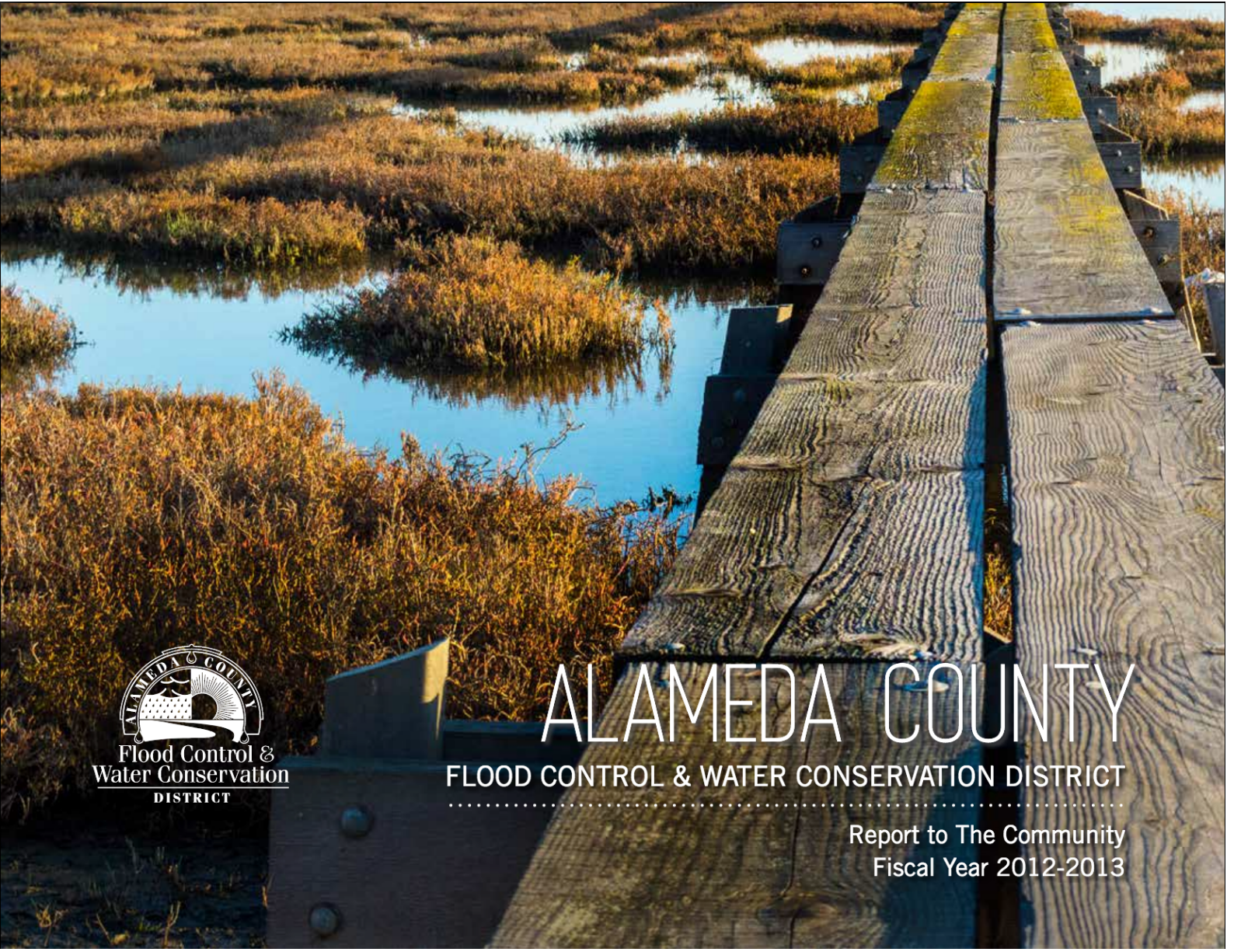

Flood Control &
Water Conservation
DISTRICT

ALAMEDA COUNTY

FLOOD CONTROL & WATER CONSERVATION DISTRICT

Report to The Community
Fiscal Year 2012-2013

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(COVER IMAGE) Eden Landing Salt Ponds in Hayward
(BACKGROUND IMAGE) A "king tide" event on December 31, 2013 as seen from Emeryville. King tides are the highest tides of the year.

Daniel Woldesenbet, Ph.D., P.E.

General Manager of the Alameda County Flood Control & Water Conservation District, and Director of the Alameda County Public Works Agency

Flood Control & Water Conservation DISTRICT

From the General Manager on Rising Tides

Safeguarding Alameda County neighborhoods and cities from flooding requires extensive study and evaluation of very complex problems that may not only our county but also the entire Bay Area region.

Among the major issues Alameda County faces today—such as high unemployment, rising costs of healthcare and education, aging infrastructure, —one of the most complex is climate change and sea level rise in the San Francisco Bay. Alameda County has a diverse shoreline shared with waterfront homes, business parks, industrial areas, an international airport, and an interstate highway, as well as beaches, parks, wetlands, and salt pond tidal marshes. In the future, sea level rise will affect our shoreline, especially as larger storms, heavier rainfall, and higher storm surge impact the Bay Area.

Be assured that we are taking action.

The Alameda County Flood Control and Water Conservation District is at the forefront of the rising tides issue in the San Francisco Bay region.

We are doing more critical evaluation, have developed more hydrologic and hydraulic models, and have collected more hydrologic data than any other Bay Area county. We have been and will continue to be actively engaged with federal, state, and local agencies and conservation groups as sea level rise and climate change issues evolve.

We are also taking a leadership role to develop regional collaboration and an integrated strategy that will cover all nine Bay Area counties. An integrated Bay Area approach is critical to providing for the safety of all citizens, supporting the Bay Area economy, and ensuring that our regional infrastructure is adequate. By developing a regional approach, our solutions will be more effective and millions of dollars can be saved.

Rising tides is the theme of our annual report for fiscal year 2012-2013 (July 1, 2012 to June 30, 2013). You can read more about our partnerships with the Federal Emergency Management Agency, National Oceanic and Atmospheric Administration Coastal Services Center, and San Francisco Bay Conservation and Development Commission to study rising tides. We're building a new pump station in San Leandro to manage more rainfall and higher tides, and have installed new pumps at the Eden Landing Pump Station.

With an eye on the future, we're also upgrading our aging flood control infrastructure to contain and transport more stormwater to meet a 100-year flood level; for example, new and larger pipe installation projects in Hayward, Fremont, and Union City.

You can always find out more about our projects and how we work on the District's website at acfloodcontrol.org.

How We Work

The Alameda County Flood Control and Water Conservation District (the "District") is responsible for flood control management to protect western Alameda County citizens from damaging floods. The District carries out large and small projects. Some are simple and straightforward and can be completed in a few months, while others are complicated and may include working with many different partners over many years. Here are some of the steps we follow.

Studies and Evaluations

Before the District begins a major project, an analysis of the underlying problem is required. Hydrologic, geotechnical, and environmental studies may be done by District staff or outside consultants. The results of the studies help determine possible solutions.

Designs

During the design stage, the District develops detailed engineering plans and specifications, along with a construction schedule and cost estimate.

Permitting

Project permitting occurs in tandem with the project design. Federal, state, regional, and local agencies check to make sure that environmental laws and requirements and municipal codes are followed.

Construction

Once a project design is final and regulatory permits have been acquired, the District finds a contractor to build the project by posting a bid package on the Alameda County Public Works Agency's website and contacting pertinent contractors in its database. We also encourage bids through Alameda County's Small, Local and Emerging Business (SLEB) program. Firms submitting bids are carefully considered in a competitive bid process. Once an engineering firm and/or contractor(s) are selected by the District and contracts are negotiated, the project construction begins.

Inspections & Monitoring

Throughout project construction, District staff inspects the work and coordinates with the engineer and contractor to make sure the project is built in accordance with the design. Once completed, a final inspection is carried out. For some projects, environmental permitting agencies may require ongoing monitoring and reporting.

Maintenance & Operations

The District performs ongoing maintenance of its facilities to ensure that they are functioning as intended. Proper maintenance extends the life of the infrastructure, which improves the public's return on investment.

PROJECTS

(BACKGROUND IMAGE) A "king tide" event on December 31, 2013, along the Emeryville shoreline.

Analyzing Sea Level Rise and How It Will Impact Alameda County

"As climate change causes sea level rise and heavier storms, Bay Area infrastructure will be more vulnerable to flooding."

The District has been involved in a number of important studies to analyze and evaluate the impacts that a higher sea level will have on Alameda County. Higher sea level is caused by melting glaciers around the world. According to the San Francisco Bay Conservation and Development Commission, water levels in the Bay have risen almost eight inches over the past century and the rate of sea level rise is accelerating.

FEMA Studies

Extreme tides studies were initiated by the Federal Emergency Management Agency (FEMA) in 2006 to map coastal flood zones for 100-year and 500-year tides, meaning a very high tide that has a one-in-100 or a one-in-500 chance of occurring within any given year. Information derived from these studies will be used to revise and update the flood and wave data for the FEMA's coastal Flood Insurance Study reports and Flood Insurance Rate Maps that determine which areas are at a higher risk of flooding than others.

Because of our demonstrated expertise, FEMA asked the District to assist with hydraulic modeling, review the studies, and make recommendations for improvements. The peer review and recommendations were completed in September 2012. We will complete our hydraulic modeling for development of a FEMA coastal flood map in 2014.


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(1) The District has made major contributions to several important studies about rising sea levels. As a result of our efforts, North Alameda County was selected for a pilot study focusing on possible infrastructure at risk. **(2)** As climate change causes sea level rise and heavier storms, Bay Area infrastructure will be more vulnerable to flooding. During king tides in December 2013, the approach to the Bay Bridge toll plaza was close to flooded areas.

Rising Tide Studies

The District was asked to work with the San Francisco Bay Conservation and Development Commission and the National Oceanic and Atmospheric Administration Coastal Services Center on a study to analyze sea level rise. These analyses will draw from the comprehensive hydrologic data the District has been collecting on rising tides.

North Alameda County (Emeryville to Union City) was the subject of the first Bay Area pilot study to look at possible transportation and infrastructure vulnerability due to sea level rise. More information about the study and examples of adaptation actions can be found on the Adapting to Rising Tides website (adaptingtorisingtides.org).

The District is now financing its own study of South Alameda County (south Hayward through Fremont).

All of these studies are a first look at how extreme tides from sea level rise may impact the Alameda County coastline. Dynamic tides, which are either very low or very high, together with wave or storm surge will have different effects on different parts of the county's diverse coastline topography. For instance, Eden Landing Salt Ponds can absorb more rising water and storm surge, while other urban coastal locations may require levees or floodwalls. Study findings will help determine where the District needs to further evaluate particular challenges.

(BACKGROUND IMAGE) In 2011, levee improvements were made along Alameda Creek near the San Francisco Bay in Fremont. New tide gates were also constructed for more flood control.

New Davis Street Pump Station to Handle More Water

"The pump station will be operated with advanced controls that can be monitored onsite and remotely 24/7."

Frequent local flooding around Davis Street, west of Highway 880 in San Leandro, is caused by a combination of higher sea level and stormwater from heavy rains. After we completed a study of the area, we determined that the existing gravity drainage system was inadequate to handle the high tide and storm event flow and that a new pump station was needed for greater flood protection in the community.

Pump stations take water from creeks, storm drains, and underground pipes in basins, and then pump it to an elevation high enough to allow the water to flow by gravity to the San Francisco Bay.

In fiscal year 2012-2013, we completed design and permitting for the station, which is comprised of two structures: the pumps are in an underground building, while the electrical controls are in an adjacent aboveground building. The station is being built on land owned by the City of San Leandro and is being constructed at night so as not to disrupt nearby businesses. Construction began in August 2013 and will be completed in late 2014.

The District is building a new pump station in San Leandro to pump more stormwater into San Francisco Bay because climate change is likely to bring higher tides and heavier winter storms to the Bay Area.

Stormwater runoff from surrounding streets and roadways will be collected in large concrete basins before being pumped to the Bay.

Watershed History to Guide Future Plans at Alameda Creek

"Hundreds of historical maps, photographs, and documents together with current scientific data were used to create a new geo-database."

Understanding the past can often help in planning for the future. That's what the District confirmed through the "Alameda Creek Watershed Historical Ecology Study," published in February 2013. The study was funded by the District and the San Francisco Public Utilities Commission.

The study followed the transformation of the San Francisco Bay's largest tributary watershed (700 square miles) from wetlands and meadows long ago to a densely populated urban region today. Hundreds of historical maps, photographs, and documents together with current scientific data were used to create a new geo-database and body of information.

With data from the study, we know how water used to flow through the Alameda Creek watershed, which will enable us to make better decisions about how to improve the health, ecosystems, and management of the watershed. For example, floodwaters used to spread over undeveloped grasslands and into meadows, pools, and tidal marshes. Water now drains more quickly across rooftops and roads into manmade channels and small creeks. This faster-flowing water has caused more erosion and sediment deposits in channels near the Bay.

The Flood Control District is using the historical information to help improve habitats and manage our flood control channels more naturally and sustainably. The Alameda Creek Watershed Historical Ecology Study can be viewed at the San Francisco Estuary Institute website (sfei.org).

Long ago, the Alameda Creek watershed was comprised of meadows and wetlands, but many areas are now densely populated sections of Fremont and Union City that require greater flood control. Alameda Creek is the longest flood control channel in the county (11.5 miles).

Alameda Creek Fish Ladder Construction to Begin in 2014

Now that required environmental permits have been obtained, construction of the new Alameda Creek Fish Ladder can begin in 2014. The regional Public Utilities Commission and the Alameda County Water District have agreed to release more water upstream to ensure there's enough water in the creek for the fish to swim year round. The District will also cut notches through the creek's concrete barriers to create low-flow water streams for fish to swim.

The fish ladder project will restore salmon and steelhead trout to Alameda Creek. The fish ladder will enable fish to swim beyond the concrete footings of BART and the railroad tracks further upstream to spawn and will also provide small fry with passage back to the bay.

Aging Pumps Replaced at Eden Landing Pump Station

Five new pumps were installed at the Eden Landing Pump Station to replace old models. The station collects stormwater runoff and pumps it to Mt. Eden Creek, where it flows to the Bay.

The electric pumps are fully automated with the state-of-the-art Supervisory Control and Data Acquisition (SCADA) system, which allows District crews to monitor pump station operations remotely with only a laptop computer and a phone connection.

The District has upgraded the Eden Landing Pump Station that handles stormwater from a 308-acre light industrial and commercial area south of the San Mateo Bridge in Hayward. Runoff is collected in pump station storage basins and then pumped to Mt. Eden Creek, which drains to the San Francisco Bay.

The pumps were so old that repair was no longer feasible. Five new pumps were installed, four of which are electric, to replace old ones powered by diesel fuel. The electrical components and control panels are so large that the District had to purchase a prefabricated building to house them. A new emergency generator was also constructed as part of the backup system. The upgrade design began in July 2011 and construction was completed over two seasons, by November 2013.

In another project, the District constructed an 860-foot-long bypass consisting of new 48-inch reinforced concrete pipe between the Eden Landing Pump Station and Mt. Eden Creek.

The original pipe, installed in the 1970s, was partially filled with sediment at a low point along the pipe. Cleaning the pipe is expensive and the problem would occur again. The new pipe enables more stormwater to be pumped out to the creek faster, with less wear and tear on the pumps. Construction took place between July and October 2012.

An 860-foot-long segment of drainage pipe between the Eden Landing Pump Station (right background) and Mt. Eden Creek was installed to replace a segment of pipe that had filled with silt.

New Detention Basin to Hold Stormwater and New Playing Fields

Before the Glen Eden neighborhood in Hayward was developed, a 54-inch-diameter drainage pipe, called Line A-5, was installed to convey stormwater runoff from the area. Recent hydraulic studies by the District showed that the pipeline was too small for flows from a 100-year storm. Installing a larger diameter pipe was not feasible because of limited easements and lack of access between homes. As an alternative solution, the District determined that a detention basin could be built to temporary hold excess water during peak periods of rain.

The basin will be located at the 9-acre playing fields next to a former elementary school owned by the Hayward Unified School District. Phase I of the project was planned and permitted by the District last year, and constructed during the summer of 2013. A 36-inch-diameter pipe now connects the school's playing field with the existing Line A-5 pipe at Bunting Street, upstream of the playing field. When the Line A-5 pipeline is full, the new pipe will carry storm water to the field.

Phase II of the project will be constructed in Summer 2014. A detention basin will be excavated that can hold up to 3 feet of stormwater runoff during peak rainfalls. The stormwater will drain quickly back into the Line A-5 after peak flow in the pipe has passed. When dry, the basin will function as an ADA-compliant school recreation field.

This project is an excellent example of how the District works with other agencies to provide beneficial use of its facilities and make community improvements, whenever possible.

A new detention basin, to be built in 2014, will improve flood control in Hayward's Glen Eden neighborhood. When dry, the basin will serve as a new full-size baseball or soccer field and a smaller size "youth" soccer field.

(BACKGROUND IMAGE) In summer 2013, a 36-inch drainage pipe was installed to convey excess stormwater from Line A-5 at Bunting Street in Hayward to a former elementary school play field. This measure will improve flood control until the new detention basin is excavated.

Channel Upgrades Save Property Owners from Purchasing Flood Insurance

During construction, a 72-inch concrete pipe was installed along Line A adjacent to three 72-inch pipes at the confluence of Lines A and E.

Line A is a primary flood control channel in Hayward that runs 4.5 miles from Amador Street to the Bay. Where the Line A channel meets the Line E channel just west of Cabot Boulevard in Hayward, the District installed a new 72-inch concrete pipe to increase the amount of stormwater the channel can carry.

The pipe was installed between April and September 2013.

The upgrade to Line A was part of the 2005 Zone 4 Master Plan to raise the level of flood control protection to a one percent annual chance flood, meaning a flood that has a one-in-a-100 chance of occurring within any given year.

The District will now take further procedural steps to remove the surrounding neighborhood from a Federal Emergency Management Agency (FEMA) designated floodplain. Once the steps are completed, property owners in the area will no longer be required to carry flood insurance.

Before the flood control upgrade to Line A where it meets Line E, the channel was unable to contain and convey runoff from a 100-year storm through the culvert crossing.

Construction was finished in 2013. Now, the Hayward neighborhood upstream meets the 100-year flood control level requirements, and properties will be removed from the FEMA floodplain map.

Channel Improvements Include Special Treatment of Mouse Habitat

Before the Line N1 channel was desilted, silt deposits had made the channel narrower and shallower so that it was unable to carry as much stormwater as originally designed.

During a desilting process, 1,200 feet of the Line N channel were dredged.

The Lines N and N1 flood control channels contained large silt deposits carried by the small creeks that drain into them. The sediment impeded the flow of stormwater from the Lines N and N1 channels into Mowry Slough, located southwest of Automall Parkway in Fremont. Mowry Slough drains into the bay.

To remove the sediment along 5,400 feet of Line N and 1,200 feet of Line N1, the District dredged the channels in a procedure called "desilting." After being desilted, the channels can again convey the amount of stormwater originally intended when they were first designed.

Before the project began, the District made special arrangements for the endangered Salt Marsh Harvest Mouse, which eats pickleweed. The pickleweed had to be removed by hand along the channel sections to be desilted, while the mice were encouraged to relocate to nearby undisturbed habitat with pickleweed.

Between June and October 2012, about 25,500 cubic yards of silt were removed from the channels. When the desilting process was completed, the area was reseeded with pickleweed to restore the mouse habitat. The silt removed was cleaned and stored by the District for beneficial reuse at a future date.

US GEOLOGICAL SURVEY

One year after desilting, the Line N1 channel can carry more stormwater. Pickleweed is growing again along the channel banks to provide habitat for the Salt Marsh Harvest Mouse.

Greater Flood Control Enhances City's Natural Beauty

The Line M flood control channel runs through parts of Union City and transports stormwater to Alameda Creek. A hydraulic study performed by the District showed that water could overtop sections of the Line M banks during major storms. To proactively increase flood control and meet a 100-year flood level, the District made several improvements.

Silt deposits had restricted the amount of stormwater the channel could carry. The District dredged roughly 4,700 feet along Line M between Royal Ann Drive and the Union Pacific Railroad and BART tracks east of the Union City BART station. After desilting was completed, channel banks were planted with new 73 new trees and native vegetation to create an attractive natural setting for the community.

Additionally, a 225-foot section of the Line M channel was widened between Perry Road and the outfall at Alameda Creek and two 72-inch pipes were installed to carry more stormwater. Construction of both projects was completed in October 2012.

In 2012, the District removed the silt along a 4,700-foot section of Line M in Union City, so the channel can carry more stormwater.

Between Perry Road and the Alameda Creek outfall, two 72-inch pipes (right) were added to the existing three pipes to carry more stormwater along Line M.

After dredging was completed, the District planted native vegetation and trees along the Line M channel banks.

Reinforcing a Creek Bank in Castro Valley

A section of Castro Valley Creek's west bank, located roughly 100 feet downstream of Castro Valley Boulevard, had eroded enough to cause cracks in a nearby parking lot. Between July and September 2012, the District installed steel sheet piles to stabilize the bank. The piles were driven into the ground along 120 feet of the bank behind a rustic log wall. The completed work strengthens the creek bank without diminishing the attractive log wall. After construction was completed, the parking lot was repaved and the area was seeded with native grasses.

(1) A cracked parking area was the result of an unstable section of nearby Castro Valley Creek as the creek bank eroded. **(2)** In 2012, sheet piles were driven down into the creek bank to stabilize the ground. **(3)** After construction, the community can again admire the rustic log wall that borders the creek without seeing the protective sheet pile barrier. The parking lot was also repaved.

More Pipes Carry Stormwater Through Stonehurst Creek

As a result of a hydraulic study completed in September 2011, the District determined that an existing culvert at Knight Street in Oakland was not large enough to convey a 100-year storm flow along the Stonehurst Creek channel. To increase the amount of flow in the channel, the District installed two 78-inch reinforced concrete pipes adjacent to the existing box culvert. The additional pipes will minimize the potential of flooding in the adjacent Oakland neighborhoods. Construction was carried out between May and October 2013.

(1) Based on hydraulic modeling, the District determined that a culvert at Knight Street in Oakland was too small to handle a 100-year storm flow along the Stonehurst Creek channel. **(2)** To meet a 100-year storm level, the District added two 78-inch drainage pipes, one on each side of the existing culvert.

Restoration Along Scott Creek Benefits Flood Control and Wildlife

Scott Creek is both a flood control channel and the historic border between Alameda County and Santa Clara County. Due to increased stormwater flow, a 1,050-foot section of Scott Creek needed restoration between Green Valley and Scott Creek Roads in Fremont. Stormwater had caused so much creek bank erosion that the safety of a nearby City of Fremont public pathway was threatened. Sediment had also built up in the storm drain system.

Studies of the creek's condition began in July 2010. Restoration alternatives were developed and design plans were completed. Environmental permits took longer than usual because the project area may be potential habitat for endangered California Red-legged Frogs and California Tiger Salamanders.

Restoration included graded creek banks, installation of rock structures to control water flow, creation of natural pools with improved aquatic habitat, and replanting with native vegetation and trees.

Restoration construction took place between August and November 2013. The District split the project cost with the Santa Clara Valley Water District.

(1) Before the restoration project began, a section of Scott Creek bank was so badly eroded that it was difficult to see the creek (left). Erosion had also undermined the adjacent public path. (2) As part of the project, creek banks were regraded to create a wider channel. (BACKGROUND IMAGE) Rocks were used to stabilize the creek bank, control water flow, and create new aquatic habitat. The regraded creek bank was also planted with native grasses, shrubs, wildflowers, and trees. The public pathway was redesigned and repaved.

The Clean Water Program

The District's Clean Water Program (CWP) works to protect and enhance local creeks and watersheds. The program involves water quality monitoring and watershed assessment, illicit discharge and connection inspection, priority pollutant control, and community outreach to promote watershed stewardship and water pollution prevention practices.

The District's CWP supports and participates in collaborative watershed stewardship efforts through support to Friends of Sausal Creek (sausalcreek.org), Friends of San Leandro Creek (fslc.org), and Alameda Creek Watershed Council, partnering with the City of Oakland to implement the Clean Creeks Program; and participating in community events such as the *Alameda County Fair* and *Alameda County Home and Garden Shows*, *Bringing Back the Native Garden Tour*, and *School Earth Day* events. The District's Clean Water Program also reaches out to school-age children through programs such as the Tule Ponds at Tyson Lagoon and the CWP's Hands-On Conservation Program.

The District CWP is currently updating the Google Earth™ Watershed Map Program for Western Alameda County that was created in 2010. The new version will feature updated historical data; an added layer showing locations, descriptions and photos of District environmental restoration projects; and links to watershed information pages. The new Watershed Map will soon be on the District website.

The District is a member of the Alameda Countywide Clean Water Program (cleanwaterprogram.org), a consortium of the 14 cities of Alameda County, Alameda County Unincorporated Area, the District, and Zone 7 of the District. Through the Countywide Program, member agencies collaboratively implement various stormwater permit compliance requirements that help improve water quality.

(1) With the support of the CWP's Hands-On Conservation Program, high school students planted a hedgerow at Sunol AgPark during the Youth Bridging Nature and Agriculture workday in February. The new hedgerow will attract beneficial insects and pollinators needed for the park's organic farm. **(2)** Dublin Boy Scouts removed trash from Castro Valley Creek on National Public Lands Day in September. The CWP encourages and supports numerous events and Adopt-a-Creek programs to foster environmental stewardship for all ages. **(3)** On Make a Difference Day in October, community and local middle school volunteers planted native poplar trees in Union City. The event was led by the Union City park staff and the CWP's Hands-On Conservation Program.