.00

GHG emissions resulting from construction of the Bypass Plan would be above the local thresholds for operational emissions associated with land use development projects. However, as discussed above in Section 4.16.2, these thresholds are not applicable to the project. With no jurisdictional threshold available as a point of comparison, there is no quantitative way to establish the level of significance for these emissions. In order to ensure that the project is not contributing to a cumulatively considerable impact on climate change, the minimization measures discussed in Section 4.16.7 below would be implemented to reduce GHG emissions resulting from the Bypass Plan to the maximum extent practicable.

4.16.5 Low Scope Plan

Construction of the Low Scope Plan would result in GHG emissions associated with project construction, including off-road construction equipment operating at project sites and on-road vehicles traveling to and from the project sites. The estimated peak construction year emissions projected for construction of Reaches 7 and 8 of the Low Scope Plan are shown below.

Table 37. Peak Year Greenhouse Gas emissions from the Low Scope Plan.

Total CO2e (lbs/day)	23,008.72
Total CO2e (tons/year)	1,507.07

As was described for the air quality analysis, the Low Scope and Combination Plans show consistent emissions because the construction year with the maximum emissions is the year including construction of Reaches 7 and 8, which are the same for these two alternatives. However, there are differences in construction between these two alternatives in other (non-peak) years. Overall, the Low Scope Plan

results in lower GHG emissions than the Combination Plan. The full emission estimates are included in Appendix C7.

GHG emissions resulting from construction of the Low Scope Plan would be above the local thresholds for operational emissions associated with land use development projects. However, as discussed above in Section 4.16.2, these thresholds are not applicable to the project. With no jurisdictional threshold available as a point of comparison, there is no quantitative way to establish the level of significance for these emissions. In order to ensure that the project is not contributing to a cumulatively considerable impact on climate change, the minimization measures discussed in Section 4.16.7 below would be implemented to reduce GHG emissions resulting from the Low Scope Plan to the maximum extent practicable.

4.16.6 Combination Plan

Construction of the Combination Plan would result in GHG emissions associated with project construction, including off-road construction equipment operating at project sites and on-road vehicles traveling to and from the project sites. The estimated peak construction year emissions projected for construction of Reaches 7 and 8 of the Combination Plan are shown below.

Table 38. Peak Year Greenhouse Gas emissions from the Combination Plan.

Total CO_2e (lbs/day)	23,008.72
Total CO_2e (tons/year)	1,507.07

As described for the air quality analysis, the Low Scope and Combination Plans show consistent emissions because the construction year with the maximum emissions is the year involving construction of Reaches 7 and 8, which are the same for these two alternatives. Emissions in other non-peak years differ between these two plans. Overall, the Combination Plan results in higher emissions than the Low Scope Plan. The full emission estimates are included in Appendix C7.

GHG emissions resulting from construction of the Combination Plan would be above the local thresholds for operational emissions associated with land use development projects. However, as discussed above in Section 4.16.2, these thresholds are not applicable to the project. With no jurisdictional threshold available as a point of comparison, there is no quantitative way to establish the level of significance for these emissions. In order to ensure that the project is not contributing to a cumulatively considerable impact on climate change, the minimization measures discussed in Section 4.16.7 below would be implemented to reduce GHG emissions resulting from the Combination Plan to the maximum extent practicable.

Operations and Maintenance

The activities required for operations and maintenance of the project features would result in minor emissions of GHGs from pickup trucks and construction equipment that could cause temporary emissions similar in type to those from the construction effort. These activities would be necessary to maintain the project's flood risk management benefits and would not cause only negligible impacts under all action alternatives.

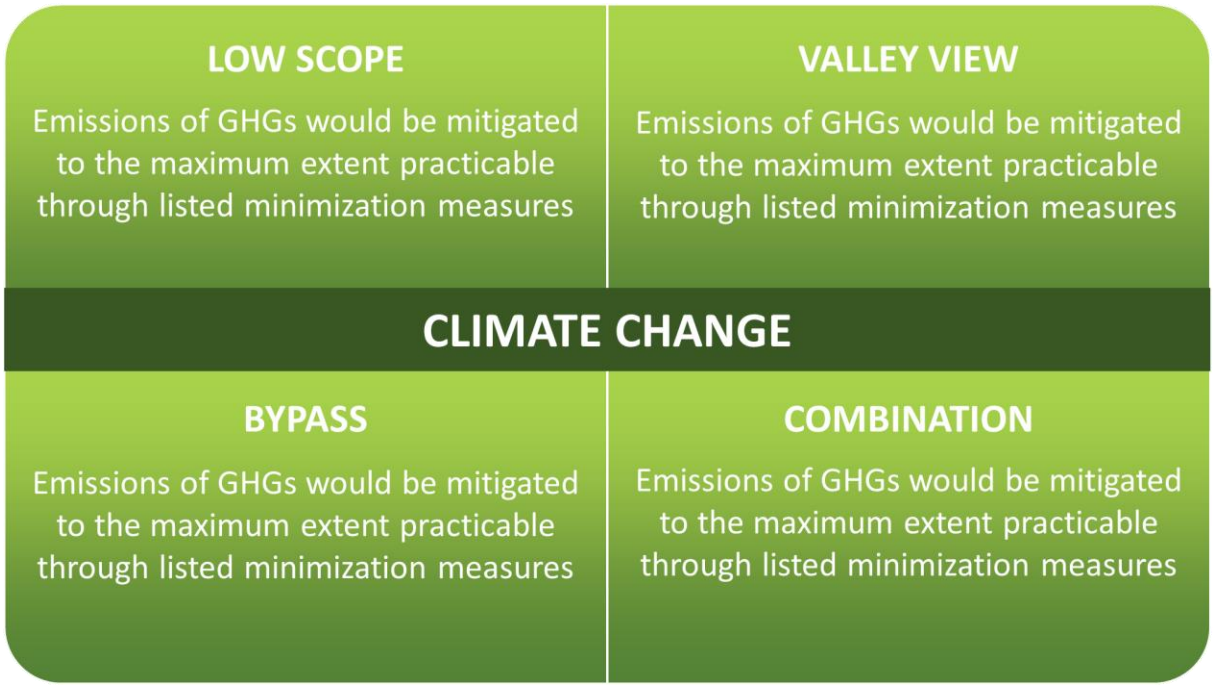
4.16.7 Avoidance and Mitigation Measures

The following measures, in combination with the Air Quality Avoidance and Mitigation Measures (Section 4.2.7), would be implemented to reduce GHG emissions to the maximum extent practicable:

- If practicable, use fuel efficient construction equipment and equipment equipped with newer technologies,
- Recycle at least 75% of construction waste and demolition debris,

- Perform on-site material hauling with trucks equipped with on-road engines (if determined to be less emissive than off-road engines),
- Use alternative fuels for generators at construction sites, where feasible,
- Encourage and provide carpools, shuttle vans, transit passes, and/or secure bicycle parking for construction workers,
- Reduce electricity use in the construction office by using compact fluorescent bulbs, powering off computers every day and using efficient heating and cooling units,
- Seek opportunities to purchase imported goods from sources within 100 miles of the project site,
- Seek opportunities to beneficially reuse disposal material within the region to reduce hauling distances.

Although not explicitly a climate change mitigation measure, the project's planting of riparian trees and support of riverine processes will improve carbon cycling through the system and lead to some carbon sequestration in the floodplain. Using a rough calculation from the scientific literature (Hinshaw and Wohl 2021), the floodplain in Reaches 7 and 8, could sequester approximately 3,300 Tons of organic carbon, which would be a long-term substantial offset of the project's CO_2e emissions.



4.17 Cumulative Effects

4.17.1 Introduction

NEPA defines a cumulative effect as an effect on the environment that results from the incremental effect of an action when combined with other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-federal) or person undertakes such other actions (40 C.F.R. § 1508). Cumulative effects for the study were evaluated by identifying any past, present, or reasonably foreseeable future projects in and around the study area that could have impacts which, if combined with the impacts of the proposed alternatives, could combine to create a cumulative effect under NEPA. The other projects assessed under this cumulative effects analysis are established in Section 2.1.2 .

The potential effects of these other projects are combined with the potential adverse or beneficial effects of the proposed alternatives to determine the type, length, and magnitude of potential cumulative effects.

The effects from these projects could be individually minor but when combined could be collectively significant actions. Significance of cumulative effects is determined by meeting the specified criteria identified under each environmental resource section in Section 4 above to evaluate impacts from the combination of the proposed alternatives and the other related projects discussed below. Those effects that cannot be avoided or reduced to less than significant are more likely to contribute to cumulative effects in the area.

Geographic and Temporal Scope

The geographic and temporal scope that could be affected by the project varies depending on the type of environmental resource being considered. Adverse effects from the project are generally expected to be limited to short-term, construction-related actions. For most resources, effects would generally be confined in geographic scope to the immediate study area, specifically the Upper Guadalupe River, Ross Creek, and Canoas Creek. The temporal scope would be limited to actions with effects that overlap with the estimated duration of construction for the project (generally a 7-year construction period beginning approximately in 2026). Potentially affected air and water resources extend beyond the confines of the project footprint due to the dynamic nature of these resources. Table 39 presents the general geographic areas associated with the different resources addressed in this cumulative effects analysis.

Table 39. Scope of the cumulative effects analysis by resource.

Resource	Geographic Scope	Temporal Scope
Air Quality	Regional (BAAQMD)	Duration of construction
Geologic Resources	Study area/construction footprint	Duration of construction
Water Resources	Guadalupe River, Ross Creek, and Canoas Creek and associated floodplain area	Construction period and resulting period of performance for flood features.
Biological Resources	Guadalupe River, Ross Creek, and Canoas Creek, and associated habitats with connectivity to the riparian corridor	Construction period and establishment period for mitigation and NNBFs
Aesthetics and Recreation	Guadalupe River, Ross Creek, and Canoas Creek corridor.	Construction period and establishment period for mitigation and NNBFs; period of performance for new recreation features period
Noise	Immediate vicinity of the study area/construction footprint	Duration of construction
Transportation	Regional transportation network in Santa Clara County and the greater study area.	Duration of construction
Land Use	Study area/construction footprint	Construction period and resulting period of performance for features that change land use.
Public Services and Utilities	Study area/construction footprint	Duration of construction
Cultural Resources	Study area/construction footprint	Duration of construction
Hazardous Materials	Study area/construction footprint	Construction period and resulting period of performance for the project.
Public Safety	Study area/construction footprint	Construction period and resulting period of performance for flood and recreation features

Resource	Geographic Scope	Temporal Scope
Socioeconomics	Immediate vicinity of the study area/construction footprint and associated flood impact areas	Duration of construction
Environmental Justice	Immediate vicinity of the study area/construction footprint and associated flood impact areas	Duration of construction
Climate Change	Regional (BAAQMD)	Duration of construction

4.17.2 Air Quality

Construction of the proposed alternatives would result in emissions of criteria pollutants, as assessed in Section 2.2. With the implementation of BMPs and avoidance and minimization measures, these emissions are expected to be below Federal thresholds and consistent with all state and local air quality plans. The related projects discussed in Section 2.1.2 would all contribute to emissions of criteria pollutants during construction throughout the region, and all of these projects, consistent with the proposed alternatives, would implement reduction measures to below significance levels. Any projects that are constructed concurrently, such as the South San Francisco Bay Shoreline Project, High Speed Rail, BART's Silicon Valley Extension, and the Anderson Dam Seismic Retrofit Project, could contribute to a cumulative effect on air quality. However, the distance between the Shoreline Project, BART, and Anderson Dam is likely sufficient to ensure that any emissions are dispersed prior to any combined impacts with the Upper Guadalupe Project. The High Speed Rail project could potentially be constructing adjacent to the Upper Guadalupe River project if construction of features in and around the Tamien Station area are being implemented concurrently with the project. In this scenario, it may be necessary for both projects to implement additional minimization measures to reduce potential cumulative effects. Any additional measures would be requested by the BAAQMD, and coordinated with the Caliofrnia High Speed Rail Authority prior to construction to ensure that cumulative effects from air emissions are reduced to below significance levels.

4.17.3 Geologic Resources

Potential cumulative effects could occur if Valley Water were to implement their Reach 6 Aquatic Habitat Improvement Project concurrently with the proposed alternatives. The Habitat Improvement Project involves placement of gravel and other coarse sediments into the Upper Guadalupe River in Reach 6, just upstream of the project area. Additionally, the proposed alternatives also include a mirroring Gravel Augmentation Program under the NMFS Biological Opinion. During long-term implementation of both projects, USACE and Valley Water would be required to coordinate to ensure that their gravel augmentation programs are compatible and are not injecting an excessive amount of sediment into the river, which could choke the river and increase turbidity to above water quality thresholds. With ongoing, long-term coordination during project implementation, these effects would be less than significant.

4.17.4 Water Resources

Implementation of the proposed alternatives would improve hydraulic conveyance in the study area and significantly reduce flood risk to the surrounding community. Valley Water's seismic retrofit projects at Calero and Guadalupe Dams may result in incidental flood risk reduction benefits because both projects include slight increases to the dam crest elevations to ensure that both facilities can pass the probable maximum flood. Overall, these projects would result in beneficial cumulative effects to water resources in the Upper Guadalupe River watershed. Water quality under the baseline condition is already in a degraded state. Implementation of the channel improvements in Reaches 7 and 8 should result in beneficial improvements to water quality through both flow improvements and the filtration provided by the natural and nature based features. These features, combined with the improvements planned by Valley Water at Almaden Lake, would contribute to water quality improvements in the system. Additionally, the City of San José has ongoing green infrastructure programs that may reduce stormwater inflows into the

study area and also improve in water quality. These actions should contribute to a cumulative beneficial improvement in water quality conditions in the Upper Guadalupe River.

4.17.5 Biological Resources

Implementation of the proposed alternatives would contribute to expansion of riverine and riparian habitat through the implementation of natural and nature-based features in Reaches 7 and 8 as part of the channel widening and floodplain bench design under the Combination and Low Scope Plans. The Bypass and Valley View Plans also include plantings as part of their mitigation for effects to the overall study area. These features would benefit aquatic and wildlife species in decline due to the degradation of this habitat in the study area. The project, in combination with the other projects discussed in Section 2.1.2, especially the Almaden Lake Improvement Project, South San Francisco Bay Shoreline Project, Reach 6 Aquatic Habitat Improvement Project, and Guadalupe River – Alviso to I-880 Project, all of which incorporate various habitat improvement features within the watershed, would combine to contribute to the overall future health of the Guadalupe River and would improve overall habitat conditions. As a result, any cumulative impacts associated with the study would be beneficial.

4.17.6 Aesthetics and Recreation

Short-term impacts to visual resources would result from the presence of construction equipment in the river corridor and the removal of vegetation to facilitate construction activities. The proposed alternatives cumulatively with the Almaden Lake Improvement Project, South San Francisco Bay Shoreline Project, Reach 6 Habitat Improvement Project, and Guadalupe River – Alviso to I-880 Project, would result in a net increase of aquatic and riparian vegetation throughout the watershed, overall improving the aesthetic condition of the area long-term.

The proposed alternatives would not contribute to a significant cumulative effect because there are no existing recreation facilities in the project area. Existing trails in Reach 12 would not be affected by the proposed alternatives because Reach 12 was constructed under the previously authorized Upper Guadalupe River Project in 2014. The proposed alternatives will incorporate new trails on the mainstem of the river, which would result in more recreational access to the river corridor. The project's proposed recreation trails would combine with the City's Guadalupe Trail Master Plan to eventually provide a contiguous trail system, which would provide recreation access for a portion of San José that is currently lacking these features. Together, the long-term vision for the Guadalupe River Trail would be a beneficial cumulative effect between USACE, Valley Water, and the City of San José.

4.17.7 Noise

The project's contribution to the noise environment would be limited to the construction period. However, plans for building a high-speed rail may introduce a new noise source which could change the soundscape, especially during construction, which is anticipated to begin in late 2022 or early 2023. Current plans include building a high-speed rail that will pass through the City of San José in a north westerly direction extending from Morgan Hill, stopping at Diridon Station which is located approximately one mile from the downstream extent of the study area (California 2021). Service for the high-speed train is expected to begin in 2029 (City of San José 2021b) and affect noise levels within 1,000 feet of the tracks in residential areas and affect noise levels within 250 feet of the tracks in noisy urban areas, with no noticeable effect to the sound levels in downtown city settings (California 2010). Since the project would begin construction in 2026 and continue for 7 (Combination or Low Scope Plan) to 16 (Valley View or Bypass Plan) years, there would be an overlap between the construction activities and high-speed rail, particularly in Reaches 7 and 8. However, as construction of the proposed alternatives is a temporary effect, the long-term impact of high-speed rail would be substantially more impactful than project construction. As a result, the contribution of the project construction to the overall cumulative impact would be less than significant with mitigation through the Noise Mitigation Plan.

4.17.8 Transportation

The proposed alternatives would not have a significant impact on local roadways or traffic in the study area. Regionally, the contribution from the proposed alternatives to the highway system is minimal. Potential cumulative impacts could occur if the other projects discussed in Section 2.1.2 are using the same local roadways at the same time as the proposed alterantives during construction. The only local projects that are anticipated to occur in close proximity to the project area are the Caltrain bridge replacement and Almaden Lake Improvement Project. Both of these projects are anticipated to be completed prior to the Upper Guadalupe River project's projected construction period. With anticipated mitigation measures, including repair of damaged roadways, these projects' impacts would not combine with the proposed alternatives to create a cumulative effect.

4.17.9 Land Use

The proposed alternatives would have both beneficial and adverse impacts to land use in the study area. It would be creating more publicly accessible open space, while also (in the short term) reducing the amount of housing in the study area. Most of the San José area is already built out and any land use conversions in the area are due to infill development, or other urban projects similar to the Upper Guadalupe River project. Much of the development incorporated into the Envision San José General Plan (San José 2022) involves transit-oriented development, which was discussed in Section 2.1.2. In the vicinity of the project area, the ongoing Tamien Station development is an example of this type of land use transition. Residential, commercial, and recreational development is included in the Tamien Station proposal, in addition to transit improvements such as parking structures at the VTA facility. Land use developments such as these provide additional multi-family housing units that contribute to the region's overall improved availability. The majority of the properties under conversion by the proposed alternatives (75% for the Combination Plan) have already been acquired and converted. Overall, the cumulative effect between these two proposed projects would result in a net increase of housing available in the area surround Reaches 7 and 8. Additionally, the inclusion of the recreation development associated with Reaches 7 and 8 would contribute beneficially to the regional planning efforts in the Envision San José General Plan (San José 2022). Overall, cumulative effects to land use would be less than significant.

4.17.10 Public Services and Utilities

Implementation of the proposed alternatives would contribute to flood risk reduction and would benefit communities in the study area at risk of flooding by taking them out of the floodplain. Retrofit and replacement of utilities would be coordinated with service and utility providers so as not to lead to overlapping impacts during construction. This project and all of the projects listed in Section 2.1.2 will individually minimize or mitigate for impacts to utilities within their geographic scopes. The majority of the projects would not affect the same geographic area and are not likely to lead to cumulative impacts to services and utilities, because all of the projects are individually implementing mitigation measures to reduce impacts. The exception is the CalTrain Bridge Replacement project which is directly in the project area. However, this project is expected to be completed prior to initation of construction of one of the proposed alternatives for the Upper Guadalupe River project. In the long-term, the project and many of the other projects in the vicinity are reducing the community's risk (e.g., reduced flooding and seismic retrofits under Valley Water's various dam safety projects), thereby reducing service disruptions or the need for emergency services. Therefore, there will be no significant cumulative effect resulting from implementation of these projects.

4.17.11 Cultural Resources

The proposed alternatives and all of the projects listed in Section 2.1.2 could potentially contribute to cumulative impacts for cultural and tribal resources. Direct impacts for cultural resources would likely occur during project implementation and the duration of construction. Direct impacts from ground-disturbing work under both the proposed alternatives and the majority of the other local projects may

alter, damage, or destroy the integrity and historic significance of buried cultural resources. These buried cultural resources are considered important for understanding the past or even viewed as having cultural importance to tribes. The development and implementation of a Tribal and Cultural Archaeological and Monitoring Treatment Plan would reduce the potential for significant impacts to less-than significant levels. Additionally, all of these local projects are expected to similarly develop mitigative features for impacts to tribal and cultural resources under both State and Federal laws. Certain natural features along the Upper Guadalupe River, such as the waterway and culturally significant plants, may face cumulative impacts from this project as well as projects listed in Section 2.1.2, such as the Guadalupe River – Alviso – I-880 Project and the various bridge replacement projects. Meaningful partnerships with tribes will ensure cumulative impacts to cultural resources are avoided and the cumulative benefits of enhancing a tribes traditional lifeways and practices are considered as a part of project design and implementation.

4.17.12 Hazardous Materials

The proposed alternatives and all of the projects listed in Section 2.1.2 are required to individually consider and minimize or avoid impacts to individual hazardous sites within their geographic scopes. The only project that is physically overlapping with the Upper Guadalupe River project is the CalTrain Bridge Replacement project, which would be constructed prior to any of the proposed alternatives. There are no known hazardous sites in the overlapping footprint between these two projects. The known high mercury levels in the Upper Guadalupe River would be accounted for by each project individually. The Almaden Lake Improvement Project would be constructed upstream of the project area and will result in less methylated and dissolved mercury being transported through the study area. Additionally, the excavation of the floodplain benches (Low Scope or Combination Plan), channel widening (Valley View Plan), or bypass channel (Bypass Plan) would all result in the removal of existing mercury-containing soils away from the active floodway. As a result, regardless of the selected alternative, there would be a cumulatively beneficial effect to the Upper Guadalupe River and the San Francisco Bay from the implementation of the project, in combination with the upstream Almaden Lake Improvement Project and the downstream Guadalupe River – Alviso to I-880 Project.

4.17.13 Public Safety

Implementation of the proposed alternatives would both improve public safety from flood risk and contribute to exposing the public to saftey risk through implementation of recreational trails, primarily due to natural hazards as discussed in Section 4.13.3. Mitigative measures are proposed to minimize this impact as practicable. The trail is intended to connect to a network of trails and public transit throughout the study area through the projects described in Section 2.1.2 therefore there is the potential for cumulative impacts through higher volumes of use of the trail over time. However, this project and many of the projects listed in Section 2.1.2 would combine to contribute to a regional risk reduction effort, such as the dam retrofit projects upstream and the South San Francisco Bay Shoreline and Guadalupe River – Alviso to I-880 Project downstream. Combined, these projects would contribute to a cumulatively beneficial impact on public safety.

4.17.14 Socioeconomics

The proposed alternatives would result in positive, short-term effects on income and employment due to the creation of the temporary construction jobs associated with implementation. Other projects in the area would all contribute cumulatively to this regional economic benefit. There would not be additional adverse cumulative effects associated with implementation of the proposed alterantives.

4.17.15 Environmental Justice

Implementation of the proposed alternatives would provide much-needed flood risk reduction for environmental justice communities in San José, as detailed in Appendix B. Additionally, while there would be a short term impact from the displacement of the unhoused community along the river during

project construction, the overall project is designed partly to address the potential life loss associated with these communities during a flood event, especially from sudden bank failure. The other projects discussed in Section 2.1.2 also provide incidental benefits to these communities. The seismic retrofit projects are designed to reduce the risk of dam failure, which would also result in downstream flooding of these communities. There are many additional actions that are not within the scope of this project that also provide benefits to minority and low income communities in the project area, including the various transit development projects, which would increase the availability and speed of rail services through the project area. Overall, the project would contribute to a cumulative beneficial impact to environmental justice commnities in San José.

4.17.16 Climate Change

Implementation of the proposed alternatives would result in the emission of GHGs temporarily during project construction. All construction projects discussed in Section 2.1.2 would also have similar impacts contributing cumulatively to a potentially significant effect on climate change. The proposed alternatives incorporate minimization measures supporting climate action and reducing GHG emissions to the maximum extent practicable. Other projects would also be required to comply with State and local regulations, requiring the incorporation of the maximum practicable mitigation for their projects. Additionally, transit-oriented projects such as the CalTrain Bridge Replacement project and the High-Speed Rail project would improve transit conditions and provide increased services to encourage a reduction of vehicles traveled throughout the region. Projects incorporating natural and nature-based features and mitigative features, such as the South San Francisco Bay Shoreline Project, the Guadalupe River – Alviso – I-880 Project, and the Almaden Lake Improvement Project would all combine with the proposed alternatives to contribute to an overall increase in vegetative cover in the region and would contribute to climate change reduction through carbon sequestration. Overall, the contribution of the proposed alterantives to a cumulative effect on climate change would be less than significant with the implementation of the reduction measures discussed in Section 4.16.7 and successful implementation of natural and nature-based features.

4.18 Mitigation, Avoidance and Minimization Measures

Avoidance and minimization measures are summarized in Table 40. These measures will be implemented into the project plans and specs.

Table 40. Summary table of avoidance and minimization measures.

Air Quality
All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered a minimum of two times per day, or as needed to ensure that fugitive dust is controlled on the construction site.
All haul trucks transporting soil, sand, or other loose material offsite shall be covered.
All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes
All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
Geologic Resources
Prior to construction, a Stormwater Pollution Protection Plan (SWPPP) would be prepared, and best management practices (BMPs) would be proposed to reduce potential erosion and runoff during rain events.

Ground and vegetation disturbance would be minimized during project construction by establishing designated equipment staging areas, ingress and egress corridors, spoils disposal and soil stockpile areas, and equipment exclusion zones prior to the commencement of any grading operations.
Plant materials would be installed to stabilize cut and fill slopes and other disturbed areas once construction is complete. Plant materials could include an erosion control seed mixture or shrub and tree container stock. Temporary structural BMPs, such as sediment barriers, erosion control blankets, mulch, and mulch tackifier, would be installed as needed to stabilize disturbed areas until vegetation becomes established.
All structural features would be constructed in accordance with required seismic Uniform Building Code specifications.
Water Resources
A stormwater pollution prevention plan (SWPPP) would need to be implemented during construction and post-construction to reduce the project's impacts on water quality in the study area. Erosion and sedimentation control BMPs would be part of this implementation.
Implement reasonable and prudent measures from the Biological Opinion related to minimizing instream construction impacts, and minimizing sediment, turbidity, and pollutant inputs to the Guadalupe River (Appendix C3).
Implement applicable provisions from the project's Clean Water Act Section 401 Water Quality Certification, including: limiting construction below the ordinary high water mark to the summer dry season between June 1st and October 15th, implementing erosion and sediment control BMPs described above, and complying with dewatering discharge pollutant limitations (Appendix C4)
Biological Resources
The mitigation completed in Reach 10B and 12 is expected to address all mitigation needs of the Combination Plan. The completed mitigation reaches account for 5.6 acres of riparian forest, well over the expected impacts under the Combination Plan (approximately 0.97 acres) therefore the Combination Plan is covered by the existing mitigation per the USACE's existing permitting agreements.
Tree and shrub species will be selected that are native to the local riparian system and priority will be placed on locally-sourced plant material. In addition, native plant material will be incorporated into seed mixes of herbaceous plants used for erosion control.
Best practices shall be put in place to protect fish and wildlife species, including pre-construction biological surveys to document the presence of wildlife species (including nesting birds protected under the Migratory Bird Treaty Act) , and appropriate protection measures to take if species are discovered (e.g., establishing buffers around nests or similar protection areas). Best practices may also include monitoring by a qualified biologist, or a worker education program (i.e., tailgate talks) to highlight the biological resources on site, the protection measures in place, and the proper monitoring and reporting process if issues with biological resources are encountered during construction.
During construction, Best Management Practices (BMPs) would be implemented to protect biological resources on site and inspected periodically to ensure the BMPs (e.g., exclusion fencing, fish rescues, buffers around nests, protective barriers around trees, invasive species management measures, phytophthora management) are functioning as intended.
A vegetation protection plan shall be prepared and implemented to protect vegetation that does not need to be removed from inadvertent damage during project construction. This plan would incorporate standard construction practices used and described in the project description, and may include things like a pre-construction survey to identify and flag specific trees near or within construction areas that are to be saved. The vegetation protection plan would also account for inadvertent or unplanned damages to trees marked for preservation or trees outside the grading footprint that have been affected by project construction.
The construction schedule will be constrained based on the project biological opinion, which limits in-water work to the period between June 1st and October 15th of any given year, with some exceptions.
Reasonable and prudent measures from the Biological Opinion related to minimizing instream construction impacts; minimizing impacts to instream and riparian habitat; utilizing a biological

monitor during construction; minimizing water quality impacts; and conducting monitoring and reporting would be implimentedimplemented (Appendix C3).
Aesthetics and Recreation
Staging, heavy equipment and construction material storage areas would be located outside visually sensitive areas. If staging areas cannot be located outside visually sensitive areas, these areas would be screened from general viewing.
Where possible, new structures or alterations to existing structures would blend with their surroundings by using forms, lines, colors, and textures that are consistent with the surroundings. Forms and lines would be broken up to avoid straight edges and forms that are out of scale with their surroundings.
The design of the project, particularly the structural components such as bridges and walls, where possible incorporate an urban or thematic element reflecting the rich archaeological and cultural history of the area, where possible, at a reasonable cost. This would include aesthetic treatments, shapes, and forms, and would be accomplished through collaboration with urban and city planners and local interest groups during the design phase.
Noise
Construction equipment shall be equipped with manufacturer's standard noise control devices, such as mufflers and/or engine enclosures.
All construction equipment shall be inspected periodically to ensure proper maintenance and confirm compliance with the Envision San José 2040 General Plan (City of San José, 2022).
In residential areas, no construction shall occur between the hours of 7:00 p.m. and 7:00 a.m. without approval from the City of San José.
The use of temporary plywood barriers for noise reduction shall be determined on an individual basis by location, particularly in areas where construction activities would be within 200 feet of residents and other sensitive receptors.
Pavement breakers shall be used in place of jackhammers.
Truck routes shall avoid heavily populated residential streets whenever possible. Prioritize use of truck routes identified in the Envision San José 2040 General Plan, and/or commercial and industrial streets (City of San José, 2022).
Transportation
Prior to construction the contractor shall prepare a detailed Construction Traffic Management Plan, which will be approved by USACE, Valley Water the VTA and the City of San José.
Construction shall be phased to maintain a minimum of one lane open to traffic at all times in each direction. Construction work at the Canoas Creek and Ross Creek crossings of Almaden Expressway shall be planned to provide three lanes open in the peak traffic direction during peak hours.
No two adjacent bridges shall be closed at the same time.
Traffic management techniques such as the use of barricades and warning signs shall be applied as described in the California Manual on Uniform Traffic Control Devices (Caltrans 2014) and the Manual on Uniform Traffic Control Devices (FHWA 2022).
Construction haul routes and other measures shall restrict truck traffic on residential streets to only those streets where project activities occur. USACE shall monitor the movements of construction vehicles to ensure that trucks use only the designated routes. Work on or near residential streets shall be limited to between 7:00 A.M. and 6:00 P.M. to prevent night-time disruption to nearby residents.
The Santa Clara VTA shall be notified in advance of any planned bridge closures. Notification shall occur so that bus lines can be rerouted and disruption to bus schedules can be minimized. The VTA Bus Stop Coordinator will be contacted at least 72 hours prior to the start of any construction work affecting bus stops or transit operations.
The Corps shall comply with all railroad company regulations and instructions governing railroad operations and property including the following: • Use signals and flags for all railroad property, including directing train traffic, as a protection against accidents;

• Conduct operations adjacent to the railroad facilities and within the railroad right-of-way in such a manner as to maintain structures and other facilities in good and safe conditions; and • Construction activities that require track removal and replacement shall be scheduled on weekends or at other times coordinated with the railroad.
Traffic detours, including bus route detours, shall be established to minimize the disruption of traffic caused by construction. Impacted areas shall be notified regarding alternate traffic and pedestrian routes at least 72 hours prior to the start of construction work. Detours should maximize use of major roadways and trucking routes.
Land Use
Compliance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1960, and any associated compensation for properties needed to construct the Combination Plan, would mitigate effects to land use to less than significant.
Public Services and Utilities
During the construction period, the City of San José Police Department would be notified regarding road closures or other activities that would be likely to impede delivery of police, fire or other emergency response services. Detours would be coordinated with emergency services to ensure that no unanticipated delays would occur. Contact would also be made with the Crime Prevention Unit to ensure that the project site and residents in the vicinity are visible and accessible by emergency vehicles. The City's Fire Department requests similar notice of road closures during the construction period. The Department would need a 60-day advance notice to plan for modified responses to accommodate the constrictions or road closures. County Communications would also be notified of all road closures.
Appropriate notification and coordination would be undertake with utility companies to reduce impacts from services interruptions to less than significant. Whenever utilities are moved or modified, a Utility Excavation Permit must be obtained from the San José Public Works Department prior to the initiation of project construction. The general conditions and requirements of such permits include the project's working hours, necessary traffic control devices, trench backfill and pavement restoration methods and coordination with other construction projects in the general vicinity. In addition, both standard and special encroachment permits would need to be secured from the department. Utility excavation permits would be issued to utility companies with franchise agreements with the City of San José (Khouzam 1990). Relocation of utilities would be coordinated with the appropriate utility company. All utilities relocation would be performed by the appropriate utility company unless directed otherwise by the company. Any damage to utilities would be repaired.
Cultural Resources
USACE will ensure that archaeological and tribal monitors are present to halt construction for such a discovery and evaluate its historic significance and eligibility for the NRHP. A Tribal Cultural and Archaeological Monitoring Treatment Plan (TCAMTP) will be developed with concurring parties as well as the SHPO. Avoidance, minimization, and mitigation measures for certain types of cultural resources discovered during construction will be included in the TCAMTP and be developed collaboratively with concurring parties. The implementation of a TCAMTP as well as having monitors present during ground-disturbing work reduces the significant impact to unanticipated cultural resources buried within the footprint of the Combination Plan to less than significant.
To address the overall cultural sensitivity of the Upper Guadalupe area, USACE will develop and implement a Programmatic Agreement to defer additional identification efforts and resolution of adverse effects for the Preferred Action alternative to the design phase of the study and before construction occurs. The Programmatic Agreement commits USACE and Valley Water to additional identification efforts before construction occurs. All Section 106 consulting parties will be invited as concurring parties to the Programmatic Agreement, including historic organizations as well as the Tamien and neighboring Ohlone tribes.
All ground-disturbing work will require an archaeological monitor and tribal monitor to be present. Monitors will have the authority to temporarily halt construction in the event of an inadvertent discovery. The archaeological monitor will maintain a work log for each monitoring day including the

date and time of work, area of work, soil unit monitored, type of work and equipment present, construction activities performed, archaeological finds observed (if applicable), and representative photos of areas being monitored. The monitors will also provide pre-construction training for all construction personnel focusing on the potential for exposing archaeological sites and procedures for unexpected discoveries.
If previously unknown archaeological resources or components of previously documented archaeological resources are encountered during monitoring, the archaeological monitor will follow the procedures established in the TCAMTP. A temporary 100-foot buffer will be placed around the discovery along with clearly marked temporary fencing. No earth moving activities are allowed inside the area before completing the post-review discovery process.
If precontact cultural materials are discovered during monitoring, a tribal monitor will be alerted to provide recommendations. If the find is archaeological, both archaeological and tribal monitors will contact USACE to follow the discoveries process outlined in the Programmatic Agreement and TCAMTP pursuant to 36 CFR § 800.13(a)(1).
The inadvertent discovery of human remains and associated funerary objects may also be discovered and represents a potential impact. If any discoveries are made of human remains or funerary objects, monitors will direct construction crew to stop ground-disturbing activities within a 100-foot radius of the find. Protective measures agreed upon with tribes within the TCAMTP will be followed until a qualified archaeologist and tribal monitor can provide an assessment before contacting the County Coroner. Based on the Coroner's determination of the human remains being Native American associated, USACE will notify the NAHC who will appoint a Most Likely Descendent (MLD) to complete their inspection and make a recommendation or preference for treatment of their ancestral remains (Public Resources Code Section 5097.98). The development and implementation of a burial recovery plan will be developed between USACE, the MLD, and Valley Water. This process will be included in the TCAMTP and would reduce the potential for significant impacts to burial sites and ancestral remains to less than significant levels.
Hazardous Materials
Minimize excavation footprint in locations with high mercury concentrations to the maximum extent practicable.
Seek beneficial reuse opportunities to the maximum extent practicable.
Conduct confirmatory testing during design phase and implement ways to reduce exposures to elevated mercury concentrations.
If leaving soil on-site that has total mercury concentrations higher than 15 mg/kg, it will be covered with at least 3 ft of soils with mercury concentrations less than 15 mg/kg. 15 mg/kg is used as a threshold because it is listed in the Water Board's environmental screening levels as being harmful to freshwater organisms.
Public Safety
Project construction areas would be posted with warning signs and would be adequately fenced and barricaded or equipped with other security measures to prevent unauthorized access during construction.
Prior to commencing construction activities for any phase of the project, access routes for construction truck traffic would be identified and posted and approved by Valley Water, the City of San José and VTA. Routes into construction areas would, to the maximum extent practical, avoid residential areas. Construction zones would be clearly marked and posted, and flag personnel used wherever necessary to direct traffic.
Notification would be given to residents and businesses in the surrounding area before construction begins. Alternate traffic and pedestrian routes for impacted areas would be posted.
Permanent warning signs (e.g., no entry, no swimming or diving), fencing, barricades and/or other access control measures would be erected in areas along the channel, where necessary, to restrict or prohibit public access.

A system for trail closures and other early warning notifications would be put in place to restrict or prohibit public access in advance of flood events. The same system would include advanced inspections and evacuation notifications for any unhoused populations in the floodplain for life safety purposes.
Socioeconomics
No mitigation would be required.
Environmental Justice
Coordinate with the City of San José to ensure that unhoused communities are relocated outside of the flood hazard zone in order to facilitate construction of the project.
Climate Change
If practicable, use fuel efficient construction equipment and equipment equipped with newer technologies.
Recycle at least 75% of construction waste and demolition debris.
Perform on-site material hauling with trucks equipped with on-road engines (if determined to be less emissive than off-road engines),
Use alternative fuels for generators at construction sites, where feasible.
Encourage and provide carpools, shuttle vans, transit passes, and/or secure bicycle parking for construction workers,
Reduce electricity use in the construction office by using compact fluorescent bulbs, powering off computers every day and using efficient heating and cooling units,
Seek opportunities to purchase imported goods from sources within 100 miles of the project site,
Seek opportunities to beneficially reuse disposal material within the region to reduce hauling distances.

5 PLAN COMPARISON AND SELECTION

The Principles and Guidelines (P&G) Criteria and Four Accounts were used to evaluate the alternatives, as discussed in Section 1053.5. This section will compare alternative plans in order to select a preferred alternative.

The *Principles and Guidelines Criteria* are:

- Efficiency – The potential benefits/outcome of the measure are greater than what could be provided by another measure/plan of equal or greater cost.
- Effectiveness – Extent to which a measure or alternative alleviates problem areas and meets planning objectives.
- Acceptability – Viability and appropriateness of an alternative from the perspective of the general public and consistency with existing Federal laws, authorities, and public policies.
- Completeness – Extent to which an alternative provides and accounts for all features, investments, and/or other actions necessary to realize the planned effects, including any necessary actions by others.

Additionally, the four Principles and Guidelines Accounts, or four accounts, were used to evaluate, compare, and screen alternatives by describing the various types of benefits alternatives can produce, and contrasting those to the cost to achieve these benefits. The four accounts are: National Economic Development (NED), Regional Economic Development (RED), Environmental Quality (EQ), and Other Social Effects (OSE). The four accounts provide a clear approach to guide the evaluation of and accounting for all significant effects of each alternative plan. The Federal objective for water and related land resources planning is to contribute to NED, consistent with protecting the nation's environment, in accordance with national environmental statutes, applicable executive orders, and other Federal planning requirements. Comprehensive documentation of total benefits of project alternatives, including equal consideration of economic, environmental, and social categories has been undertaken in accordance with SACW Policy Directive on the "Comprehensive Documentation of Benefits in Decision Document," dated 5 January 2021.

Hydraulic modeling was performed to assess how each alternative reduces flooding, a qualitative assessment to habitat impacts was followed by more detailed quantitative modeling of changes to key types of habitat (riparian and aquatic), as described in Section 3.5.2. RED was assessed using the Recons model and OSE was assessed quantitatively using tools which scaled in complexity as the study progressed. The team also evaluated and compared key cost drivers such as how much sediment would be excavated and need to be disposed of off-site, versus what could feasibly be managed on site. Finally, the team also took care to evaluate how each alternative would perform from a self-sustaining channel perspective, and assessing whether O&M would likely be management or untenable. This was an important evaluation criteria as it was a key driver in moving the previously authorized Bypass Plan into a general reevaluation.

5.1 Plan Comparison

A summary of the plan comparison is shown below in Table 41. This comparison identifies the Combination Plan as the plan that reasonably maximizes comprehensive benefits.

Table 41. Alternative plan comparison.

	Evaluation Criteria #1: Efficiency ($ cost effective)	Evaluation Criteria #2: Effective-ness	Evaluation Criteria #3: Acceptable (Implement-able)	Evaluation Criteria #4: Completeness (standalone)	Evaluation Criteria #5a: Environmental Quality (EQ) riparian habitat	Evaluation Criteria #5b: EQ aquatic habitat	Evaluation Criteria #5c: EQ Cultural Resources	Evaluation Criteria #6a: Other Social Effects (OSE), life safety	Evaluation Criteria #6b: Environmental Justice (OSE)	Evaluation Criteria #6c: Resiliency by Critical Infrastructure (OSE)	Evaluation Criteria #7: Regional Economic Development (RED)	Evaluation Criteria #8: Trucking Air Emissions from sediment disposal offsite (EQ)	Velocities in Reaches 7 & 8
Final Array of Alternatives	**Green = High Light Green = Med-High Peach = Marginal BCR Red = BCR < or = 1**	**Percent Damages Reduced Green = >90 Yellow = 80-90 Red = <80**	**Green = High Peach = Pink = Low**	**Green =** Would not require action from others **Light green=** Requires opt-in action from others	**Green = High Yellow = Med Red = Low**	**Green = High Yellow = Med Red = Low**	**Green = No to low impacts to Cultural Resources Yellow = Medium impacts Pink= High impacts**	**Green = manages risk Light Green = manages risk but not as well Peach = Unsure/medium Pink = Hazard remains**	**Green = at least 50% of benefits are in socially vulnerable reaches**	**Green = All 11 critical infrastructure (CI) removed from floodplain Pink = 1 CI at risk Bright Red = >3 CIs at risk**	**Green = High Gross Regional Product (GRP) / # Jobs Created / Regional Output Yellow = Med Red = Low**	**Green = Low emissions Yellow = Medium emissions Red = More emissions**	**Green = Manageable O&M Yellow = Medium Red = Unacceptable O&M**
<u>Alternative 2b</u>: Valley View	**3rd Highest Net Annual Benefits $8.11 M**	**98%**	Might be Difficult to Identify Sufficient Space for Required Mitigation[15]		Relatively large decrease in Riparian Habitat (-11 HUs)	Increase in acres aquatic rearing habitat (2.47 acres) / Increase in spawning habitat (1.88 acres)			99.3% of persons removed from 1% AEP floodplain in socially vulnerable reaches		$164.5 M GRP 1,544 jobs $234 M output	48,000 cy trucked	
<u>Alternative 3b</u>: Bypass	Lowest Net Annual Benefits $0.65 M BCR of 1.0	**96%**	Difficult to Identify Sufficient Space for Required Mitigation[16]		Relatively large decrease in Riparian Habitat (-12 HUs)	Slight increase in acres aquatic rearing habitat (1.49 acres) / Increase in spawning habitat (1.88 acres)			100% of persons removed from 1% AEP floodplain in socially vulnerable reaches		$262.5 M GRP 2,463.3 jobs $373 M output	52,000 cy trucked	**This issue was key trigger for GRR**
<u>Alt 4: Nonstructural</u>	4th Highest Net Annual Benefits $0.72 M / Marginal BCR of 1.1	**43%**	Mitigation likely low /negligible	Opt-in rate effects benefits and residual risk	No effect			Dangerous flood depths remain	76.2% of persons removed from 1% AEP floodplain in socially vulnerable reaches	9 critical infrastructure structures at risk	$214.4 M GRP 2,011 jobs $304.6 M Output	Not quantified, but likely low to negligible	
<u>Alt 7: Low Scope</u>	2nd Highest Net Annual Benefits $14.58 M	**87%**	Mitigation can be contained within FRM footprint[3]		Large increase in Riparian Habitat (+30 HUs)	Slight decrease in acres aquatic rearing habitat (-.08 acres) / Slight decrease spawning habitat (-.07 acres)		Life safety is improved, but residual risk includes moderate life loss from Canoas flooding	100% of persons removed from 1% AEP floodplain in socially vulnerable reaches, but more residual risk than all above plans	Canoas Creek Elementary School still floods at 1% event.	$41.8 M GRP 393 jobs $59.4 M output	1,000 cy trucked	
<u>Alternative 8b</u>: Combination	**Highest Net Annual Benefits $15.21 M**	**95%**	Mitigation can be contained within FRM footprint[17]		Large increase in Riparian Habitat (+30 HUs)	Increase in acres aquatic rearing habitat (0.93 acres) / Slight increase spawning habitat (0.14 acres)			99.7% of persons removed from 1% AEP floodplain in socially vulnerable reaches		$59 M GRP 555 jobs $83.9 M output	1,000 cy trucked	

[15] *Estimated Remaining Mitigation $8,265,574*
[16] *Estimated Remaining Mitigation $11.1 million*
[17] *Estimated Remaining Mitigation $1.6 million*
** Costs are in FY 2023 price levels, 2.5% discount rate **Color shading indicates good (dark green is best) to bad (bright red is worst), with shading of pink, peach, yellow, to light green indicating a spectrum between from worst to best, respectively.*

The Combination Plan (Alt 8b) is the highest-ranking plan, followed by the Low Scope Plan (Alt 7). However, the Low Scope Plan does not compare well against the Combination, Valley View, and Bypass Plans for life safety, nor critical infrastructure protection, with pockets of deeper flooding remaining in socially vulnerable areas and the Canoas Creek Elementary School still at risk of flooding for the 1% AEP event.

The Valley View Plan (Alt 2b) ranks as the third most preferrable plan as it is economically justified, is equitable, and very effective at managing flood risk, including risk to life safety. However, it's large decrease in riparian forest habitat—a rare and highly productive habitat type that supports threatened steelhead and has high biodiversity, make this a less preferable plan, especially when considering the good alternatives available. Furthermore, the Valley View Plan has the most cultural impacts to tribes of any plan. The Nonstructural Plan (Alt 4) ranks 4th highest between alternative plans. It has a marginal BCR and manages 43% of the flood damages, leaving the largest residual risk of all the plans. There are nine critical infrastructure structures still at risk under this plan and dangerous flood depths remain in a heavily populated urban area. The lowest ranking plans is the Bypass Plan (Alt 3b). Its BCR is marginal, especially when considering the uncertainty that it's impacts may not in fact be mitigable due to the lack of sufficient space in the project footprint to conduct mitigation and the regionally scarcity of appropriate mitigation sites.

The Combination (Alt 8b) and Low Scope (Alt 7) Plans rank comparably for EQ, as they both provide a large increase in riparian habitat. The Low Scope Plan is not quite as good for EQ since it has a slight decrease in aquatic rearing habitat, while the Combination Plan has an increase of .93 acres of aquatic rearing habitat. Similarly, the Low Scope Plan has a slight decrease in spawning habitat, while the Combination Plan slightly increases spawning habitat. The Low Scope Plan ranks worst of all the structural plans for OSE due to the higher amount of residual risk in the Low Scope Plan which includes deeper flooding in socially vulnerable areas. RED was not identified as an important evaluation criteria. Ranking by RED benefits in this case follows the most expensive plan (highest ranked) down to the least expensive plan (lowest ranked), though all plans provide moderate to great RED benefits ranking from roughly 500 to 2,000 jobs created, and gross regional product between roughly $60 M and $260 M.

In addition to the P&G criteria and the four accounts, the team also evaluated both qualitatively and quantitively how the with-project flow velocities would be in reaches 7 & 8 since high velocities with the Bypass Plan (Alt 3b) in place were the significant issue identified in PED which in part triggered the General Reevaluation. The Combination Plan (Alt 8b) was modeled with a higher resolution analysis to assess with project velocities which were in an acceptable/ mitigable range. It was extrapolated that the similar Low Scope Plan (Alt 7) would also be acceptable. The nonstructural plan does not change the velocities in the channel, which are already problematic, so this scored medium, along with the Valley View Plan (Alt 2b). The Bypass Plan (Alt 3b) is known to have difficult to address velocity issues that would trigger unacceptable O&M costs for Valley Water, and thus scored the worst for velocities.

5.2 Identification of the Comprehensive Benefit and NED Plans

The plan that reasonably maximizes net benefits and is therefore the NED plan is Alternative 8b, the Combination Plan. The Combination Plan is the plan that reasonably maximizes net comprehensive benefits and is therefore the Comprehensive Benefit Plan.

The Combination Plan (Alt 8b) and Low Scope Plan (Alt 7) are within 6% of each other for net NED benefits so the Low Scope Plan will be carried forward to further analysis in case it becomes the NED plan with further analysis and optimization.

5.3 Plan Selection

The Combination Plan (Alternative 8b) was selected as the Tentatively Selcted Plan (TSP). It not only reasonably maximizes net NED benefits, but it also maximizes EQ and OSE which are important metrics for comparison given the significance of the habitat in the study area, which this plan would improve, and the life safety and environmental justice considerations.

6 THE RECOMMENDED PLAN

This section describes the TSP and its accomplishments as well as procedures and cost sharing required for implementation of the plan if it is authorized by Congress. The TSP is Alternative 8b, the Combination Plan. The Combination Plan is also the NED and Comprehensive Benefits plan, and as such will provide social, environmental, and monetary benefits.

6.1 Plan Accomplishments

Alternative 8b: Combination Plan is economically justified and offers flood risk reduction and substantial comprehensive benefits. The plan provides flood risk reduction for over 99% of people residing in the study area floodplain for the 1% AEP event, including people residing in socially-vulnerable reaches. The TSP also improves aquatic and rapian habitats and incorporates engineering with nature features. The Combination Plan BCR and average annual costs and benefits, and total project cost are shown below in Table 42.

Table 42. Equivalent annual benefits and costs.

Item	Amount (in $1000's)
Total Project Cost	$152,800
Expected Annual Damages	$939
% Damages Reduced	95%
Average Annual Cost	$6,500
Average Annual NED Benefits	$21,600
Net NED Benefits	$15,100
Benefit Cost Ratio	3.4

The tentatively selected plan (TSP) is the Combination of Engineering with Nature and Traditional FRM Plan. The Combination Plan is the NED and the Comprehensive Benefit Plan and reduces 95% of damages across all flood events modeled. In addition to the NED benefits noted in Table 42, the Combination Plan will provide $59 million gross regional product, 554 jobs, and $83.9 million in regional economic output.

The Combination Plan has substantial benefits to environmental justice—90.5% of persons removed from the 1% AEP floodplain are in socially vulnerable flooding impact areas. All eleven incidences of critical infrastructure in the 0.2% AEP without project floodplain are removed from the floodplain with this plan.

The Combination Plan maximizes EQ benefits compared to other alternatives by providing a large increase of over 30 habitat units of riparian forest habitat in the form of a floodplain bench, compared with the without project condition: and an increase in both aquatic rearing habitat (0.93 acres), and spawning habitat (0.14 acres). The purpose of the floodplain bench is to increase the capacity of the channel, reducing hydraulic constrictions and flood damages. However, by designing it with habitat in mind, more benefits to the nation can be gained.

Agriculture and development in the Santa Clara Valley have eliminated most of the riparian forest in the region. The riparian forest along the Guadalupe River and nearby creeks constitutes one of the last remaining area of significant riparian forest in the valley. Along the Upper Guadalupe River where this project takes place, the remaining riparian habitat has been reduced and degraded by channelization, gravel mining, and development along the banks of the river. This project converts parking lots and pavement to riparian forests and reestablishes a floodplain which had been developed upon. Riparian forests are among the most productive habitats for wildlife in California and these habitats support the

densest and most diverse wildlife communities in the Santa Clara Valley. Biodiversity is generally highest in riparian forests. Thus, the EQ benefits that this FRM project delivers are significant. Unlike the previously authorized plan, the mitigation for adverse impacts from the Combination Plan can all be contained within the FRM footprint, and no additional ecological mitigation is needed beyond what has already been constructed.

Impacts to tribal and cultural resources are expected from deep excavation proposed from the Combination Plan. Ground disturbance along the riverbanks could uncover unanticipated cultural resources, which would require mitigation or avoidance during their discoveries based on an implemented treatment plan. USACE is also exploring ways to identify unanticipated sites through survey and testing during design and before construction occurs. The project costs for mitigation as well as additional surveys, testing, and monitoring is included.

It is important to note that this is not an ecosystem restoration project and the team did not formulate for ecosystem restoration, but rather for flood risk management. Thus, there are further opportunities to restore the riparian ecosystem in this system which were not evaluated because they were not associated with FRM.

The TSP would also increase recreational opportunities along the Upper Guadalupe River by creating trails along maintenance roads, improving connectivity to other trails and bikeways, and adding observation and access points along the river.

The TSP provides comprehensive benefits by encouraging development of water resource solutions that are holistic and take into account both local and national stakeholder interests. The TSP provides the following RED, EQ, and OSE benefits, shown in Table 43. Additional information on these accounts can be found in Section 3.5 and Appendix B – Economics and OSE Analysis.

Table 43. Comprehensive benefits of the tentatively selected plan (TSP), Combination Plan.

Category	Benefits
Regional Economic Development (RED)	• $83.9M RED output • Approximately 550 jobs created during implementation of the TSP • $52.9M of labor income • $59M gross regional product
Environmental Quality (EQ)	• Approximately 30 acres of riparian habitat created • Some reduction in riparian habitat with the initial clearing and grubbing, but this habitat comes back within 5 years and then is substantially improved after 10 years of vegetation growth • 0.93 acres of aquatic habitat created • Uses engineering with nature
Other Social Effects (OSE)	• 95% flood damages reduced • 99.7% residential populations in residential structures in socially vulnerable areas removed form 1% AEP floodplain • Reduces life safety risk to population in 1% AEP floodplain • Removes all critical infrastructure (11 structures) from the 1% AEP floodplain

6.2 Plan Components

Reach 7
UPRR Bridge to UPRR Bridge (STA 741+00 to STA 781+00):

The existing Reach 7 is approximately 3,845 ft in length that spans from an active existing Caltrain/UPRR Crossing to an abandoned UPRR bridge. Caltrain/UPRR Bridge will be extended to encompass the proposed widened channel. The proposed design for Upper Guadalupe River includes a widening the eastern bank and implementing new bypass channels at crossings which comprise of an expanded floodplain, maintenance road with access ramps, gravel augmentation, and a pilot channel for low flow activities. The proposed extended floodplain will have a 2% slope towards the existing channel. A 50 to 100-ft wide floodplain bench will include riparian vegetation along the low-flow channel.

Islands will be left in place to preserve some of the existing vegetation on the east bank. Biotechnical bank stabilization, large wood structures and rip rap (if needed) will also be included to help reduce erosion and scours where necessary. Gravel augmentation is incorporated along the existing channel to provide spawning substrate for migratory fish and an infusion of coarse sediment supply for downstream reaches.

The new 18-ft wide maintenance road will be located at the toe of the new eastern channel which can be accessed from the new access ramp. The 2H:1V slopes will be stabilized by natural plantings. At the Willow Street Crossing and Alma Avenue Crossing, a new bridge and bypass have been proposed at both locations. Each bypass consists of a maintenance road and, expanded floodplains with a 2% slope that leads to low-flow pilot channels.

There are 2 permanent fill placement sites within Reach 7: Willow Street & Lelong Street and W Alma Avenue (Elks Lodge). These sites will also act as construction staging areas which will help reduce the truck trips during construction reducing the environmental impact of transporting all the earthwork.

During feasibility level design prior to the release of the Final Report, the team will investigate potential features to optimize the plan (i.e. obtain additional net benefits), including a floodwall or levee on the east side of the Guadalupe Parkway on the bank on the northern edge of the channel as it bends to cross under the parkway, as well as a short segment of floodwall or levee on the west side of the channel between Alma Avenue and Falcon Place.

Reach 8
Abandoned UPRR Bridge to Willow Glen Way (STA 781+00 to STA 795+00):
Continuation of the channel widening to be constructed at Reach 8. The proposed design for Upper Guadalupe River will include a floodplain bench on eastern bank while leaving some natural mitigation islands in place. The existing UPRR Bridge will be rehabilitated to provide recreation access and connectivity across the Guadalupe River. A new 3-cell box culvert is proposed to be installed below the existing UPRR tracks. The permanent fill placement site within Reach 8 is along Mackey Avenue.

Canoas Creek
Almaden Expressway to Nightingale Drive:
The proposed design for Canoas Creek consists of widening the channel on the eastern bank. Additional box culverts are proposed at both Almaden Expressway and Nightingale Drive crossing. At Almaden Expressway Culvert Crossing, a new box culvert will be constructed on the eastern side adjacent to the existing double culverts. While the new box culvert at Nightingale Drive crossing will be built on the western side adjacent to the existing double culverts. New eastern wingwall at Almaden Expressway and new western wingwall at Nightingale Drive will be built to incorporate the additional culverts. Utilities will be protected and adjusted in coordination with implementing these new culverts at both locations. Floodwalls are proposed along both creek banks between Almaden and Nightingale (each floodwall approximately 2800-ft in length), and a floodwall is proposed along the western bank for 750 ft upstream of Nightingale, to increase the channel height. The floodwalls heights will vary between 4-ft to 6-ft from existing grade.

During feasibility level design, targeted nonstructural measures such as home elevations, dry floodproofing on non-residential properties, and buyouts/relocations will be investigated as potential measures to reduce risk to life safety and in combination with structural features in an effort to reduce the height of floodwalls on Canoas Creek. Removal of levees or creek widening in combination with floodwalls may also be investigated as a means to optimize the plan.

Ross Creek
Almaden Expressway to Kirk Road:
Culverts at Almaden Expressway, Cherry Avenue, Jarvis Avenue, Meridian, and Kirk Road are being widened to help with the flooding along Ross Creek. A new adjacent box culvert will be implemented at Almaden Expressway, Cherry Avenue, Jarvis Avenue, and Kirk Road. The culvert at Meridian Avenue will be replaced with a 3-box culvert. The wingwalls at all the new crossing will be updated to incorporate the new culverts. Floodwalls are proposed to be constructed along both creek banks near certain culverts. At Almaden Expressway Crossing, the floodwalls on the northern side will approximately be 325-ft from Briarglen Drive and the southern side will be 125-ft from Briarglen Drive. At the Cherry Avenue Crossing, the northern floodwall will be placed approximately 712-ft upstream from Cherry Avenue and the southern floodwall will run approximately 359-ft upstream from Cherry Avenue. At the Jarvis Avenue Crossing, the northern floodwalls are 516-ft (upstream) and 334-ft (downstream) and the southern floodwall is approximately 530-ft upstream from Jarvis Avenue. The floodwall heights will be approximately 4-ft from existing grade.

Upper Reaches
During feasibility design, the PDT will conduct more detailed hydraulic modeling and update topographic surveys to assess the needs for potential minor flood risk management features in Reaches 9 through 12. Among other, these investigations will focus on minor breakout locations on the west bank betweed Malone Road and Curtner Avenue, at Almaden Expressway where it crosses the river, on the right bank near the Capitor Expressway Bridge, and on the right bank near the Branham Lane bridge. If needed, the minor flood risk management features could include additional sections of floodwall or levee, or floodplain benches if sufficient space is available. If these features are confirmed to be necessary prior to the release of the Final Report, the cost/benefit and environmental impact analyses will be updated to reflect their inclusion. It is not anticipated that inclusion of these features would change impact determinations or result in an expanded geographic scope beyond that incorporated by reference into this document.

A summary of proposed features in each reach of the TSP is displayed in Table 44.

Table 44. Summary table of tentatively selected plan (TSP) Features, Combination Plan.

Reach	Channel	Bridges/Culverts	Levees/Floodwalls	Bank Protection
7	50 to 150 ft wide floodplain bench on eastern bank of main channel Islands left in place to preserve existing riparian vegetation Gravel augmentation Floodplain revegetation Large woody debris structures in low flow channel	Retrofit/Replacement at Caltrain, Willow, and Alma St.	Floodwalls at Elks Lodge and Mills Ct if needed	450 ft of biotechnical bank stabilization on western bank Rip-rap if needed
8	Same as 7	Retrofit at abandoned Union Pacific railroad bridge with box culvert		Biotechnical bank stabilization or rip-rap if needed
Canoas Creek	Widening at culverts	New culverts at Almaden and Nightingale	Floodwalls on both banks (~2,800 ft), potentially to replace existing levees	
Ross Creek	Widening at culverts	New culverts at Almaden, Cherry, Jarvis, Kirk, Meridian	Intermittent floodwall on both banks	

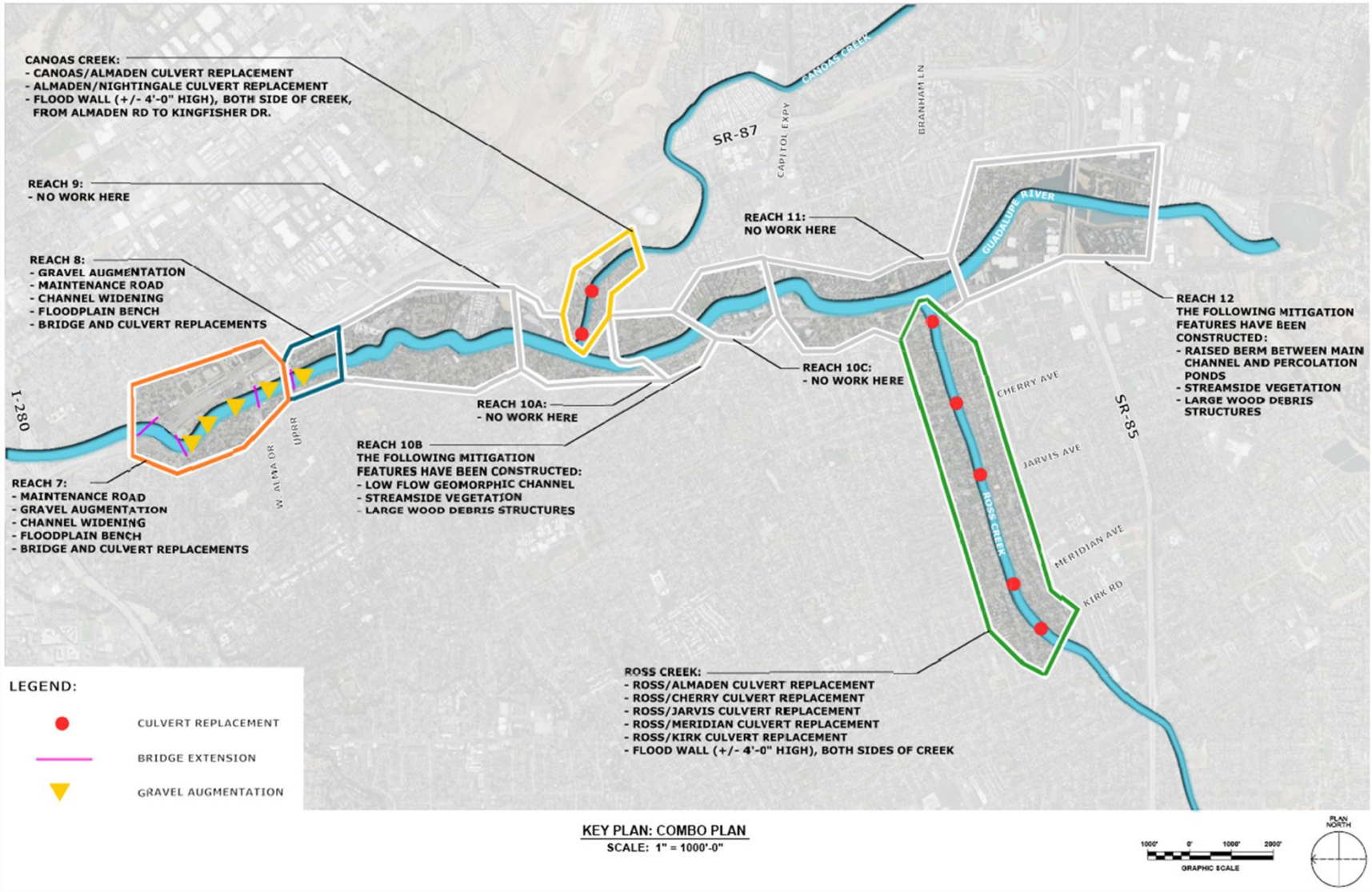


Figure 41. Combination Plan overview.

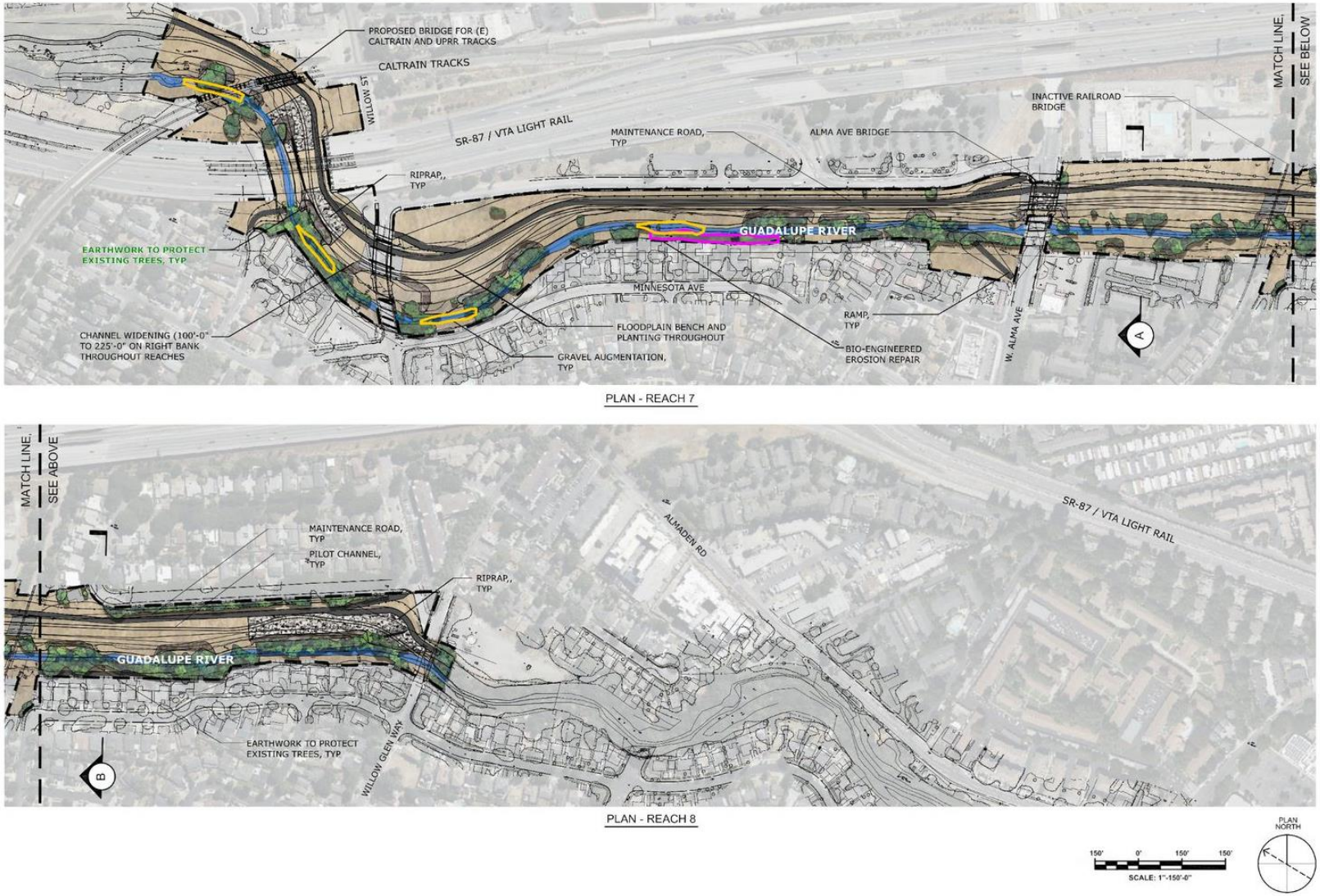


Figure 42. Combination Plan Reach 7 and 8 engineering with nature features.

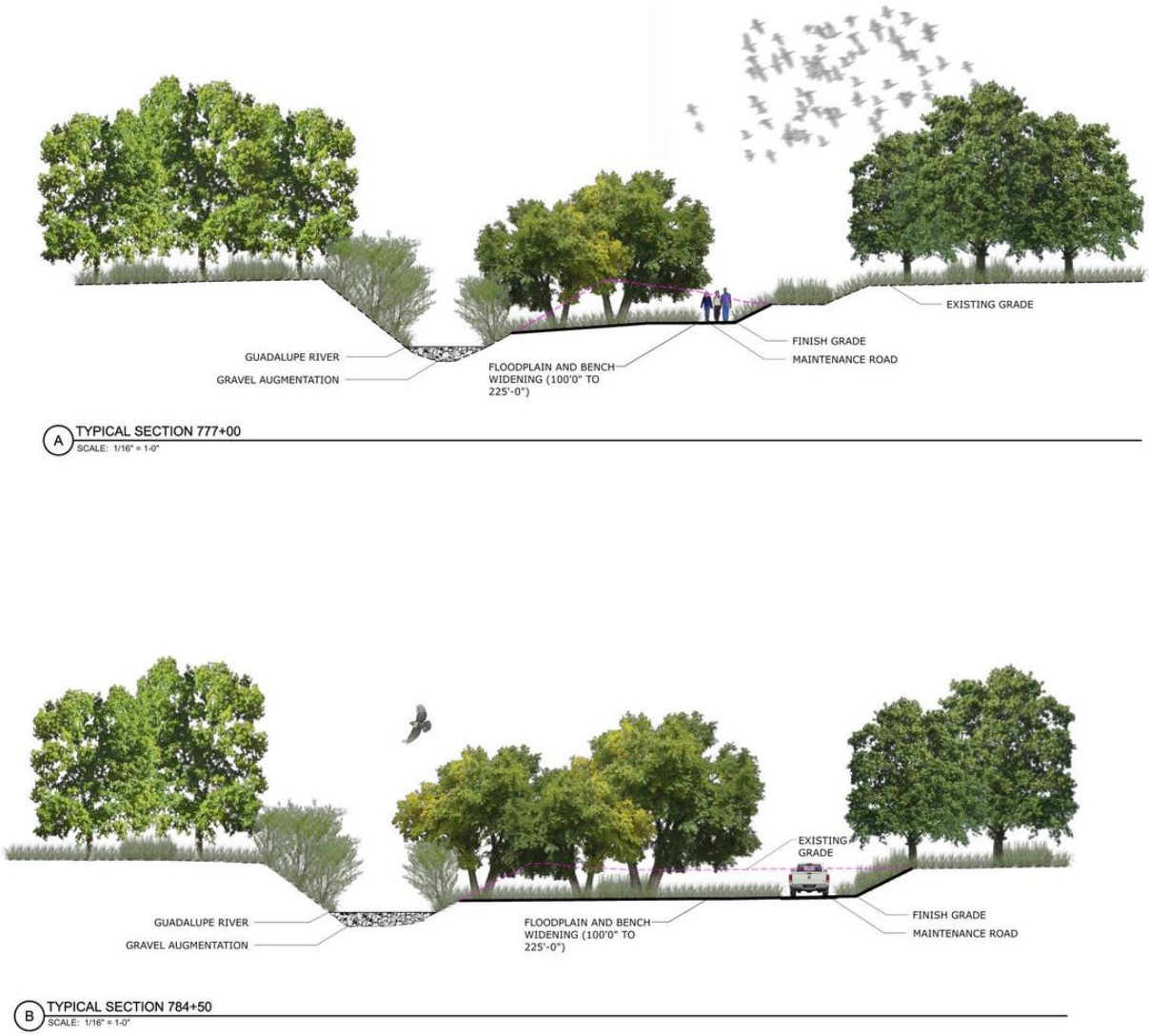


Figure 43. Conceptual cross-section of proposed plantings in the Combination Plan

6.3 Cost Estimate

The project first cost for remaining costs is estimated at $152.8 million based on fiscal year 2023 price levels. Table 45 displays costs by account. The total is summed at the top of below table.

Table 45. Tentatively selected plan (TSP) Cost Estimate & Alternative Cost Estimates.*

Account	Measure	QTY	UOM	Total Direct Cost	Contingency	Total Project Cost
	Valley View Plan			$ 242,371,543	$ 82,892,332	$ 325,263,875
01	Lands and Damages (Real Estate)	1	LS	$ 103,000,000	$ 25,750,000	$ 128,750,000
02	Relocations	1	LS	$ 1,000,000	$ 410,000	$ 1,410,000
06	Environmental Mitigation	1	LS	$ 8,265,574	$ 3,388,885	$ 11,654,459
18	Cultural Mitigation	1	LS	$ 475,000	$ 194,750	$ 669,750
	Construction				$ -	$ -
11	Levees and Floodwalls			$ 21,515,108	$ 8,821,194	$ 30,336,302
15	Roads, Railroads, and Bridges			$ 74,526,179	$ 30,555,733	$ 105,081,912
16	Construction Subtotal			$ 96,041,286	$ 39,376,927	$ 135,418,214
30	Engineering and Design	20.5	PCT	$ 22,212,532	$ 9,107,138	$ 31,319,670
31	Supervision and Admin	10.5	PCT	$ 11,377,150	$ 4,664,632	$ 16,041,782
	Bypass Plan			$ 380,408,625	$ 130,413,450	$ 510,822,076
01	Lands and Damages (Real Estate)	1	LS	$ 145,000,000	$ 36,250,000	$ 181,250,000
02	Relocations	1	LS	$ 1,000,000	$ 400,000	$ 1,400,000
06	Environmental Mitigation	1	LS	$ 11,177,922	$ 4,471,169	$ 15,649,091
18	Cultural Mitigation	1	LS	$ 525,000	$ 210,000	$ 735,000
	Construction				$ -	$ -
11	Levees and Floodwalls			$ 28,332,415	$ 11,332,966	$ 39,665,380
8	Roads, Railroads, and Bridges			$ 140,381,479	$ 56,152,592	$ 196,534,071
16	Construction Subtotal			$ 168,713,894	$ 67,485,558	$ 236,199,452
30	Engineering and Design	20.5	PCT	$ 35,704,261	$ 14,281,704	$ 49,985,966
31	Supervision and Admin	10.5	PCT	$ 18,287,548	$ 7,315,019	$ 25,602,568
	Lower Scope Plan			$ 101,077,960	$ 30,231,184	$ 131,309,143
01	Lands and Damages (Real Estate)	1	LS	$ 68,000,000	$ 17,000,000	$ 85,000,000
02	Relocations	1	LS	$ 1,000,000	$ 400,000	$ 1,400,000
06	Environmental Mitigation	1	LS	$ 1,616,150	$ 646,460	$ 2,262,610
18	Cultural Mitigation	1	LS	$ 330,000	$ 132,000	$ 462,000
	Construction				$ -	$ -
11	Levees and Floodwalls			$ 22,641,714	$ 9,056,685	$ 31,698,399
8	Roads, Railroads, and Bridges				$ -	$ -
16	Construction Subtotal			$ 22,641,714	$ 9,056,685	$ 31,698,399
30	Engineering and Design	20.5	PCT	$ 4,953,128	$ 1,981,251	$ 6,934,379
31	Supervision and Admin	10.5	PCT	$ 2,536,968	$ 1,014,787	$ 3,551,755
	Combo Plan			$ 116,104,552	$ 36,722,866	$ 152,827,418
01	Lands and Damages (Real Estate)	1	LS	$ 68,000,000	$ 17,000,000	$ 85,000,000
02	Relocations	1	LS	$ 1,000,000	$ 410,000	$ 1,410,000
06	Environmental Mitigation	1	LS	$ 1,616,150	$ 662,621	$ 2,278,771
18	Cultural Mitigation	1	LS	$ 330,000	$ 135,300	$ 465,300
	Construction				$ -	$ -
11	Levees and Floodwalls			$ 23,109,058	$ 9,474,714	$ 32,583,772
8	Roads, Railroads, and Bridges			$ 11,093,014	$ 4,548,136	$ 15,641,150
16	Construction Subtotal			$ 34,202,072	$ 14,022,850	$ 48,224,922
30	Engineering and Design	20.5	PCT	$ 7,245,315	$ 2,970,579	$ 10,215,894
31	Supervision and Admin	10.5	PCT	$ 3,711,015	$ 1,521,516	$ 5,232,531

**LS – Lump Sum*
UOM - Unit of Measure

6.4 Lands, Easements, Rights-of-Way, Relocations, and Disposal

Valley Water has ownership to all but 13 of the required real estate parcels located within the TSP project footprint. Any existing ownership and existing real estate easements would have to be reviewed and verified for sufficiency to meet project requirements.

Credit will only be applied to lands, easements, rights-of-way, relocations and disposal areas (LERRDs) owned and/or held by the sponsors that fall within the "project footprint," namely the LERRDs required for the TSP. Lands outside of the project requirements and that may be acquired for the sponsor's own purposes which do not support the minimum interests necessary to construct, operate and maintain the Project would not be creditable LERRDs. Only land deemed necessary to construct, operate and maintain the plan would be creditable. The value of potentially creditable lands owned by the sponsors is included in the TSP's cost estimate.

Table 46 displays the cost estimate for real estate requirements of the TSP.

Table 46. Real estate cost estimate.

Alternative	# Acres	# of Ownerships	Proposed Estate	Cost Estimate
Alt 8b: Combination Plan	19.5	22	Fee	$68,000,000

6.5 Operations, Maintenance, Repair, Replacement and Rehabilitation

Routine operations and maintenance are required for the proper care and efficient operation of various project elements, including channel embankments, bridges, culverts, and floodwalls. Site maintenance necessary to ensure serviceability of the channel banks to withstand flow events up to the design flood event. Proper maintenance includes excavaation, repair, and reconstruction of channel embankments, including natural and nature-based features, due to seepage, slumps, vandalism, cracks, scours, loss of grade, animal burrows or erosion to maintain channel capacity. Maintenance actions also include cutting back vegetation to meet the flood risk management goals of the project and maintain project features. Such actions will ensure that the channel, bridges, culverts, and maintenance roads are well maintained and clear of debris to allow for dynamic adjustments as river processes re-establish. After MAMP criteria are met (See Section 6.6 and Appendix C5), operations and maintenance of project features would be required to realize the long-term biological benefits included in the project.

A refined Operations, Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) manual will be available upon project completion to preserve and maintain adequate function of the various project elements. These operation records must be maintained and available for annual inspections.

The cost of OMRR&R is currently estimated at $587,200 annually over a 50-year period of analysis.

6.6 Monitoring and Adaptive Management

To ensure the functional success of the nature-based FRM features, the project will implement a monitoring and adaptive management plan (MAMP; Appendix G). The MAMP actions will be cost-shared activities that occur concurrently with OMRR&R for up to 10 years following active construction, or until success criteria are met. Although the project is not an ecosystem restoration project, the plan will mirror the requirements laid out in Section 1161 of WRDA 2016. The plan will also generally incorporate some lessons learned from the existing MMP that the project has been following for the already constructed reaches. While the plan still needs to be further refined in coordination with Valley Water and

the resource agencies, an early draft is available in Appendix G. The plan will monitor for vegetation success and restored geomorphic processes, as well as lateral and bed stability. Within a period of up to ten years from the completion of construction activities (to include the completion of the plant installation phase of construction), monitoring and adaptive managment shall be a cost-shared project cost. Any additional monitoring and adaptive menagagment required beyond the ten-year period, until ecological success criteria are achieved, would be the responsibility of Valley Water. The team has included $1 million as a placeholder to cover monitoring, reporting, and adaptive management actions. Potential adaptive management actions will include replanting, supplemental irrigation, supplemental biotechnical bank stabilization, additional gravel augmentation, and potentially others.

6.7 Project Risks

Risks and uncertainties were identified at various stages of the plan formulation and considered during plan formulation, to be managed through evaluation, or during design and construction. Some risks and uncertainties may be acceptable and can go unaddressed because the risk is manageable, and the consequences should it be realized are acceptable. Some risks and uncertainties were addressed or minimized as the study progressed to raise the confidence in the next decision, or in order to feel comfortable moving forward with the TSP. The level of detail and certainty increased as the study progresses, and the risk and uncertainty decreased. This approach supports risk-informed decision making.

The following risks related to implementation of the project and/or elements of project performance were identified:

- High channel velocities cause erosion, channel incision, and high maintenance costs for the non-federal sponsor
- Gravel routing and downstream deposition could create maintenance issues, affect flood conveyance, and require disposal. This implementation risk will likely be managed with more detailed sediment transport analysis and/or modeling during the PED phase. Lessons learned from the Reach 6 Gravel Augmentation Pilot Study will be incorporated into the future iterations of the design.
- Large wood in system may accumulate and route through the system, including through bridges and flood conveyance, risking stoppages that increase flood risk. The OMRR&R manual will include surveillance requirements for Valley Water to remove blockages that occur during flood events.
- Lateral channel migration could damage infrastructure and SRA habitat. The OMRR&R will include measures to implement if lateral channel migrations start impacting critical infrastructure like utilities and roads.
- Project may have difficulty revegetating in heavy clay soils, but should be able to incorporate best practices from past construction in the area.
- The Water Board may end up disagreeing with the project's management plan for mercury-containing soils, which could be a significant cost risk to the project.
- Ground disturbance has a medium to high likelihood of uncovering unanticipated archaeological sites situated below any modern fill and alluvium deposits. Archaeological or buried human remains, if uncovered, will require proper documentation, reburial, and coordination with tribes based on the *Tribal and Cultural Archaeological and Monitoring Treatment Plan*. More information is available on mitigating this risk within the Cultural Resources Effects Analysis, sections 4.11 and 4.17.11.
- The USACE Climate Hydrology Assessment Tool was used to investigate trends in simulated historical and projected future precipitation, temperature, and streamflow for the study area. This analysis found a significant trend in the future for project hydrology to be impacted by climate change. Namely, average monthly streamflow is expected to increase the volume of

flow going through the creek by roughly 24% on average over a roughly 100-year projection period. Importantly though, average extreme streamflow is not expected to change, which is relevant as extreme flows are what typically cause flooding. Next steps for analysis and managing risk and uncertainty around increased future stream flows to provide appropriate resiliency across the life of the project is discussed further in Appendix A1. In order to refine the design of the TSP and incorporate this assessment, the team will perform a sensitivity analysis to see how sensitive the TSP is to changes in stream flow. The team will then evaluate options for refining the design to build in resiliency based on potential climate-related hydrology changes. Uncertainty will be reflected in an increased cost contingency and further H&H analysis will be performed during the PED Phase.

6.8 Cost Sharing

The TSP includes implementation of voluntary nonstructural measures within certain areas of the study area. All project costs of the TSP are allocated to the purpose of flood risk management.

The project first cost for remaining costs, estimated using fiscal year 2023 price levels, amounts to $152,827,000 rounded. Cost sharing responsibilities are shown in Table 47Table .

Table 47. Summary of remaining cost sharing responsibilities of the TSP (rounded)*.

Item	Federal	Non-federal
Flood Risk Management	**$60,350,000**	**$90,117,000**
Breakdown of Non-federal Costs		
LERRDs (creditable)	N/A	$75,041,000
5% Cash requirement	N/A	$3,707,000
Remaining Cash	$60,350,000	$0
LERRDs (non-creditable)**	N/A	$11,369,000
Recreation	**$1,180,000**	**$1,180,000**
Flood Risk Management and Recreation Total	**$61,530,000**	**$91,297,000**
	$152,827,000	

* *Including creditable remaining costs and creditable sunk costs (Table 48), the cost share for all creditable costs is estimated to be 50% Federal/50% non-federal.*

** *All LERRDs are the responsibility of the non-federal sponsor. LERRDs that are in excess of 45% of total creditable costs are not creditable.*

Table 48 shows the sunk costs from previous construction of reaches 10B and 12.

Table 48. Previously constructed reaches sunk costs (rounded).

Item	Federal	Non-federal
LERRDs (creditable)	N/A	$4,351,000 *
Cash	$27,862,000	$5,114,000
Total	**$27,862,000**	**$9,465,000**
Non-creditable Project Coordination Team Costs:	N/A	$2,637,000 *
Flood Risk Management Total Sunk Costs	**$39,964,000**	

** Estimated under review.*

6.9 Design and Construction

Design is projected to begin in 2025 and last two years. Of the 75 required real estate parcels, 54 have already been purchased by Valley Water. The remaining acquision and easement purchases on 13 parcels is feasibile prior to implementation. Valley Water is able and experienced in real estate acquisition, as demonstrated by the largescale acquisition of properties necessary to construct the Bypass Plan.

For the purposes of computing interest during construction (IDC), construction of the project alternatives is expected to begin in the year 2026 and will continue for a period of 7 years. Interest during construction was calculated using a mid-year payment schedule and 2.25% discount rate.

Cost estimates for the structural alternatives final array were developed by the San Francisco District Cost Engineering Branch. An abbreviated cost risk analysis was completed to determine the contingencies used for all structural plans. The Combination Plan has a contingency of 41% added to the base estimate.

Operations, maintenance, relocations, rehabilitation, and repair (OMRR&R) costs associated with each of the structural measures was estimated by the cost engineering branch. OMRR&R associated with the nonstructural measures is not in the current estimate but will be added in the next phase of the study.

6.10 Environmental Commitments

The project has a long history of environmental commitments. The completed Reaches 10B and 12 have been monitored as laid out in the original MMP. Valley Water has been leading this monitoring effort and presenting results and seeking input from an annual meeting of the AMT. The required monitoring period is almost complete for Reaches 10B and 12, and most of the success targets have been met. The MAMP for the Preferred Alternative going forward is summarized in Section 6.6 and Appendix G. This MAMP will build on the lessons learned through implementation of the original MMP.

The team has not yet received the draft CAR, but has received a USFWS Staff Memorandum Summary of Concerns and Issues, dated October 26, 2022. The 1998 CAR included conservation recommendations that have been incorporated into the design of the Preferred Alternative, including floodplain benches, biotechnical bank stabilization, and replacing nonnative ruderal scrub with native riparian plantings. The staff memorandum provides feedback on the importance of rootable soils for revegetation along the Upper Guadalupe River, a request for more information on vegetation allowances in the floodway, or floodplain, input on the size of islands necessary for preserving mature trees, and a preference for alternative ecological modeling. Finally, the memorandum requests a net environmental impact assessment and follow-on site visit to the upstream reaches. This memorandum is included as Appendix C2 of this report. The final report will include responses to the conservation recommendations contained in the CAR, which will be coordinated prior to the Final Report.

The project permits from the Water Board and NMFS do contain design review requirements for future construction, so these agencies will have some influence over future design decisions. A Section 106 agreement is currently in development, and its commitments will be summarized in the Final Report. The avoidance and minimization measures incorporated into the project description are summarized in Table 40, and the project's compliance with environmental laws is summarized in Table 48.

6.11 Project-Specific Considerations

Based on the large amount of existing information and input from agency stakeholders who have been actively engaged in the study area for decades, the team identified a number of planning considerations to keep in mind during plan formulation. As more was learned about the study area, the team refined the

planning considerations, acknowledging what has already been incorporated, or identifying how to manage risks associated with some of the planning considerations.

- Attempts to preserve the aesthetic value (visual relief from the surrounding urban development that the existing riparian corridor provides) of this urban buffer were considered, particularly in residential areas that border the Upper Guadalupe River.
- Considered the high cost of real estate in the study area and utilized real estate owned by Valley Water, where appropriate. Since Valley Water purchased significant real estate interests along the eastern bank of the channel mainstem in preparation for construction of the previously authorized Bypass Plan, real estate holdings provided an opportunity to widen the channel in a densely developed urban corridor. The dense residential development adjacent to the creeks was an important consideration and somewhat limiting what measures would be cost effective along Canoas and Ross creeks.
- Consideration was given to the added cost to incorporate HTRW sites that exist along the channel into the project, and efforts were made to avoid these sites, as feasible and appropriate.
- A plan that stays within the impacts already accounted for in the authorized plan would avoid added cost and time to re-coordinate with resource agencies. This was considered and has been successfully accomplished with NMFS coordination determining that new TSP can be covered under the existing Biological Opinions.
- Considered how alternatives would integrate with the already constructed Reaches 6, 10B, and 12 to provide continuity as practicable and appropriate, and incorporate lessons learned from the work in the constructed reaches.
- Heavy clay soils at depth may pose revegetation challenges in Reaches 7 & 8. Utilization of best practices learned during construction of Reaches 6, 10B, and 12 may mitigate these challenges.
- Consideration was given to existing permit requirements and coordination is underway to refine/update as needed.
- Consider existing and planned recreation and parks to potentially integrate with, providing continuous trails and park networks.
- Unhoused populations and encampments along the river are vulnerable populations to flood risk, and the team must consider impacts and effects on them during plan formulation
- Consider ways to integrate the project with the planned high-speed rail in the study area, and other regional/local planning efforts, such as the San Francisco Bay Basin Plan, to integrate with the goals of partners and locals, as encapsulated in master/regional plans.
- Consider the GWIWG input during the Reformulation Study process.
- Avoid/minimize increased sediment loads associated with construction activities, unless analysis shows benefits in contributing sediment to this sediment starved system without adversely impacting listed species.
- Avoid potential impacts to water quality and consider incorporating measures identified in the existing 401 water quality certification. Potential mitigation against any potential additional water quality impacts and impacts to spawning areas will be considered and coordinated appropriately.
- Consider the high likelihood to encounter unanticipated archaeological sites during construction and subsequent of Section 106 review. A collaborative and well-reviewed cultural resources treatment plan will need to be implemented in coordination with the California tribes and the SHPO.

<u>Considerations for Effects/ Mitigation</u>

- Consider federally listed steelhead in the study area during plan formulation to avoid adverse impacts and identify opportunities to support this threatened species.
- Water quality/temperature monitoring should be considered in plan formulation.

- Mercury is commonplace in the study area soils, which adds to construction and maintenance costs/considerations.
- Habitat-related impacts (riparian, SRA, floodplain, etc.) must be considered during plan formulation.
- Traffic detours and impacts to bridges, and associated traffic patterns must be considered as part of the plan formulation.
- Consider impacts of a bypass channel or other alternatives associated with a separation of island berms from overland flows. In a water limited environment (drought or dry seasons/years), this separation could adversely impact vegetation.

Considerations for Optimization and Design Refinement of the Recommended Plan

During feasibility-level design, after the release of this Draft GRR/EA, the team will refine and optimize the plan, including any work necessary to respond to comments received on the Draft GRR/EA. The final recommended plan will be presented in the Final GRR/EA, to include any changes made during feasibility-level design. Considerations to be further analyzed and incorporated include:

- Refinement of the n-value to reflect existing and FWOP channel roughness based on on vegetation. A sensitivity analysis has already been performed on Alternative 8b using updated n-values and verified the plan still performs as evaluated. Updates to the n-value is not expected to affect plan select, but will refine the design and the O&M requirements of the project.
- Ground surveys of possible low spots on the channel banks will confirm whether existing areas in the hydraulic model that show with-project flooding overtopping the channel are in fact realistic, or confirm that existing elevations are in fact higher, adjusting the model and analysis to indicate the ground-truthed elevations. If low spots are confirmed, the team will evaluate potential measures to reduce residual flooding, where justified and feasible, in order to optimize the plan. These may include short sections of floodwall, or levee, and/or targeted nonstructural measures such as elevation, dry floodproofing, or buyouts/relocations at various locations.
- Incremental risk associated with floodwall failure will need to be analyzed and resiliency features to mitigate any risks applied. Incremental risk, or "levee risk", refers to risk associated with the floodwall or levee itself, usually resulting from a theoretical but unlikely overtopping event of the system, with or without an actual breach (or failure) of the floodwall or levee. Manmade systems are designed and sized using probabilistic and detailed forecasting, and the best available data. However, no system is 100% failure proof as nature can always produce a storm or event larger than any on record, or the design level. Should this occur, the floodwall or levee could overtop and/or fail, and in this event it is possible that the with-project risk at the site of failure is greater than if there were not a project in place. The team will seek to reduce this incremental risk to a tolerable risk level with additional analysis and resiliency features, as appropriate.[18]

6.12 Environmental Operating Principles

The Environmental Operating Principles (EOP) is an essential component of the Corps of Engineers' risk management approach in decision making, allowing the organization to offset uncertainty by building flexibility into the management and construction of infrastructure. The Environmental Operating Principles are:

1. Foster sustainability as a way of life throughout the organization.
2. Proactively consider environmental consequences of all Corps activities and act accordingly.

[18] See PB 2019-04 *Incorporating Life Safety in to Planning Studies* and *Attachment A: Tolerable Risk Guidelines* for more information (USACE, June 2019)

3. Create mutually supporting economic and environmentally sustainable solutions.
4. Continue to meet our corporate responsibility and accountability under the law for activities undertaken by the Corps, which may impact human and natural environments.
5. Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs.
6. Leverage scientific, economic and social knowledge to understand the environmental context and effects of Corps actions in a collaborative manner.
7. Employ an open, transparent process that respects views of individuals and groups interested in Corps activities.

Plan selection accounted for these principles to ensure the sustainability and resiliency of the national economic development plan while considering the environmental consequences of implementation. The preferred plan is also the plan that maximizes environmental quality benefits and life safety, as well as equity. USACE considers avoiding and minimizing adverse impacts to existing environmental resources and cultural resources within the study area to the extent practicable during the plan formulation process. This tentative recommendation goes further than what is required by NEPA and maximizes EQ within FRM, creating a mutually supporting economical and environmentally sustainable solution. Scientific, economic and social knowledge was leveraged innovatively to understand the larger environmental and socioeconomic context of the actions which were considered and compared. Continual coordination with the non-federal sponsor, resource agencies and tribal partners, stakeholders, and the public will continue to occur throughout the feasibility study to ensure an open and transparent process that respects views of individuals and groups. The project will be constructed in compliance with all applicable environmental laws and regulations.

6.13 Views of the Non-Federal Sponsor

Valley Water is supportive of the TSP, and is willing and able to provide the needed LERRDs and cost share and perform O&M once implemented. Recreational features may be maintained by the City of San José and/or Santa Clara County, to be determined as recreation features are refined. Valley Water is unlikely to support implementation of the Low Scope Plan given the residual risk associated with that plan.

7 ENVIRONMENTAL COMPLIANCE*

This section documents environmental compliance and public, agency, tribal, and stakeholder engagement, including a summary of agencies and persons consulted consistent with 40 CFR §1501.5(c)(2).

7.1 Environmental Compliance Table

Table 48 below provides a summary of the project's compliance with all applicable environmental laws and executive orders.

Table 48. Summary of the Project's environmental compliance actions.

Statute or Executive Order (EO)	Status of Compliance
Clean Air Act	An emissions inventory has been completed and the emissions are below the de minimis threshold. No general conformity analysis is needed.

Statute or Executive Order (EO)	**Status of Compliance**
Clean Water Act	Coordination with the Water Board is ongoing to determine if the project's existing Section 401 Water Quality Certification (WQC) applies to the Combination Plan. Preliminary conversations indicate that even if it cannot be, a new WQC would be very similar to the existing document. The team has conducted a supplemental Section 404(b)(1) analysis and included it in Appendix C.
Endangered Species Act	The team has worked with NMFS to determine that the existing biological opinions remain applicable to the project. These opinions are available in Appendix C. The project will not be impacting any USFWS-managed endangered species.
Fish and Wildlife Coordination Act (FWCA)	USACE and USFWS are actively coordinating and the USFWS provided a Staff Memorandum summarizing concerns and issues which is included with the report in Appendix C. USFWS will provide a Draft CAR during feasibility level design, which will support continued coordination and a final Coordination Act Report (CAR) will be attached to the Final Report in Appendix C.
Magnuson-Stevens Fishery Conservation and Management Act	Although the study area is not located in designated Essential Fish Habitat (EFH), the original biological opinion did include some EFH conservation recommendations. These are generally in-line with the project's ESA conservation recommendations.
Migratory Bird Treaty Act	The project will utilize nesting bird surveys and implement buffers if nests are found to minimize impacts to nesting and migratory birds.
National Environmental Policy Act Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of the NEPA (40 CFR 1500-1508) dated July 1986	This supplemental EA has been prepared in compliance with NEPA and CEQ regulations. All agency and public comments will be considered and evaluated. If appropriate, a Finding of No Significant Impact (FONSI) will be signed with a conclusion of no significant impacts from this proposed action. A Draft FONSI is included in this Environmental Assessment (EA).

Statute or Executive Order (EO)	Status of Compliance
National Historic Preservation Act Executive Order (EO) 11593: Protection and Enhancement of the Cultural Environment Archaeological and Historic Preservation Act of 1974, (16 USC 469 et seq)	USACE's identification efforts within the area of potential effects for the Preferred Action alternative did not locate any existing historic properties. Literature research and consultation with tribes have indicated the Upper Guadalupe River is highly sensitive for discovering unanticipated cultural resources from any ground-disturbing work. A *Tribal and Cultural Archaeological and Monitoring Treatment Plan* will need to be implemented before construction occurs. This document will be included within a Programmatic Agreement for the project to comply with Section 106 of the National Historic Preservation Act. This agreement document will ensure that the SHPO and any other concurring parties are included in future identification efforts as well as the development of specific avoidance, minimization, and mitigation measures during the design phase of the project.
EO 11998, Floodplain management	In compliance – the project will be reducing the size of the floodplain and not inducing development in any significantly way. The project is in an already-developed urban area.
EO 11990, Protection of Wetlands	In compliance – the project is minimizing impacts to existing wetlands and also significantly expanding the extent of riparian forest wetland in the study area.
EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations	In compliance – as described below, the team has tried to specifically reach out to and coordinate with disadvantaged communities to ensure that the project is bringing benefits to those communities.
EOs 13112 and 13751, Invasive Species	Specific avoidance and minimization measures would be developed in the design phase of the project. Measures may include cleaning equipment and tools prior to arrival on site and departure, using weed-free borrow material or from local sources, and restoring disturbed areas with a native mix of grasses and forbs to prevent invasive species from colonizing.

7.2 Public Involvement

The 1998 FS/EIS/EIR details the extensive public engagement undertaken at the time. The General Reevaluation team has endeavored to meaningfully engage with the public and stakeholders, as well as resource agencies and tribes at key points in the study to solicit input on the scope of the Reformulation and the evaluation of the alternatives in the Reformulation. Further input on the TSP is requested and will be reviewed and incorporated as appropriate into a refined recommendation. Responses to comments will be included in the Final GRR/EA. The project websites[19] have information on the study, engagement opportunities, as they arise, and contact information for the submitting comments and questions. Comments can be emailed to UpperGuadalupe@usace.army.mil.

[19] *https://www.valleywater.org/project-updates/e8-upper-guadalupe-river-flood-protection-0 and https://www.spn.usace.army.mil/Missions/Projects-and-Programs/Current-Projects/Upper-Guadalupe-River/*

7.2.1 Scoping

A virtual public scoping meeting was held on July 14, 2021. In-person meetings were discouraged at the time due to the global coronavirus pandemic. The meeting was held via WebEx, with engagement through annotations, a poll, and the chat box, as well as invitations to unmute and speak. There were two participants from the public who identified themselves as local homeowners, and 16 agency representatives from the USACE and Valley Water, respectively. A presentation was given by the study team, with various prompts seeking public input on scope, priorities, alternatives, and issues. Participants expressed a priority for trails that can be used for walking, running, and to observe natural features. They also requested safer trails and expressed a concern about encampments. Participants were supportive of the flood protection objective of the project, with a focus on fish habitat, and expressed a desire to see the project get done. Participants liked the presentation and the explanation of the historical development of the Guadalupe River. The tone of the meeting was calm and supportive.

7.2.2 Agency Coordination

The project has a long and ongoing history of agency coordination through the GWIWG and Resource Agency Working Group (RAWG). At the outset of the GRR, NMFS and EPA agreed to be NEPA cooperating agencies. USFWS has primarily been involved through their development of the CAR and participation in the RAWG. The team hosted two large RAWG meetings during the GRR—one on July 19th, 2021 to present the GRR alternatives and solicit feedback on major study issues and another on July 28th, 2022 to present the TSP. The RAWG agencies were generally supportive of the TSP and expressed some minor concerns for the team to consider in the design process going forward.

USFWS' primary concerns are that the team should keep in mind that revegetation in the heavy clay soils of Reaches 7 and 8 will not be easy. The team plans to incorporate lessons learned from the already constructed reaches where vegetation has been performing relatively well. The Water Board's primary concern has been how the mercury-containing soils will be handled. They have expressed an interest in working with the team to come up with a plan that is not cost-prohibitive that still keeps the public safe.

The team has also had numerous coordination meetings with various departments of the City of San José to discuss recreation opportunities and the status of unhoused encampments in the study area. The City is currently undertaking a master planning trail design process for the Guadalupe River Trail and will be incorporating the project's maintenance roads into that trail. The City has numerous services available to unhoused individuals and has made progress in life-safety warning systems for extreme weather events and mental health resources.

7.2.3 Tribal Consultation

USACE coordinated with the NAHC in February and August 2021 to obtain a Tribal Consultation List. A request was also submitted to the NAHC for a Sacred Lands File Search for the Upper Guadalupe study area. Tribes were invited to consult under NEPA, Section 106 of the NHPA, and as participating agencies for a Resource Agency Working Group Meeting held periodically for the study.

The following tribes were identified through the NAHC to be consulting parties for the Upper Guadalupe study area:

- Amah Mutsun Tribal Band
- The Amah Mutsun Tribal Band of Mission San Juan Bautista
- Indian Canyon Mutsun Band of Costanoan
- Muwekma Ohlone Indian Tribe of the SF Bay Area
- North Valley Yokuts Tribe
- Tamien Nation

- The Confederated Villages of Lisjan
- The Ohlone Indian Tribe
- Wuksache Indian Tribe/Eshom Valley Band

Formal Section 106 letters were sent to tribes on March 4th, 2022, inviting them to be a Section 106 consulting party for the study and to aid in the identification of historic properties, TCPs or significant resources with traditional, cultural, or religious importance within the study area. Tribal consultation is currently ongoing. The latest Section 106 letter sent to tribes was on October 4th, 2022. The letter invited tribes to consult and to review USACE's updated identification efforts. The letter proposes to develop a Programmatic Agreement to defer further identification efforts along with a finding of effects during the design phase of the study and before construction occurs.

USACE consulted with the Ohlone Indian Tribe early on May 5th, 2021 and November 12th, 2021, and during a Resource Agency Working Group Meeting held on July 28th, 2022. Chairman Galvan from the Ohlone Indian Tribe confirmed the area was culturally significant and that USACE and Valley Water should expect significant cultural resources to be uncovered from any ground-disturbing work near the river banks. Future testing efforts was also recommended to determine the presence or cultural sites before construction occurs.

USACE consulted with the Tamien Nation on September 27th, 2022, providing a high level overview on the project goals along with the planning timeline. Chairwoman Geary from the Tamien Nation mentioned a traditional trail used by the Tamien and neighboring Ohlone tribes for thousands of years leading to the San Francisco Bay that USACE should consider in its cultural resources inventory. Chairwoman Geary also mentioned that tribal and archaeological monitoring was necessary, however subsurface testing would potentially create an impact for cultural resources. Based on this input, USACE and Valley Water will consider non-disturbing methods of survey, such as ground penetrating radar or cadaver dogs to identify sensitive cultural sites buried underneath the river banks.

The consultation also identified opportunities for the Tamien Nation to be involved in signage and education based on the recreational features being proposed, along with the opportunity for the Tamien Nation to select certain culturally significant native plants to enhance and restore with the Upper Guadalupe's wetland habitats. For example, certain willow types were a useful resource for them to use in their traditional gathering practices, along with tule roots which are edible for the tribe and viewed as a filter for keeping their ancestral waterway clean. The waterway was also viewed as a living being and should be addressed as such within the cultural impact analysis. USACE is continuing consultation with tribes, with the goal of inviting them to be concurring parties to the Programmatic Agreement and critical partners in developing the Tribal Cultural Archaeological Monitoring and Treatment Plan.

7.2.4 List of Statement Recipients

The Draft GRR/EA was sent to Valley Water, the City of San José, the agencies and tribes listed in sections 7.2.2 and 7.2.3, Caltrain, and Santa Clara County, as well as private citizens who provided their contact information at the August 2022 public meeting and requested updates on the project.

7.2.5 Public Comments Received and Responses

A community engagement meeting was held in-person on Saturday, 6 August 2022 at the Alma Community Center, within a socially vulnerable flooding impact area. As part of the outreach for this engagement, Valley Water mailed postcards to approximately 20,000 community members and distributed them to local organizations, Nextdoor posts and reminders were sent, which received 6,401 impressions, and a Facebook Live event was created and boosted. At the meeting, a Spanish interpreter was present, coloring books for children were provided by Valley Water, and information materials were translated into multiple languages known to be spoken in the area. Extensive outreach was conducted to

advertise this meeting which included door-knocking, flyering, email blasts, website postings, and social media posts. The meeting was streamed on Facebook Live. Turnout was good, with 16 members of the public attending in person, and 13 attending virtually. The team was able to meaningfully engage with participants.

Figure 44. USACE and Valley Water staff meet with the community on August 6, 2022 at the Alma Community Center in San José, CA.

Public comments ranged from inquiries into who was responsible for encampment-generated trash and debris to inquiries regarding fallen trees, groundwater contamination, and local tribe consultation. Additional comments inquired about recreational improvements near Ross Creek, which the USACE and NFS are investigating for potential integration into project alternatives.

8 DISTRICT ENGINEER RECOMMENDATION

The TSP would provide substantial flood risk management benefits and enhanceced recreational opportunities. The Combination Plan consists of constructing floodplain benches, gravel augmentation, retrofitting/replacing bridges, floodplain revegetation, and biotechnical bank stabilization, possibly with rip rap in Reaches 7 and 8; floodwalls on Reach 7, Canoas Creek, and Ross Creek; and widening and adding culverts on Canoas and Ross Creeks.

The recommendations contained herein reflect the information available at this time and current departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to higher authority as proposals for authorization and implementation funding. However, prior to transmittal to higher authority, the sponsor, the states, interested Federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

I recommend that the TSP (Combination Plan, Alternative 8b) be authorized for implementation, as a Federal project, with such modifications thereof as in the discretion of the Commander, U.S. Army Corps of Engineers, may be advisable. The estimated remaining first cost (October 2023 price level) of the TSP is $152,827,000 with an estimated Federal cost of $61,530,000 and an estimated non-federal cost of $91,297,000. The estimated annual OMRR&R cost is $587,500 (2023 price levels). Federal implementation of the TSP would be subject to the non-federal sponsors agreeing to comply with applicable Federal laws, regulations, and policies, including but not limited to:

a. Provide a minimum of 35 percent, but not to exceed 50 percent, of creditable design and construction costs allocated to structural, nonstructural, natural, or nature-based flood risk management features, and 50 percent of construction costs allocated to recreation, as further specified below:

1. Provide all lands, easements, rights-of-way, and placement areas and perform all relocations determined by the Federal government to be required for the project;

2. Provide, during construction, any additional contribution necessary to make its total contribution equal to at least 35 percent of construction costs for structural, nonstructural, natural, or nature-based flood risk management and 50 percent of construction costs for recreation;

b. Prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) that might reduce the level of flood risk reduction the project affords, hinder operation and maintenance of the project, or interfere with the project's proper function;

c. Keep the recreation features, access roads, parking areas, and other associated public use facilities, open and available to all on equal terms;

d. Inform affected interests, at least yearly, of the extent of risk reduction afforded by the flood risk management features; participate in and comply with applicable Federal floodplain management and flood insurance programs; prepare a floodplain management plan for the project to be implemented not later than one year after completion of construction of the project; and publicize floodplain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in adopting regulations, or taking other actions, to prevent unwise future development and to ensure compatibility with the project;

e. Operate, maintain, repair, rehabilitate, and replace the project or functional portion thereof at no cost to the Federal government, in a manner compatible with the project's authorized purposes and in accordance with applicable Federal laws and regulations and any specific directions prescribed by the Federal government;

f. Give the Federal government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsor owns or controls for access to the project to inspect the project, and, if necessary, to undertake work necessary to the proper functioning of the project for its authorized purpose;

g. Hold and save the Federal government free from all damages arising from design, construction, operation, maintenance, repair, rehabilitation, and replacement of the project, except for damages due to the fault or negligence of the Federal government or its contractors;

h. Perform, or ensure performance of, any investigations for hazardous, toxic, and radioactive wastes (HTRW) that are determined necessary to identify the existence and extent of any HTRW regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. 9601-9675, and any other applicable law, that may exist in, on, or under real property interests that the Federal government determines to be necessary for construction, operation, and maintenance of the project;

i. Agree, as between the Federal government and the non-Federal sponsor, to be solely responsible for the performance and costs of cleanup and response of any HTRW regulated under applicable law that are located in, on, or under real property interests required for construction, operation, and maintenance of the project, including the costs of any studies and investigations necessary to determine an appropriate response to the contamination, without reimbursement or credit by the Federal government;

j. Agree, as between the Federal government and the non-Federal sponsor, that the non-Federal sponsor shall be considered the owner and operator of the project for the purpose of CERCLA liability or other applicable law, and to the maximum extent practicable shall carry out its responsibilities in a manner that will not cause HTRW liability to arise under applicable law; and

k. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended, (42 U.S.C. 4630 and 4655) and the Uniform Regulations contained in 49 C.F.R Part 24, in acquiring real property interests necessary for construction, operation, and maintenance of the project including those necessary for relocations, and placement area improvements; and inform all affected persons of applicable benefits, policies, and procedures in connection with said act.

The recommendations contained herein reflect the information available at this time and current departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations

may be modified before they are transmitted to higher authority as proposals for authorization and implementation funding. However, prior to transmittal to higher authority, the sponsor, the states, interested Federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

_____
Date

Kevin P. Arnett
Lieutenant Colonel, U.S. Army
District Commander and Engineer

9 LIST OF PREPARERS

Name	Role on Study	Qualifications/Experience
Anne Baker	Environmental Compliance	16 years USACE Environmental Planning BA English Water Resources Certified Planner (USACE)
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Fanny Chan	Civil Design / Technical Lead for Engineering	2.5 years USACE 5 years in Civil Design and Construction BS Engineering
Tami Church	Environmental Planning Team Lead	20 years professional experience in environmental planning and watershed ecology BA Environmental Sciences MLA Environmental Planning
Ruzel Ednalino	Cultural Resources	4 years USACE Environmental Planning BA Anthropology, Minor in Geospatial Sciences MA Anthropological Archaeology
Jess Edwards	Support Planner	1 year USACE Planning BS Environmental Science and Management
Jeneya Fertel	Environmental Lead Planner	7 years USACE Environmental Planning BS Molecular Environmental Biology MS Civil and Environmental Engineering
Lindsay Floyd	Support Planner	3 years USACE Planning BS Environmental Science and Management
Garrett Kaspala	H&H Engineer	4 years USACE Hydrologic and Hydraulic Engineering BS Civil & Environmental Engineering
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Sasha Voight	Economist	4 years USACE Planning MA Applied Economics BA International Relations
Grace Wieland	Economist	2 years USACE Planning BS Economics
Warren Tan	Cost Engineer	12 years USACE Cost Engineering BS Civil Engineering
Andy Farhan	Geotechnical Engineer	Civil and Geotechnical Engineer, Ph.D., PE, GE, +30 years experience in geotechnical design and construction, past structural design and construction in reinforced concrete structures, 13 years USACE geotechnical engineering in dams and levees.

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