

Zone 7 Water Agency

Flood Protection Program

2018 Annual Report

July 2019



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Glossary

Please note that glossary definitions below are offered to explain word usage in the context of this report and are not dictionary definitions.

ACPWA - Alameda County Public Works Agency

AQPI – Advanced Quantitative Precipitation Information

ASCE – American Society of Civil Engineers

BAFPAA – Bay Area Flood Protection Agencies Association

Bedload – Sediment transported along the bottom of the channel

Biotechnical – A biotechnical repair utilizes plant material and/or live plantings to stabilize the bank. Techniques can vary in the extent to which structural engineering principles are applied.

BMP – Best Management Practice

Brush mattress – a biotechnical bank stabilization method that uses live willows woven together into a mat to protect the bank by slowing water velocity and collecting sediment. Once established, the willow roots will also provide additional soil stabilization.

Cal OES – California Governor’s Office of Emergency Services

CCTV – Closed Circuit Television. In the context of this report, CCTV refers to a camera attached to a remote controlled vehicle used to monitor areas humans cannot access.

CDFW – California Department of Fish and Wildlife

CEQA – California Environmental Quality Act

CIP – Capital Improvement Program

DIF – Development Impact Fee

EBRPD – East Bay Regional Park District

EPA – Environmental Protection Agency

FEMA – Federal Emergency Management Agency

FMA – Floodplain Management Association

Geomorphic – Related to the form of the earth’s surface; i.e. the shape of the channel

GIS – Geographic Information System

Hydraulics and Hydrology – both have to do with the movement of water; hydraulics with the physics of water movement and hydrology with the water cycle and movement over the earth.

Hydroseed – Slurry of seed, mulch, and fertilizer

IRWM - Integrated Regional Water Management

JEPA – Joint Exercise of Powers Agreement

Log crib wall – a structural biotechnical bank stabilization technique in which logs are stacked in layers alternately parallel to and perpendicular to the bank. Log crib walls can also include willow plantings.

MOU – Memorandum of Understanding

NPDES – National Pollutant Discharge Elimination System

NRCS – National Resources Conservation Service

Outfall – Discharge point of stormwater from city streets into the flood control channel

RCD – Resources Conservation District

Reach – A section of a channel

RFQ – Request for Qualifications

RWQCB – Regional Water Quality Control Board

Sediment Load – soil particles carried by water

SFEI – San Francisco Estuary Institute

SFPUC – San Francisco Public Utilities Commission

SMP – Stream Maintenance Program

SMMP – Stream Management Master Plan

USACE – United States Army Corps of Engineers

USGS – United States Geological Survey

Willow Staking – planting live willow cuttings in the stream bank. The willows provide shade and habitat and the roots help to stabilize the bank.

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 Protection, 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 2018 are in the sections that follow.

- Administration and Planning

Administration includes staffing and training, legal, safety, property management, and regulation compliance. Planning includes studies, assessments, and data and program management.

- 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 2018

The following are some of the key accomplishments related to the Flood Protection Program by Zone 7 in 2018, all of which are described in more detail in the following chapters.

Administration & Planning:

- As a part of the Stream Maintenance Program (SMP), staff continued developing a streamlined permitting process with various regulatory agencies.
- Zone 7 hosted a Flood Preparedness Open House during the statewide Flood Preparedness week.
- Zone 7 purchased ESRI Enterprise Solution and staff is developing several projects to improve workflow, data management, and public communications.
- Zone 7 continued data collection for the sediment study.
- Staff is finalizing an amendment to the SMMP using updated modeling.
- Staff development activities in 2018 included attending the Alameda County Watershed Confluence and Floodplain Management Association conferences, and regularly attending webinars hosted by the American Society of Civil Engineers.

Watershed Protection & Collaboration:

- Zone 7 staff chaired two multi-agency working groups that support environmental studies and collaboration in the Alameda Creek watershed.
- The Living Arroyos Program planted over 700 riparian trees, installed over 500 willow stakes, removed nearly 30,000 gallons of non-native invasive weeds through hand weeding or using string trimmers, and conducted several stream clean-ups following high-flow events in the winter.
- Zone 7 is a member of the Bay Area Flood Protection Agencies Association (BAFPAA). In 2018, BAFPAA members formed Environmental Permitting Workgroup in order to

better collaborate and coordinate on common themes dealing with environmental permitting and mitigation requirements.

- The Flood Protection Program supported two grant applications with a combined total value of \$1.631 million.
- As a part of Zone 7's commitment to support recreational opportunities, collaborated with local municipalities and park districts in their planning and construction of trail projects utilizing Zone 7's Flood Protection channel maintenance access roads.
- Zone 7 collaborated with the local cities in four creek cleanup events.

Capital Projects:

- Zone 7 reduced the scope of work of Arroyo Mocho Medeiros Parkway (an SMMP project) and released a California Environmental Quality Act (CEQA) Initial Study/Mitigated Negative Declaraion for public review.

Repair & Maintenance Activities:

- Completed repairs of bank slides, access roads, a drainage inlet, concrete outfalls, and cracking in concrete channels.
- Zone 7 managed various maintenance activities, such as vegetation management, downed tree removal, hydroseeding, fence and gate repairs, and debris and trash removal, totaling approximately \$500,000.
- Zone 7 completed 26 repairs from the 2017 damages in Phase 1 of construction and a U.S. Army Corps of Engineers (USACE) contractor completed an additional 5 repairs in 2018.

2. ADMINISTRATION AND PLANNING

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. Planning tasks include those related to studies and assessments used to plan section activities and projects as well as data and program management. Flood 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 Protection staff routinely engages with the public to address resident complaints and inquiries.

The following is a description of the key administrative activities that occurred in 2018:

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 (CDFW). 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 Regional Water Quality Control Board (RWQCB) approvals. Larger projects, or those that could impact special species or habitats, require "individual" permits from CDFW and other agencies.

Joint Exercise of Powers Agreement for Aquatic Pesticides NPDES Permit

In compliance with the 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 Protection 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. Zone 7 is in compliance with the NPDES permit 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 2018, staff continued participation in the JEPA and to pay for the annual program costs. Zone 7 has been in good standing and in full compliance with the NPDES permit since its inception.

Stream Maintenance Program (SMP)

In 2018, Zone 7 continued work to secure programmatic permits from the three major permitting agencies: CDFW, RWQCB and USACE. Once in place, these permits will allow Zone 7 to more quickly and efficiently complete routine channel maintenance.

Work in 2018 included a major mapping update of stream ownership and facility inventory, initial development of mitigation opportunities, and preparation of introductory/setting text for the Program document. Staff also visited two Bay Area agencies that have long since held SMP permits to take advantage of their “lessons learned.”

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 (i.e. for one-day creek cleanup event), long-term access is usually provided, when warranted, through a license agreement (i.e. to open an access road as a public trail). 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 2018, Zone 7 staff developed a number of requests for proposals, annual purchase orders, and consultant contracts; administered various construction contracts; and responded to several requests from developers. Specifically, Zone 7 executed the following documents: 1) Living Arroyos Program task order authorization; 2) multiple contracts for vegetation management; 3) Development Impact Fee Study and Financing Strategy for the SMMP Amendment; 4) License agreement with Pleasanton Unified School District; 4) Agreement with the City of Livermore for mitigation at the Arroyo Mocho Stanley Reach pilot project; and 5) multiple contracts for engineering support and construction services for the emergency and permanent repairs resulting from the 2017 winter storms.

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 2018, Zone 7 issued 39 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 USACE Public Law 84-99 (PL 84-99) Federal Assistance Program. The program provides federal funding after Presidential-declared storm-related disasters to complete and rehabilitate damaged and eligible facilities participating in the program. For non-federally constructed flood control works like Zone 7's channels, USACE performs the design and project management and pays 80 percent of the construction cost, while the local sponsor (Zone 7) pays 20 percent of the construction costs. For more detail on repairs from this program see Section 6. STORM EVENTS OF 2017.

Flood Preparedness Open House

Zone 7 hosted a Flood Preparedness Open House on October 22, 2018, during the statewide Flood Preparedness Week. The Open House featured presentations by staff on Zone 7's historical ecology, the flood protection section's work, how individuals can prepare for floods, how Zone 7 prepares for winter storms, and recovery efforts after the winter 2017 disasters. Agencies such as the Department of Water Resources, the National Resources Conservation Service (NRCS), the Alameda County Sheriff's Office, and the Cities of Livermore and Pleasanton also attended to present emergency and flood preparedness information and Morrison and Associates hosted an educational kid's corner.

GIS Program

A geographic information system (GIS) is a useful tool for capturing, storing, analyzing, displaying, and sharing information with respect to its physical location. In 2018, Zone 7 staff made substantial efforts to improve how the agency utilizes GIS and how it can be streamlined for future use. To increase current capabilities and limit licensing restrictions, Zone 7 purchased the ESRI Enterprise Solution for small utilities and committed to migrating data to a centralized enterprise geodatabase with a dedicated GIS server. This update of software and database infrastructure will give staff the tools to increase ease of access to spatial data both internally and externally. With the Enterprise solution, data can be viewed, created, and modified through

custom applications available on smartphones or through a web browser. All changes are updated directly to the enterprise geodatabase, streamlining many field data collection processes.

With the expanded potential for GIS usage across the agency, Flood Protection staff are developing projects based upon four major lines of effort, which each contain numerous tasks at varying degrees of prototyping and implementation:

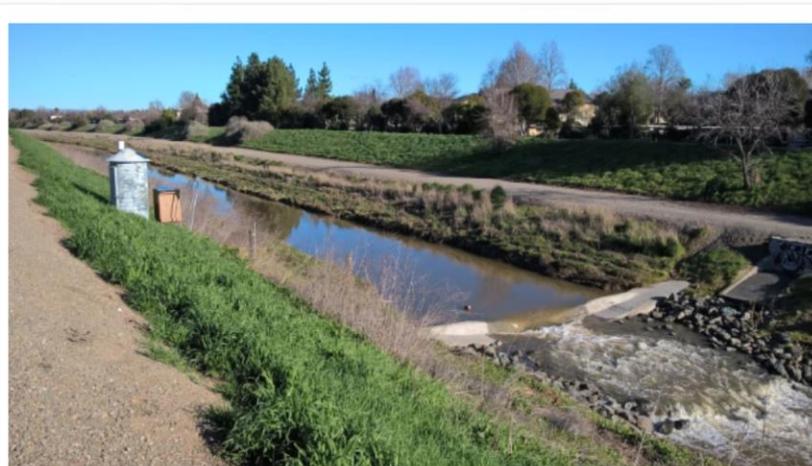
- GIS Mapping Products for Flood Protection Programs
- GIS Workflows for Routine Maintenance Program
- GIS Frameworks for Data Sharing and Inputs (Internal / External)
- GIS Components of Enterprise Asset Management

Lynx Technology has been hired to assist in the migration of existing data, establishment of data standards, and identification GIS projects and workflows. With the guidance from Lynx Technology, staff has begun reorganizing existing data to store in the new database infrastructure and for its eventual use in field applications or online map viewers.

In addition to developing future GIS framework for the agency, staff has continued to build upon the use of ArcGIS Online and the Collector application. ArcGIS online allows for the creation and sharing of maps through an internet browser, and the Collector app facilitates the collection, instant upload, and sharing of data in the field. Staff continues to streamline the 2017 ArcGIS Collector pilot program for inspection workflows and has expanded it to include daily contractor inspections and monthly channel inspections. Recognizing the potential for utilizing GIS applications for public outreach, staff has developed public facing online maps displaying the Flood Protection Maintenance Projects as well as a reporting application for community concerns that is expected to go live in 2019.

Sediment Study

Flood Protection staff had been monitoring and assessing sediment transport within Arroyo Mocho and Arroyo Las Positas between 2010 and 2016 in an effort to directly support improved modeling for design and compliance purposes and decisions about future operations and maintenance of flood protection facilities. For example, understanding where sediment deposition reduces channel capacity helps to make such determinations as an appropriate location for a sedimentation basin or from where to remove sediment. 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 was 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 (sediment transported along the channel bottom) data collection during more extreme events is needed to complete modeling and designs.

To fill the data gap for wet weather sampling, in 2017, staff contacted the U.S. Geological Survey (USGS) and inquired about having them provide sampling coverage, and an additional fourth gauge, Alamo Canal near Pleasanton (ACNP), was added to the study. At the end of each year through Water Year 2019, SFEI staff will generate an annual summary based on the sampling data collected by USGS. This summary is being appended to the overall data set that SFEI has been administering since the inception of the sedimentation study in 2010. The annual summary for WY 2017 was completed in 2018.

Stream Management Master Plan (SMMP)

In August 2006, the Zone 7 Board adopted a new flood protection 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 focuses on achieving project goals by incorporating multiple objectives, balancing flood protection with water supply, water quality, habitat, and recreation, while forming partnerships with related agencies to accomplish and fund those portions that are not a part of Zone 7's main mission.

Staff is working on an amendment to the SMMP using updated modeling and proposing projects to address regional flood-prone areas, while still implementing key ideas of the original SMMP. A draft of the SMMP Amendment was presented to stakeholders in May 2018 and received good feedback on project revisions. The SMMP Amendment was presented to the Board in August 2018 to bring new Board members current on the subject. At the meeting, the Board directed staff to provide further information about projects that had already been completed as part of the SMMP and the status of updating Zone 7 policies associated with flood protection.

A Development Impact Fee (DIF) Study was initiated but due to new direction from the Board, it was put on hold until the proposed projects in the SMMP Amendment are finalized. The DIF is paid by developers to mitigate for new impermeable surfaces, as these generate additional stormwater runoff, and Zone 7 uses these funds for capital improvements. While the SMMP is in the process of being updated, the current DIF remains unchanged. Additional funding sources will likely be necessary to implement the SMMP in its entirety. Long-term financial planning for the SMMP projects is ongoing and will be addressed in an SMMP update.

Flood-Flow Monitoring and Early Storm/Flood Warning System

Zone 7 actively monitors stream flows in the channels both historically and in real time. With this information, staff can estimate the amount of flow coming through the watershed to help direct actions to address problems and maintain flood protection facilities. The collection of streamflow data also helps the development of Zone 7's hydrologic and hydraulic models used in forecasting and planning for the flood control channels.

Zone 7 began developing an early storm/flood warning system in 2014 and continues to do so. The objective is to help staff identify any potential flooding concerns before they occur and to notify the public so they may better prepare during these storm events. This system requires a large network of streamflow gauges providing real-time streamflow data in the Livermore Valley to be effective, as well as hydraulic modeling to estimate flood stage levels. In 2018, Alameda County Public Works Agency (ACPWA) began discussions with Zone 7 to assist with the expansion of Zone 7's streamflow and rainfall monitoring system to aid in the continued development of an early storm/flood warning system. Staff prepared an agreement with ACPWA to allow ACPWA's consultant to assist with the installation, monitoring, and maintenance of six new gauging sites, as well as assume monitoring/maintenance duties of three existing sites. The agreement is under review by the County Counsel's offices, but Zone 7 anticipates it will be completed in 2019.

Storm Central, a web based communication system for the 13 stream gauges, has played a significant part of Zone 7's in-house monitoring capabilities, as tracking flows and stream gauge heights can help indicate when emergency measures might be necessary. It also allows real-time public access to the data. Staff is currently exploring system improvements and the programming capability of Storm Central. Staff can use Zone 7's hydraulic model to estimate flood stage levels. Zone 7 has also been reaching out to other agencies, such as Santa Clara Valley Water District, to learn how they share vital information beneficial to the public. Storm Central can be accessed from the following address: <https://stormcentral.waterlog.com/public/Zone7>

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

Employee Development and Staff Training

In 2018, Zone 7 staff had the opportunity to participate in a number of training and educational events to improve staff productivity and employee development.

Floodplain Management Association (FMA) 2018 Annual Conference (Reno, NV)

Three staff members attended the FMA conference. Seminars attended included watershed modeling, programmatic permitting, emergency flood funding, and future use of remote imagery for maintenance work.

Alameda County Watershed Confluence Conference (Oakland, CA)

Three staff members attended this conference in support of the Zone 7 presentation on flood event preparation at the conference. Additional topics of interest explored by staff within the attendee network included homeless debris management, public/non-profit partnerships, and green infrastructure.

American Society of Civil Engineers (ASCE) Live Webinars

Section participated in a total of three live webinars presented by ASCE instructors. This participation is part of an ongoing program to ensure that the section remains abreast of developing technologies, repair methods, and watershed management practices that are applicable to Zone 7 needs in the Flood Protection channel network. Topics covered included slope stability, stream structures, and construction Best Management Practices (BMPs).

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 2018, four meetings were held including a field trip to Alameda County Water District’s major fish passage projects in Alameda Creek.

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.

Meetings were sidelined in 2018 so the group could assist in planning a County-wide watershed conference. The County-wide “Watershed Confluence” conference was held in October and by all accounts was a huge success. Zone 7 supported the conference through a major sponsorship, assisting with event planning, and presenting one talk (also see Employee Development and Staff Training).

Arroyo de la Laguna Agency Collaborative

The Arroyo de la Laguna (ADLL) Agency Collaborative is comprised of agencies and municipalities with facilities that drain into ADLL and the greater Alameda Creek Watershed. Zone 7 serves as unofficial chair of the Collaborative, setting meetings and agendas. 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, SFPUC, Zone 7, the Cities of Dublin, Livermore, Pleasanton, and San Ramon, Alameda County Resources Conservation District (RCD), NRCS, and Tri Valley Conservancy.

The Collaborative discusses ADLL as a whole in order to better understand the scientific and engineering data that is available, identify goals that will benefit the stakeholders and local residents, and help foster inter-agency collaboration. In 2018, discussions focused on grant opportunities, new environmental regulations, and local project updates.

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 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 cities of Livermore and Pleasanton continued as project partners.

The Program includes an internship program where local college students or emerging professionals engage in hands-on learning about stream ecology and channel maintenance while also developing leadership and public-speaking skills through interactions with community members during volunteer workdays. The Program increases opportunities for local residents to learn about their watershed, 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 2018, the volunteers and Living Arroyos staff performed stream enhancement and maintenance activities along the Arroyo Mocho at the Stanley Reach Project and elsewhere in the Livermore-Amador Valley. This past year, activities included planting over 700 riparian trees, installing over 500 willow stakes, removing nearly 30,000 gallons 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 with over 350 unique volunteers donating their time at 19 volunteer events. An average of 25 volunteers attended each event but the number of volunteers ranged from as few as five up to 30+ volunteers with several repeat volunteers. Over 80% of volunteers came from within the Tri-Valley Area. 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.

Bay Area Flood Protection Agencies Association (BAFPAA) Accomplishments

Zone 7 has been a member of the BAFPAA since its inception and continues to actively participate. In addition to BAFPAA holding several joint meetings with the RWQCB and the CDFW to explore opportunities for better coordinated regulatory permitting processes, Zone 7 staff acts as the BAFPAA representative and current Committee Chair on the San Francisco Bay Area Implementation Committee for the Estuary Blueprint. The Implementation Committee is made up of various regulatory, business, community, and environmental groups throughout the Bay and Delta areas. The Implementation Committee works directly with the US EPA and the state to fund studies and projects that promote water quality and a healthy Bay/Delta.

In 2018, BAFPAA member staffs formed an Environmental Permitting Workgroup in order to better collaborate and coordinate on common themes dealing with environmental permitting and mitigation requirements. Major emphases of the workgroup include identifying common challenges in stream maintenance work around the Bay Area and seeking consistent and holistic mitigation guidance during negotiations on permitting conditions across the region. Zone 7, along with other agencies lacking a programmatic permitting framework for stream maintenance, is developing its own draft program with an eye towards lessons learned based on feedback from other BAFPAA member agencies that do have these permits.

Public Outreach

In 2018, Zone 7 staff documented, responded to, and investigated 131 complaints and inquiries related to Flood Protection facilities and activities. Typical inquiries included complaints about homeless encampments, trail user complaints about graffiti and illegal dumping (e.g., shopping carts, tires, sofas, mattresses, etc.), downed tree branches and untrimmed vegetation on Zone 7's property, and neighbors' complaints of dust and vibration generated by moving equipment. Staff opened up a dialogue with affected residents, carefully listening to their concerns, and as a result was able to resolve many of the complaints.

Grant Applications

In 2018, the Flood Protection Program supported two grant applications:

- 1) River Parkways Grant Program - \$500,000 for Arroyo Mocho Floodplain and Riparian Forest Restoration Project.
 - Status: award in re-negotiation due to change in project scope.
- 2) U.S. EPA Water Quality Improvement Fund (WQIF) - \$1.131 million for Preparing for the Storm: Riparian Restoration, Sediment Reuse, and Urban Greening to Enhance Stream and Watershed Resilience. Joint application with SFEI, H.T. Harvey, SF Bay Joint Venture, and several local partners.
 - In 2018, Zone 7 staff met with local partners for the two local implementation projects: bank repair at Castlewood Country Club, and floodplain grading at Concannon Vineyard.
 - SFEI completed fieldwork and analysis of Arroyo de la Laguna between Verona Bridge and Interstate 680 to support a geomorphic vision for the reach (river section)(report expected in March 2019).
 - Preliminary data acquisition and modeling was initiated for the Urban Greening task.
 - For public outreach, staff presented an overview of the grant efforts at the Alameda Creek Watershed Confluence Conference in October.

Trail-Use Collaboration and Support

Zone 7 recognizes the benefits of public access to our flood control channel maintenance roads, and therefore collaborates with the cities in our service area in their efforts to expand their trail networks. In 2018, Zone 7 staff continued this collaboration with the City of Pleasanton, City of Livermore, City of Dublin, East Bay Regional Park District (EBRPD), and local trail groups. Staff assisted the City of Livermore with developing plans for a future public trail on the south side of Stanley Reach. In addition, staff has been participating in the City of Pleasanton's Trails Master Plan development by attending public meetings and participating in discussions with their

landscape architecture team to provide Zone 7's input, as the preliminary plan includes development of trails along Zone 7 maintenance roads.

Alameda Countywide Clean Water Program



Zone 7 is a member of the Alameda Countywide Clean Water Program that fosters a culture of stewardship of the county's creeks, wetlands, and the Bay (<http://www.cleanwaterprogram.org>). In 2018, Zone 7 participated in the Alameda Countywide Clean Water Program by implementing best management practices

in its maintenance activities, responding to illegal dumping and discharge into the channel, 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 2018, Coastal Clean-Up Day, and Dublin Pride Week activities.



On April 21, 2018, in collaboration with volunteers and the City of Pleasanton, 25 tires, 240 cubic feet of trash, and some plastic and metal pipes were removed from Arroyo Mocho between Hopyard Road and Stoneridge Drive at the Earth Day Creek Cleanup event.

4. CAPITAL IMPROVEMENT PROGRAM

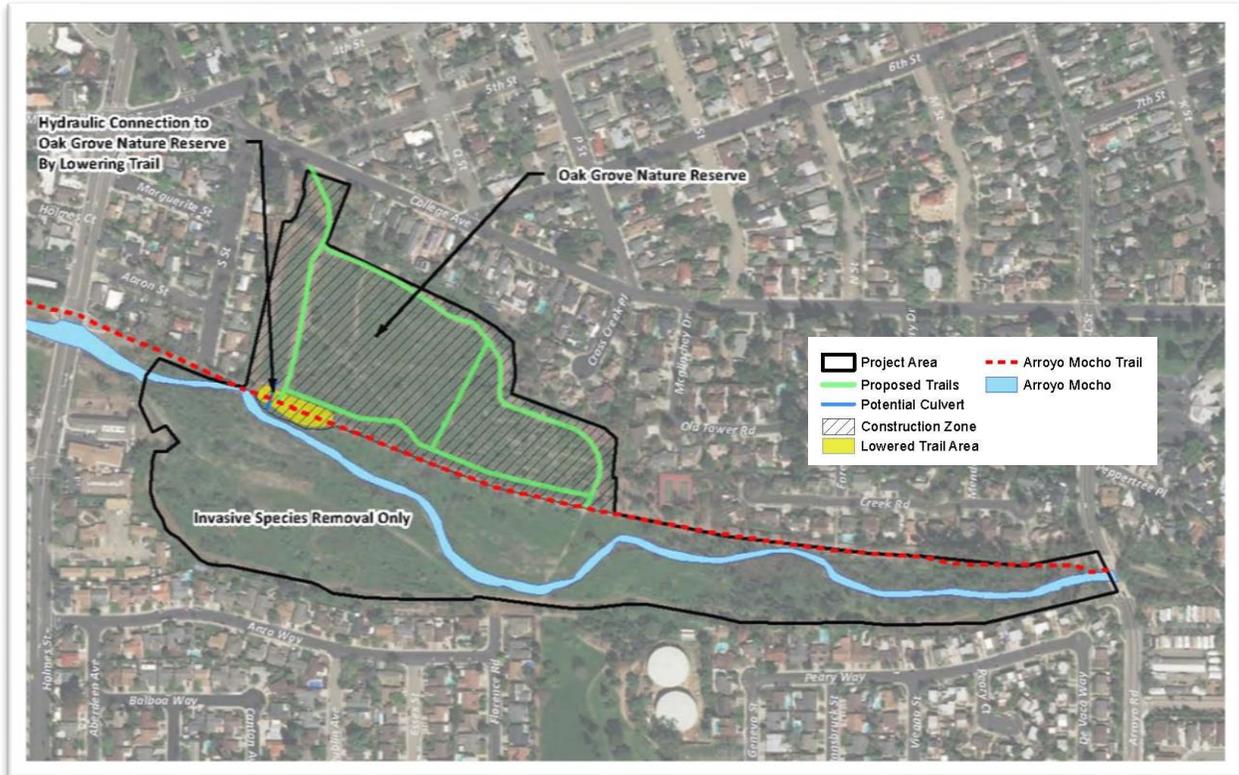
While Zone 7 owns and maintains approximately 37 miles of improved and unimproved channels throughout the Livermore-Amador Valley, there are approximately 80 additional miles of unimproved channels that flow through the Alameda Creek Watershed. The function of the Capital Improvement Program (CIP) is 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 and 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 strives to improve Zone 7's data collection from stream and rainfall gauge monitoring systems to use for modeling purposes and to implement an early-warning flood system. 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 that utilize plant materials rather than harder materials like concrete. In addition, staff reviews development referrals to identify potential impacts to Zone 7's flood protection facilities.

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

This project is identified in Zone 7's SMMP and CIP 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 preserving existing trails as well as allowing for future city development in Oak Grove Nature Reserve. Stormwater detention helps to prevent downstream flooding by temporarily holding excess water from the channel. The project may also help reduce 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 2018, Zone 7 progressed on our engineering design and released a CEQA Initial Study/Mitigated Negative Declaration for public review. Some neighbors and interested public expressed concern about the proposed excavation in the Oak Grove Nature Reserve, the former gravel quarry north of the bike trail. In response to the community's concern, Zone 7 conducted additional analysis and decided to defer elements of the project, including the excavation. The previously proposed in-channel work on Arroyo Mocho and excavation in Oak Grove Nature Reserve will be analyzed as a future project in the SMMP. Lowering of the bike trail to direct flood flows into the Oak Grove Nature Reserve will proceed.

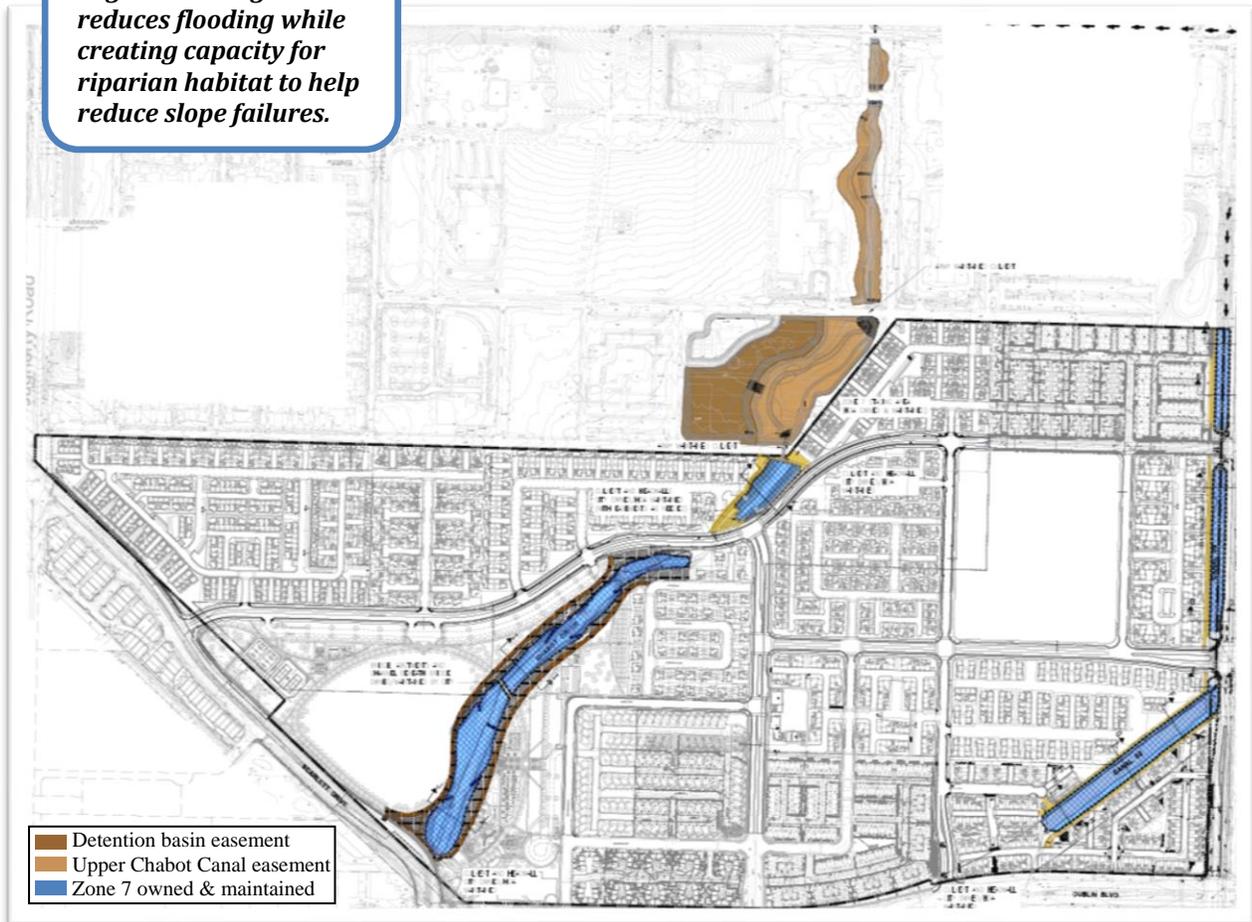


A CEQA Initial Study/Mitigated Negative Declaration for the reduced scope of work was released for public review in December 2018. A site plan is above. Finalization of the engineering design and project permitting will continue with construction planned for late summer 2019. The project was selected for a grant from the California Natural Resources Agency (CNRA) River Parkways Program in 2016. Zone 7 is working with CNRA to revise the grant for the reduced scope of work. Grant funds, if secured, will allow Zone 7 to remove invasive species throughout the reach and improve some of the existing dirt fire roads/trails in the Oak Grove Nature Reserve.

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

In July 2017, Dublin Crossing, LLC, entered into a Developer Reimbursement Agreement with Zone 7 to construct a regional flood storage detention basin facility on the U.S. Army's Camp

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



Parks Reserve Training Area, in correlation with their new development, the Boulevard. The purpose of the regional flood detention storage in the Camp Parks area is to reduce the risk of flooding and potential sediment loading while promoting a more natural creek flow through the proposed development that mimics historical conditions. The project will reduce flooding downstream of the development and also create additional capacity in downstream areas experiencing bank slides, allowing Zone 7 to plant riparian plants that will help stabilize the banks and create habitat. Zone 7 received two easements in 2018 from the Army in relation to the regional detention basin and Chabot Creek. The detention basin is substantially completed in 2018, with final completion scheduled for 2019.

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 Protection facilities and/or proposed projects identified in the SMMP. In 2018, Zone 7 staff conducted 11 reviews. Some of the reviews included evaluating the Garaventa Project in Livermore; a third review of Chik-fil-A restaurant in Livermore; Irby Ranch in Pleasanton; and Arroyo Lago in Pleasanton (this application was withdrawn at the beginning of 2019).

5. MAINTENANCE PROGRAM

Zone 7 owns and maintains approximately 37 miles of engineered, modified, and natural channels throughout the Livermore-Amador Valley. 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 damaged flood protection facilities.

As part of the maintenance program, staff is dedicated to implementing environmentally-friendly repair solutions that integrate the need for proper flood protection with progressive engineering practices. Design considerations, therefore, incorporate green and biotechnical techniques as much as possible in order to minimize mitigation requirements and the impact on sensitive environments existing within channel boundaries. Typical biotechnical solutions include brush mattresses (willows woven together), willow stakes (cuttings), and log crib walls (log structure), for example. Techniques involving planting have benefits for the environment in addition to the bank stabilization provided by the roots.

In addition to maintenance of Zone 7 facilities, staff sustains a general awareness of flood-prone and damaged areas throughout the Zone 7 region, including flood protection 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 areas of concern in these channels to maintain the overall safety of the region.

For flood protection channels within the scope of Zone 7's jurisdiction, staff actively plans a list of projects encompassing several priority levels for each summer. To implement the various maintenance projects, Zone 7 staff executes 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 2018, Zone 7 staff identified, planned, designed and managed the \$1,083,500 Annual Maintenance and Emergency Contract with a general engineering contractor.

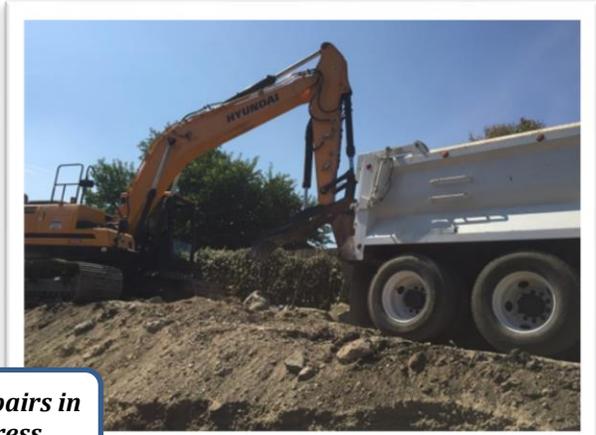
- Four bank repairs totaling 299 linear feet
- 11,657 feet of access road repair
- Repair of one drainage inlet
- 5,000 linear feet of Closed Circuit TV (CCTV) inspection
- 3,900 linear feet of concrete channel was closely inspected and patched as needed

- Seven concrete repairs to outfalls (storm drain discharge into channel)
- Protection and stabilization of issues to remain unrepaired through winter 2019 to prevent further damage

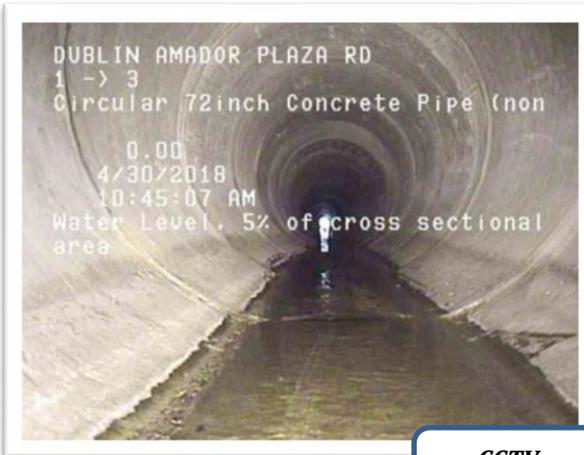
The following photos show a few of the key projects implemented under this year's contract:



Bank repairs in progress



Outfall repairs: after



CCTV inspections

Vegetation Management Program

In 2018, 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 reduces 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. Zone 7 is exploring alternatives to glyphosate-containing products.

With the exception of clearing vegetation for annual maintenance/repair projects by staff, in 2018, the majority of vegetation clearing was handled through various maintenance contractors under annual service contracts as detailed below.

- **Vegetation Spraying Contracts - \$160,000**

In 2018, Zone 7's vegetation spraying contract expired and a new contract was advertised for bidding. The new contract was awarded by the Board on August 15, 2018. The contract allows for the spraying of maintenance roadways and control of broad leaf plants and aquatic vegetation within the facilities. Expenditure on these contracts for 2018 was \$104,000.

- **Mowing Contract - \$120,000**

In 2018, Zone 7 staff administered and managed an annual contract to provide district-wide mowing services for the major improved channels and other facilities owned by Zone 7. 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 2018 was \$120,000.

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

In 2018, through annual contracts with the CCC and Civicorps, Zone 7 employed crews 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 2018 was \$100,000.

In addition to routine vegetation trimming and removal along fence-lines, major efforts included removal of vegetation on the concrete lined portions of the Arroyo Seco and G-5, homeless encampment cleanup along the Arroyo Las Positas, and vegetation trimming along the J-3/J-4 junction to facilitate access for larger trees to be removed.

- **Landscape Contract - \$50,000**

Zone 7 utilizes an 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. Additionally, the landscape contractor's services were used to help with homeless encampment cleanups. Expenditure on this contract for 2018 was \$50,000.

- **Tree Maintenance Services Contract - \$50,000**

Recognizing the need for specialized tree removal and the status of tree removal as a public work, Zone 7 staff completed a Request for Qualifications (RFQ) and selected a contractor for tree removal and maintenance for the remainder of the 2018/19 fiscal year. The contractor will conduct major tree treatments in Dublin and Pleasanton starting in spring 2019.

- **Environmental Vegetation Technical Services – \$330,000**

Zone 7 has a growing need for specialized environmental vegetation technical services. Native vegetation is often required as part of channel improvement projects; for example, to mitigate for trees removed due to construction activities, or as a stream enhancement element. In order to more efficiently obtain these specialized services, Zone 7 undertook an RFQ process and a contract was awarded by the Board on May 15, 2018.

In fall 2018, Zone 7 staff worked with the contractor to identify several sites for biotechnical bank stabilization treatment using a combination of coir logs, live willow and mulefat stakes, and long-rooted grasses. Additional task orders were executed for native tree planting and biotechnical bank stabilization at Arroyo Mocho Medeiros Parkway.

- **Hydroseeding**

Hydroseeding is spraying a slurry of seed, mulch, and fertilizer to plant grasses. After channel embankment repairs, all areas where vegetation was removed are hydroseeded by Zone 7 contractors. Hydroseeding of repaired embankments encourages the re-establishment of appropriate vegetative cover. In 2018, an annual hydroseeding contract was used to meet this need with a total of \$3,400 spent.

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 members perform routine inspections of all 37 channel miles and associated facilities on a monthly basis. These inspections allow the section to maintain awareness of channel conditions, including areas susceptible to damages from erosion, bank failures, trespassing, and homeless encampments. Information gathered during inspections helps the section better prioritize work for vegetation management and facility repair to maintain public health and safety, as well as the project matrices for capital improvement work. In addition to maintaining an excel file documenting the inspection processes, staff has continued implementing the use of GIS Collector to streamline the inspections.

- **Project-Specific Inspection**

Zone 7 staff performed inspections for both Maintenance and Capital 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.

- **Storm Watch Inspection**

During major storm events, Zone 7 staff immediately shift into a pre-emergency response mode, working to prevent and minimize the loss of life and property. Response activities such as responding to emergency phone calls, storm monitoring, and field patrols, were top priorities during the storm season. Zone 7 staff paid particular attention to and documented the status of all areas that are especially 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, Zone 7 staff are on-call and ready to respond as necessary. In addition, Zone 7 issues annual contracts to support these efforts.

Miscellaneous Facility Maintenance Activities

In addition to the general facility maintenance, which includes such things as fencing repairs, graffiti abatement, and general debris removal, Zone 7 staff also contract for services that require specialized knowledge or equipment. Many of these services are performed on an as-needed basis.

Goat Pilot Program

In spring of 2018, Zone 7 staff worked with a goat grazing company to schedule and complete goat grazing treatment of the construction site for the future Patterson Pass Water Treatment Plant expansion project. The area treated totaled approximately 10 acres at a final cost to the agency of approximately \$12,500.



Utilizing lessons learned from the initial project, staff identified three riparian areas in Pleasanton and Dublin for a second phase of testing goat grazing in Zone 7 facilities. These areas are scheduled for grazing in 2019.

Homeless Encampments

Homeless encampments along flood protection facilities are another sensitive issue Zone 7 deals with under our routine maintenance program. In 2018, 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 concern to the agency and before the trash/debris left behind blocked flow within the creeks.





Zone 7 also updated appropriate safety procedures that provide guidelines for employees dealing directly with occupants of these encampments.

Staff initiated discussions with the Human Services Manager at the City of Livermore to explore collaboration opportunities for cleanup and support services as well as sharing of encampment data. Discussions are ongoing and are expected to result in some level of contract sharing under the Tri-Valley Inter-Governmental Reciprocal Services Master Agreement during 2019. In 2018,

approximately \$18,000 was spent on contractor labor for homeless encampment cleanup. In 2019, expenditures on homeless encampment cleanup including staff time will be tracked under a specific project number.

Other Miscellaneous Facility Maintenance Activities

- **Storm Drain Pipe Inspection**

Zone 7 facilities contain numerous culverts conveying water from municipal storm drains and other surface drainage into flood control channels via outfall structures. As these culverts age and corrode, they present a risk to channel embankments as water leaks into the surrounding soil. 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 protection facilities. Inspections continued in 2018 but no pipes were determined to need replacement.

- **Rodent Control**

Rodents, specifically ground squirrels, cause damage to the flood protection banks by burrowing through the ground, causing water intrusion and destabilization of the flood protection banks. Zone 7 uses the services of a pest control contractor to control and relocate foxes within the 37 miles of channels owned by Zone 7. In 2018, Zone 7 spent \$7,500 to address rodent control in flood control channels.

- **Horizontal Drilling Bank Stabilization Program**

The horizontal drilling 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 of the 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 helping to prevent bank failures. This program also includes monitoring to evaluate the effectiveness of the drains and periodic surveying of the banks. Zone 7 staff worked with a drilling contractor to install six new horizontal drains during summer 2018.

Mitigation Monitoring and Reporting Program

A typical Zone 7 flood protection project does not end after the construction is completed; most require ongoing monitoring and mitigation of project impacts. Zone 7 must provide a mitigation and monitoring report to various regulatory agencies, such as the CDFW, RWQCB, USACE, 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. In fall of 2018, staff initiated field work to support the annual monitoring report.
 - The large storms of winter 2017 were the first real test for the project since construction in 2013. The roughened channels did not entirely perform as expected and corrective actions are warranted to ensure the facility continues to provide 100-year flood protection in future years. Interim efforts were accomplished in 2018 to support the overall project function, and permanent repairs are currently planned for 2019.
 - The regulatory agencies have been supportive of allowing outside 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) Foothill Road Bank Stabilization Project
 - Year one annual monitoring was completed, and the annual report is underway.
 - No major changes to report.
- 3) Annual Priority Streambank Repair Projects
 - Bank repairs are completed on an annual basis; the nature of these projects required permit authorizations from all three major regulators: CDFW, RWQCB, and USACE. Permits typically include required monitoring for five years.

Asset Management

As a part of its responsibilities, Zone 7 plans for the maintenance and replacement of its property, including flood protection channels, fences, gates, signs, and access roads. In 2018, staff continued to document all of Zone 7's assets in ArcGIS to create and manage a long term plan for their maintenance, monitoring, and replacement. Efforts include utilizing existing databases and updating data, as well as collecting, digitizing, and geo-referencing additional data.

6. STORM EVENTS OF 2017

FEMA/Cal Office of Emergency Services

Flood protection channels in Zone 7's service area experienced extensive damage during the 2016/17 winter storms. As Zone 7's service area was included within a federal Major Disaster Declaration for these storms, repairs of the resulting damages could be eligible for reimbursement from the Federal Emergency Management Agency (FEMA). While the appeal process for reimbursement of permanent repairs continues into 2019 through coordination with the California Governor's Office of Emergency Services (Cal OES), Zone 7 has received reimbursement for costs related to emergency protective measures and debris removal. Any damages that occurred within channels that are part of the USACE PL 84-99 program were ineligible for FEMA funding.

U.S. Army Corps of Engineers (USACE)

Zone 7 staff also worked with USACE to repair damages that occurred during the winter storms of 2017. USACE teams inspected the damaged sites in spring 2017; the sites' eligibility for federal repair depends on having good standing in the PL 84-99 program as well as a benefit to cost ratio greater than one.



USACE will repair 26 sites damaged as a result of the federally declared storm events in 2017; five were repaired in 2018 with construction of the remaining 21 scheduled for 2019. For construction costs alone this represents an approximately \$6.5 million benefit for Zone 7. USACE may consider the remaining slides in the program at a later date. Under the PL 84-99 program, USACE manages the design and construction of the repairs, obtains federal permits, and contributes 80 percent of the construction cost while the local sponsor (Zone 7) contributes 20 percent of the construction cost, obtains state and local permits, and signs a Project Coordination Agreement. Five bank slides were repaired in 2018 and the remaining 21 will be repaired in the 2019 construction season.



Other Repairs

Zone 7 continues to work on repairs to the other damages that will not receive federal or gubernatorial assistance. Seven of the most critical repairs were designed in-house and constructed in 2017 under the routine maintenance contract. Zone 7 hired an engineering design consulting firm to design the remaining repairs in a few phases. Phase I, which included 26 sites, was competitively bid and constructed in 2018. Design on Phase II, which consists of an additional 26 sites, was completed and submitted for permitting in 2018. Construction of Phase II is anticipated in the summer of 2019. Phase III will also be designed in 2019.



National Resources Conservation Service/Verona

The February 2017 storms caused significant damage to property where a Zone 7 easement runs, resulting in the significant erosion and a vertical slope to the creek. Zone 7 completed a bank stabilization project at this property and acted as the local sponsor for the adjacent landowner in the application for emergency funding through the NRCS Emergency Watershed Protection Program (EWP) and Environmental Quality Incentives Program (EQIP).

Zone 7 received reimbursement of \$759,000 from NRCS and \$189,750 from Cal OES to help offset the \$2.9 million total cost of the slope repair. In addition, funds from the EPA grant “Preparing for the Storm” helped implement aspects of the revegetation plan (\$250,000).

Plants at the site are not only intended to provide riparian habitat and mitigate for trees removed during construction, but are also intended to work hand-in-hand with the engineered elements to protect against future bank erosion, and enhance structural integrity by acting as the first line of defense against erosive forces.

Site conditions prior to reconstruction of the right bank (April 2017)



Post-construction during replanting (December 2017)

Original plantings included over 1,500 live willow and cottonwood stakes; hydroseeding on the slopes; and over 3,000 container plants distributed throughout the site.

In year one following construction, the site continues to evolve and settle. No bank deformations or instabilities were observed on either bank. It appears a dense willow thicket is forming at the toe and minor replanting of stakes along the upstream left bank is

the only corrective action recommended. Erosion control fabric is still present and intact while vegetation grows in. Vegetative cover on the slopes is continuing to develop as the grasses, forbs, and other plantings establish. Tree mortality is low and 80% of the 197 trees originally planted were in good or better condition. Non-native invasive species are being closely monitored and treated. Four patches of non-native, invasive arundo were observed and treated during summer 2018.



Nearly one year after planting (November 2018) looking downstream toward Verona Bridge

City of Livermore Levee Fix

February 2017 storm events caused significant damage to public facilities along some of the creeks that flow through Livermore. The City of Livermore proceeded with the 2017 Storm Damage Repairs Project at nine locations within the city, which consisted of emergency repairs to stabilize the storm damage sites during summer 2017 to prevent additional damage the following winter. One of the nine locations included the repair of a levee between Arroyo las Positas and the southern conveyance facility east of El Charro Road. This reach of Arroyo las Positas is owned and maintained by Zone 7 while the southern conveyance facility is maintained



by the City via an existing agreement. The City agreed to be the lead for the repair, performing it under the City's Stream Maintenance Permit Program. Repair costs may be eligible for reimbursements from FEMA and Cal OES. Due to the time constraint of the work window, the quantity limitation under the Stream Maintenance Permit Program, the scope of work under the emergency repair project, and the overall project budget, the levee repair work was limited to stabilization of the levee to a point where no additional damages during the 2018 winter would be substantiated. Permanent repair was undertaken and completed under Zone 7's jurisdiction in 2018.

Caltrans

The storm events of 2017 produced some uncontrolled runoff from I-680 adjacent into Zone 7's Alamo Canal facility that caused significant damage to the channel slopes in two locations adjacent to Stoneridge Drive off-ramps.





In 2017, Caltrans maintenance workers installed a temporary asphalt dike to ensure future runoff does not exacerbate the erosion issue at one location. The second location, consisting of approximately 100 feet of damage to both Caltrans and Zone 7 right-of-way, required a larger design strategy to implement both temporary and permanent repairs. Zone 7 and Caltrans staff collaborated on an approach to repairing this area and the project was completed in summer 2018.

Moving Forward

At the end of 2018, a total of 49 sites damaged in the 2017 winter storms had been repaired. Zone 7 plans to repair 47 sites in 2019 and an additional 25 will be evaluated for potential repair in 2020, concluding the rehabilitation effort. Zone 7 staff continues to regularly inspect all of our facilities and will respond accordingly to any changes in condition of the channels and the pending repairs.