



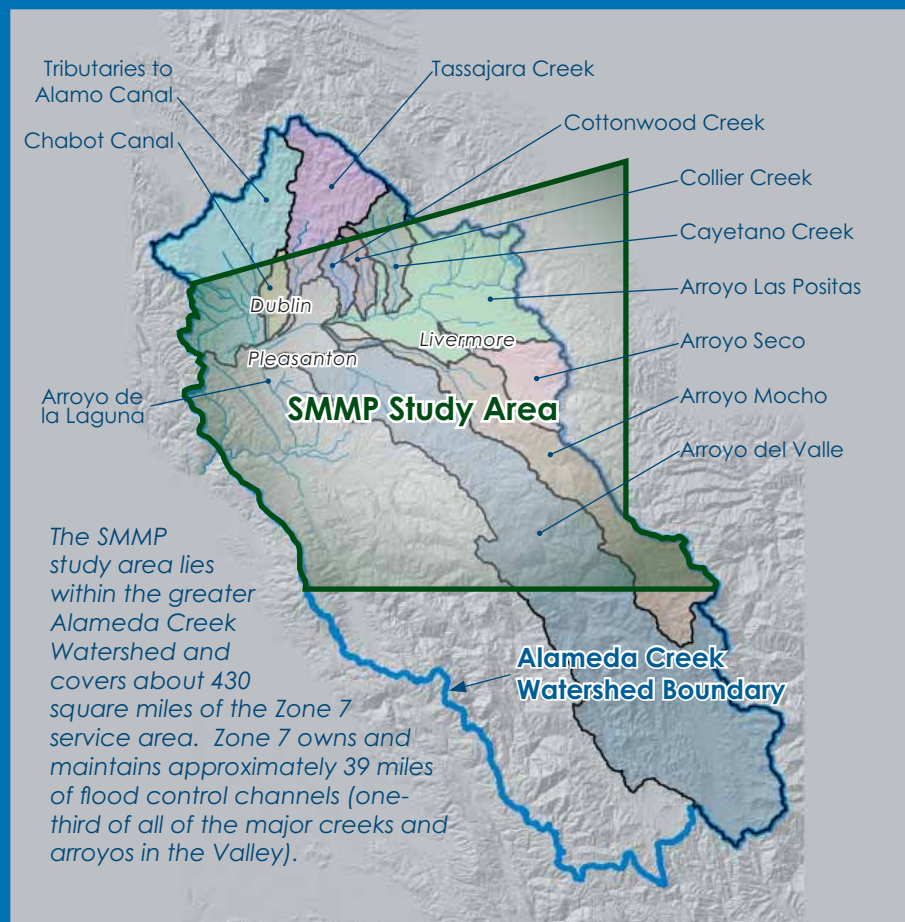
Zone 7 Water Agency
Stream Management Master Plan



Introduction

The system of arroyos, creeks, and streams that move water through the Livermore-Amador Valley have shaped the physical landscape and continue to influence day-to-day life in the Valley. These watercourses play an important role in ensuring a reliable supply of drinking water for our communities and draining stormwaters from low-lying areas. At the same time, they sustain plant and animal habitat and offer recreational and educational opportunities that enrich our lives.

Zone 7, in pursuing its flood control mission, has developed a Stream Management Master Plan (SMMP) in collaboration with Valley cities, park districts, businesses, and other stakeholders. The SMMP is a multi-disciplinary planning document that emphasizes the interrelationships between flood protection, adequate water supply, healthy habitats for plants and animals, and recreation. It is a roadmap for stream management projects and practices that will address all these issues as development continues in Livermore, Dublin, Pleasanton, and the unincorporated Tri-Valley area in keeping with area general plans.



What is the SMMP?

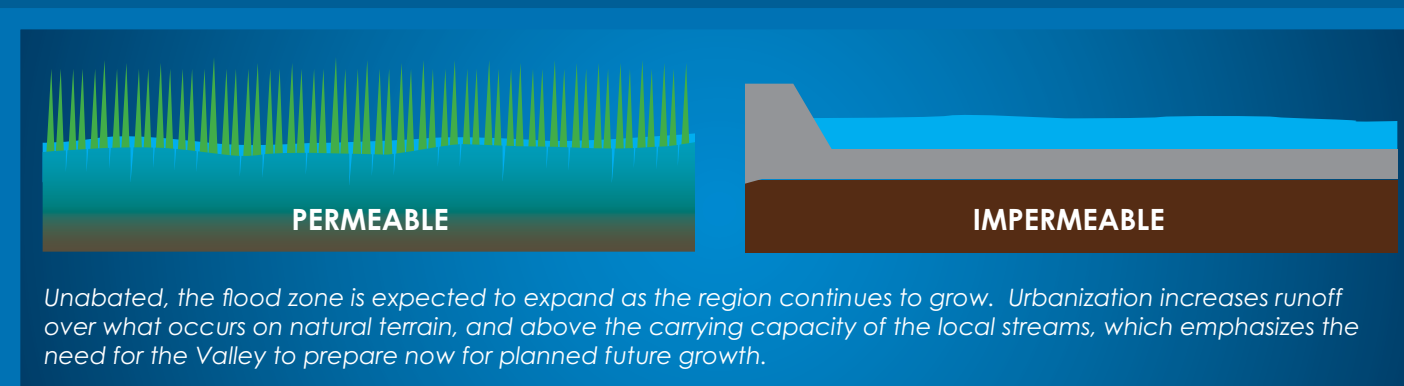
The Stream Management Master Plan is a planning document that identifies the flood control projects necessary to help Zone 7 protect communities against 100-year storm events in the Valley through 2034, while providing opportunities for water quality, water supply, habitat restoration, and recreational projects. The SMMP will be a tool for Tri-Valley cities and other agencies to help facilitate development decisions that complement and protect the Valley's flood control system. The SMMP is neither a funding document nor a project-specific implementation plan.

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A Rising Reality

Floods are the most common and dangerous natural disasters, occurring in all 50 states. In the Valley, flooding is a region-wide issue that affects every resident, regardless of location. Prior to flood control improvements, the entire Livermore-Amador Valley was an historic floodplain that likely flooded regularly during large storm events. A portion of the rain that falls in the watershed runs off the land and gathers in the stream system that shapes the Valley; as streams converge they grow larger and carry ever-increasing amounts of water. Where land is converted from fields and open space to impermeable surfaces (roads, parking lots, and buildings), the runoff moves faster and is unable to soak into the ground, increasing the amount of runoff entering into the stream system.



The majority of the water in our streams is natural runoff from the Valley's watershed. Local cities also collect runoff from local storm drains, which discharge their water into streams. Local flooding can occur when streambeds fill with water too quickly after extended rainfall periods or heavy thunderstorms. Because a watershed acts like an enormous funnel, every portion of the Valley—even those portions miles from the nearest stream—contributes to the amount of water flowing through our local waterways.

Although Zone 7's flood control system has significantly reduced flood impacts in the region, we must continue to work with other local agencies to manage the remaining floodplain. Because a community's best defense against flooding is to prepare in advance, Zone 7 has developed the flood control elements of the SMMP to prevent and reduce the potentially damaging effects of future major storm events. Zone 7 is preparing for future flood events by planning now for improvements that will minimize the disruption to public services, loss of habitat, and property damage when such events inevitably occur.



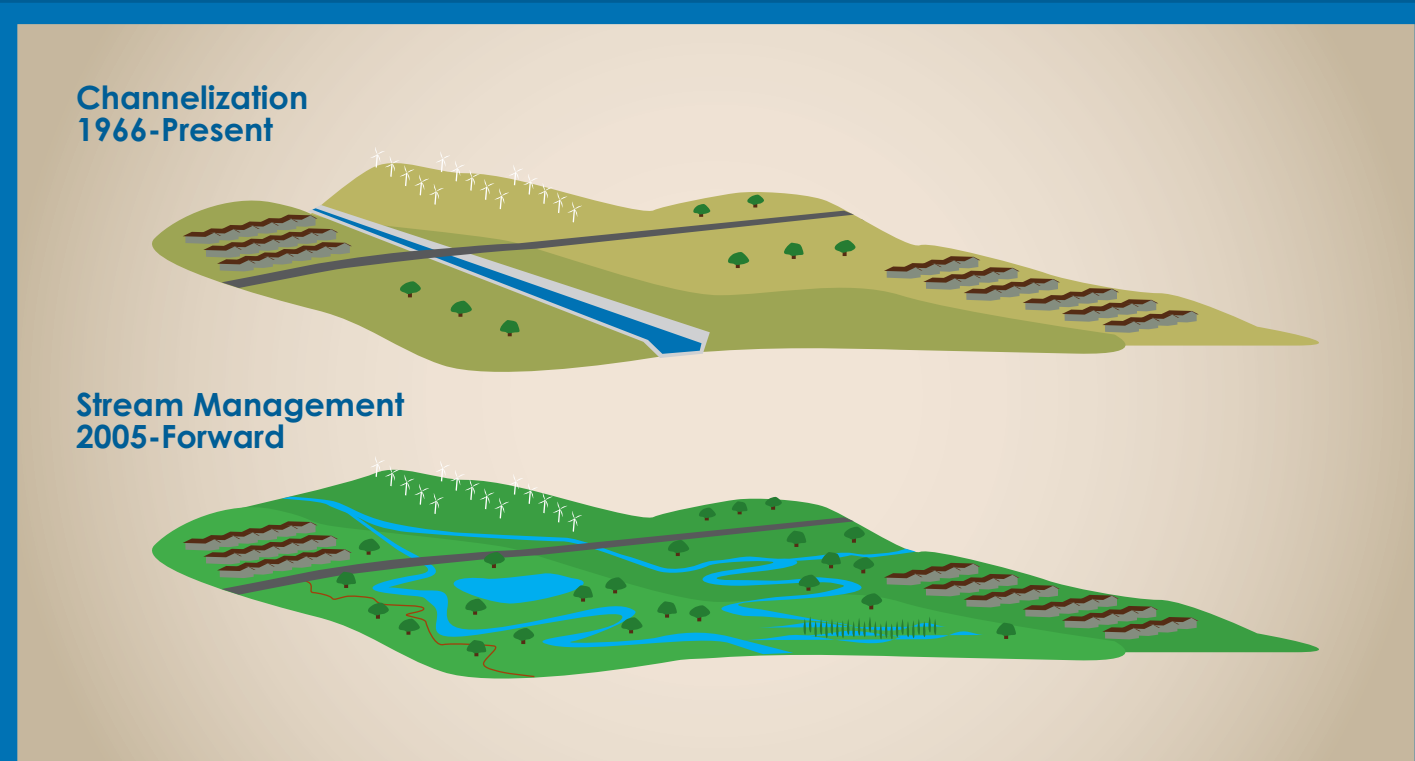
The Valley has not been immune to flooding. The largest flood on record occurred in 1955, turning much of North Pleasanton into a lake. Smaller events, most recently in 1998, also caused significant flooding in localized areas. The potential for this type of flooding was reduced with the construction of the Del Valle Dam in 1968 and subsequent Zone 7 flood control projects.

A New Approach to Flood Control

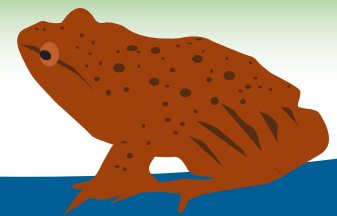
The SMMP is a major overhaul of Zone 7's Flood Control Master Plan, which the agency developed in 1966. The master plan, in keeping with then-current science, focused on *channelization*—constructing and maintaining channels that move stormwaters through the Valley as quickly as possible. However, as experts' understanding of natural processes has increased, there have been changes in stormwater management strategies. Moreover, the regulatory environment is changing to keep pace with this body of knowledge, and is increasingly concerned with the interrelationships of waterways that are maintained for water supply and flood control with the natural environment that also depends upon these waterways. When Zone 7 began to update its Flood Control Master Plan in 1998, regulatory agencies charged with authorizing activities that impact stream resources urged a new approach to flood control that would address the Valley's entire drainage system.

Since then, Zone 7 has been working with local agencies to coordinate this effort. The SMMP represents this new approach to flood control by focusing on stormwater detention, minimizing erosion and sedimentation, and reducing peak stormwater flows. The heart of the SMMP will be the future Chain of Lakes, which will store excess water Zone 7 diverts from Arroyo Mocho and Arroyo las Positas during peak flow periods. While achieving our flood control goal of protecting the Valley against 100-year storm events, proposed SMMP flood control projects provide benefits for water quality and supply, as well as partnering opportunities with other local agencies for habitat restoration and recreation.

From Channelization to Stream Management



The SMMP embodies a new approach to flood control that addresses the interconnectedness of water resources, plant and wildlife species, and the public's need for open space and recreation.



Erosion and Sedimentation Control

The primary goal is to reduce or manage erosion and sedimentation in a manner that optimizes flood control while protecting other stream resources (e.g., water quality for people and animals). Erosion can cause bank instability, threaten neighboring properties, and discharge sediment into watercourses. Excess sediment and silt can spread through the system, reducing flood channel capacity, preventing storm drains from working properly, and leading to adverse effects on the environment, water quality, water supply, and property.

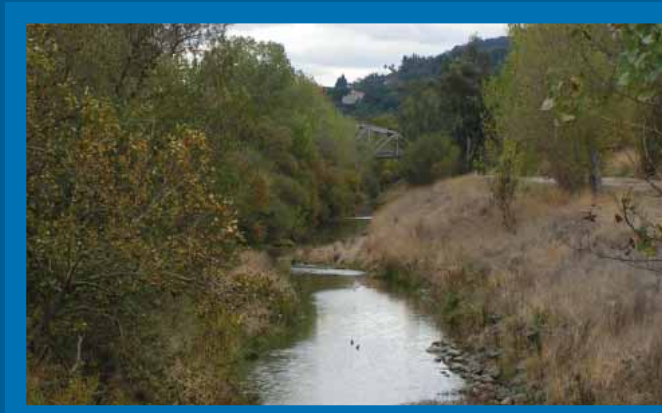


Sedimentation buildup, as shown here at the confluence of Arroyo del Valle and Arroyo de la Laguna under Interstate 680, can impact downstream areas.

In formulating the SMMP, Zone 7 and stakeholders developed goals and objectives that provide a framework for identifying, developing, and sequencing the program's projects and policies.

Flood Control and Drainage

The primary goal is to protect people, property, and stream corridors from damaging drainage and storm events. As urban growth continues to encroach on floodplain areas and increase the amount of impervious surfaces (new roads, parking lots, and buildings) in the area, flood control projects are necessary to maintain adequate protection of life, property and the environment.



Arroyo de la Laguna (shown here near Bernal Bridge in Pleasanton), is the main artery that drains the entire Valley into the San Francisco Bay.



Zone 7 performs routine maintenance such as inspections, repairs, vegetation management, silt removal, pest control, and other activities that keep channels in smooth working order. Zone 7 also conducts emergency repairs and installs new channels as necessary.



Bank erosion on Arroyo de la Laguna can cause bank instability and deposit sediment in the arroyo.

Goals & Objectives

Water Supply

The primary goal is to provide adequate water conveyance for Zone 7's recharge and storage needs. The Valley's Main Groundwater Basin meets approximately 25% of the region's annual demand. Zone 7 stores water in the groundwater basin, helping to ensure a reliable supply to Valley communities—even during a prolonged drought. The agency currently uses several arroyos and will, in the future, use the Chain of Lakes to convey untreated water supplies and to recharge groundwater supplies.



Zone 7 is currently investigating the future uses of Cope Lake, which could include flood control and water storage.



Zone 7 will reduce peak flows in Arroyo Mocho and Arroyo las Positas by diverting excess water into the future Chain of Lakes for storage. Stormwaters will be detained in the Chain of Lakes until peak flows have subsided, then released back to the arroyos in a controlled manner.

Water Quality

The primary goal is to protect and enhance water quality in streams and groundwater. Because Zone 7 uses local arroyos to convey water and to recharge the groundwater basin, stream management is an important part of maintaining water quality. Stream management is also key to managing potential contamination sources.



Zone 7 uses Arroyo Mocho (shown here) and Arroyo del Valle to convey water through the Valley and to recharge the groundwater basin.



Zone 7 monitors the water quality of the watershed runoff in Arroyo Mocho and Arroyo del Valle (shown here), drinking water sources that recharge the groundwater basin.

Goals & Objectives

Habitat and Environment

The primary goal is to protect and enhance the aquatic and riparian habitat associated with streams and wetlands. As the Valley has grown, much of its historic natural habitat has been replaced by urban communities. Arroyos and streams offer excellent opportunities to preserve and restore natural habitat areas because many of these areas support a high concentration of biodiversity.



A Zone 7 restoration project along Arroyo las Positas near El Charro Road involves planting of native vegetation to keep the bank from eroding, as well as a fish ladder to help fish migrate upstream.



Riparian habitats provide food, nesting habitat, cover, and migration corridors for plants and animals. Across the West, many of these important areas have been degraded or removed by stream channelization, development, grazing, and water diversion.

Recreation, Trails, and Public Education

The primary goal is to promote recreational, alternative transportation and public education opportunities along streams and the future Chain of Lakes. An educated public will help protect the watershed and the groundwater basin. Since 1984, Zone 7 has licensed its rights-of-way along streams to local cities to support recreational opportunities and open space. The SMMP identifies many new partnering opportunities with other local agencies, interest groups, schools, and regulatory agencies for recreational facilities. This will be an important component of Zone 7's stream management approach.

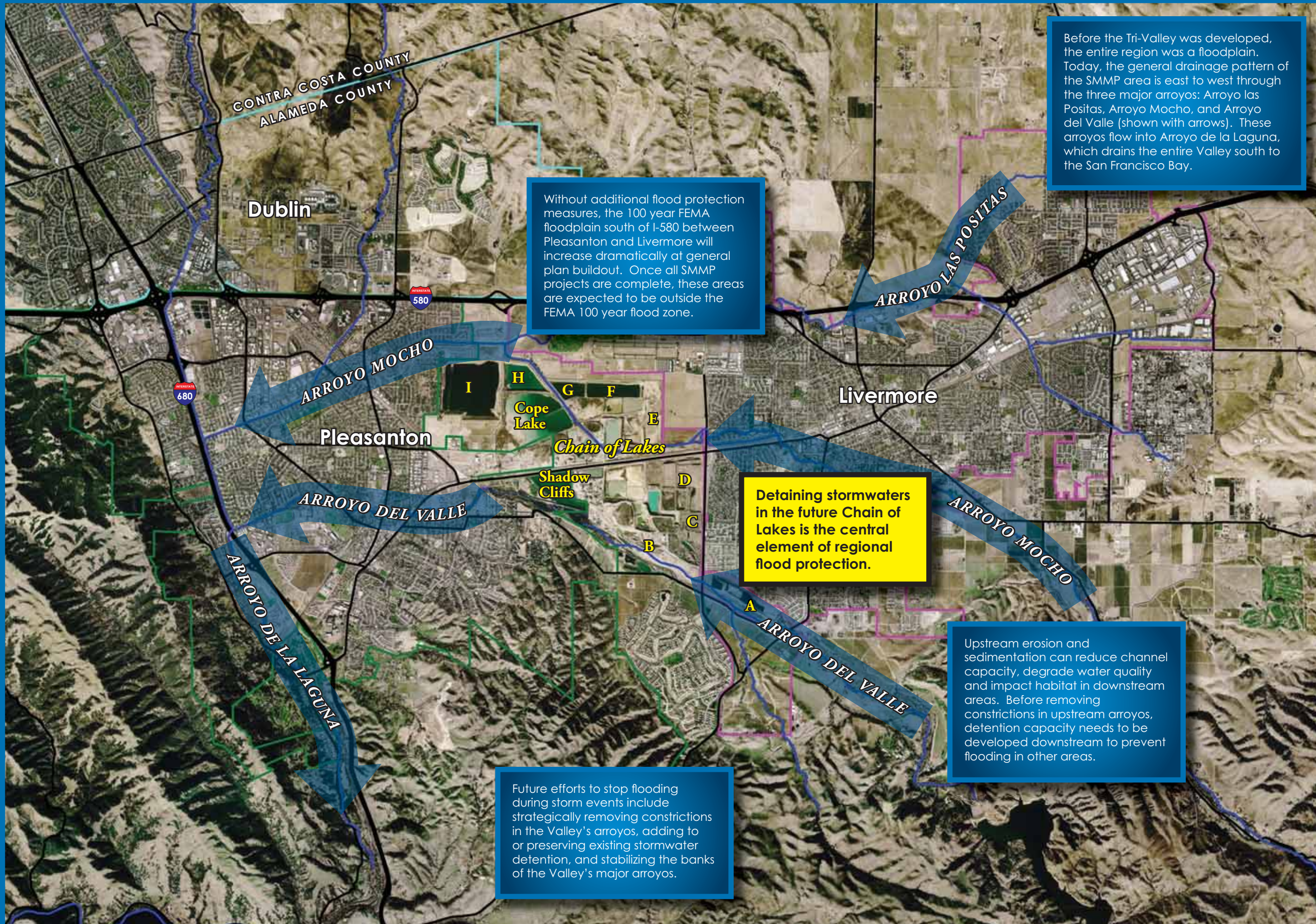


A walking bridge crosses Arroyo del Valle in Sycamore Grove Park enhances quality of life for the community.



Zone 7 teamed with Friends of the Arroyos and community volunteers to plant native vegetation that will reduce erosion on Alameda Creek.





Before the Tri-Valley was developed, the entire region was a floodplain. Today, the general drainage pattern of the SMMP area is east to west through the three major arroyos: Arroyo las Positas, Arroyo Mocho, and Arroyo del Valle (shown with arrows). These arroyos flow into Arroyo de la Laguna, which drains the entire Valley south to the San Francisco Bay.

Without additional flood protection measures, the 100 year FEMA floodplain south of I-580 between Pleasanton and Livermore will increase dramatically at general plan buildout. Once all SMMP projects are complete, these areas are expected to be outside the FEMA 100 year flood zone.

Detaining stormwaters in the future Chain of Lakes is the central element of regional flood protection.

Upstream erosion and sedimentation can reduce channel capacity, degrade water quality and impact habitat in downstream areas. Before removing constrictions in upstream arroyos, detention capacity needs to be developed downstream to prevent flooding in other areas.

Future efforts to stop flooding during storm events include strategically removing constrictions in the Valley's arroyos, adding to or preserving existing stormwater detention, and stabilizing the banks of the Valley's major arroyos.

Flooding: A Regional Problem

Because stormwater from the hills surrounding the Valley as well as runoff from urban areas like Dublin and Livermore all contribute to the demands placed on the water conveyance system, predicted flooding is clearly a regional problem that requires a regional solution.

SMMP Projects

Zone 7 divided its service area into twelve reaches based on the geography of the watersheds within Zone 7's service area. The agency established a specific emphasis for each reach depending on that reach's role in providing flood protection to the Valley and its relation to other resource areas such as water supply, habitat, and recreation.

The SMMP identifies 45 projects throughout the twelve reaches that provide the opportunity for multiple resource benefits to the community. Because Zone 7's flood control mission is directed at planning and implementing flood control-specific projects, projects that include recreation, public education, and habitat opportunities may require partnerships with other agencies for implementation and funding.

Zone 7—like other agencies across the country—primarily used rock and other hardscape techniques to contain floodwaters. In the future, Zone 7 will employ a new approach to flood control that restores a channel to mimic a natural meandering stream, as shown here in the City of Pleasanton. Zone 7 will continue to use hardscape if it is deemed necessary for a particular project.



Project Costs by Reach

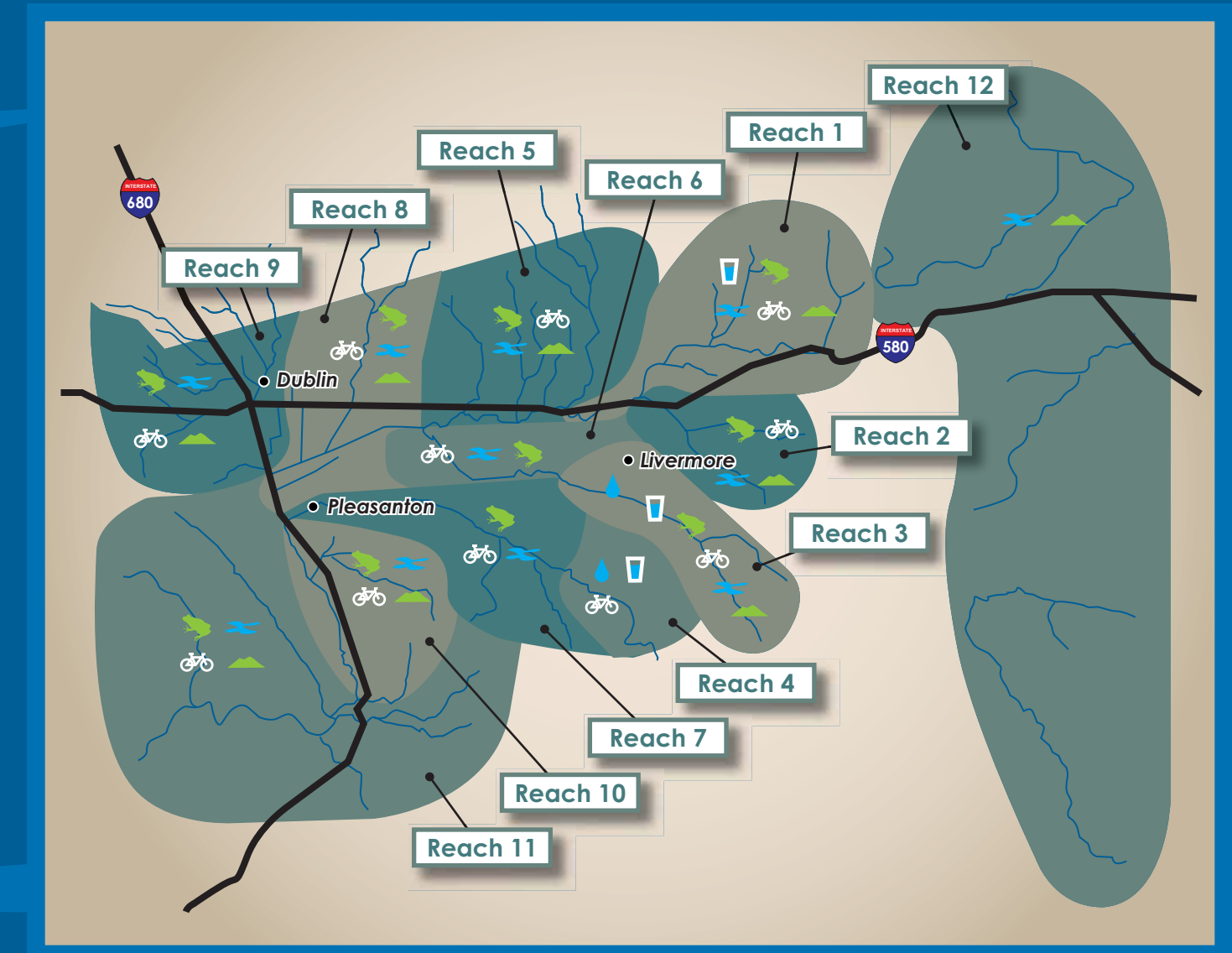
Reach	No. of Projects	Flood Protection	Water Quality & Supply	Habitat	Education & Recreation	Total Improvements
1	7	\$8,800,000	\$23,200,000	\$11,100,000	\$10,000,000	\$53,100,000
2	3	\$7,000,000	0	\$14,900,000	\$2,100,000	\$24,000,000
3	5	\$38,700,000	\$10,100,000	\$19,400,000	\$2,700,000	\$70,900,000
4	2	0	\$1,200,000	0	\$2,200,000	\$3,400,000
5	3	\$168,200,000	0	\$4,500,000	\$22,000,000	\$194,700,000
6	2	\$120,400,000	0	\$9,900,000	\$9,500,000	\$139,800,000
7	3	\$70,000	0	\$20,600,000	\$15,200,000	\$35,900,000
8	4	\$78,000,000	0	\$22,800,000	\$5,800,000	\$106,600,000
9	7	\$27,000,000	0	\$9,800,000	\$1,300,000	\$38,100,000
10	5	\$23,900,000	0	\$18,500,000	\$11,000,000	\$53,400,000
11	2	\$260,000	0	\$40,000	\$2,900,000	\$3,200,000
12	2	\$1,000,000	0	0	0	\$1,000,000
Total	45	\$473,300,000	\$34,500,000	\$131,500,000	\$84,700,000	\$724,000,000

Zone 7's previous flood control plan, which focused on channelization, would have cost about \$600 million (in 2001 dollars) and provided only flood control benefits. The stormwater detention approach of the SMMP reduces the cost of flood control projects by about \$150 million while providing the same level of flood control protection, and also offers opportunities for additional community benefits.

¹2005 Dollars



Resources by Reach



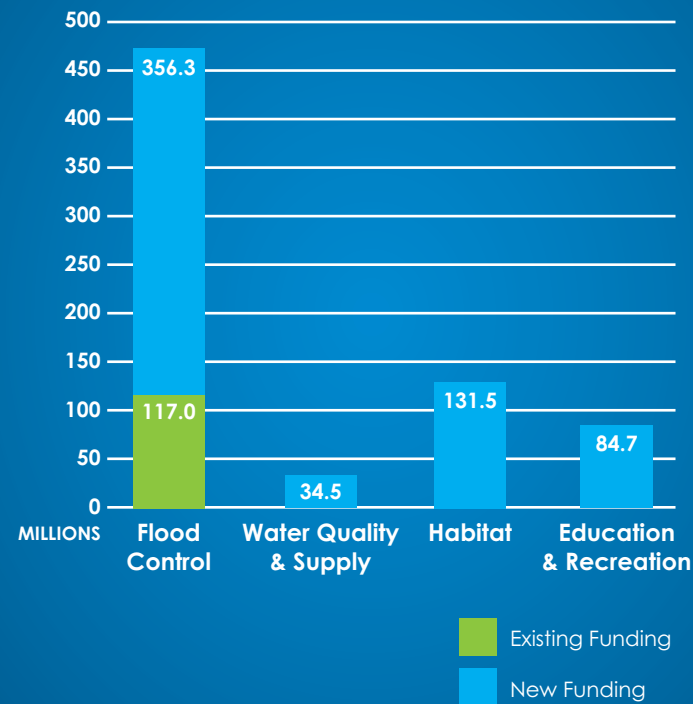
Zone 7's stream management approach incorporates the individual reaches into the larger flood control mission by considering their particular flood control, soil and erosion, water supply, water quality, habitat, and recreation characteristics in the context of the overall planning effort.

Water Supply	Recreation & Public Education
Water Quality	Flood Protection
Habitat	Erosion & Sedimentation

Funding

Zone 7 currently collects fees from development to fund new flood control projects through the Special Drainage Area 7-1 (SDA) program. Reflecting the channelization approach to flood control developed in 1966, the SDA 7-1 program focuses on projects that improve the ability of the Valley's biggest arroyos—Arroyo de la Laguna, Arroyo del Valle, Arroyo Las Positas, and Arroyo Mocho—to convey water. Embracing a regional storage approach to flood control, the SMMP broadens the community benefits beyond flood control to other resources such as water quality, water supply, habitat, recreation and education. The expanded benefits create implementation opportunities for other agencies in conjunction with Zone 7's flood control projects and necessitates expanded funding sources. These additional sources could include property tax, public and private grants, sales tax, and water rates, among others. The SMMP reduces the originally estimated \$600 million flood control costs in the 2001 update of the SDA 7-1 program to approximately \$450 million by replacing channelization projects with stormwater detention and diversion projects.

Project Costs and Funding Through 2035 (in Millions)



Zone 7's existing funding mechanism is restricted to flood control projects and is projected to be \$117 million over the life of the SMMP (based on SDA 7-1 fees last updated in 2001 and adjusted for inflation). Additional funding sources need to be developed for other SMMP projects.

SMMP Development Process



Moving Forward

Partnering Opportunities

SMMP goals, objectives, and projects were developed in collaboration with Valley cities, the environmental community, park districts, business interests, the agricultural community, recreation interests, and other stakeholders. In pursuing implementation, Zone 7 will partner with various jurisdictions to determine near-term project priorities and to develop specific funding and implementation strategies.

Environmental Compliance

Zone 7 developed an Environmental Impact Report (EIR) for the SMMP to comply with the California Environmental Quality Act (CEQA). The master EIR examined potential impacts associated with implementing the SMMP. For more information, call (925) 454-5008.

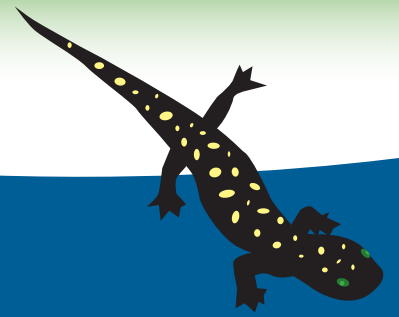
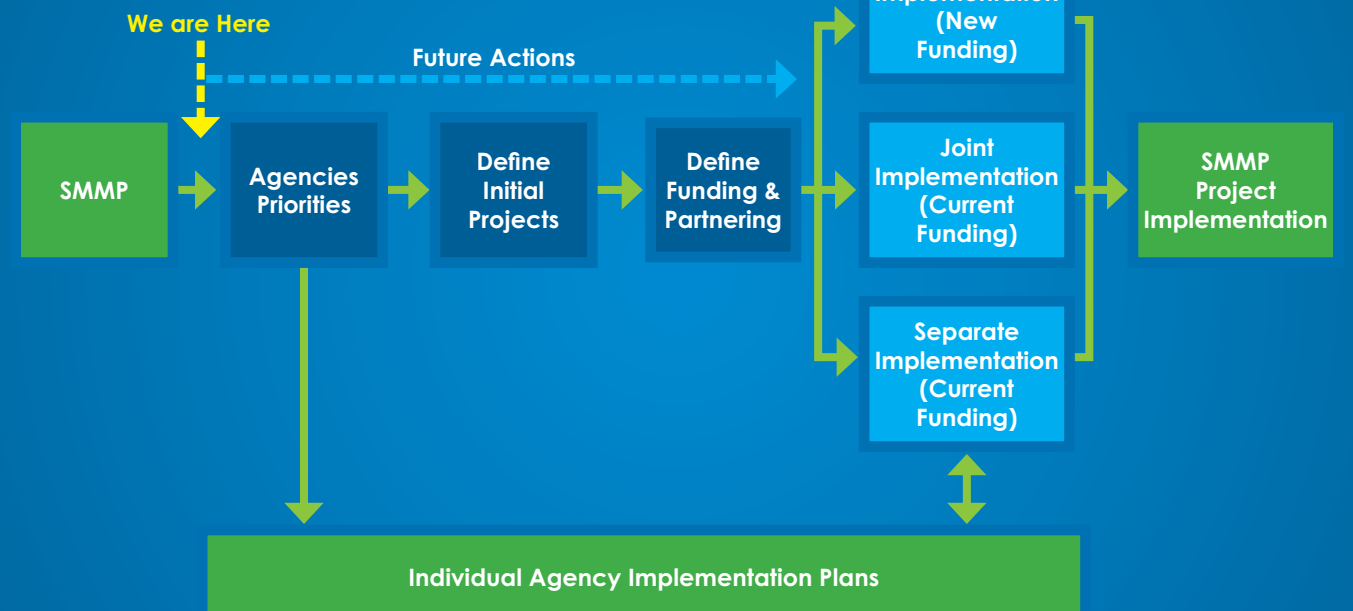
Partners

Zone 7 appreciates the active involvement of its stakeholders in the SMMP process, including:

- County of Alameda
- Alameda County Water District
- Alameda Creek Alliance
- California Department of Fish and Game
- City of Dublin
- City of Livermore
- City of Pleasanton
- Dublin San Ramon Services District
- East Bay Regional Park District
- Lawrence Livermore National Laboratory
- Livermore Area Recreation and Park District
- Regional Water Quality Control Board
- San Francisco Public Utilities Commission
- United States Army Corps of Engineers
- Friends of the Arroyos

Zone 7 also worked closely with local trail, environmental, and business groups.

Partnering Approach



100-year flood: A flood of a magnitude that has a one percent chance of occurring in any given year.

Arroyo: A deep gully cut by an intermittent stream; a dry gulch, brook, or creek.

Chain of Lakes: Zone 7 plans to create a chain of lakes from gravel mining quarries located south of Interstate 580 between Livermore and Pleasanton. Once Zone 7 takes ownership of the quarries over the next 25 years, the ten chain of lakes could be used for stormwater storage, groundwater recharge, and other water resources projects.

Channel: A natural or artificial watercourse with defined bed and banks used to confine and conduct water flow.

Channel Capacity: The maximum flow that can pass through a channel without overflowing the banks.

Creek: A small stream, often a shallow or intermittent tributary to a river.

Erosion: The process by which soil is removed from one place by forces such as water or construction activity and eventually deposited at a new place as sediment.

FEMA: The Federal Emergency Management Agency, responsible for preparing the nation for all hazards and effectively managing federal response and recovery efforts following any national incident.

FEMA Floodzone: Geographic areas that the Federal Emergency Management Agency (FEMA) has defined according to varying levels of flood risk.

Flood/Flooding: A temporary condition caused by the accumulation of runoff from any source, which exceeds the capacity of a natural or man-made drainage system and results in inundation of normally dry land areas.

Flood Control: Activities and regulations that help reduce or prevent damages caused by flooding.

Floodplain: Low lying areas that are flooded during high channel flows.

Floodplain Management: A program that uses corrective and preventative measures to reduce flood and erosion damage and preserve natural habitat and wildlife resources in flood prone areas.

Groundwater: Water naturally stored underground in aquifers, or that flows through and saturates soil and rock, supplying springs and wells.

Groundwater Recharge: The natural or intentional infiltration of surface water into the groundwater basin.

Habitat: The area or environment where an organism or ecological community normally lives or occurs.

Mitigation: Any action taken to permanently eliminate or reduce the long-term risk to human life and property and the negative impacts on natural and cultural resources that can be caused by natural and technological hazards.

Non-point Source: Pollution that comes from many sources (such as runoff from parking lots, streets, and lawns), rather than from one specific source (such as a pipe).

Reach: The smallest subdivision of a drainage system consisting of a uniform length or channel.

Riparian: Pertaining to, living near, or situated on the banks of rivers and streams.

Runoff: Water from rain or irrigation that flows over the ground and into bodies of water, often contributing to soil erosion and carrying harmful pollutants.

Sediment: Soil particles, sand, and minerals washed from land into water systems as a result of natural and human activities.

Stormwater: Rainwater and runoff that enters the storm drain system and empties into rivers and streams.

Stream: A body of water, confined within a bed and banks and having a detectable current.

Stream Management: Practices that modify or control the bed, bank, and environs of a watercourse in order to achieve specific flood control, water quality, or habitat-related objectives.

Urban Runoff: Stormwater from city streets and adjacent domestic or commercial properties that may carry pollutants into water systems.



About Zone 7 Water Agency

Zone 7 Water Agency is one of the 10 active zones of the Alameda County Flood Control and Water Conservation District.

The District was established by the State Legislature in October 1949 to solve problems of flooding, drainage, channel erosion and water supply and conservation in Alameda County. A seven-member board of directors governs Zone 7. Along with flood control, Zone 7 supplies water to all of eastern Alameda County and a population of more than 190,000. Treated water is sold wholesale to local retailers, including the cities of Livermore and Pleasanton, the Dublin San Ramon Services District, and the California Water Service Company. Zone 7 also distributes untreated water to local agriculture operations and golf courses.



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