



ALAMO CREEK BANK STABILIZATION AND FLOOD MANAGEMENT PILOT PROJECT

ALAMEDA COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT, ZONE 7
[Zone 7 Water Agency](#)

DWR FLOODPLAIN MANAGEMENT, PROTECTION,
AND RISK AWARENESS GRANT PROGRAM
[February 9, 2022](#)

FULL PROPOSAL



100 North Canyons Parkway
Livermore, CA 94551
(925) 454-5000

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Applicant Information

Applicant:	Alameda County Flood Control and Water Conservation District, Zone 7 (Zone 7 Water Agency)
Address:	100 North Canyons Parkway, Livermore, CA 94551
Project Name:	Alamo Creek Bank Stabilization and Flood Management Pilot Project
Project Location:	Alamo Creek (Dublin, CA) immediately downstream of the confluence with South San Ramon Creek
Primary Point of Contact:	Joe Seto, PE Flood Protection Manager (925) 454-5085 jseto@zone7water.com
Signature Authority:	Valerie Pryor General Manager (925) 454-5000 vpryor@zone7water.com

Agency Information

The mission of the Zone 7 Water Agency (Zone 7) is to deliver safe, reliable, efficient and sustainable water and flood protection services. The Agency is responsible for providing both a reliable supply of high-quality water and an effective flood control system to protect residents, businesses and other properties within the Livermore-Amador Valley (Figure 1). Zone 7's key functions include:

- Maintaining 37 miles of regional flood-protection channels;
- Supplying treated drinking water to retailers serving over 265,000 people in Pleasanton, Livermore, Dublin and, the Dougherty Valley area of San Ramon (through special agreement with the Dublin San Ramon Services District).
- Supplying untreated water for irrigation of 3,500 acres, primarily South Livermore Valley vineyards.
- Serving as the groundwater sustainability manager for the Livermore-Amador Valley Groundwater Basin.

Zone 7's water supply, groundwater management, and flood protection programs are managed as one integrated system. Approximately 90% of Zone 7's water supplies are



imported from the State Water Project; water is either conveyed directly untreated water users, to one of two water treatment plants, or released as surface water (as available) through the channel network to artificially recharge the local groundwater basin during the dry season when channel capacity is not needed to convey storm flows.

Agency's Flood Management Authority

The Alameda County Flood Control and Water Conservation District (District) was created in 1949 with dual goals of providing flood protection and water conservation in ten zones in Alameda County. In 1957, residents of the Livermore-Amador Valley (Figure 1) voted to establish Zone 7 of the District (Zone 7 Water Agency or Zone 7) as a separate agency governed by its own locally elected board of directors. Zone 7's regional flood protection authority is established by District Act 205 (Alameda County Flood Control and Water Conservation District, 1949), as amended by Assembly Bill 1125 in 2003. The Act defines the District's role in providing for the control and conservation of flood and storm waters and authorizes Zone 7 to "protect all waterways, watersheds, harbors, and public highways, as well as lives and property, from damage or destruction caused by flood and storm waters" throughout its flood control service area. Embedded within Zone 7's empowering legislation are a number of operating principles and goals including:

- Protect watercourses, watersheds, public highways, utility infrastructure, roadways, life, and property within and adjacent to Zone 7 boundaries from flood or storm water damage by maintaining the functional integrity and operational quality and capacity of Zone 7 facilities.
- Ensure stream banks and slopes are stable and manage sediment transport and deposition to maintain channel capacity. (Act 205 paragraph 5.6)
- Avoid and minimize potential impacts to the natural environment, including water quality, by implementing water quality protection measures and protocols during maintenance activities. (Act 205 paragraphs 5.6, 5.15)
- Conduct all maintenance and repair work or improvements necessary to maintain flood control operations and reduce the risk of flooding within Zone 7's boundaries in a fiscally and environmentally responsible manner. (Act 205 paragraphs 5.6, 5.9, 5.15).
- Control and conserve flood and storm waters within Zone 7 boundaries to maximize and direct percolation to major aquifers where possible using flow detention. (Act 205 paragraphs 5.6, 5.9).
- Manage vegetation in and along flood control facilities and in riparian zones to maintain channel capacity and reduce risk of damage to adjacent facilities while maximizing habitat and recreational value. (Act 205 paragraphs 5.6, 5.15).



- Protect and enhance the natural environment within riparian corridors by encouraging establishment of native riparian vegetation, fish, and wildlife species and by eradicating invasive plant and animal species within such corridors. (Act 205 paragraphs 5.6, 5.15).
- Continue to maintain Zone 7's flood protection system, reduce flood risk, and conduct watershed stewardship through preventative and routine maintenance and storm damage repairs.



Project Description

Overview

Zone 7 Water Agency (Zone 7) manages approximately 37 miles of flood channels and is committed to providing an effective system of flood protection. Zone 7 is in the midst of the first phase of developing a Flood Management Plan (FMP, Phase 1) which focuses on establishing updated Agency flood management guidance as well as development and implementation of a proactive stakeholder outreach program. Zone 7 is submitting a separate concept proposal for Phase 2 which, if funded, will focus on flood system strategic planning: Capital Improvement Plan, Implementation Plan, funding/finance plan, geomorphic study, governance plan and implementation of the public and stakeholder outreach plan.

As part of the broader strategic flood management approach, Zone 7 proposes implementation of an early implementation project to serve as a pilot project and inform strategies proposed in FMP, Phase 2. If funded, both the planning and implementation projects would be concurrent and integrated components of the larger, strategic approach to flood management.

A CIP will be developed as part of FMP, Phase 2 that describes in detail each of the capital projects and major studies that will be required to implement the capital components of the FMP. The CIP will become the blueprint for sustaining and improving Zone 7 flood infrastructure and advance and integrate into all objectives of the FMP.

Zone 7's flood protection system is challenged by several stressors. A large portion of Zone 7's channel network consists of engineered trapezoidal channels that were designed using hydraulic and hydrologic assumptions that are now outdated. In addition, there are several chronically problematic channel reaches which are generally concentrated in areas where high plasticity, expansive/weak alluvial soils are known to be present. To address these challenges, Zone 7 undertakes pilot projects to test new techniques and approaches to maintaining the integrity of the channel network and integrating multiple benefits where possible. Zone 7 intends to incorporate lessons learned from pilot projects, and post-project monitoring to guide project development and best practices in the FMP, Phase 2 CIP.

Project Justification

The Project is located in Dublin (California) on Alamo Creek (Figure 2) immediately downstream of a large concrete structure that was designed to hold the grade where South San Ramon Creek joins Alamo Creek. The high velocity convergence of these two water bodies creates extreme turbulence and erosive power as flows move downstream



along the (now) trapezoidal engineered section of Alamo Creek, causing toe erosion and downcutting (Figure 3). Combined with the steep slopes (approximately 2:1), this entire section of engineered trapezoidal channel experiences recurring bank instability, erosion, downcutting and associated sediment transport which is exacerbated during larger winter storms.

2017 brought extensive rain to Northern California and setting the record for the wettest year in California ever. While the recurrence interval for the project areas was moderate (17–20 years) waters caused widespread damage across Zone 7's flood management system. Zone 7 sustained damage to the flood system at over 200 locations requiring Zone 7 expenditure of approximately \$40 million for a flood event that may well be the new normal.

As a result of the 2017 storms, a 250 linear foot (LF) section of Alamo Creek was damaged and subsequently repaired in 2019; however, the repair has not performed as expected (Figure 3, Photo 4)—resource agencies allowed 2 feet of soil cover on top of the rock slope protection (RSP) to lessen mitigation requirements; however, the soil layer washed away at the toe the following winter and now leaves the upper slope vulnerable to slumping. Further, the channel bed of the entire Project area (2,000 LF) has varying degrees of incision and toe erosion that threaten the stability of the reach and it is a matter of time before additional slope failures occur. Additional slope failures could result in water quality, erosion, sedimentation impacts in addition to increase potential flooding in the adjacent and downstream communities.

Zone 7 is proactively seeking approaches to address the turbulence, lateral bank erosion, and incision experienced throughout the reach that:

- promote aquatic and riparian habitat enhancement where possible;
- reduce flood risk to adjacent and downstream communities;
- reduce costly future, reactive fixes; and
- serve as a pilot project that informs Zone 7's Flood Management Plan for wider use throughout Zone 7's system.

Proposed Project

As noted in our concept proposal, Zone 7 proposes implementation of an early implementation of a bank stabilization and flood management project along Alamo Creek to serve as a pilot project (Figure 4), and to inform strategies proposed in the Flood Management Plan (FMP, Phase 2).

The proposed project addresses approximately 2000 linear feet of urban trapezoidal channel using two progressive approaches. To address the turbulence at its source, the



upstream section immediately downstream of the confluence structure will be reinforced with rock slope protection (RSP) on both banks, and will build on the existing RSP from previous repairs (Figured 4 and 5). Pole plantings will be installed along the toe to slow velocities and reduce the erosive forces acting on the banks. Preliminary modeling shows a potential velocity reduction of 1.4 cfs.

To reduce the impacts of reach-wide incision and lateral bank erosion, Zone 7 will test a novel modular strategy. The project proposes a series of five in-channel structures to buffer flows and funnel them back to a center alignment through a transition of hard to soft bank treatments (Figure 4, 5, 6). Each structure includes:

- A rock cross-vane tied into the bed and banks to hold the grade and redirect flows away from the toe
- Rock slope protection to prevent flanking of the structure
- 100 LF of pole plantings along the toe of both banks
- Additional vegetative slope protection (as appropriate)

The location of each structure along the long profile will be determined during the design process and will be screened based on hydraulics and existing bank stability. The exact technique used for bank reconstruction will also be screened based on hydraulics and existing bank stability, but may include any combination of the following approaches for structural, habitat and aesthetic enhancements:

- Hydroseeding with native, long-rooted grasses
- Native slope plantings
- Willow brush mattress
- Vegetated Soil Lifts (VSLs)

The proposed toe protection and other stabilization measures integrate a larger degree of planting than Zone 7 typically incorporates in engineered channels. Zone 7 is exploring the feasibility of this technique in an urban setting while providing proper levels of flood protection. In addition, the modular nature of the approach, if successful, could be incorporated in the Flood Management Plan (Phase 2) and implemented on a more widespread basis as a way to enhance aquatic and riparian habitat, and reduce stream bank erosion and downcutting without increasing flood hazard.

The implementation project encompasses all stages of design, permitting, environmental review, construction, and monitoring. In addition, Zone 7 proposes utilization of our environmental stewardship program—the award-winning Living Arroyos Program—as well as staff from Civicorps Schools (formerly known as East Bay Local Conservation Corps) and the California Conservation Corps to install vegetation along the top of bank to improve



aesthetics along the Alamo Creek Trail, provide shade for trail users, and reduce the project's carbon footprint.

Pre- and post-project monitoring are essential components of this proposal to see how well the project holds up, to provide transferrable information and overall lessons learned to include in Phase 2 of the Flood Management Plan. This project proposes the use of Unmanned Aerial Vehicle (UAV or "drone") to collect aerial imagery and detect changes in topography at three periods: pre-project, post-project (as-built) and in Spring 2024 after winter flows have subsided—the first test of the project's effectiveness.

Scope of Work

See Appendix B.

Related Flood Management Planning Initiatives

Zone 7 participates in the Tri-Valley Local Hazard Mitigation Plan (LHMP) that encompasses flood risk within the Zone 7 geographical service area. The plan was created in 2017 with oversight from a Steering Committee that included Zone 7. The proposed project is consistent with, and advances, all of the stated goals of the LHMP:

1. Ensure that hazards are identified and considered in land use decisions.
2. Improve local emergency management capability.
3. Promote community awareness, understanding, and interest in hazard mitigation policies and programs.
4. Incorporate hazard mitigation as an integrated public policy and standard practice.
5. Reduce community exposure and vulnerability to hazards where the greatest risk exists.
6. Increase resilience of infrastructure and critical facilities.
7. Promote an adaptive and resilient planning area that responds proactively to future conditions.
8. Develop and implement mitigation strategies that identify the best alternative to protect natural resources, promote equity, and use public funds in an efficient and cost-effective manner

Accordingly, there is no reasonable possibility that the proposed project would be changed by this broadly supported plan.

A key tenet of the proposed project is to provide greater resilience and adaptability to a key stormwater and flood control channel for the region; thus, the benefits of this project are



projected to reduce flood and environmental hazards by proactively mitigating impacts of channel erosion and sediment transport.

Consistency with Government Code section 65041 – State Planning Priorities

The proposed bank stabilization project is consistent with California State Planning Priorities, specifically the implementation of activities or projects that include “protection of environmental and agricultural resources by protecting, preserving, and enhancing the state’s most valuable natural resources, including working landscapes such as farm, range, and forest lands, natural lands such as wetlands, watersheds, wildlife habitats, and other wildlands, recreation lands such as parks, trails, greenbelts, and other open space, and landscapes with locally unique features and areas identified by the state as deserving special protection”. In addition, because the project is anticipatory in nature—by preemptively repairing a known area of bank erosion, the proposed improvements also align with State planning priorities requiring investments to minimize ongoing costs to taxpayers.



Eligibility Criterion Analysis

Brief responses to the specific eligibility criterion in Table C-2 (Final Solicitation Package) are included below:

A) Public Safety Benefits/Flood Risk Reduction

The Project significantly reduces flood risk for homes, businesses and recreational amenities along a 2000 linear foot section of engineered trapezoidal channel at risk of destabilization during high flows. Erosion of an incised flood channel endangers people and property by taking land, thereby flooding adjacent residents, infrastructure, businesses, and commercial interests.

A-1. H&H Analysis, Modeling Suitability, Level of Flood Protection within the Project Domain

Zone 7 has prepared Service Area wide hydrology-hydraulic models of the Upper Alameda Creek Watershed, covering all of Zone 7's flood protection facilities. Zone 7 has analyzed the 100-year and 500-year events of the system under future buildout conditions. The proposed project falls within the Alamo Creek subbasin watershed, which also includes South San Ramon Creek subbasin watershed.

Based on past experiences of channel impacts, Zone 7 has experienced channel erosion/incision due to the channel velocities experienced both upstream and downstream of the confluence with Alamo Creek and South San Ramon Creek. An ecological engineering project implemented on the lower section of Alamo Creek can minimize impacts to the channel bank, thereby relieving the possibility of bank failure, which could lead to channel blockage and potential flooding concerns. While there is a potential for flooding further downstream of the reach during a 500-year storm event, during the 100-year event, flooding is minimal downstream of the proposed project reach. Minimizing channel erosion by constructing the project, maintains downstream channel capacity by reducing the overall amount of sediment in the channel. Supporting documentation is available upon request.

A-2. H&H Documentation, Modeling and Conformity with Federal, State, Local Guidance

Zone 7 has retained and used Environmental Science Associates (ESA) to support flood management planning and decisions across its jurisdiction. ESA developed hydrologic and hydraulic models for of the Alameda Creek watershed upstream of Niles Dam that adhere to methodologies developed by the U.S. Army Corps of Engineers (USACE) Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS version 4.1).

The methods used to parameterize the HEC-HMS model were selected based on a 2016 update to the Alameda County Hydrology & Hydrologic Manual (ACPWA, 2016). Initial



parameters for the Zone 7 model were calculated following the ACPWA methodologies and then adjusted to approximately match the results of a calibrated ACPWA hydrologic model.

Hydrographs generated in the hydrologic model were used as inputs to a 1D/2D hydraulic model of the primary drainage pathways, developed using the USACE's HEC-RAS model version 5.0.1.

The hydrology model covers a drainage area of 486 square miles and the primary tributaries to Alameda Creek within this area including Alamo Creek (the subject of this Project), Altamont Creek, Arroyo De La Laguna, Arroyo Del Valle, Arroyo Las Positas, Arroyo Mocho, Arroyo Seco, Cayetano Creek, Collier Canyon Creek, Cottonwood Creek, South San Ramon Creek, and Tassajara Creek.

The models were developed at a level of detail sufficient to support planning level analyses focused on the 1% chance event (flood event with a 1% chance of occurring in any given year - "100-year storm").

Supporting documentation is available upon request.

A-3. Measures to Increase Resilience and Address Climate Change

Over the past decade Californians have experienced intense oscillations in weather patterns fluctuating from severe drought to excessive precipitation. At the fringes of these extremes, the effects of the changing weather have resulted in destructive wildfire and catastrophic flooding. This was the scenario that played out in late 2016 and early 2017. On the heels of a four-year drought, 2017 brought extensive rain to Northern California — setting the record for the wettest year in California ever. Despite preparations, the severe storms and unprecedented volume of water caused widespread damage across Zone 7's flood management system. As experienced in other jurisdictions, localized flooding throughout the Zone 7's Service Area caused bank erosion, and damage to outfall structures and maintenance roads—leading to declarations of both local and state States of Emergency.

Zone 7 is anticipating greater climate variability in the future with flashier hydrologic conditions that are expected to exacerbate existing pressures on site—velocity, erosion, and downcutting. The proposed project fixes a potential future erosion issue in an engineered flood conveyance channel that was designed and based on hydrology in the early 1960's. The project will address the problem with an innovative, proactive, anticipatory approach to streambank stabilization before another extreme weather event occurs. The improvements and fortification to the embankments will improve bank stabilization and protect the immediate local residential and business community from possible bank failure and localized flooding. Taking a proactive approach will reduce/minimize expenditures for



costly post storm repairs to the adjacent and downstream levee system, maintenance roads, recreation trails, accumulated channel debris and vegetation, as was experienced in 2017-2018. The inclusion of vegetation and habitat will add resilience and increase functionality of the immediate and downstream aquatic ecosystem. An added benefit is the inclusion of woody vegetation which will assimilate carbon as they grow and mature.

A-4. Comprehensive Mitigation Features Incorporated into the Project

Flood Mitigation Measures. The proposed project incorporates several structural mitigation strategies including rock slope protection to maintain normal slopes, toe trenches for scour protection, rock cross vanes to address lateral erosion and downcutting, and use of vegetated slopes to reinforce the banks and reduce velocities.

Zone 7 also works with the City of Dublin as the land-use agency to ensure wise use of the floodplain, including local building restrictions adjacent to the channel and other non-structural measures. As a participant in the Tri-Valley LHMP, Zone 7 also coordinates with regional partners to incorporate structural and non-structural elements in flood management practice, including the use of biotechnologies, an early warning stream gaging system, and flood readiness measures for the community.

Environmental Mitigation Measures. As described above, Zone 7 proposes anticipatory erosion control measures at this critical location that makes use of innovative biotechnical measures as well as strategic placement of rock revetment at locations of high erosive forces. As designed, the project will be largely mitigated onsite by incorporating plantings and other natural elements that will improve water quality and enhance the environment from the existing, actively eroded condition. The project incorporates a higher degree of planting (density to be determined through modeling) than is typically used in an engineered trapezoidal channel which will create an overall net ecological improvement to the site.

A-5. Impacted Land Use, Critical Infrastructure, Population, Residential, Commercial, Industrial

The proposed project is in a location along Alamo Creek that is in both a residential and commercial part of downtown Dublin. To the west is a densely populated residential area with approximately 500 to 700 single family homes across a 160-acre floodplain area that abuts nearby Amador Valley Boulevard. Valley High School, a small continuation school for the Dublin Unified School District, with an enrollment close to 100, is in the center of the residential area and within a few blocks of the proposed project. The southern part of this residential subdivision includes the Alameda County fire department and a mix of medical and retail commercial establishments that extend along Interstate 680.

The east side of the project area is a business park with a large number of office buildings, some light commercial industrial activity, including a mix of retail establishments and



multi-family high density dwellings immediately adjacent to the main boulevards. At the southern end of this area is the Dublin Civic Center, which includes City Hall, the Dublin Police Services, the Dublin Public Library and the Dublin Sports Grounds Recreation Area.

We estimate the population of both the east and west side floodplains to be on the order of 3,000-5,000 residents.

Critical infrastructure adjacent to the project includes an interstate highway interchange between Interstate Hwy 580 and Hwy 680. In addition, the West Dublin/Pleasanton Bay Area Rapid Transit (BART) station is just downstream from the proposed project, with the main tracks crossing over Alamo Creek Canal less than a mile away. Supporting documentation is available upon request.

A-6. Magnitude of Flood Risk Impacts

2017 brought extensive rain to Northern California—setting the record for the wettest year in California ever. However, the recurrence interval for the project areas was moderate (17-20 years). Yet despite preparations, flood waters caused widespread damage across Zone 7's flood management system. Recent risk workshops conducted by Zone 7 identified high consequences of flood damage, as demonstrated in Zone 7 expenditure of approximately \$30 million due to 2017 damages to channels throughout the system. Zone 7 experienced over 200 slope failures and flood-related damages for a flood event that may well be the new normal. The proposed project addresses this large magnitude of risk by providing critical erosion protection at a highly populated location at a key confluence of two flood channels.

Supporting documentation is available upon request.

FEMA's Flood Zones/Equivalent Flood Hazard Area

Yes, the proposed bank stabilization project is subject to 500-year flooding or a FEMA moderate risk flood zone, based on recent model results. However, recent erosion damage under a relatively frequent recurrence interval (17-20 year) eroded this location substantially. Further, the channel bed of the entire Project area (2,000 LF) has varying degrees of incision and toe erosion that threaten the stability of the reach and it is a matter of time before additional slope failures occur.

Supporting documentation is available upon request.



B) Providing Multiple Benefits

Benefits to Fish and Wildlife Habitat

Alamo Creek supports a variety of microhabitats and fish resources year-round due to the presence of year-round water from urban runoff. The composition of fish species is influenced by a number of factors including water temperature and the presence of wetland and riparian vegetation to provide cover, shade, and foraging opportunities. Common native fish species include the California roach (*Lavinia symmetricus*), hitch (*Lavinia exilicauda*), Sacramento sucker (*Catostomus occidentalis*), and Sacramento pikeminnow (*Ptychocheilus grandis*) (Leidy 2004, RMC Water and Environment 2006, unpublished data 2015).

As provided in the description above, the proposed bank stabilization project incorporates bio-technical methods that are intended to provide both erosion/flood protection and habitat benefits. The proposed project will lead to a number of benefits for fish and wildlife including reduced erosion/fine sediment inputs into the water column and increased amounts of vegetated habitat which correspondingly will enhance conditions for native fish by providing more shade, improved temperate conditions along with a significant new source of allochthonous organic and inorganic inputs into the aquatic ecosystem.

In addition, the techniques in this approach—combining engineered and vegetated elements—test the ability to introduce larger amounts of woody vegetation where vegetation is typically discouraged in a flood control channel. If proven to be effective, this modular approach to including vegetation in channels may be explored elsewhere in Zone 7's system with the opportunity for additional fish and wildlife habitat benefits system-wide.

Improving Water Reliability

Failure of the channel slopes will result if erosion is left unchecked, resulting in potentially large sediment transport, negatively impacting downstream water users as well as the natural environment. In addition, catastrophic failure of the channel slopes may temporarily divert or reduce downstream conveyance, or even threaten water mains in adjacent neighborhoods. Proactive remediation of erosion and slope failure will improve water reliability.

Public Recreation

As noted in more detail below, the project is located immediately adjacent to the Alamo Creek Trail which connects to the Iron Horse Regional Trail (East Bay Regional Parks) at the upstream end of the project site. The Iron Horse Trail serves as a major regional connector, providing a 32-mile commuter, biking and walking corridor for the people of Contra Costa and Alameda counties. Regarded as a 'treasured community asset', the trail runs north to south passing through numerous commercial, residential, and rural areas in the



communities of Concord, Pleasant Hill, Walnut Creek, Alamo, Danville, San Ramon and Dublin. The Alamo Creek Trail is a central piece of Dublin's Bicycle and Pedestrian Master Plan as it is part of a regional path system connecting to the entire Livermore-Amador Valley. Construction of the proposed project fortifies both banks of Alamo Creek and thus protects and maintains the integrity of the Iron Horse Regional Trail as a regional commuter link.

Educational/Risk Awareness Outreach

Updates on this project, its importance to reducing flood risk, and Zone 7's efforts for regional flood protection will be regularly shared through Zone 7's public outreach program. Zone 7 is committed to transparency and regularly posts updated information to the agency website, sends out a community newsletter each month, and hosts public events and online webinars. Recently, the agency updated its strategic communications plan to align with their agency-wide strategic plan to comprehensively address outreach needs. Zone 7's newsletter and website were redesigned to make information more readily accessible to the public, in addition to engaging more with the community on social media by launching Facebook, YouTube and Next-Door pages.

Zone 7 regularly hosts open houses where participants can learn and follow the journey their water takes from source to tap. Geographically themed stations explained the various steps water takes as it makes its way from the snowy peaks of the Sierra Nevada, into Lake Oroville, down through the Delta and into the Livermore-Amador Valley. Residents also learned what they can do to help protect their watershed, conserve water and prepare for floods and emergencies.

To initiate water education early, Zone 7 will continue our efforts to reach into the school system with our Kid Zone Schools Program. Funded by Zone 7 and supported by its Board of Directors, the program invests in youth water system education and appreciation. Initiated in 2005, the program is designed around the idea that teaching kids to be flood-savvy today translates to flood conscious adults for generations to come. Lessons in the program are aligned with the Next Generation Sciences Standards for K-12 content, created and taught by certified educators. If funded, Zone 7 intends to highlight the Alamo Creek project in the curriculum during the construction season.

Since 2013, Zone 7 has partnered with the cities to deliver the Living Arroyos Program. Living Arroyos is a unique volunteer opportunity that gives participants hands-on experience restoring creek banks with native vegetation while learning about local ecology and important watershed issues. In addition, the program employs college students and young professionals, providing field learning for stream management techniques. This strategic partnership provides many community benefits including cost sharing, leveraging unique resources, aligning the community vision of the watershed, and achieving long-term management goals. The project proposes using the Living Arroyos



Program to install many of the top-of-bank plantings through volunteer workdays with the local community while also educating participants on the project and flood protection.

Improving Water Quality from Future Inland Climate Change

Northern California will experience more intense weather extremes and precipitation as the oceans warm and temperature intensifies. This increased climate variability is already underway as manifested by the 2013-2016 drought followed immediately by an unprecedented wet 2017. As erosion damage is episodic in nature, damage from years like 2017 are expected to be the new normal, requiring flood managers to work proactively to avoid catastrophic and expensive repairs. This project addresses erosion at a critical location of previous damage, thereby eliminating a key source of sediment transport into environmentally sensitive areas. In addition, the integration of riparian plants in the project will help filter and keep water clean while providing shading.

C) Project Benefits to a Disadvantaged Community

The Iron Horse Regional Trail serves as a major and unique regional connector, providing a 32-mile commuter, biking and walking corridor for the people of Contra Costa and Alameda counties. Among the goals of the trail are to promote social equity by serving underserved communities with 1) health disparities that have an urgent need for more safe places to walk and bike, creating more opportunities for 2) recreation and 3) active transportation. Established in 1986, the trail follows the Southern Pacific Railroad right-of-way that was abandoned in 1978 and is one of the largest and oldest multi-use trails in the San Francisco Bay Area. Regarded as a 'treasured community asset', the trail runs north to south passing through numerous commercial, residential, and rural areas in the communities of Concord, Pleasant Hill, Walnut Creek, Alamo, Danville, San Ramon and Dublin, where it runs immediately adjacent to and paralleling Alamo Creek and the proposed project. The trail corridor lies within 1.5 miles, or a comfortable walking distance, of over 340,000 residents (151,000 commuters) and 3 miles, or a comfortable bicycling distance, of 425,000 residents (200,000 commuters). The corridor is only a few blocks from both the Pleasant Hill and Dublin/Pleasanton BART stations just downstream from the project site. The trail connects workers to dense employment areas throughout the region it serves including identified disadvantaged communities in Concord and Walnut Creek and provides recreational users with an active transportation route that is separated from vehicles.

Valley High School, a small continuation school for the Dublin Unified School District, with an enrollment close to 100. As noted in the table below, the total minority enrollment is approximately 77%, with 30% of students economically disadvantaged. Valley High School is in the center of the residential area and within a few blocks of the proposed project is at risk for shallow flooding without remedial work such as the proposed project.



2019-20 Student Enrollment by Group

Group	Percent of Total Enrollment
Black or African American	19.6
Asian	8.9
Filipino	1.8
Hispanic or Latino	30.4
White	23.2
Two or More Races	16.1
Socioeconomically Disadvantaged	30.4
English Learners	8.9
Students with Disabilities	7.1

Source: Dublin Joint Unified School District/Valley High School 2019-20 School Accountability Report Card

D) Scope, Schedule, and Budget

See Appendix B.

E) Funding Match

See Appendix B.

F) [was not listed in the grant solicitation package]

n/a

G) Delivering Sustainable Outcomes in the Long-Term

As documented and noted in this proposal, the proposed pilot project is anticipatory in nature and employs an innovative and environmentally responsible method that incorporates both soft and hard engineering methods to stabilize and prevent erosion while at the same time providing important habitat benefits to the aquatic environment. This approach minimizes the potential for the identified problem to increase in scope and scale, thus both reducing potential costs associated with a much larger and costly repair and future long-term maintenance costs.

Given past experience, we have good reason to believe the use of vegetated soil lifts and this approach to small erosion repairs will evolve and be perfected for future use in many waterways within the jurisdiction of Zone 7.



H) Community Participation in the NFIP CRS Program

City of Dublin has stated their intent to participate in the CRS Program.

I) Benefit to Cost Ratio (BCR)

The \$4,746,890 project protects \$95.6 million of damageable assets immediately adjacent to the channel resulting in a BCR of 20.1.

The table below reflects the contents-to-structure ratio values (CSV) method for calculating value of a single line of properties on the left and right bank using a structure percentage to calculate content value.

	Total Taxable Value	Total Net Taxable Value	Total Value (Structure+Content+Land)
Right Bank	\$ 8,475,983	\$ 8,384,983	\$ 33,439,994
Left Bank	\$ 27,011,447	\$ 23,188,610	\$ 62,161,638
	TOTAL VALUE (both banks)	\$	95,601,632

Using the total project cost (\$4,746,890) and total valuation of left and right banks, the BCR using is as follows:

Total Project Cost	\$4,746,890
BCR CSV method	20.1

J) Conservation Corps Participation

Zone 7 has active contracts with both the Civicorps Schools (formerly known as “East Bay Local Conservation Corps”) and the California Conservation Corps. Accordingly, staff from one of the Agencies will be utilized for various aspects of the project, including to harvest much of the plant material needed for the project.



References

- 2006. RMC. Stream Management Master Plan. Prepared for Zone 7 Water Agency.
- 2018. ESA. Hydrologic and Hydraulic Modeling Report. Prepared for Zone 7 Water Agency.
- 2019. Alamo Creek Repair Design Final Drawings.
- 2020. CE&G. Evaluation and Cost Analyses for Repair Alternatives. Prepared for Zone 7 Water Agency.
- 2021. ESA. Arroyo Mocho Stanley Reach Stabilization Project. Bid Set and Basis for Design. Prepared for Zone 7 Water Agency.



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FIGURES

Zone 7 Water Agency Service Area

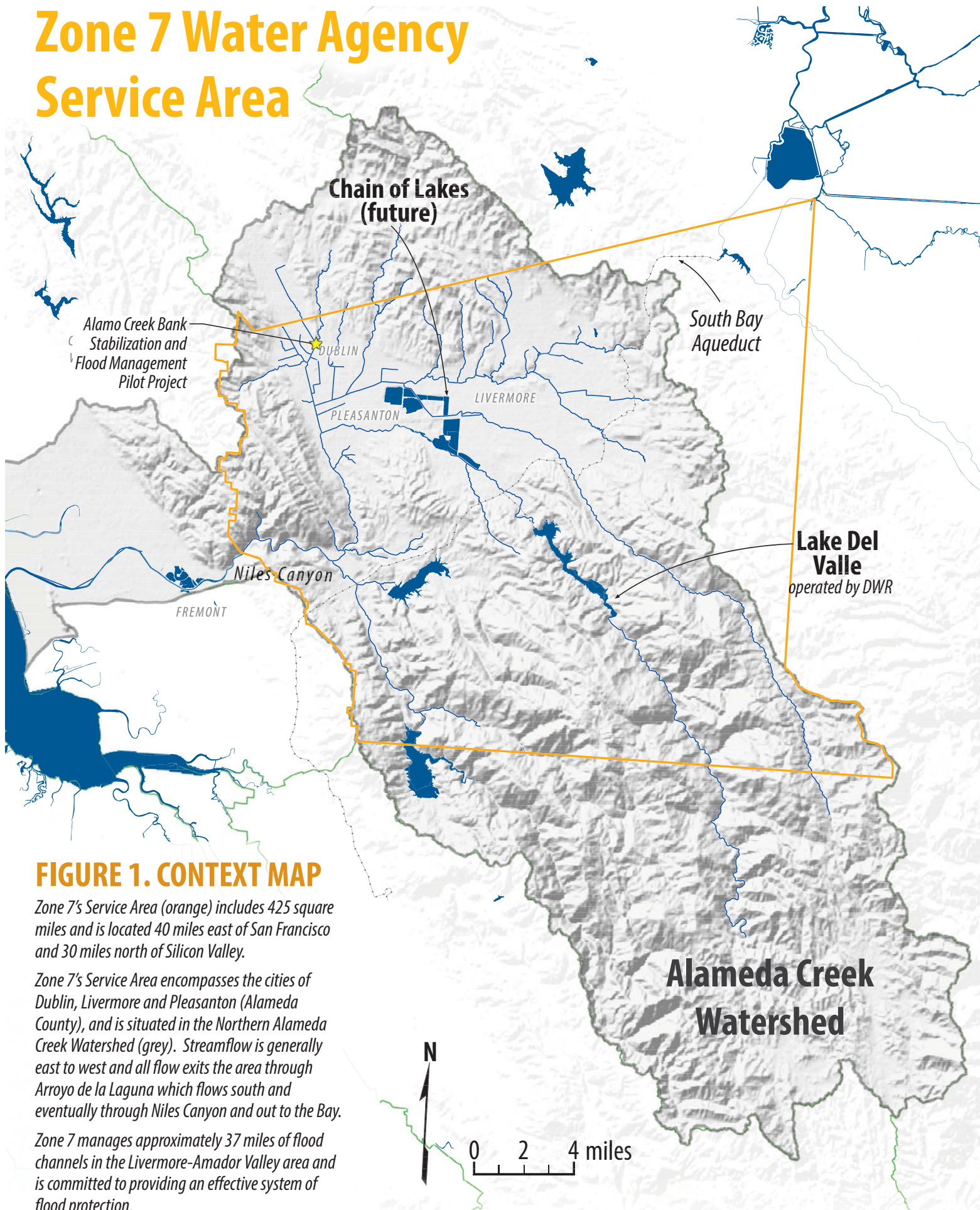


FIGURE 2. LOCATION MAP



FIGURE 3. SITE PHOTOS



PHOTO 1: Looking upstream at the concrete structure at the confluence of South San Ramon Creek (left) and Alamo Creek (right).

Photo taken October 25, 2021, post-storm.



PHOTO 2: Looking downstream at the concrete structure at the confluence of South San Ramon Creek and Alamo Creek. Photo taken from the pedestrian bridge over Alamo Creek.

Photo taken October 25, 2021, post-storm.



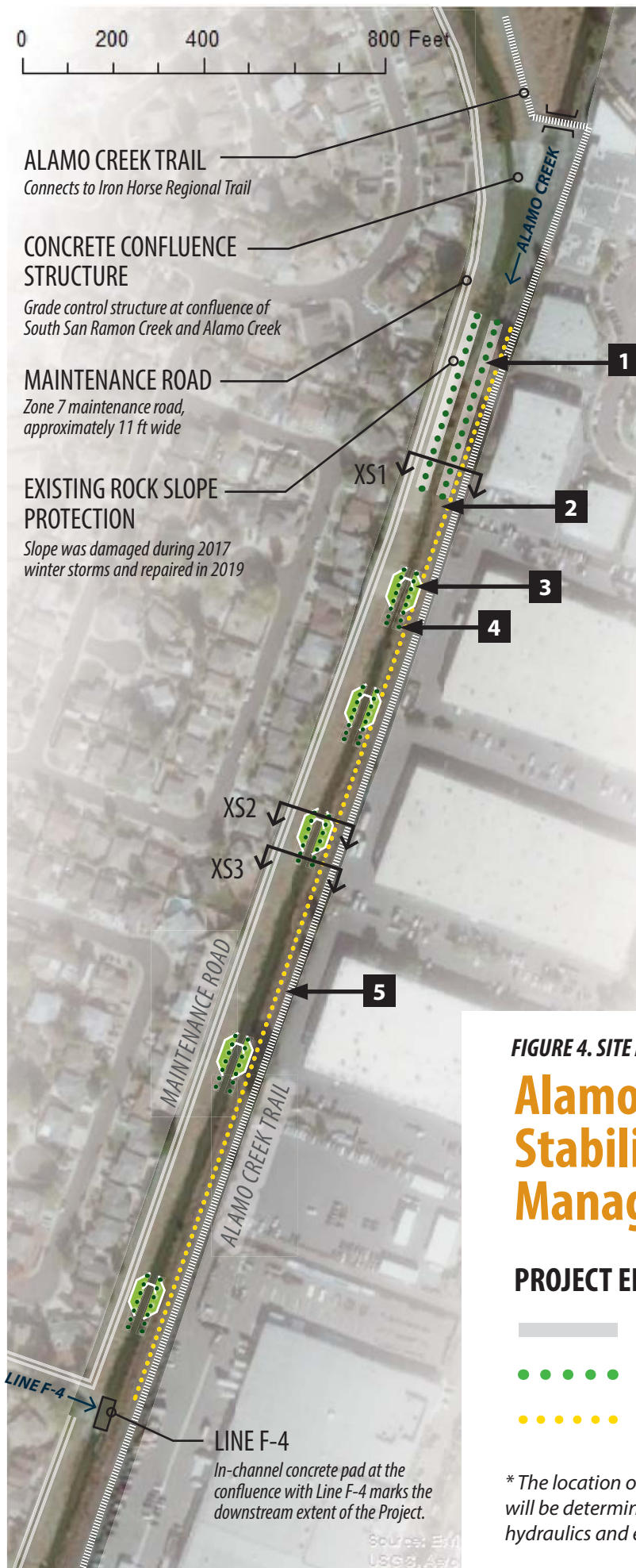
PHOTO 3: Looking downstream where the channel transitions from the concrete confluence structure to earthen trapezoidal channel.

Photo taken October 25, 2021, post-storm.



PHOTO 4: Looking at the right bank that was damaged as a result of 2017 storms and reconstructed in 2019. The resource agencies required 2 feet of topsoil in the repair which has not performed as expected. *Photo taken December 14, 2021, post-storm.*





PROJECT APPROACH

- 1** Add live stakes to existing rock slope protection to dampen turbulence while also providing vegetative enhancements.
- 2** Extend planted rock slope protection for continuous protection of both banks for a total of 400 LF.
- 3** Install a series of five in-channel structures to buffer flows and funnel them back to a center alignment through a transition of hard to soft bank treatments.
- 4** Planted toe will ease the transition between the reconstructed slopes and the earthen trapezoidal channel.
- 5** Install vegetation along the top of bank to improve aesthetics along the Alamo Creek Trail, provide shade for trail users, and reduce the project's carbon footprint utilizing our environmental stewardship program—the award-winning Living Arroyos Program—as well as staff from Civicorps Schools (formerly known as East Bay Local Conservation Corps) and the California Conservation Corps.

FIGURE 4. SITE MAP AND PROJECT APPROACH

Alamo Creek Bank Stabilization and Flood Management Pilot Project

PROJECT ELEMENTS

- Rock Slope Protection
- Planted Toe (*willows/mulefat*)
- Trailside Planting (*top of bank*)



Rock Cross-vanes
[see Figure 6 for more detail]

** The location of each structure along the long profile, and the bank treatment will be determined during the design process and will be screened based on hydraulics and existing bank stability.*

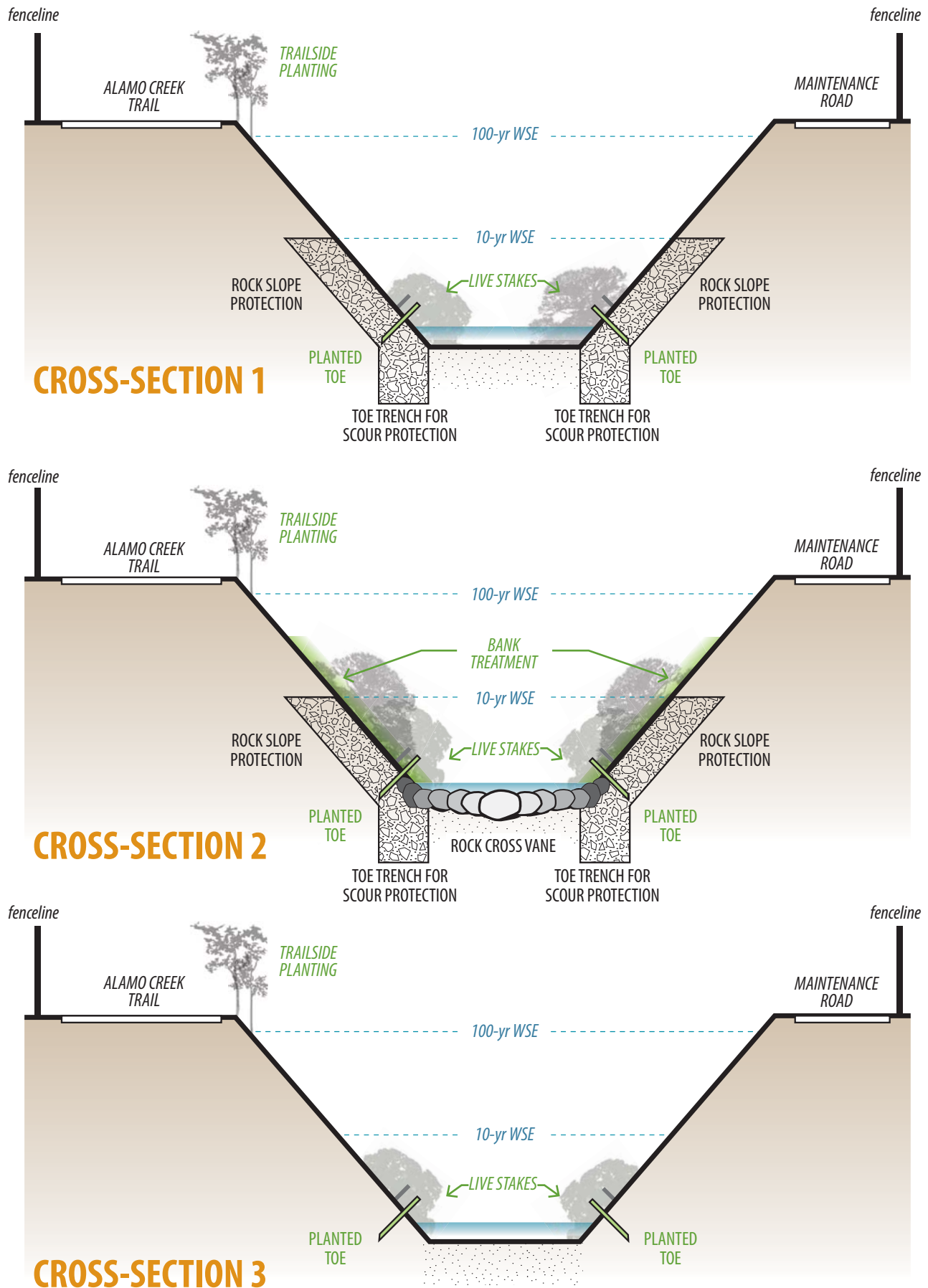
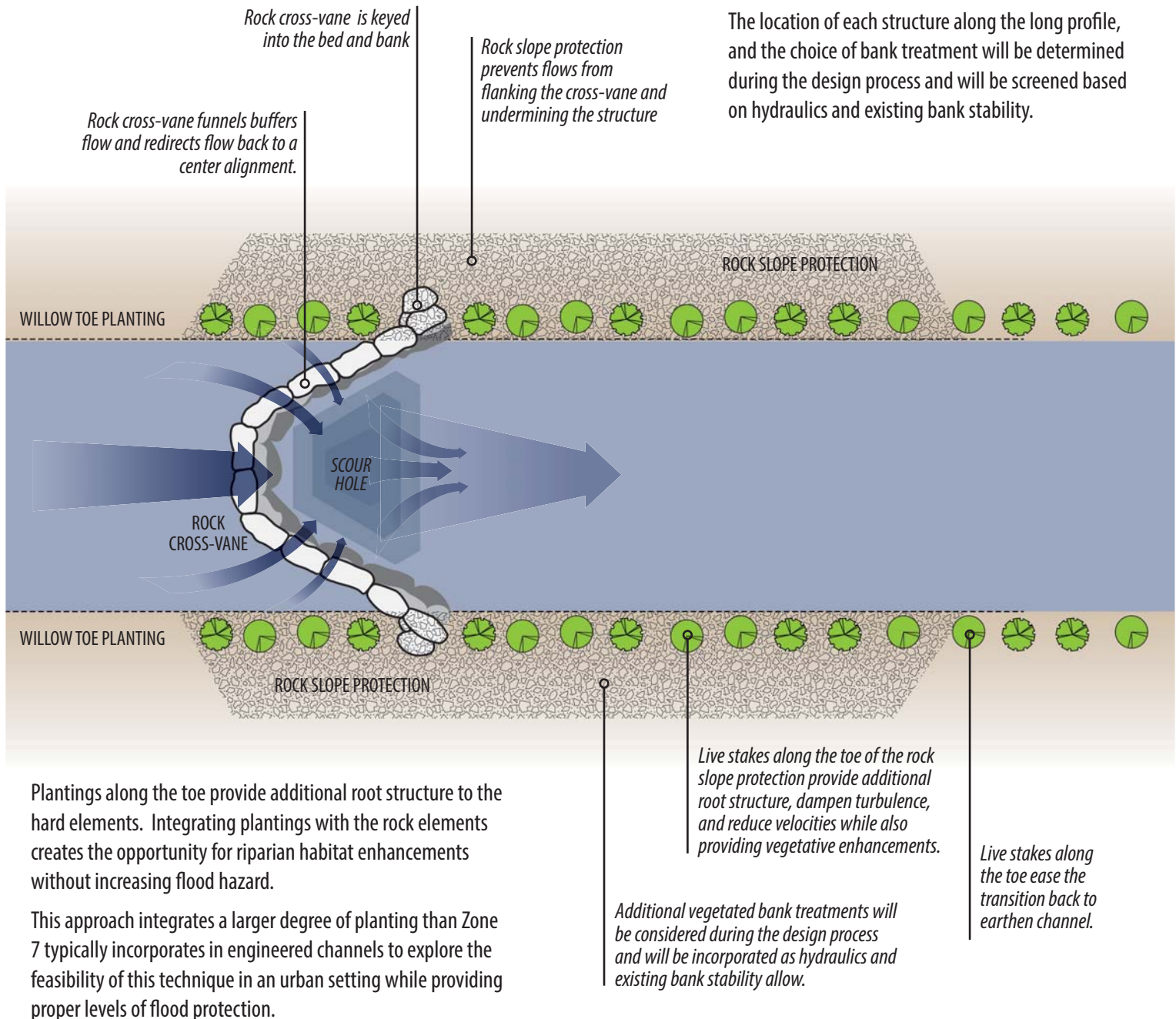


FIGURE 5. CONCEPTUAL CROSS-SECTIONS

Items labeled in green indicate elements that would be installed as part of this project. Figures are not to scale and are presented for illustrative purposes only.

FIGURE 6. CONCEPTUAL DIAGRAM OF MODULAR IN-CHANNEL STRUCTURES



Two examples of demonstrating the application of rock cross-vanes to redirect flows back to the centerline. Source: USBR



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APPENDIX A

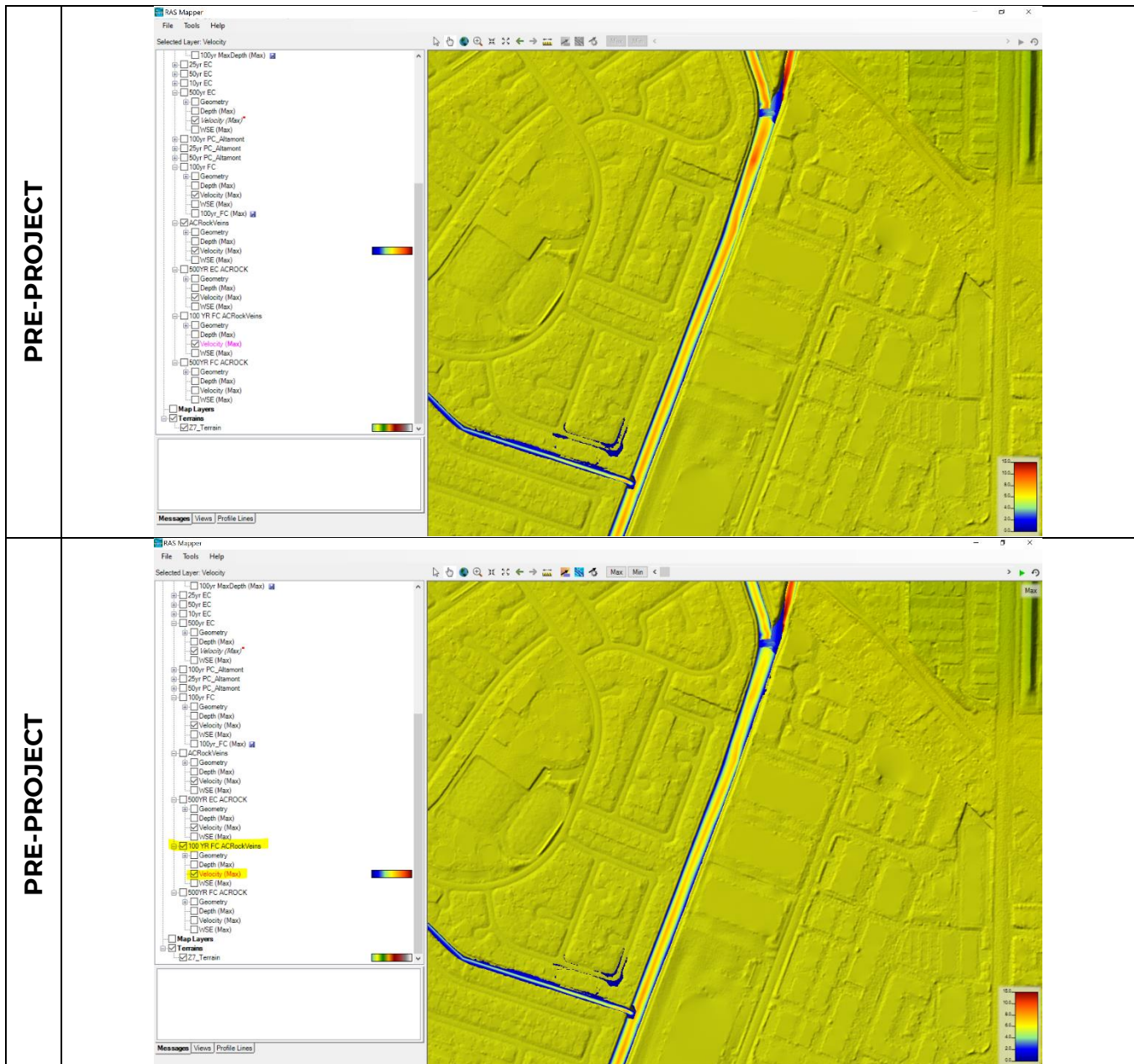
Existing and Proposed Conditions Model Results

*Alamo Creek Bank Stabilization and
Flood Management Pilot Project*



- Preliminary modeling output for the 100-year storm
- Modeling will be refined as part of the project to guide the project design.

Condition	Max. Velocity (fps)	Avg. Velocity (fps)
Pre-project	~15 fps	6 fps
Post-project	~8 fps	4 fps





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APPENDIX B

Scope of Work, Schedule and Budget



SCOPE OF WORK

A brief description of the scope of work for this project is presented below along with the intended deliverables for each task.

Task 1. Project Management and Grant Administration. This task includes project management and grant administration performed by Zone 7 staff and will occur for the duration of the project. Effort includes invoicing and reimbursement requests, progress reporting, and coordination with DWR grant manager.

Deliverables: Quarterly progress reports and reimbursement requests.

Task 2. Environmental Compliance and Design. The design process will begin within one month of contract award with 90% designs complete by December 2022. During the design process, Zone 7 will begin other pre-construction activities including preparing and submitting the CEQA documentation (anticipated to be an IS/MND), associated surveys and studies (e.g., wetland delineation, biological surveys, cultural resources surveys), and active pursuit of the necessary permits to undertake the work. Bidding and subsequent award of construction contract will be no later than April 2023.

Deliverables: draft and final environmental documents, submitted permit applications, final project construction documents stamped by a licensed engineer, and awarded construction contract.

Task 3. Construction. This task consists of all actions immediately following contract award including engineering inspections, contract change orders, biological clearance surveys, design support during construction, and all other work required to oversee and ensure that construction of the project is properly executed. All construction will be completed in 2023 and monitoring will be completed by April 2024 to leave time for final invoices and project closeout. Construction will last one season, from approximately May through December 2023. All in-channel construction will be completed during the typical construction work window; however, standard practice is for pole planting to occur closer to December as willows require harvest and installation during their dormancy period.

Deliverables: As-built report.

Task 4. Monitoring. Monitoring will assess pre-project, as-built conditions, and one winter post-project to evaluate project progress.

Deliverables: Final monitoring report comparing pre-project and post-project conditions.

Alamo Creek Bank Stabilization and
Flood Management Pilot Project



SCHEDULE

	2022			2023				2024			
Task	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Task 1. Project Management and Grant Administration											
Task 2. Environmental Compliance and Design											
Task 3. Construction											
Task 4. Monitoring											

BUDGET

Task	Task Description	Local Cost-Share	Requested Amount	TOTAL
Task 1. Project Management				
1.1	Project Management	\$0	\$25,000	
	<i>Subtotal Task 1</i>	<i>\$0</i>	<i>\$25,000</i>	<i>\$25,000</i>
Task 2. Environmental Compliance and Design				
2.1	CEQA IS/MND	\$60,000	\$0	
2.2	Permitting	\$80,000	\$0	
2.3	Design	\$0	\$200,000	
	<i>Subtotal Task 2</i>	<i>\$140,000</i>	<i>\$200,000</i>	<i>\$340,000</i>
Task 3. Construction				
3.1	Mobilization and demobilization	\$0	\$204,000	
3.2	Flow Diversion	\$0	\$575,000	
3.3	Rock slope protection with planted toe	\$0	\$1,349,640	
3.4	In-channel structures and bank enhancements	\$0	\$1,928,550	
3.5	Trail improvements	\$0	\$150,650	
3.6	Construction management	\$0	\$57,500	
	<i>Subtotal Task 3</i>	<i>\$0</i>	<i>\$4,265,340</i>	<i>\$4,265,340</i>
Task 4. Monitoring				
4.1	Topographic Change Analysis	\$0	\$22,050	
4.2	LiDAR	\$0	\$31,500	
4.3	Plant establishment	\$0	\$63,000	
	<i>Subtotal Task 4</i>	<i>\$0</i>	<i>\$116,550</i>	<i>\$116,550</i>
	TOTAL PROJECT COST	\$140,000	\$4,606,890	\$4,746,890
	Other related studies and efforts in support of local cost-share*	\$820,000		
	Zone 7 Direct Labor Costs	\$230,000		
	TOTAL LOCAL COST SHARE	\$1,190,000	25%	

*Detailed in the cost share section below.



COST SHARE

Zone 7 intends to meet the 25% local cost share requirement through a combination of sunk costs (incurred since July 1, 2019), near-term related work efforts, and future direct labor costs for work specifically related to the project.

Related studies and efforts in support of local cost-share are described below.

2019 REPAIR (Site F-36) \$579,670	<p>Site F-36 (located in the Project Area) was damaged as a result of 2017 storms and subsequently repaired in 2019. The design and analyses that went into this project, as well as its performance since 2019 serves as a pilot project of one type of repair approach that is being proposed as part of this project. Understanding how this repair approach fared since 2019 informed Zone 7's proposed Project.</p>
EVALUATION AND COST ANALYSES FOR REPAIR ALTERNATIVES \$49,914	<p>Zone 7 contracted with Cal Engineering & Geology, Inc. (CE&G) to do an evaluation of potential repair alternatives and conceptual-level construction cost estimates for Zone 7's chronically problematic reaches of earthen flood control channels.</p> <p>This analysis was key for understanding the root causes of bank instability and identifying potential repair strategies. In assessing repair alternatives, they evaluated commonly used creek bank repair measures that are applicable to the types of failures prevalent at the Zone 7 channels. The alternatives evaluated included slope regrading and revegetation, hydraugers, geogrid reinforced slope, rock slope protection, lime treatment, cellular confinement, log crib walls, and hybrid repairs (which can be a combination of the other measures).</p> <p>This assessment backs Zone 7's use of a hybrid approach for this setting as proposed in this project.</p>
SOUTH SAN RAMON CREEK FEASIBILITY STUDY \$22,000	<p>South San Ramon Creek is a tributary to Alamo Creek and the reach immediately upstream of the Project area was evaluated for additional stormwater detention to alleviate downstream flooding. Upstream detention would also reduce velocities and erosive potential downstream (at the Project site). The modeling conducted as part of the effort concluded that there was insufficient space to accommodate the amount of detention necessary to improve downstream conditions. This assessment provided additional justification for the proposed Project.</p>



UPDATES TO THE HYDRAULIC AND HYDROLOGIC MODEL \$83,540	Zone 7 developed the Valley-wide Hydraulic and Hydrologic Model to inform flood planning by showing pre- and post-project conditions. Zone 7 updates the models based on new information and insights to provide the most accurate assessments possible. Zone 7 did some revisions to the model in 2019-2021.
BI-ANNUAL CALIFORNIA RED- LEGGED FROG SURVEYS \$29,685 (2020) ~\$30,000 (2022, future)	Zone 7 has been conducting, regular, system-wide protocol-level surveys for California Red-legged Frogs in the Dublin/Pleasanton Area to facilitate project permitting and regulatory compliance specifically for the bank repairs and channel improvement projects that Zone 7 regularly undertakes. The project area will be included in 2022 surveys. This system-wide approach replaces the need for project-specific surveys to meet USFWS requirements.
LIVING ARROYOS ~\$12,000 (future)	Zone 7 contributes annually to participate in the Living Arroyos Program. Zone proposes use of the Program, staff and volunteers, to support planting along the top-of-bank as well as serve as a platform for education and outreach to the local community.

Zone 7 is also proposing to cover the costs of CEQA, Permitting, and Regulatory Compliance to meet the 25% cost share.



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APPENDIX C

Attorney Certification

Appendix F
Attorney's Certification Form

(The applicant's attorney shall answer the following questions regarding this proposal and where indicated, shall cite statutory authority or other references.)

•Is the Applicant a political subdivision of the State of California? (x) Yes () No

Citation: Alameda County Flood Control and Water Conservation Act (Water Code Appendix, Chap. 55)

•Does the Applicant have legal authority to enter into a funding agreement with the State of California? (x)Yes ()No

Citation: Alameda County Flood Control and Water Conservation Act §55-36

•What steps are required by law for the Applicant to contract with the State?
Approval by Board of Directors.

Citation: Alameda County Flood Control and Water Conservation Act §55-36

•What is the statutory authority under which the Applicant may obtain funds for the purpose, amount, and duration requested?

Citation: Alameda County Flood Control and Water Conservation Act §§55-5; 55-34; 55-36

•What is the statutory authority under which the Applicant was formed and is authorized to operate?

Citation: Alameda County Flood Control and Water Conservation Act §55-36

•Is the Applicant required to hold an election before entering into a funding contract with the State? ()Yes (x)No

Citation: Alameda County Flood Control and Water Conservation Act §§55-5; 55-34; 55-36

Will a funding agreement between the Applicant and the State be subject to review and approval by other governmental agencies? ()Yes (x)No

Identify all such agencies: N/A

Citation: Alameda County Flood Control and Water Conservation Act §§55-5; 55-34; 55-36

•Describe any pending litigation that impacts the financial condition of the Applicant or the operation of flood management facilities. If none is pending, state none.
None

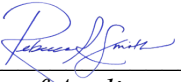
•Does the Applicant have legal authority and jurisdiction to implement a flood control program and the authority to make land use decisions at the Project site and in the protected area?

(x)Yes ()No

Citation: Alameda County Flood Control and Water Conservation Act §§55-5; 55-34; 55-36

I certify that I am a duly qualified and licensed attorney in California representing the applicant agency and that I have answered the questions on this page and the preceding page to the best of my knowledge

.

By:  Date: Feb 1, 2022
(Signature of Applicant Agency's Attorney)

Rebecca R.A. Smith, General Counsel CA Bar No. 275461

(Printed Name of Applicant Agency's Attorney) (Title) (Bar No.)

Alameda County Flood Control and Water Conservation District, Zone 7

(Name of Applicant Agency)



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APPENDIX D

Environmental Information Form

Appendix G

Environmental Information Form

Grantees are responsible for complying with all applicable laws and regulations for their projects, including the California Environmental Quality Act (CEQA). Work that is subject to the California Environmental Quality Act (CEQA) shall not proceed under this Agreement until documents that satisfy the CEQA process are received by the Department of Water Resources (Department) and the Department has completed its CEQA compliance. Work that is subject to a CEQA shall not proceed until and unless approved by the Department. Such approval is fully discretionary and shall constitute a condition precedent to any work for which it is required. Once CEQA documentation has been completed, the Department will consider the environmental documents and decide whether to continue to fund the project or to require changes, alterations or other mitigation.

Grant Recipient: _____

Project Manager: _____

Phone Number: _____ Agreement #: _____

Address: _____

1. List the source of any other grants or funds received from the Department of Water Resources to implement a portion of this project.

2. Is this a project as defined by CEQA? Yes ☐ No ☐ (if "yes", skip to #3) If "no", please explain below then skip to #8.

3. Is this project exempt from CEQA compliance? Yes ☐ No ☐ (if "no", skip to #4) If "yes", provide reasons for exemption. Cite the CEQA Article, Section and Title of the CEQA exemption, if appropriate. A partial list of the statutory exemptions is found in Cal. Code Regs., tit.14, art. 18 (sections 15260 – 15285) and a list of categorical exemptions is found in Cal. Code Regs., tit. 14, art. 19 (sections 15300 – 15332). A copy of CEQA and the applicable regulations may be found at:

http://resources.ca.gov/ceqa/docs/2016_CEQA_Statutes_and_Guidelines.pdf

Check appropriate box below:

- ☐ Lead Agency has already filed a Notice of Exemption (NOE) with the State Clearinghouse and/or County Clerk. Attach copy of NOE and, if applicable, a copy of Board Resolution.
- ☐ Lead Agency will file a NOE with the State Clearinghouse and/or County Clerk. Provide estimated date: _____
- ☐ Lead Agency will NOT file a NOE with the State Clearinghouse and/or County Clerk.

If Lead Agency chooses not to file a NOE, sufficient documentation and information must be submitted to the Project Director, along with this form, to allow DWR to make its own determination that the project is exempt from CEQA.

Reason for exemption:

Approved by FAIR Committee for Interim Use
ENVIRONMENTAL INFORMATION FORM

4. If the project will require CEQA compliance, identify the Lead Agency.

CEQA Lead Agency: **Zone 7 Water Agency**

5. Please check types of CEQA documents that have been or are to be prepared:

☐ Initial Study

☒ Negative Declaration / Mitigated Negative Declaration

☐ Environmental Impact Report

6. Please describe the status of the CEQA documents, expected date of completion, and estimated cost, if requesting DWR funds relating to CEQA compliance:

Status: **To be initiated on receipt of grant funding for project implementation**

Date of Completion: **Approx. 6 months from award**

Estimated Costs: **CEQA: \$50,000 Permitting: \$85,000**

7. If the CEQA document has been completed, please provide the name of the document and the State Clearinghouse number, if available. Submit two copies to the Program Manager.

8. Please list all environmental permits you must obtain to complete the project: (attach additional pages, as necessary)

TYPE OF PERMIT REQUIRED

PERMITTING AGENCY

Lake and Streambed Alteration (1602)

CDFW

401 WQ Certification

RWQCB

404 Nationwide

USACE

9. This form was completed by:

Elke Rank

925-454-5005

Print or Type Name

Phone Number

Elke Rank

2/7/2022

Signature

Date

Please send the completed and signed form to DWR Project Manager.

For DWR internal use:

☐ DWR received environmental documents.

☐ DWR made findings.



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APPENDIX E

Authorizing Resolution (forthcoming)

Per communications with DWR grants staff, the adopted resolution does not have to be part of the complete submittal. The adopted authorizing resolution can be provided after the close of the solicitation period.

Zone 7 intends to bring the resolution for approval at our March 2022 Board Meeting.