

Zone 7 Water Agency

Flood Protection Program

2016 Annual Report

August 2017



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1. OVERVIEW

Introduction and Background

Zone 7 of the Alameda County Flood Control & Water Conservation District (Zone 7 Water Agency) was established in 1957 by the voters of the Livermore-Amador Valley in order to place water management, including flood control, under local control through a locally-elected Board of Directors. Zone 7's programs for flood protection and water supply are integrated. Since the 1960s, Zone 7 has imported water from the State Water Project and artificially recharged the local groundwater basin using abandoned quarries, local streams, and flood facilities during the dry season when capacity is not needed to convey storm flows. Zone 7 provides for the management of flood and storm waters in order to protect life, property and habitat from damage and destruction within a 430-square-mile area.

In addition to providing wholesale potable water supply to the businesses and residents of Dublin, Livermore, Pleasanton and the Dougherty Valley portion of San Ramon, Zone 7 also sustainably manages the groundwater basin for the Livermore-Amador Valley and provides untreated irrigation water to Eastern Alameda County agricultural customers.

Although many programs and projects satisfy multiple objectives, Zone 7's Flood Protection Program includes four major sub-programs. Additional details about these sub-programs and descriptions of some of the major activities that occurred during 2016 are in the sections that follow. Where appropriate, the Strategic Planning Priority has been noted (SPP: #).

- Administration

Administration includes staffing and training, legal, safety, property management, and regulation compliance.

- Watershed Protection and Collaboration

The Watershed Stakeholder Collaboration Program includes participation in a variety of local and regional efforts with specific emphasis on collaboration with the many public and individual stakeholders in the watershed.

- Capital Improvements

The key Capital Improvement Program activities include planning, data collection, hydrologic and hydraulic modeling, financing and budgeting, design and construction management, and working with other entities such as developers, cities, and NGOs to further partnerships on projects identified in the Stream Management Master Plan (SMMP).

- Maintenance

The key Maintenance Program activities for the 37 miles of Zone 7-owned channel facilities include emergency repairs, routine maintenance and repairs, clearing debris from channels and access roads, vegetation management along the channels, inspections to ensure the system is in good working condition to receive and convey storm waters, and rehabilitation of existing facilities. Maintenance also includes annual monitoring of past project sites in accordance with all permit requirements.

Highlighted Accomplishments from 2016

The following are some of the key accomplishments related to the Flood Protection Program by Zone 7 in 2016, all of which are described in more detail in the following chapters:

- Completed three emergency bank repairs totaling 320 linear feet, 3500 feet of access road repair, retaining wall construction to support a slope above a multi-use trail in Dublin, 2500 linear feet of concrete lining repairs, slope stabilization to repair 120 feet of cracked bank, re-installation of two drain inlet structures and culverts, 280 feet of new V-ditch drainage, 1000 feet of erosion fabric installation and 6 soil bioengineering brush walls. (SPP: 2.1)
- Zone 7 managed various maintenance activities, such as vegetation management, downed tree removal, hydroseeding, fence and gate repairs, and debris and trash removal, totaling an additional \$500,000. Further, the planning, permitting, design and construction management was performed directly by Zone 7 staff. (SPP: 2.1)
- Staff continued the process of updating the Stream Management Master Plan (SMMP) using updated modeling and proposing projects to address flood-prone areas, while still implementing key ideas of the original SMMP. In addition, long-term financial planning for the SMMP projects is ongoing and will be addressed as part of one of the phases of the SMMP Update. (SPP: 2.2, 2.3)
- A new webcam replacing an older one was installed at the Sunol Glen Elementary School to provide a visual check of the Arroyo de la Laguna levels and flows from the Internet. (SPP: 2.4)
- Zone 7 completed planning level studies of Medeiros Parkway (an SMMP project) biological resources, geomorphology, hydrology, and hydraulics to inform the project design and permitting efforts. Zone 7 also began engaging stakeholders in our project plans and additional outreach will continue in 2017. (SPP: 2.4, 2.7)
- Zone 7 staff chaired three multi-agency working groups that support environmental studies and collaboration in the Alameda Creek watershed. (SPP: 2.5)

- Contracted with the United States Geological Survey (USGS) in continuing the sediment study and adding a fourth gauge to the study which helps with tracing where sediment originates in the northern part of the watershed through Alamo Canal and South San Ramon Creek, augmenting gauge data already being collected from the Arroyo Mocho and Arroyo las Positas watersheds. (SPP: 2.5)
- Zone 7 collaborated with the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) on two bank stabilization projects at Line G-1-1 and Pleasanton Canal (Line B-5) where monitoring work was completed and found to be satisfactory on both locations. Both sites continue to be maintained by the Living Arroyos crew who hand weed both sites and limb up trees along Line B-5. (SPP: 2.5)
- Zone 7 partnered with the Alameda County Resources Conservation District (RCD) on two Altamont Creek sites that were identified as benefiting from water quality improvements, such as plantings using native species and willow materials. Post installation monitoring began in 2016. Initial monitoring of the Confluence Project shows that certain species performed better, and that survival at the upstream site was higher than the downstream site possibly due to heavier recreational traffic at the downstream site. Initial monitoring at the Willow Project shows that willow survival was good. (SPP: 2.5)
- Zone 7 collaborated with students from the Foothill High School and the City of Pleasanton on an arroyo clean-up effort to remove litter and debris along a reach of the Arroyo del Valle near First Street behind two apartment complexes. A total of 10 bags of miscellaneous debris, with an estimated weight of 100 pounds, were removed from the arroyo. (SPP: 2.5)
- The Living Arroyos Program, in collaboration among Livermore Area Recreation and Park District (LARPD), City of Livermore and Zone 7, seeks to improve the urban streams and streamside habitats of the Livermore-Amador Valley and to engage the local community. Volunteers and Living Arroyos staff harvested and planted willow stakes, installed willow fascines, and performed other maintenance activities along the Arroyo Mocho at the Stanley Reach Project, including replanting riparian trees during the fall, applying mulch to over 1,000 oak seedlings, removing nearly one mile of non-native invasive weeds through hand weeding or using string trimmers, and several stream clean-ups following high-flow events in the winter. (SPP: 2.5)
- Zone 7 is a member of the Bay Area Flood Protection Agencies Association (BAFPAA) and BAFPAA was awarded \$19 million from the Department of Water Resources (DWR) under the Integrated Regional Water Management (IRWM) Proposition 84 grant program for the Advanced Quantitative Precipitation Information (AQPI) project. In 2016, the AQPI project continued to be under development. Project details, including the historical background and the project benefits, have been further defined. (SPP: 2.5)
- The Flood Protection Program supported three grant applications. While some have been rejected, others remain pending. (SPP: 2.6)

- Zone 7 secured a five-year extension (2016 – 2020) of a Routine Maintenance Agreement (RMA) issued by the California Department of Fish and Wildlife (CDFW). This RMA specifies the allowable activities, work windows, mitigation measures, and reporting requirements for Zone 7's channel maintenance program. In addition, Zone 7 is seeking a multi-agency Stream Maintenance Permit (SMP) that would supersede the RMA in future years. In 2016, the consultant provided a document inventory and reviewed 10 years of Zone 7 maintenance records to determine what an average year of typical maintenance year might entail. (SPP: 2.8)
- Collaborated with local municipalities and park districts in their planning and construction of trail projects utilizing Zone 7's flood control channel maintenance access roads.
- Staff development activities in 2016 included training in Storm Central database capability, HEC RAS 5.0 for 2D model hydraulic analyses, project controls, planning and design for stream rehabilitation with large wood and other safety-related classes. In addition, staff attended United States Army Corps of Engineers (USACE) permitting, rules and best practices in environmental planning, and Levees Owners workshops.

2. ADMINISTRATION

Zone 7's Flood Protection Program's administrative tasks include those related to staffing, planning, budget preparation, preparing board agendas and presentations, updating and managing current agreements and contracts, and issuing permits as appropriate. Flood Control protection staff coordinated extensively with other agencies to minimize impacts to the public and utilize Zone 7-owned properties for other compatible community uses such as trails. In addition, Flood Control protection staff routinely engages with the public to address citizen complaints and inquiries.

The following is a description of the key administrative activities that occurred in 2016:

Permits: Routine Maintenance Agreement

Activities that may impact the environment are subject to regulatory compliance, including CEQA and authorizations from regulatory agencies. Zone 7's channel maintenance work is covered by a Routine Maintenance Agreement issued by the California Department of Fish and Wildlife. The permit specifies the allowable activities, seasonal work windows, mitigation measures, and reporting requirements. Zone 7 has secured a five-year (2016 – 2020) extension of this Agreement. Many projects also require USACE and/or RWQCB approvals. Larger projects, or those that could impact special species or habitats, require separate permits from CDFW and other agencies.

Contract Administration and Management

Zone 7 staff administers and manages various consultant and vendor contracts related to flood protection projects. This includes the preparation and administration of requests for proposals, contracts, and right-of-way documents. Staff is also responsible for preparing Zone 7 Board agenda items pertaining to flood protection.

Zone 7 staff routinely receives requests from private entities, as well as public agencies, regarding using flood protection facilities for their projects. While temporary access is usually granted by issuing encroachment permits, long-term access is usually provided, when warranted, through a license agreement. A license agreement is board-approved and will generally spell out the terms of operating within a Zone 7 facility, as well as indemnify Zone 7 from any liabilities that may occur from that entity's use of the property.

In 2016, Zone 7 staff developed a number of requests for proposals, annual purchase orders, consultant contracts, and administered various construction contracts, as well as responded to several requests from developers. Specifically, Zone 7 executed the following documents: 1) an endowment fund agreement with the developer for Phase 1 of the Camp Parks Project; 2) a joint funding agreement with the USGS for the annual sediment load monitoring program; 3) a task

order with LARPD for the Living Arroyos Program; and 4) a contract for support services for the SMMP update and Stormwater Resources Plan.

Encroachment Permit Program

The Encroachment Permit Program involves engineering design review, inspection, and issuance of encroachment permits. Encroachment permits are necessary when adjacent neighbors have exhausted all other options and request use of Zone 7's access roads for access to work within their properties, or when improvement work is proposed within Zone 7's right-of-way or easement by a local or state agency. The program involves developing permit terms, conditions, fees, insurance and bond requirements. In 2016, Zone 7 issued 30 encroachment permits to both private entities and public agencies and coordinated with applicants to assure safe access to Zone 7 facilities.

U.S. Army Corps of Engineers PL 84-99 Federal Assistance Program

Zone 7 participates in the U.S. Army Corps of Engineers' (USACE) PL 84-99 Federal Assistance Program. The program provides federal funding for Presidential-declared storm-related disasters to complete and rehabilitate damaged and eligible facilities participating in the program. One of the conditions required to participate in the program is a bi-annual eligibility inspection conducted by the USACE inspectors on all eligible Zone 7 facilities. In 2016, no inspection was necessary within Zone 7 facilities in order to remain eligible in the program. Updates on the 2017 storm inspections will be addressed in next year's annual report.

Trail-Use Collaboration and Support

In 2016, Zone 7 staff continued collaboration with the City of Pleasanton, City of Livermore, City of Dublin, East Bay Regional Park District (EBRPD) and local trail groups to make sure that the trail use and license agreement terms and conditions were up to date, reflecting current concerns. Staff continued active participation in discussions with the City of Livermore on their development of the Isabel Neighborhood Plan trail system effort. In addition, staff assisted in identifying a possible route expansion that may connect the future Livermore BART station to the Cayetano Park. Further, staff provided a support letter to the City of Livermore in pursuance of grant funding to extend the Iron Horse Trail along the reach of Arroyo Mocho between Isabel Avenue and Murrieta Boulevard. As incidents relating to trail use occurred, Zone 7 staff worked with the public to ensure safety as a number one priority.

Alameda Countywide Clean Water Program

Zone 7 is a member of the Alameda Countywide Clean Water Program which fosters a culture of stewardship of the county's creeks, wetlands, and the Bay (<http://www.cleanwaterprogram.org>).

In 2016, Zone 7 participated in the Alameda Countywide Clean Water Program by implementing best management practices in its maintenance activities, responding to illicit discharges, and contributing data for the Clean Water Program semi-annual reports. Per Clean Water Program requirements, staff kept track of violations such as shopping carts, debris, and spills in the channels and prepared reports for the Clean Water Program. By staying proactive and being prepared for action when violations arose, Zone 7 has been able to effectively reduce the amount of runoff pollution. Zone 7 also participated in Earth Day 2016, Coastal Clean-Up Day and Dublin Pride Week activities.



In April 2016, in collaboration with students from the Foothill High School and the City of Pleasanton, a number of students initiated an arroyo clean-up effort to remove litter and other debris along a reach of the Arroyo del Valle near First Street behind two apartment complexes. Students retrieved garbage and other debris from the channel bank, deeming the effort a success. A total of 10 bags of miscellaneous debris, with an estimated weight of 100 pounds, were removed from the arroyo.



Joint Exercise of Powers Agreement for Aquatic Pesticides NPDES Permit

In compliance with the 2001 statewide General National Pollutant Discharge Elimination System (NPDES) Permit for the discharge of aquatic pesticides to waters of the United States, Zone 7 entered into a Joint Exercise of Powers Agreement (JEPA) in 2003 with the Contra Costa County Public Works Department, Contra Costa County Flood Control and Water Conservation District, Alameda County Public Works Agency, City of Antioch and City of Concord to monitor and implement aquatic pesticide use. Flood Control staff attend meetings and contract agreement discussions with the selected consultant. All JEPA member agencies share equally in the costs of monitoring and testing for each pesticide being used and for the costs associated with coordination and administration of the JEPA. With the NPDES permit, Zone 7 is in compliance when aquatic pesticides are used for keeping flood protection channels clear of obstructive vegetation.

Since the commencement of the 2013 Statewide General NPDES Permit for Residual Aquatic Pesticide Discharges from Algae and Aquatic Weed Control Applications, Zone 7 continued actively participating in the JEPA work group to share common interest and knowledge with other Bay Area flood control agencies to ensure full compliance with the new permit requirements.

In 2016, the Zone 7 Board authorized staff to continue participation in the JEPA and to pay for the annual program costs.

Employee Development and Staff Training

In 2016, Zone 7 staff had the opportunity to participate in a number of training classes to improve staff productivity and employee development. Classes included Storm Central database capability training, HEC RAS 5.0 for 2D model hydraulic analyses, project controls, planning and design for stream rehabilitation with large wood and other safety-related classes. In addition, staff attended Army Corps permitting, rules and best practices in environmental planning, and Army Corps Levees Owners workshops. With increased knowledge of these new programs, Flood Control staff was able to accomplish daily tasks, as well as new assignments, with greater safety and efficiency.

Grant Applications

In 2016, the Flood Protection Program supported three grant applications:

- 1) River Parkways Grant Program - \$500,000 for Arroyo Mocho Floodplain and Riparian Forest Restoration Project
 - Status: award in negotiations as of 2016

- 2) Proposition 1 Stormwater Grant Program - \$500,000 for Arroyo Mocho Floodplain and Riparian Forest Restoration Project
 - Status: pending

- 3) California Urban Rivers Grant Program \$3,000,000 for Arroyo Mocho Floodplain and Riparian Forest Restoration Project
 - Status: pending

3. WATERSHED PROTECTION AND COLLABORATION PROGRAM

The Watershed Protection and Collaboration Program represents staff participation in a variety of local and regional watershed efforts, with specific emphasis on collaboration with the many public and individual stakeholders in the Northern Alameda Creek Watershed.

Alameda Creek Fisheries Restoration Workgroup

The Alameda Creek Fisheries Restoration Workgroup was formed in early 1999 as a collaborative effort among many parties focusing on water flows and habitat restoration in the Alameda Creek watershed to explore opportunities related to steelhead trout. A Memorandum of Understanding (MOU) was authorized by the 17 Workgroup members in 2006, and Zone 7 is one of the core funding partners. The MOU covered ten years and has since expired; a new MOU is under development.

A comprehensive study plan, the “Alameda Creek Population Recovery Strategies and In-Stream Flow Assessment for Steelhead Trout,” was completed in 2008. Work included an assessment of hydrologic and habitat conditions, identification of strategies for population recovery, and monitoring.

Zone 7 staff currently chairs this workgroup, developing the agendas and facilitating the meetings. As a funding partner, we also help guide the studies done on behalf of the workgroup, and seek ongoing collaboration from all stakeholders. Meetings are typically held quarterly and are open to the public. In 2016, four meetings were held.

Alameda Creek Watershed Forum

The Alameda Creek Watershed Forum consists of representatives from several local agencies, environmental groups, industries and organizations. The Forum’s mission is to protect and enhance water-related beneficial uses and resources in the Alameda Creek Watershed in order to create a healthy and sustainable watershed for the community. The Forum promotes collaboration and the sharing of information among all stakeholders. The Forum, led by a small planning committee, typically hosts two events per year: a spring conference and a fall technical/focused workshop.

October 25, 2016, the Forum hosted its first “State of the Watershed” event, featuring speakers from Zone 7, Alameda County Public Works Agency, San Francisco Public Utilities Commission, Alameda County Water District, and others.

Arroyo de la Laguna Agency Collaborative

The Arroyo de la Laguna Agency Collaborative is comprised of agencies and municipalities with facilities that drain into the arroyo and the greater Alameda Creek Watershed. More specifically, collaborators include the Alameda County Flood Control and Water Conservation District (Zone 5/6), Alameda County Water District, Contra Costa County Flood Control and Water Conservation District, San Francisco Public Utilities Commission, Zone 7, and the Cities of Dublin, Livermore, Pleasanton, and San Ramon. The Alameda County Resource Conservation District and Natural Resources Conservation Service are also engaged in the Collaborative, as much of their work is in or around our waterways. This Collaborative discusses the arroyo as a whole to better understand the scientific and engineering data that is available along with what goals for the arroyo will benefit the stakeholders and local residents. The RCD is particularly interested in working to better position the local agencies for possible future federal funding or grant opportunities.

Zone 7 serves as unofficial chair of the Collaborative. In this capacity we set meetings and agendas, and help to foster inter-agency collaboration.

Living Arroyos Program



The Living Arroyos Program was initiated in 2013 with the dual goals of improving the urban streams and streamside habitats of the Livermore-Amador Valley by engaging the local community and of improving community understanding and appreciation of the arroyos through such involvement. The Livermore Area Recreation and Parks District continued in their role as the managing partner, and the City of Livermore continued as a project partner. The City of Pleasanton joined the effort in 2016.

The Program includes a year-long internship program where local college students learn hands-on about stream ecology and channel maintenance while also developing leadership and public-speaking skills by working with the community during volunteer workdays. The Program increases opportunities for local residents to engage in hands-on stewardship and establish relationships to the streams in their own backyards, while contributing to long-term vegetation management strategies across the valley.



In 2016, the volunteers and Living Arroyos staff harvested and planted willow stakes, installed willow fascines, and performed other maintenance activities along the Arroyo Mocho at the Stanley Reach Project, including replanting riparian trees during the fall, applying mulch to over 1,000 oak seedlings, removing nearly one mile of non-native invasive weeds through hand weeding or using string trimmers, and conducting several stream clean-ups following high-flow events in the winter.



The Program continues to be a huge draw for volunteers and this year was featured in an East Bay Times article. The number of volunteers on any given volunteer day ranged from as few as five up to 30+ volunteers with several repeat volunteers. As in previous years, the Program was a big hit with high school student service groups and continues to draw from a wider audience with added projects in Pleasanton

Sediment Study

Flood Protection staff has been monitoring and assessing sediment transport within Arroyo Mocho and Arroyo Las Positas over the last six years in an effort to directly support improved modeling for design and compliance purposes and decisions about future operations and maintenance of flood protection facilities. This effort was initially started in September 2010 with a Phase 1 contract with San Francisco Estuary Institute (SFEI). Three gauge stations, Arroyo Mocho near Pleasanton (AMP), Arroyo Mocho at Hagemann (AMH) and Arroyo Las Positas near Livermore (ALPL), were monitored. Phase 2 was initiated in November 2012, with a plan to complete the study over the following two seasons (2012-2013 and 2013-2014). Staff and SFEI were hoping for more substantial rain events to provide more information on sedimentation.

The recent drought years and lack of large storms resulted in data collection limited to smaller events. As of the end of 2016, data are presently insufficient to describe the processes of supply, transport, and deposition during wetter periods such as those that occurred during the early to mid-1980s and mid-1990s. Further, suspended and bedload data collection during more extreme events is needed to complete modeling and designs.

To fill the data gap for wet weather sampling, staff contacted the USGS and inquired about having them provide sampling coverage. The estimate was initially only for the three gauges that SFEI has been studying but an additional fourth gauge was added to this study, Alamo Canal near Pleasanton (ACNP), which helps with tracing where sediment originates in the northern part

of the watershed. The Alamo Canal gauge, which collects information on runoff from South San Ramon Creek and its tributaries along with Alamo Creek, provides an even better, and more complete, picture of where and how much sedimentation is coming through our system when data is compared to an existing downstream USGS gauge at Arroyo de la Laguna at Verona (ADLLV.)

Lines B-5 and G-1-1 Revegetation Demonstration Project



In 2012, Zone 7 collaborated with the RCD and the NRCS on a demonstration project assessing the feasibility of improving bank stability at two locations in Pleasanton. With limited additional flow capacity, deep-rooting native grasses (sod) were installed at Line G-1-1 in lieu of larger shrubs or trees to preserve capacity. A short distance away native trees and shrubs were planted at Line B-5 (Pleasanton Canal) for bank stabilization. The required monitoring work was completed and found to be satisfactory at the Line G-1-1 site in winter 2014 and the

Pleasanton Canal site in spring 2015. Both sites continue to be maintained by the Living Arroyos crew who hand weed both sites and limb up trees along Pleasanton Canal (Line B-5). In light of the heavy winter rains in 2017, staff will see how well these two bank treatments held up in their first test.



Upper Altamont Creek Demonstration Projects

Zone 7 partnered with the Alameda County RCD and NRCS on two sites that were identified as potentially benefiting from water quality improvements, making them eligible for funding from the EPA's San Francisco Bay Water Quality Improvement Fund:

1. The **Altamont Creek Confluence Planting Project** (Confluence Project) installed cover vegetation as a Best Management Practice (BMP) to improve water quality along approximately 570 linear feet of stream within two project areas located upstream and downstream of Bluebell Drive, respectively. Several different locally-collected and locally-adapted species were grown at the Watershed Nursery and planted by volunteers on a Saturday Planting Day Event hosted by Zone 7.

2. The **Upper Altamont Creek Willow Demonstration Project** (Willow Project) installed live willow material as a Best Management Practice (BMP) to improve water quality and protect eroding banks along an incised reach of creek upstream of Vasco Road. BMPs were implemented at ten sites along this stretch of creek. Willow bank stabilization techniques included varying combinations of stakes, willow fascines, modified willow walls, and use of long-rooted native grasses to see the pros and cons of the different configurations.



Both projects were constructed in 2015 and RCD/NRCS staff will monitor the level of success through 2017. Initial monitoring of the Confluence Project shows that certain species performed better, and that survival at the upstream site was higher than the downstream site possibly due to heavier recreational traffic at the downstream site. Initial monitoring at the Willow Project shows that willow survival was good, but this recent winter is the first real test of these willow applications. RCD and NRCS staff will do one more round of monitoring in spring 2017 before presenting their findings and recommendations to Zone 7.

Lake del Valle Property (a.k.a. Patterson Ranch) Update

Three Environmental Quality Incentives Program (EQIP) projects were in the planning and design phase for 2016 including:

1. **Hillside Erosion Project** – Construct reinforced turf-lined waterway to provide safe disposal of runoff water from the road above the house to correct existing erosion and minimize future issues. This project was completed in 2016.



- 2. Fish and Wildlife Structure** – Install three turtle rafts in three ponds for western pond turtle basking habitat. This project was completed in 2016.



- 3. Triangle Property** – Improve infrastructure on parcel to provide better water supply for livestock including a new storage tank (5,000 gallons) and approximately 300 ft. of pipeline to connect an existing well and trough on site. This project is still in progress.

RCD/NRCS staff also installed wildlife cameras at one of the ponds to document what other species utilize these ponds, better understand the importance of multi-beneficial pond projects, and how best to manage them.



Stonybrook Creek Fish Passage Improvement Project

The Stonybrook Creek Crossings and Fish Passage Improvement Project made huge progress in 2016, with anticipated completion in early 2017. The project was led by the Alameda County Resource Conservation District, in partnership with the Alameda County Public Works Agency, Natural Resources Conservation Service, Zone 7 Water Agency and the EPA. The project removed and modified two known fish migration barriers in Stonybrook Creek, which runs alongside Palomares Road, and opened up quality trout spawning and rearing habitat in Stonybrook Canyon to migrating fish.



The project addressed the aging masonry culvert at MP 8.60 along Palomares Road in Alameda County and improved fish passage conditions within Stonybrook Creek. The project included the retrofit of an existing County-owned culvert (at milepost 8.75) and a full bridge replacement (at milepost 8.60) to address public safety and improve access for native fish, including landlocked rainbow trout and anadromous steelhead. At MP 8.75 the stream was re-graded to remove a boulder back up at the inlet of the culvert and installing 22 concrete baffles to make fish passage possible through the culvert. At MP 8.60 the project included a full replacement of the bridge, removal of the grouted masonry channel to restore the creek bed to a natural channel bottom. At both locations the stream was re-graded to restore the natural channel grade and morphology

by reshaping the channel bed to form boulder step pool and cascade features.

The final Zone 7 contribution for the project was \$113,000.

Bay Area Flood Protection Agencies Association (BAFPAA) Accomplishments

Zone 7 has been a member of the Bay Area Flood Protection Agencies Association (BAFPAA) since its inception. In 2015, BAFPA, in a coordinated effort with its consultant, Morrison and Associates, applied for an Integrated Regional Water Management (IRWM) Proposition 84 grant. Of the more than \$43 million total awarded by the California Department of Water Resources, \$19 million was awarded to BAFPA for the Advanced Quantitative Precipitation Information (AQPI) project.

The purpose of the AQPI project is to implement a network of improved radar units and observation stations to better predict the amounts and precise location of precipitation, especially extreme precipitation events from Pacific Ocean atmospheric rivers.

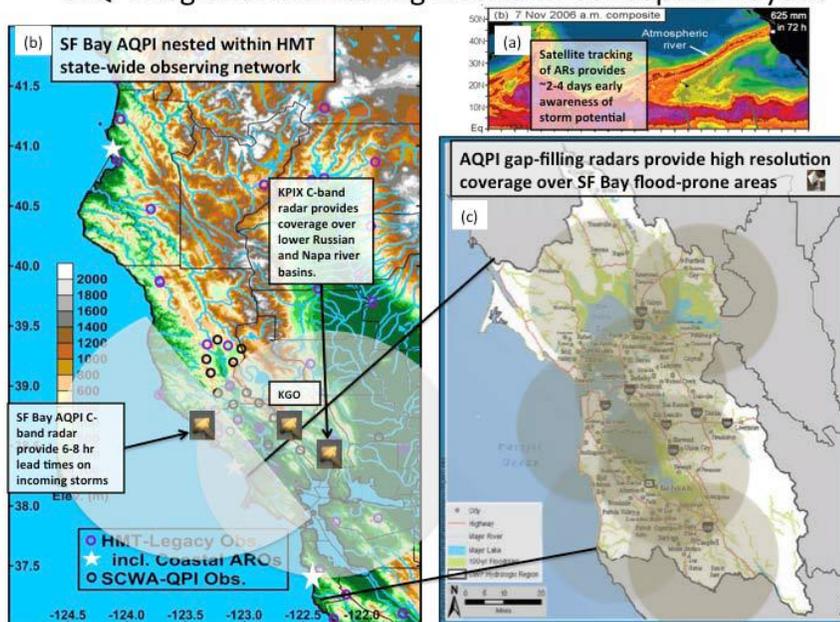
Precipitation observation stations and a network of four to six strategically-placed, gap-filling, lower-elevation aiming X-band radar units to supplement existing higher-level aiming S-band radar units in the greater San Francisco Bay Area to give two hours or more of lead time of impending precipitation with estimated amounts and more precise locations.

Some of the specific project benefits for the IRWM functional areas include:

- Water supply – Improved reservoir management in anticipation of storms to protect dams and preserve water supplies.
- Flood protection – Better anticipate flooding locations for improve response.
- Watershed management – Improved response to flooding of wetlands and other ecosystems.

- Wastewater – Improved management of stormwater flows into combined sewer/wastewater systems.

AQPI Regional Monitoring Network: Conceptual Layout



In 2016, the AQPI project continued to be under development. Additional understandings on the historical background and the project benefits have been further defined. It is estimated that over the last few decades more than 50 percent of major flooding in the Bay Area, and closer to 70 percent in the North Bay, has come from atmospheric rivers that often are not detected with conventional radar units that were originally designed for thunderstorms in the Midwest. The new radar system will give flood control managers, emergency responders, and reservoir operators more precise information on just where, when and what the intensity of expected rainfall will be. Specifically, this system will provide improved monitoring, prediction and decision support for nine counties in the areas of flood management, emergency response, water quality, ecosystem services, water supply, and transportation management. Similar systems are being used in Tokyo, the Netherlands, and Dallas-Fort Worth.

Public Outreach

In 2016, Zone 7 staff documented, responded to, and investigated 122 complaints and inquiries related to flood control facilities and activities. Typical inquiries included trail user complaints over graffiti and illegal dumping (e.g., shopping carts, tires, sofas, mattresses, etc.), complaints about homeless encampments, downed tree branches and untrimmed vegetation on Zone 7's property, and neighbors' complaints of dust and vibration generated by moving equipment. By working calmly and reasonably with residents, staff was able to resolve many of their concerns while educating them about flood protection activities.

4. CAPITAL IMPROVEMENT PROGRAM

While Zone 7 owns and maintains approximately 37 miles of improved channels throughout the Livermore-Amador Valley, there are approximately 80 miles of unimproved channels that flow through the Alameda Creek Watershed. The function of the Capital Improvement Program is to address the regional flood protection needs and continue to improve the overall flood protection infrastructure for multiple public benefits. This involves the administration, planning and implementation of the SMMP Program, its projects, as well as the administration and collection of development impact fees for development's share of the SMMP. Staff provides hydrologic and hydraulic modeling support to assist in the reassessment and prioritization of SMMP projects, as well as to evaluate future development impacts. To assist in planning efforts, staff strive to improve Zone 7's data collection from stream and rainfall gauge monitoring systems, where they can be used for modeling purposes and an early-warning flood system can be implemented. When the opportunity arises, Zone 7 will often try to collaborate with other public entities and developers, to help implement core objectives of the SMMP, such as maintaining natural floodplains or restoring channel reaches with biotechnical solutions. In addition, Staff provides review of development referrals, allowing staff to identify potential impacts to Zone 7's flood protection facilities.

Stream Management Master Plan

In August 2006, the Zone 7 Board adopted a new flood control master plan, the SMMP. The SMMP included 45 individual multi-benefit projects throughout the Livermore-Amador Valley while focusing mainly on regional storage of flood and storm waters within the Chain of Lakes to limit peak flows downstream. The SMMP also focuses on achieving project goals by incorporating multi-benefit and environmentally-friendly objectives, while forming partnerships with related agencies.

Staff is in the process of updating the SMMP using updated modeling and proposing projects to address flood-prone areas, while still implementing key ideas of the original SMMP. With new hydrologic and hydraulic modeling, Staff is able to better understand where potential flooding problems are in the Livermore Valley; this understanding allows us to update our SMMP projects to better reflect the needs of the area. This will also facilitate prioritizing project for the next CIP and facilitate a review of Development Impact Fees (DIF). With new development starting to pick up once again, more opportunities are becoming available to allow Zone 7 to collaborate with developers prior to project implementation and to incorporate key SMMP ideas into these development projects. For 2016, staff continued discussions on implementing a couple of SMMP projects, described further below.

The DIF continues to be collected to mitigate for the creation of new impervious surfaces by new developments. While the SMMP is in the process of being updated, the DIF remains unchanged until the update is complete. Additional funding sources likely will be necessary to implement the SMMP in whole. Long-term financial planning for the SMMP projects is ongoing and will be addressed as part of one of the phases of the SMMP updates.

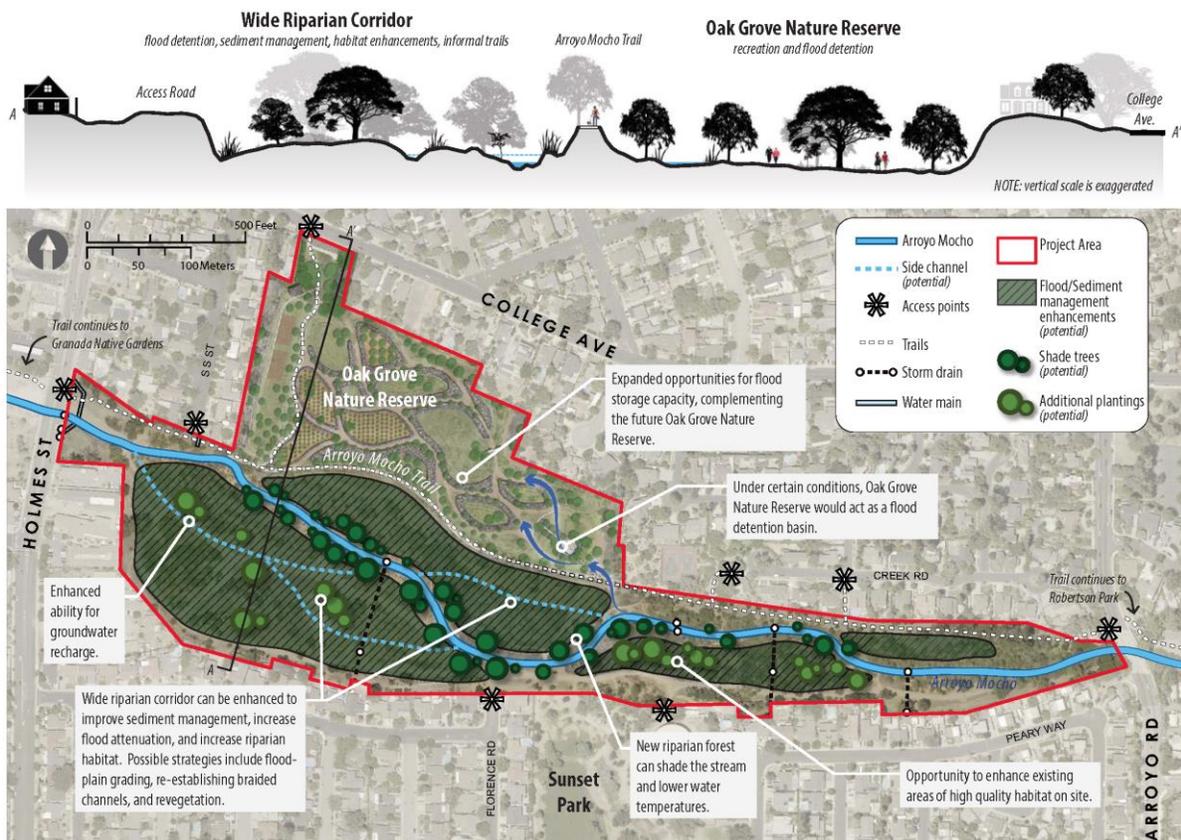
Arroyo Mocho Floodplain and Riparian Forest Restoration Project (Medeiros Parkway)

This project is identified in Zone 7's SMMP and Capital Improvement Plan to improve regional flood protection. The project is located along a reach of the Arroyo Mocho surrounded by largely undeveloped parcels commonly known as Medeiros Parkway, between Holmes Street and L Street/Arroyo Road in Livermore.

The purpose of the project is to create a natural floodplain along the Arroyo Mocho, which will provide stormwater detention while promoting natural habitat and allowing compatible recreational use by enhancing existing trails. The project may also help mitigate sedimentation issues along Holmes Street while promoting a more natural hydrograph that mimics historical conditions. As an additional benefit, the natural floodplain may increase groundwater recharge capacity which will improve groundwater supply and quality sustainability for the Livermore Valley Groundwater Basin.

In 2016, Zone 7 completed planning level studies of Medeiros Parkway biological resources, geomorphology, hydrology, and hydraulics to inform the Project design and permitting efforts. Zone 7 began engaging stakeholders in our project plans and additional outreach will continue in

CONCEPTUAL SITE PLAN



2017. The Project was selected for a grant from the California Natural Resources Agency River Parkways Program. In 2015, Zone 7 issued a Request for Proposals and selected a consultant team to assist with overall planning, permitting, and design. That work is underway now. Above is a high-level conceptual site plan developed by Zone 7 for the purposes of a which was included in the grant application.

Chabot Canal Regional Stormwater Detention (SMMP Project R.8-2)

In 2016, Zone 7 staff continued to work with the City of Dublin, the U.S. Army, and the developers CalAtlantic and Brookfield Homes, to incorporate regional flood protection elements of the SMMP into the Dublin Crossings (now known as the Boulevard Project) development. The purpose of these elements is to provide regional flood detention storage in the Camp Parks area to reduce the risk of flooding and potential sediment loading while promoting a more natural creek through the proposed development that mimics historical conditions. The project will reduce flooding downstream of the development and also create additional capacity in areas experiencing bank slides, allowing Zone 7 to plant riparian plants that will help stabilize the banks in an environmentally sensitive manner. The developer worked with staff in 2016 to finalize the detention basin plans, incorporating Regional Water Quality Control Board and CA Fish and Wildlife input. Staff and the US Army drafted initial easement language for the detention basin, and are still in the process of finalizing language.

Regional storage reduces flooding while creating capacity for riparian habitat to help reduce slope failures.



Hydrologic and Hydraulic Models

In 2016, Staff collaborated with Alameda County Public Works Agency (ACPWA) to revise the initial hydrologic modeling work for the SMMP Update. ACPWA had completed a draft update of their 2003 Hydrology and Hydraulic Manual and offered to share the updated information which had been calibrated to local data. Staff determined that the hydrologic model would benefit from utilizing ACPWA's updated methodology and parameters. As a result, Zone 7 brought Environmental Science Associates (ESA) on board to assist with the revision of the hydrologic model using ACPWA's methodology and parameters and to combine the previous hydraulic models completed using a combination of HEC-RAS and FLO-2D, into the latest HEC-RAS 2-dimensional modeling application. The revised modeling work resulted in an updated floodplain map and identification of seven main program areas in which to concentrate flood protection projects. Staff is working on completing the SMMP Update Report in 2017, which will summarize the modeling, updated/priority projects, and estimated project costs.

Development Referral Review Program

The Development Referral Program is an interagency program designed to keep public agencies abreast of public projects and private developments that may have an impact on an agency's facilities or operations. Staff reviews and evaluates other public agencies' and private parties' development plans and inquiries, environmental documents (CEQA), master plans, improvement plans, and engineering studies for impacts on Zone 7 flood control facilities and/or proposed projects identified in the SMMP. In 2016, Zone 7 staff conducted 17 reviews. Typical reviews included evaluating the Boulevard Project development impact on Chabot Canal in Dublin and a sewer siphon project which would encroach on Zone 7's existing maintenance access road along the Arroyo de la Laguna in Pleasanton.

Flood-Flow Monitoring and Mitigation

Flood-flow monitoring and mitigation discusses actions being taken by Zone 7 to actively monitor stream flows in the channels both historically and in real time. This information is used by staff to estimate the amount of flow coming through the watershed to help direct Zone 7's actions to address problems and maintain flood protection facilities.

Additionally, facility inspections take place before and after large storms. The pre-inspection is to confirm there are no obstructions that could compromise the facility's capacity to move water while the post-inspection is to check for obstructions and damages caused by rainfall events. Inspections are photo documented to provide chronological history of damage.

Early Flood Warning System Development

Development of an Early Warning System was started in 2014, and continues at this time. The objective is to help staff identify any potential flooding concerns before they occur and to provide notice to the public to facilitate their own responses. This system requires a large network of streamflow gages, providing real-time streamflow data in the Livermore Valley, to be effective.

In 2016, staff updated the video camera at the Sunol Glen Elementary School (School) site along Arroyo de la Laguna, and added two new staff gages to be monitored via video camera. The decision to use video instead of a stream gauge recorder system at Sunol Glen is due to the lack of a good location to install the proper type of stream gauge recording system used in other parts of Zone 7's system. The old Sony video camera installed in early 2016 did not have the night-vision capabilities originally anticipated. Staff enlisted the help of a professional camera surveillance company to recommend a new video camera system that could provide monitoring of the gauges, 24/7. Acme Security was contacted and provided support for a new system.



Storm Central, a web based communication system for the stream gauges, has played a significant part of our monitoring capabilities and allowing real-time public access to their data. It allows anyone to access 13 stream gauge locations and review data in real time, which is essential for tracking flows or stream gauge heights, which can help indicate when emergency measures might be necessary. At present, additional work needs to go into identifying what typical peak levels are for each gauging location, as certain stations only provide gage height data, and not necessarily stream flow or elevation. Storm Central can be accessed from the following address: <https://stormcentral.waterlog.com/public/Zone7>

Other elements used for the Early Warning System are the forecast sites such as the National Weather Service California Nevada River Forecast Center and Advanced Hydrologic Prediction Service; in addition, regional precipitation amounts are monitored from local precipitation gauging stations. Lastly, USGS stream gauge data is checked for overall correlation of the data to field observations.

5. MAINTENANCE PROGRAM

Zone 7 owns and maintains approximately 37 miles of improved channels throughout the Livermore-Amador Valley. Vigilant upkeep of these channels and the adjacent access roads and facilities is among the Flood Protection Program's highest priorities. The Maintenance Program involves routine, major, and emergency maintenance of and repairs to the Flood Protection Program facilities. Such activities are directed toward preventing minor problems from becoming major flooding problems, minimizing unnecessary damage to private property through proactive planning, preserving and maximizing flood carrying capacity of existing creeks and channels, and post-storm rehabilitation of flood protection facilities damaged in storms.

As part of the maintenance program, staff is dedicated to implementing environmentally-friendly repair solutions that juxtapose the need for proper flood protection with progressive engineering practices. Design considerations, therefore, incorporate green techniques and bioengineering as much as possible in order to minimize mitigation requirements and the impact on the sensitive environment existing within channel boundaries. Typical bioengineering solutions include brush walls, willow stakes, etc.

In addition to maintenance of Zone 7 facilities, staff maintains a general awareness of flood-prone and damaged areas throughout the Zone 7 region, including flood channels owned by Dublin, Pleasanton, and Livermore, as well as the Arroyo de la Laguna south of Pleasanton. Staff continues to initiate and maintain communication with the relevant entities regarding observed shortcomings in these areas.

For flood control channels within the scope of Zone 7 jurisdiction, staff actively plans each summer for a list of projects encompassing several priority levels. To implement the various maintenance projects, Zone 7 staff plan and execute all aspects of the program, including project management, planning, scheduling, CEQA compliance, permit acquisition, surveying, design, cost estimates, construction management and inspection.

Annual Maintenance/Repairs

In 2016, Zone 7 staff identified, planned, designed and managed the \$985,000 Annual Maintenance and Emergency Contract with Fanfa, Inc.

- Three emergency bank repairs totaling 320 linear feet
- 3500 feet of access road repair
- Retaining wall construction to support a slope above a multi-use trail in Dublin
- 2500 linear feet of concrete lining repairs
- Slope stabilization to repair 120 feet of cracked bank
- Re-installation of two drain inlet structures and culverts
- 280 feet of new V-ditch drainage
- 1000 feet of erosion fabric installation

- 6 soil bioengineering brush walls

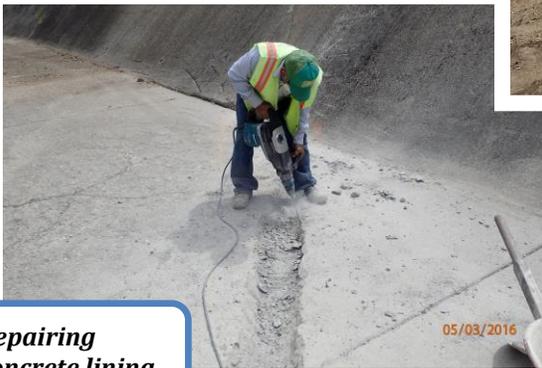
The following photos show a few of the key projects implemented under this year's contract:



Installing erosion protection fabric



Re-installing storm water drain inlet structure and pipe



Repairing concrete lining



Repairing channel bank

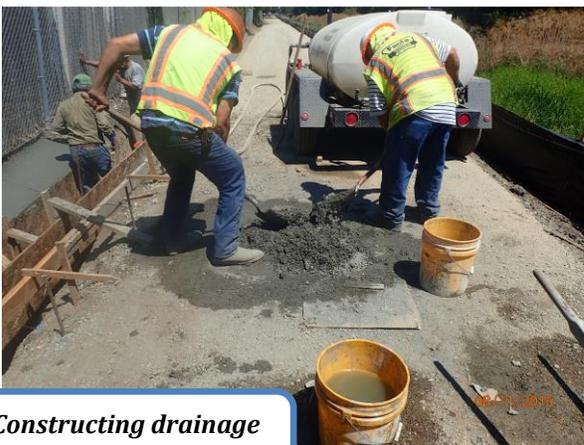


Repairing channel bank

Stabilizing cracked channel bank slope



Repairing access road



Constructing drainage v-ditch



Constructing retaining wall structure

Sunol Glen School and Community Support

A major activity in 2016 continued from last year had been Zone 7's response to flood concerns that were raised by Sunol Glen Elementary School in Sunol. The school is located in the 100-year flood zone and had previously experienced flooding during the 1997/1998 El Niño season. Due to this history of flood susceptibility, school officials and parents of children attending the school became concerned for the safety of the children and school facilities during the season.

School officials observed that the State Highway 84 Bridge over Arroyo de la Laguna presents a constriction to high flows due to large gravel deposits beneath the bridge and snagged trees and debris. Zone 7 continued in 2016 to explore possibilities to remedy the situation. Despite having no drainage easements in the area, the role of Zone 7 as regional flood manager in the Tri-Valley area made it possible for staff to assist the school in seeking solutions to reduce flood risk.

Zone 7 continues to monitor the area and has worked with the school to install a webcam and rain gage on the site in order to better monitor the immediate flood risk and flow regime at the northeast corner of the school property. In parallel, Zone 7 continues to collaborate with SFPUC and Caltrans to explore and identify both near-term and longer-term alternatives to address the issues at the site.



Vegetation Management Program

In 2016, Zone 7 staff administered a Vegetation Management Program, which cleared obstructive vegetation such as weeds and tall grasses that could impair the flow of water in channels and vehicle access along channel access roads. The program also aimed at reducing the fire fuel loads per the requirements of the local Fire Marshals. In addition, permitted herbicides were applied by qualified contractors to inhibit the growth of obstructive vegetation and control weed growth.

With the exception of clearing vegetation for annual maintenance/repair projects by staff, in 2016, the majority of vegetation clearing was handled through various maintenance contractors

under annual service contracts. Zone 7 utilized the following contract labor providers to assist with such maintenance activities under Zone 7's direction: California Conservation Corps, East Bay Conservation Corps, Pacheco Brothers Gardening, Inc., and Bruce Balala Mowing.

LARPD Contract - \$250,000.00

In 2016, Zone 7 continued with the use of Livermore Area Recreation Park District to provide contract labor for vegetation management activities within Zone 7's facilities. Such activities included spraying of maintenance roadways and control of broad leaf plants and aquatic vegetation within the facilities. Expenditure on this contract for 2016 was \$180,000.



Soil Bio-Engineering for Bank and Channel Stability - \$50,000

In 2016, Zone 7 continued using soil bio-engineering to temporarily repair and stabilize channel embankments within Zone 7's facilities. Soil bio-engineering is the use of plant material, like willow stakes, to stabilize the soil. As this plant material grows, the roots form a network around the eroded section of the toe and stabilize the soil, thereby preventing further erosion. This soil-bioengineering technique is more habitat friendly than "hard engineering" and has the potential for growth into permanent living structures. Some of the advantages of this method are: less expensive than rock rip rap, create habitat, encourage sediment accumulation, redirect scouring flood flows, protect localized erosion area, stabilize bank soil, effective for simple/small sites and good for increasing vegetative cover and shading canopy along streams. An update on the performance of these techniques during the storms of 2017 will be provided in the next report. Expenditure on this contract for 2016 was \$50,000.



Bruce Balala Mowing Contract - \$120,000.00



In 2016, Zone 7 staff administered and managed an annual contract with Bruce Balala Mowing to provide district-wide mowing services for all 37 miles of Zone 7 channels. The mowing consisted of cutting tall weeds and grasses along channel embankments to meet the local Fire Marshal's requirements for establishing a fire break. Expenditure on this contract for 2016 was \$120,000.

**California Conservation Corps (CCC) and East Bay Conservation Corps (EBCC)
Contracts - \$50,000 each**



In 2016, annual contracts with the CCC and EBCC involved labor crew usage for projects requiring manual labor such as the facility winterization program, trash/debris cleanup and trimming of trees and vegetation. Total expenditure on both contracts for 2016 was \$100,000.

Pacheco Brothers Gardening, Inc., Landscape Contract - \$50,000

Zone 7 uses this annual contract for tree maintenance, such as tree trimming to ensure adequate vehicle clearance, removal of broken tree limbs and replanting of trees where applicable. Expenditure on this contract for 2016 was \$50,000.



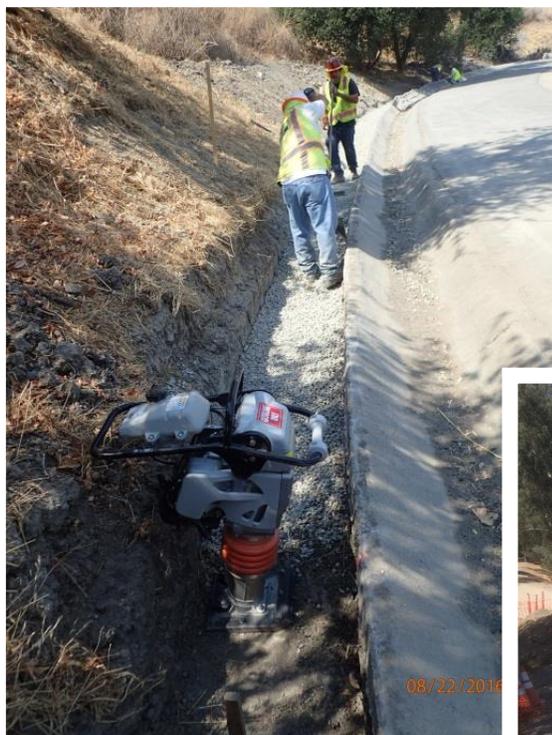
Inspection Program

Throughout the year, Zone 7 staff performed inspections to ensure that Zone 7's channel facilities would be ready for the next big storm event. The inspection program consisted of multiple elements including routine facilities inspection, project-specific inspection, storm watch inspection, and on-call emergency response.

Routine Facilities Inspection

Zone 7 staff performed routine inspections by thoroughly inspecting Zone 7 facilities and former repair projects at a minimum of once per month and documenting any problems. Problematic areas were tracked on a spreadsheet with relevant information, such as description, priority, location, and dates. These spreadsheets are used to prioritize future repairs and improvements.

Project-Specific Inspection



Zone 7 staff performed inspections for both Maintenance and Capital Project-related projects. Staff is generally responsible for inspecting any project that requires an encroachment permit from Zone 7 as well. Staff inspectors act as the eyes and ears for the project engineer and report their findings on a daily basis. Only after communicating with the project engineer does the inspector inform a contractor of the directive.



Storm Watch Inspection

During major storm events, Zone 7 staff immediately shift into a pre-emergency response mode, working to minimize the loss of life and property. Flood-fighting activities, such as responding to emergency phone calls, storm monitoring, and field patrols, were top priorities during the storm season. Zone 7 staff documented all areas that are more prone to problems during storms.

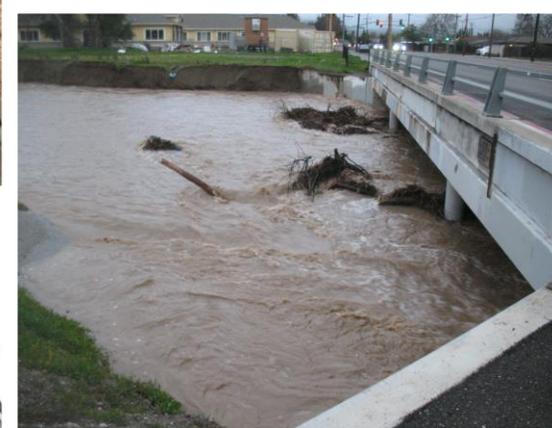


On-Call Emergency Response

For emergency situations, such as flooding or major damage to facilities and other property-related issues (e.g., hazardous materials spilled into Zone 7's flood protection facilities), Zone 7 staff are on-call and ready to respond as necessary.

In addition, Zone 7 issues annual contracts to support these efforts. In 2016, there were no flooding emergencies; however, Zone 7 staff responded to one hazardous material spill incident where raw sewage overflowed a City of Pleasanton vault located within a Zone 7 maintenance roadway and spilled into the Zone

7-owned flood facilities, which required Zone 7's response and support.



Horizontal Drilling Bank Stabilization Program

This program involves the installation of a number of horizontal drains to minimize bank instability due to the high groundwater table or otherwise trapped water along the west bank reach of Alamo Canal. These horizontal drains are perforated PVC pipes that are strategically installed at locations with seepage evident in the bank. Perforations are designed to capture the surrounding water and empty it into the channel, releasing hydrostatic pressure and thereby avoiding bank failures. This program also involves a monitoring program to evaluate the effectiveness of the drains and periodic surveying of the banks.

Miscellaneous Facility Maintenance Activities

Facility Fencing Repairs

Zone 7 protects its facilities from trespassers through the use of fencing along property lines. When fencing is damaged, it becomes a liability to Zone 7 if the fencing is not repaired. An annual contract with a fencing contractor is used to repair fences that have been damaged and to install new fences and gates as needed to maintain the required level of safety and security in Zone 7-owned facilities.



Hydroseeding

After channel embankment repairs, all denuded areas are hydroseeded by Zone 7 contractors. Hydroseeding of repaired embankments encourages the re-establishment of appropriate vegetative cover. In 2016, an annual hydroseeding contract was used to meet this need.

Homeless Encampments

Homeless encampments along flood protection facilities are another issue Zone 7 deals with under our routine maintenance program. In 2016, staff, with the assistance of the respective city Police Departments, removed and cleaned up various sites in Dublin, Pleasanton and Livermore. Camps had to be promptly removed before they became a safety and sanitation liability to the agency and before the trash/debris left behind inhibited flow within the creeks.



Zone 7 also adopted a new safety procedure to provide guidelines for employees dealing directly with occupants of these encampments.



Storm Drain Pipe Inspection

Some of Zone 7's storm drain pipes are aged, corroded and leaking, thereby causing channel embankment failure. Inspection of the storm drain pipes is needed and routinely performed as part of facility inspections to identify and repair damaged pipes before any embankment failure occurs.



Proactive replacement of corroded storm drain piping has prevented embankment failure in many of Zone 7's flood control facilities.



Inspections continued in 2016.

Rodent Control

When considering the maintenance of a flood protection facility, the inevitable subject of rodent control always arises. Rodents, specifically ground squirrels, cause damage to the flood control banks by burrowing through the ground, causing water intrusion and



destabilization of the flood control banks. Zone 7 uses the services of a pest control contractor to control and trap foxes/squirrels and other pests within the 37 miles of channels owned by Zone 7.



Graffiti Abatement

In 2016, Zone 7 staff continued efforts to abate graffiti found within flood control facilities.



Mitigation Monitoring and Reporting Program

A typical Zone 7 Flood Control capital improvement project usually does not end after the construction is completed. Typically, a project requires ongoing monitoring and mitigation of project impacts. As a requirement for project approval, Zone 7 must provide a mitigation and monitoring report to various regulatory agencies, such as the California Department of Fish and Wildlife, California Regional Water Quality Control Board, U.S. Army Corps of Engineers and U.S. Fish and Wildlife Service, for a period of five to ten years after project completion to show that the mitigation for the improvements are performing as intended.

Current mitigation and monitoring efforts include:

1) Arroyo Mocho Stanley Reach Riparian Restoration and Channel Enhancement Project, (Phase 1).

- Zone 7 is required to monitor both the biological and physical conditions of the restored channel reach for a period of ten years (2015-2024) to insure that restoration work does not affect the channel integrity and to ensure the riparian plantings are successful. Zone 7 staff performs the mitigation monitoring and reporting.
- An as-built report was submitted to the regulatory agencies in early 2015, and in fall of 2016 staff initiated field work to support the second annual monitoring reports.

- Abnormally dry conditions in 2016 were less than ideal to support the new trees and grasses, and some remedial actions, such as the addition of new plants to replace those that did not survive, are likely to be required in order to meet the success criteria for regulatory compliance.



- The resources agencies have been supportive of allowing other agencies to meet their own project mitigation requirements by reimbursing Zone 7 for certain costs related to construction of this restoration project. To date, Zone 7 has been reimbursed for about four acres. Staff continues to receive inquiries on this front from local agencies and consultants seeking mitigation options.

2) 2016 Priority Streambank Repair Projects

- Four substantial bank repairs were completed in 2016; the nature of these projects required permit authorizations from all three major regulators—CDFW, RWQCB, and USACE. Permits all included required monitoring for five years.