City of Albany

Watershed Management Plan

Prepared by the City of Albany
in consultation with
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LETTER OF TRANSMITTAL

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TO: City Council

FROM: Bill Ekern, Community Development & Environmental Resources Director

The development and completion of the City's Watershed Management Plan is a significant achievement for the City of Albany. The technical analysis prepared by Mattern & Associates, which is included in the Technical Appendices, provides a detailed study of the City's storm water infrastructure. However, beyond the analysis of pipes and capacity, this Plan provides a framework to understand the link between these pipes and the creeks that carry the water to the San Francisco Bay. This is important because it places the City's treatment and handling of storm water in the context of its impact on the environment. To this end, this document is a powerful long-term planning tool.

It is important, however, to understand that the programs and projects identified in the Plan will still require detailed engineering design. The Plan identifies deficiencies, opportunities, and needs based on a global analysis of the City. At such time as projects are funded, the additional engineering analysis will confirm elements such as location, pipe size, and cost.

As this Plan makes clear, the cost of improving the environment cannot be taken lightly. Hard decisions regarding funding and priorities face the Council in the years to come.

EXECUTIVE SUMMARY

Introduction

The purpose of this document is to provide a comprehensive overview of Albany's drainage systems so as to guide the City in making improvements to these systems. The Watershed Management Plan will become an element of the City's Clean Water Program. It is the intention of the plan to integrate the engineered drainage structures with the natural creek channels in the overall approach to managing and improving in Albany's watersheds.

The City's Clean Water Program is composed of several elements: the National Pollutant Discharge Elimination System (NPDES) permit, a federally mandated program; urban creeks, an environmental restoration program; and storm drain/flood control, a public health and safety program.

Albany's creeks, the NPDES program and the City's storm drain/flood control measures need to be planned and managed as an integrated program. By integrating each of the discrete elements of storm water flow, the entire water system benefits. Creeks benefit from fewer pollutants; storm drains work more efficiently with better filtration mechanisms; and the City complies with its federal permits when all of the systems work in concert.

Storm water that originates in five watersheds flows through Albany via a variety of drainage systems and empties into San Francisco Bay. A watershed is the land over which water flows on its way to the lowest geologic point. In the case of Albany this is the San Francisco Bay. Watersheds are defined by topographic features such as the slight increases and decreases in elevation throughout the City. (See Figure 1)

The purpose of a storm drain system is to drain water from surfaces to prevent flooding. The system collects water running on the City streets and directs it into pipes that carry it to the City's creeks. In some instances the storm drain inlets are located directly over the creeks, where they have been buried in culverts. Most of the City's storm drain system was built in the 1920s and 1930s in conjunction with the development of the residential neighborhoods. (See Figure 2)

The City's storm drain system suffers from two deficiencies. (1) The original engineering of the system did not take future upstream development into consideration and the system has inadequate capacity to prevent public and private property damage due to flooding. Annual flooding occurs that damages public and private property. (2) The system has inadequate or non-existent facilities to separate pollutants from storm water. The system directly discharges almost all sources of urban water pollution into the

creeks and, ultimately, the San Francisco Bay. Thus, the issue of water quality is important, both in terms of the environment and infrastructure.

In cases where pipes are under-sized, the system often fills with debris and backs up, creating flood conditions. As a result, intensive maintenance is necessary to remove debris from the storm drain system. The pipes that are located at street corners, such as those in Solano Avenue, were designed for smaller flows and now require continuous cleaning by City crews. In an effort to reduce areas of historic flooding, the City's maintenance crew focuses considerable effort and technology on clearing the small inlets and culverts that are prone to flooding. Besides creating nuisances for residents and businesses, flooded intersections and culverts create potentially hazardous situations and property damage.

The last three winters have demonstrated the need for improved storm drain systems. In several locations storm waters overwhelm the system forcing water and mud to flow overland through yards and private property.

The Plan describes existing conditions (including known problems and theoretical deficiencies) and recommends opportunities for improvements to the overall storm drain system of the City. It provides a vision for enhancement of the watersheds. Watershed project recommendations are provided and prioritized. The Plan is organized by watershed, so that projects, programs, and issues can be evaluated in the context of potential impact and benefit within the watershed.

Approach

In January 1997, the City Council authorized staff to issue a Request for Proposals to develop a Watershed Management Plan. In response to this request, twelve proposals were received. Staff interviewed five consulting firms and recommended the team led by Mattern and Associates. Mattern and Associates, which was involved in the preparation of the El Cerrito Storm Drain Master Plan, teamed with three other consulting groups (Wolfe Mason Associates, Balance Hydrologics, Inc., and Botanical Consulting Services) to provide a comprehensive approach to the watershed issues in Albany. The Council awarded a contract to Mattern and Associates in April 1997, and work began in May 1997. On June 19, 1997, a public meeting was held to solicit input from residents and businesses regarding drainage problems that affect them, or ones they know of.

The three main elements of the Plan are Storm Drainage and Flooding, Creek Restoration, and Water Quality. Included in each of these sections are extensive file and field research. Field studies were conducted by Mattern & Associates, Wolfe Mason Associates, Balance Hydrologics, Inc., and Botanical Consulting Services.

The City of Albany has a long history of concerns about its watershed areas. In 1977,

the Albany Landuse Committee and the Albany Planning & Zoning Commission prepared a Creek Restoration Program report. This report recommended that the City encourage controlled access to creeks in public and semipublic areas, improve wildlife habitat and enhance visual qualities in industrial and commercial areas. The report suggested short-term projects that included planting suitable vegetation, stream cleanup, establishing cooperation with other agencies, and public education. Suggested long-term programs included requiring creek restoration as part of development, and public acquisition of property along creeks.

File research indicated that no storm drain master plans exist for Albany. Storm Drain Master Plans are complete for the cities of Berkeley and El Cerrito. Because these cities share watersheds with Albany, these studies were reviewed. The Watershed Management Plan includes information from these plans.

A number of studies have been prepared for individual sites in Albany. This Watershed Management Plan relies on and references the plans for these sites. On Codornices Creek these sites include the former Villa Motel property (between San Pablo Avenue and Kains Avenue) and University Village between San Pablo Avenue and the Union Pacific Railroad tracks. Along Cerrito Creek, studies evaluated opportunities adjacent to the El Cerrito Plaza and the Albany Hill Creekside Park.

An evaluation of flooding conditions in Codornices and Village Creeks within and adjacent to the University Village property, including a hydrology analysis and hydraulic study, was prepared in 1993 for the University of California by Philip Williams & Associates. Philip Williams & Associates supplemented the 1993 report with an additional hydraulic analysis of various flood control alternatives in October 1997 (draft). These reports are included by reference.

As part of the storm drain evaluation, a field review was made of the existing storm drain system to confirm the type, size, and condition of existing pipes and culverts. The depths to inverts (i.e., flow line) of pipes were measured. Surface elevations of access points were obtained with Global Positioning System (GPS) methods to allow determination of pipe inverts and slopes.

Storm drain maps were prepared showing the location of existing storm drains, using 1997 topographic maps as the base map. A storm drain database was created with information about each pipe segment, and each drainage sub-area in the City. Ultimately, this database will be linked to the orthophoto map files for planning and ease of information transfer.

A field review was also performed of all existing creek channels in the City. A video tape record was made of the creek conditions, and an assessment was made of bed materials, bank materials, channel dimensions, and structures near the creeks. An inventory was made of existing vegetation and wildlife habitats in and near the creeks.

Hydraulic Analysis

A hydrology analysis was performed for the entire city to estimate water flows at various points in the storm drain system. For evaluation purposes 118 sub-areas averaging 7 acres (about 2 city blocks) each were identified. The analysis of system capacities is used to evaluate deficiencies, based on criteria discussed below, and to provide a basis for determining maintenance priorities and recommended improvements.

The level of flood protection provided by a drainage system is called its design storm frequency. This is expressed as an average period that it is predicted will occur between larger storm events that exceed the drainage system capacity. The 10-year storm has the probability of occurring once in ten years, or a ten percent chance of occurring in any year. Likewise, the 100-year storm has the probability of occurring once in 100 years, or a one percent chance of occurring in any year. It is also possible, although generally unlikely, to have two 10-year storms or even two 100-year storms in a single year.

Drainage criteria recommended for planning storm drain improvements for the City of Albany are the 10-year storm for areas less than one square mile, and the 25-year storm for larger areas. These standards are comparable to criteria used by counties and other cities near Albany.

Hydrology methods used for the evaluation were the rational method, using criteria developed by the Alameda County Flood Control District. The rational method is the most widely used and accepted method for analysis of small urban watersheds. This analysis method measures the average depth of rainfall in an area over a given time period. The resulting calculation gives a resulting flow measured in cubic feet per second (cfs). The method is generally accepted as being reasonably accurate for drainage planning purposes in watersheds up to one square mile in drainage area. The watershed areas defined for the analysis of the storm drain system in Albany were small enough that the rational method of estimating peak storm runoff is appropriate.

Storm Drain Condition

Generally, the field surveys identified three primary storm drain pipe materials: concrete, corrugated metal pipe (CMP) and vitreous clay (VCP). The storm drain maps catalogue each type within each watershed.

Based on inspection of the storm drain system, the condition of concrete pipes appears to be good. The condition of clay pipes is generally good, but some pipes are cracked or have offset joints causing debris to accumulate or soil surrounding the pipes to wash into the drain. A few CMP drains are in poor condition, and are a high priority for replacement.

Many areas of Albany lack underground storm drains, and storm runoff is carried in street gutters and shallow cross street drains. Some of these gutters carry large flows, which might be more appropriately carried in underground systems in areas where local ponding affects traffic or pedestrian safety. Many of the street cross drains cause significant maintenance problems, generally because of corroding pipe material, flat slopes, and difficult access. This Plan recommends that funding be allocated annually for these storm drain improvements, as part of ongoing drainage facility maintenance.

Watershed Overview

The watersheds of the City drain into five creeks. These are Codornices Creek, Village Creek, Marin Creek, Middle Creek, and Cerrito Creek. All of these watersheds also drain areas from outside Albany, including the neighboring cities of Berkeley, El Cerrito, and Richmond.

There are five creeks that flow within and along Albany's borders from the Berkeley hills to the San Francisco Bay: Cerrito, Codornices, Marin, Middle, and Village. Cerrito and Codornices Creeks serve as the northern and southern borders of Albany and traverse residential private properties from the eastern Albany border to San Pablo Avenue in a combination of buried and open channels. These creeks are above ground for most of their length from San Pablo Avenue to the Bay. Two creeks, Middle and Village, are predominantly underground and generally run through private property, including underneath houses and businesses. Marin Creek runs through a culvert in the center of Marin Avenue, the Gill Tract, Albany Middle School and U.S.D.A. properties.

Reviewing City maps it is apparent that large sections of the creeks in Albany are not publicly owned or accessible. The current City urban creek efforts, therefore, focus on two areas. First is providing information and education to property owners along the creeks to aid them in improving and retaining the natural elements of the creek. Second is working in areas under public ownership (such as within University Village and along the Creekside Park) to improve public access and to restore the riparian habitat.

During the building of Albany through the 1950s, creeks were placed in culverts, buried, and built over, severing the tie between the creeks and the wildlife that depend on them. During the last three years, community interest in restoring creeks has increased, spurred by City outreach and education. The community support to restore Albany's creeks is evidenced by attendance at events such as Creek Forums, volunteers at creek clean-up events, and local activist groups providing regular water quality monitoring of the creeks. The outreach and education efforts in 1995 and 1996 led to the formation of the Friends of Five Creeks, a volunteer group whose goal is to improve the quality of Albany's creeks. The efforts of these groups and the City contributed to the passage in November 1996 of Measure R, which provides funding for creek restoration, as well as open space and recreation fields.

Codornices Creek Watershed

Codornices Creek Watershed is located along Albany's southern boundary between Albany and Berkeley. The Codornices Creek Watershed extends from the Berkeley hills to the San Francisco Bay near Golden Gate Fields. At some time in the past, the City of Berkeley diverted a portion of the water in this drainage area into the Marin Creek watershed. Only about 4% of the drainage area is located in Albany. Figure 1 shows the relationship of the total watershed to that portion located in Albany.

Storm drains with insufficient capacity to carry the 10-year design storm (i.e., those pipe systems considered deficient) in this area include those on Dartmouth Avenue, Posen Avenue, and Peralta Avenue. These projects are identified in the Codornices Creek Watershed section as recommended storm drain projects (SD) SD-5 and SD-18.

East of San Pablo Avenue, Codornices Creek's channel has been altered as it traverses the mostly residential neighborhoods of Albany and Berkeley. In this reach (or creek section), bed and bank materials generally consist of poured concrete or concrete debris. Downstream of San Pablo Avenue the channel is wider and shallower, generally having earthen banks.

Existing conditions observed in the creek include several areas where structures or debris may block flows, vegetation is growing in the channel, and a few areas of erosion. Recommendations for restoration, repair, or resolution of these conditions are identified as creek restoration projects (CR) CR-3, CR-6, and CR-15. The areas most suitable for habitat enhancement are areas downstream of San Pablo Avenue. Creek restoration opportunities include the former Villa Motel site located between Kains Avenue and San Pablo Avenue. This project is CR-6.

The most serious flooding problem in the watershed is located between 6th Street and Interstate-80. These problems are generally caused by low culvert capacity at Interstate-80, the Union Pacific Railroad crossing, Fifth Street, and Sixth Street. The street crossing culverts are located on City of Berkeley streets just outside the University Village housing site. It should be noted that this area is presently identified as being within the 100-year flood plain as defined by the Federal Emergency Management Agency (FEMA) through its Flood Insurance Rate Map (FIRM).

Vegetation habitat in Codornices Creek consist of Central Coast riparian scrub, coast live oak woodland, and coastal freshwater marsh in the upper portions, and coastal brackish marsh and northern coastal salt marsh in the lower areas. A number of native tree species are present in the upper parts of the creek.

Village Creek Watershed

Village Creek is a relatively small watershed located almost entirely within Albany.

The watershed is in an area south of Marin Avenue and generally the middle of the 1000 block of the north-south streets located between San Pablo Avenue and the eastern Albany border. The entire drainage system east of San Pablo Avenue is contained in storm drain pipes. See Figure 1 for the location of this watershed.

Many of the storm drains in this basin have serious capacity deficiencies. Critical issues with storm drain projects in this watershed revolve around the location of some drain pipes on private property and beneath houses. Recommended priority projects for this system are SD-1 (A-C).

At some point in the past an overflow channel was constructed to benefit Codornices Creek. This overflow channel connects with the Village Creek channel at the western edge of University Village to discharge through the Union Pacific Railroad right-of-way and on into San Francisco Bay.

Flooding problems are experienced in the area near the Union Pacific Railroad tracks and upstream of Interstate-80. These problems are caused by overflows that occur in the Codornices Creek overflow channel, low culvert capacity at Interstate-80 and the Union Pacific Railroad crossing, and lack of vegetation management in the channel on private property.

Open creek sections are located west of San Pablo Avenue and east and west of the Union Pacific Railroad tracks. Generally the banks remain earthen. Existing vegetation habitat includes ornamental trees, freshwater marsh, and riparian scrub.

The existing creek sections have moderate to high opportunities for habitat enhancement. This Management Plan recommends creek restoration projects at various creek sections, including the existing culvert through the University Village housing site. Recommended projects adjacent to University Village are CR-11 and CR-17. CR-11 is located on the Union Pacific Railroad property. CR-17 involves property owned by the University of California. Both are outside the immediate control of the City of Albany.

Marin Creek Watershed

Marin Creek is located along Marin Avenue, and extends from Berkeley to the San Francisco Bay near the Interstate-80/Buchanan Street interchange. About 27% of the watershed is located within Albany. Changes to the storm drain system in Berkeley have transferred water into the Marin Creek watershed from areas that historically drained into either Codornices Creek or Middle Creek. The former creek is entirely contained in culverts and pipes. Figure 1 shows the extent of the watershed extending into the City of Berkeley.

Issues with the existing storm drain system include:

- capacity deficiencies at the Interstate-80 crossing,
- the drain from Washington Avenue and Kains Avenue west to San Pablo Avenue,
- the drain in San Pablo Avenue from Washington Avenue south to Solano Avenue,
- the drain on Madison Street from Solano Avenue south to Buchanan Street,
- local drainage on Solano Avenue,
- drainage on Cleveland Avenue at Washington Avenue and Solano Avenue, and
- the southeast corner of Marin Avenue and Curtis Street.

There are no existing open creek areas in the Marin Creek watershed, and no existing habitat. Creek restoration opportunities would be limited to removing the existing culvert. An opportunity exists west of San Pablo Avenue through the University of California Gill Tract, the Albany Middle School play fields, and the United States Department of Agriculture Research Center. Because the City is pursuing additional playfields, it is not considered feasible to open the creek within Middle School Park. The cost of relocating the baseball fields would include removal of the tennis courts and the removal of the grove of trees at the southwest corner of the park.

Middle Creek Watershed

The Middle Creek watershed is located north of Solano Avenue to approximately Brighton Avenue. About 90% of the drainage area is within Albany. A significant portion of the historic Middle Creek drainage area now flows into the Marin Creek storm drain because of drainage improvements in the City of Berkeley. Figure 1 shows this watershed.

Storm drain capacity deficiencies include;

- the existing drains at San Pablo Avenue under the Albany Bowl building,
- the drain in Portland Avenue, and
- local drains on Portland Avenue at Santa Fe Avenue, and Washington Avenue at Santa Fe Avenue.

These projects are identified as SD-9, SD-12, SD-14, and SD-16

Open creek sections include a small section west of Masonic Avenue, and from Adams Street west to Cerrito Creek. Existing vegetation habitat includes Central Coast riparian scrub. The section of the creek west of Adams Street is considered to have high potential for habitat enhancement and creek restoration. This section of the creek is one of the few in the City on publicly owned land, as it is immediately adjacent to the Albany Hill Creekside Park.

Cerrito Creek Watershed

Cerrito Creek flows along the northern boundary of Albany. It is generally perceived

as the boundary between Albany and the cities of El Cerrito and Richmond. Only about 2% of the watershed area is located in Albany. Much of the actual creek flow is in these other cities, with only the southern creek bank at some locations lying within the city limits of Albany. The expanse of this watershed outside of Albany is demonstrated in Figure 1.

There are few existing storm drains in this watershed, and no identified capacity problems. Areas in El Cerrito west of San Pablo Avenue have experienced flooding problems because they are in areas subject to the 100-year flood, but there are no flooding problems on the Albany side of the creek.

Existing vegetation habitat in the upstream areas includes remnants of Central Coast riparian scrub, coast live oak woodland, and coastal freshwater marsh. West of San Pablo Avenue, habitat includes native riparian trees, riparian scrub, coastal freshwater marsh, coast live oak woodland, coastal brackish marsh, and northern coastal saltmarsh.

Habitat enhancement opportunities include areas west of San Pablo Avenue and adjacent to the El Cerrito Plaza. The most likely sections for creek restoration include the areas adjacent to the future Albany Middle School, El Cerrito Plaza, and Albany Hill between San Pablo Avenue and Pierce Street. These are identified as creek projects CR-2, CR-4, CR-5, CR-8, CR-12, CR-14, and CR-16.

Storm Water Management Alternatives

Water Quality

The 1987 re-authorization of the Federal Clean Water Act requires cities throughout the United States to obtain a National Pollutant Discharge Elimination System (NPDES) permit. The NPDES permit enables the City to discharge storm water to the San Francisco Bay. Fifty percent of water pollution is estimated to originate from "non-point" sources, i.e., various and dispersed locations. These sources include automobile fluid leaks and spills, residential and commercial fertilizer and insecticides, street litter, animal waste, and hundreds of other sources of solid and chemical waste that is deposited onto streets, parks, and lawns. This pollution is washed off surfaces, carried by rain to the creeks, and then to the San Francisco Bay.

Through its permit the City is responsible for the quality of the water that flows over the land within City boundaries and into the Bay. Alameda County, through the County-wide Clean Water Program, administers the NPDES permit for all cities in Alameda County.

The NPDES permit requires cities to meet minimum performance standards in the areas of maintenance, public information, new development, industrial inspections, and illegal

discharge enforcement, primarily through Best Management Practices (BMPs). These BMPs and the minimum standards for implementing them are outlined in the Alameda County Storm Water Management Plan. The City of Albany, over the past two years, has met and exceeded these standards through the concerted and combined efforts of the Fire Department and the Community Development & Environmental Resources Department.

The NPDES permit fee and the programs required through it were not specifically funded for many years. Storm drain fees of $22.60 per household now provide annual funding of $158,000 to the City's Clean Water Program. The FY1998/99 budget commitment to the Clean Water Program includes $10,000 repayment to the Sewer Fund for development of the Watershed Management Plan, $30,000 for small, specific storm drain projects, $14,400 for the continuing efforts of public outreach and education, $20,600 for the annual NPDES permit fee, and $83,000 for labor costs associated with street sweeping and maintenance of the storm drain system and creeks.

Water quality data in Albany has been obtained in previous studies and by community volunteer groups for Codornices Creek and Cerrito Creek. Although the testing methods are not consistently performed under rigorous scientific controls, results show that both streams are generally healthy. A review of water quality in the open reaches of Cerrito, Codornices, Village, and Middle Creeks in August 1997 as part of the development of this Watershed Management Plan, showed that water quality varied in the range from acceptable to excellent.

The studies included in this Watershed Management Plan evaluated opportunities to implement innovative and/or standard techniques for improving water quality, called Best Management Practices (BMPs). Locations for implementation of BMPs for water quality improvements in Albany are limited due to the built out and urban nature of the city. Some BMPs might be incorporated into redevelopment of larger parcels, such as the proposed Albany Middle School and the El Cerrito Plaza sites on Cerrito Creek, and along Codornices Creek in conjunction with the planned housing and site improvements at University Village. In general, however, no opportunities for capital projects such as detention ponds or infiltration basins could be identified. A possible demonstration project to reduce erosion at the outfall of the Madison Street drainage pipe is discussed in the Middle Creek Watershed section.

Innovative Solutions to Storm Runoff Control

A primary concern of the City was to not merely develop a plan that places pipes in the ground to carry water directly to the creeks and eliminate any potential benefits of storm water. An analysis was made of opportunities to incorporate developing technologies and open space to reduce the rate of storm runoff. No specific locations were identified that provide on a cost-effective basis sufficient area to construct systems for the detention or retention of storm flows. The available land under public control is generally street right-of-way and the cost of reconstructing public streets, coupled with

the long-term cost of maintenance, made detention systems unfeasible.

Storm runoff in an urban setting affects the overall functioning of the storm drain system. Because of the increase in impervious surface that accompanies urban development, rain has less opportunity to soak into the ground than prior to development. The time it takes water to move from one point to another is significantly reduced, which results in overwhelmed pipes and creeks. Rather than attempting to retard large volumes of water through detention ponds, it is often effective to control the rate at which runoff leaves an individual piece of property. A multitude or community of efforts can be effective in increasing the time it takes water to move from one point to another.

There are a number of methods for reducing the rate of storm runoff in Albany. These include roof-downspout systems, parking lot perimeter trenches, composite pavement material for parking lots and streets, and modification of street areas. These could be implemented either as conditions of approval for private development or by incorporation into public works projects. To accommodate these improvements, new standard specifications and drawings should be developed and approved by the City.

As the City implements public projects that reduce paved area, such as the Ordway Street demonstration project, which narrows the access to Ordway Street from Marin Avenue, a low-lying, low-maintenance planting scheme could be developed and constructed. New curb and gutter lines would control street drainage, while the planted area would provide an opportunity to encourage groundwater infiltration without risking damage to the roadway section. It is likely the Citywide Transportation Plan will identify a number of specific sites where median planters or round-abouts could be constructed to reduce the impact of traffic in residential neighborhoods. These sites are small, generally only a couple of hundred square feet, but they may most visibly represent the City's commitment to capturing any and all opportunities to improve water quality and reduce the rate of storm runoff.

Although there are theoretical solutions to retard the rate of storm runoff, designs and specifications must address low soil permeability, lack of available open space because of the built-out urban density, and relatively small residential lots. Goals for runoff control should consider a long-term approach, with implementation of small, demonstration sites considered as opportunity presents itself.

Rights and Responsibilities of Property Owners

Because most of the creeks course through private property, the City cannot effectuate improvements to a considerable portion of the watershed. To address this issue, the Community Development & Environmental Resources Department prepared a booklet for private property owners. In this publication, are outlined resources for private property owners to draw upon, as well as an enumeration of the property owners'

responsibilities to maintain creeks and clean water. This booklet is included in the Technical Appendices.

Because of the relationship of the creeks to private property and the fact that the City of Albany does not have any identified easements for maintenance or access to the creeks on private property, improvement or maintenance projects are the sole responsibility of the adjacent property owner. This does not mean that property owners can simply effectuate changes to the creeks. The City's Zoning Code (Chapter XX of the Albany Municipal Code) clearly identifies the requirements and process by which any work can occur along the creek corridors. In fact, the City has established a Watercourse Combining district that overlays the residential and commercial properties that front both Cerrito Creek and Codornices Creek to more clearly define rights and responsibilities. Further, any work that impacts the actual stream bed requires permits from the California Department of Fish and Game. There are some reaches of the creeks, generally near the freeways that are tidally influenced, which means that work in those areas may be subject to federal jurisdiction, including the Department of Fish & Wildlife and the Army Corps of Engineers.

Recommendations

The storm drain and creek restoration projects recommended by this Watershed Management Plan are shown on the following tables in order of priority. Priority is based on several criteria. These criteria include mitigating the potential for public or private property damage and the opportunity for enhancement of a planned improvement project (i.e., other development or construction occurring at the site). For storm drain projects, those projects with the greatest potential for mitigating potential public or private property damage rank highest. For creek restoration, those projects that combine the benefits of flood control improvements, with opportunity (i.e., potential near term development of adjacent properties), and habitat enhancement rank highest. (See Figures 3 and 4)

The projects identified and recommended by this Plan are consistent with the Joint Watershed Goals Agreement (July, 1995). These goals were signed by the City Councils of Albany, Berkley, El Cerrito, and Richmond in recognition of the overlapping of watersheds between jurisdictions. The cities committed to:

1. remove culverts and other obstructions to fish and animal migration;
2. use creek corridors as transportation routes for pedestrians and bicycles;
3. eliminate conditions that pollute rainwater as it flows to creeks and eliminate conditions that prevent rainwater from soaking into the ground; and
4. instill widespread public awareness of the value of developing infrastructure along lines that promote healthier watersheds.

Recommended Storm Drain Projects				
Short Term				
Project Number	Project Site	Drain Size	Length (Feet)	Project Cost Estimate
SD-1A	Neilson Street to Santa Fe Avenue	24"	700	$315,000
SD-1B	Ramona Avenue between Santa Fe Avenue and Key Route Boulevard.	36"	1,120	$504,000
SD-1C	Albany Terrace between Tevlin Street and Neilson Street	21"	550	$151,000
SD-2	Solano Avenue between Pomona Avenue and San Pablo Avenue	18" - 24"	2,000	$500,000
SD-3	Cleveland Avenue between Washington Avenue and Buchanan Street	18"	950	$238,000
SD-4	Solano Avenue from San Pablo Avenue to Madison Avenue and Madison Avenue to Buchanan Street	24"	1,370	$411,000
SD-5	Posen Avenue between Ordway Street and Codornices Creek	21"	1,400	$220,000
SD-6	Madison Avenue from Clay Street north	18"	300	$75,000
SD-7	Marin Avenue at Curtis Street			$35,000
SD-8	Sonoma Avenue at Peralta Avenue			$35,000
SD-9	Washington Avenue at Santa Fe Avenue			$35,000
SD-10	Other Sites			$70,000
SD-11	Drainage Inlet Structures			$50,000

Recommended Storm Drain Projects				
Long Term				
SD-12	San Pablo Avenue between Clay Street and Adams Street (Middle Creek)	48"	450	$160,000
SD-13	San Pablo Avenue from Solano Avenue to Washington Avenue and Washington Avenue to Evelyn Avenue	18"	1,780	$445,000
SD-14	San Pablo Avenue between Clay Street and Portland Avenue and Portland Avenue from San Pablo Avenue to Talbot Avenue	21"	2,000	$550,000
SD-15	Between Key Route Boulevard and San Pablo Avenue (Village Creek)	36"	1,750	$780,000
SD-16	Portland Avenue between the Ohlone Greenway and Carmel Avenue	24"	1,290	$390,000
SD-17	San Pablo Avenue from Codornices Creek to Dartmouth Avenue and Dartmouth Avenue to Talbot Avenue	21"	1,200	$330,000
SD-18	Codornices Creek at I-80	72"	800	$720,000
SD-19	Village Creek at I-80	48"	1000	$450,000
SD-20	Local drainage sites			$35,000/yr

Recommended Creek Projects				
Short Term				
Project Number	Project Site	Project type	Length (Feet)	Project Cost Estimate
CR-1	Codornices Creek: Between Fifth Street and the Union Pacific Railroad Tracks	Restore creek	600	$120,000
CR-2A	Cerrito Creek: Between San Pablo Avenue and Pierce Street	Restore creek	2,100	$400,000
CR-2B	Middle Creek: Between Cerrito Creek and the Orientation Center for the Blind	Enhance ment	200	$95,000
CR-3	Codornices Creek: Between Tenth Street and Fifth Street	Restore creek; new bridge	1,500	$420,000
CR-4	Cerrito Creek: Between San Pablo Avenue and Kains Avenue	Relocate creek	300	$465,000
CR-5	Cerrito Creek: Between San Pablo Avenue and Adams Street	Enhance ment	200	$245,000
CR-6	Codornices Creek: Between San Pablo Avenue and Tenth Street	Enhance ment	300	$160,000
CR-7	Codornices Creek: Between San Pablo Avenue and Kains Avenue	Restore creek	300	$95,000
Long Term				
CR-8	Cerrito Creek: Between Spokane Avenue and the Ohlone Greenway	Open creek channel	700	$700,000
CR-9	Village Creek: Between San Pablo Avenue and Eighth Street	Enhance ment	700	$380,000
CR-10	Codornices Creek: Between the Union Pacific Railroad tracks and Eastshore Highway	Restore creek	700	$195,000
CR-11	Village Creek: Railroad tracks west to Eastshore Highway	Enhance ment	350	$90,000
CR-12	Cerrito Creek: Between Spokane Avenue and Key Route Boulevard	Remove concrete	225	$260,000
CR-13	Middle Creek: At the Ohlone Greenway	Open creek	100	$235,000
CR-14	Cerrito Creek: West of Interstate 80 to San Francisco Bay	Enhance ment	500	$50,000

CR-15	Codornices Creek: Between Kains Avenue and eastern Albany city limits	Education and bridge	3,600	$105,000
CR-16	Cerrito Creek: Between Key Route Boulevard and the Berkeley border	Education 3 bridges	1,400	$312,000
CR-17	Village Creek: Between Eighth Street and the Union Pacific Railroad tracks	Remove concrete	1,500	$875,000
CR-18	Codornices Creek: Golden Gate Fields to San Francisco Bay	Enhance ment		$30,000
CR-19	Marin Creek: Between San Pablo Avenue and the USDA Facility	Remove concrete		$780,000

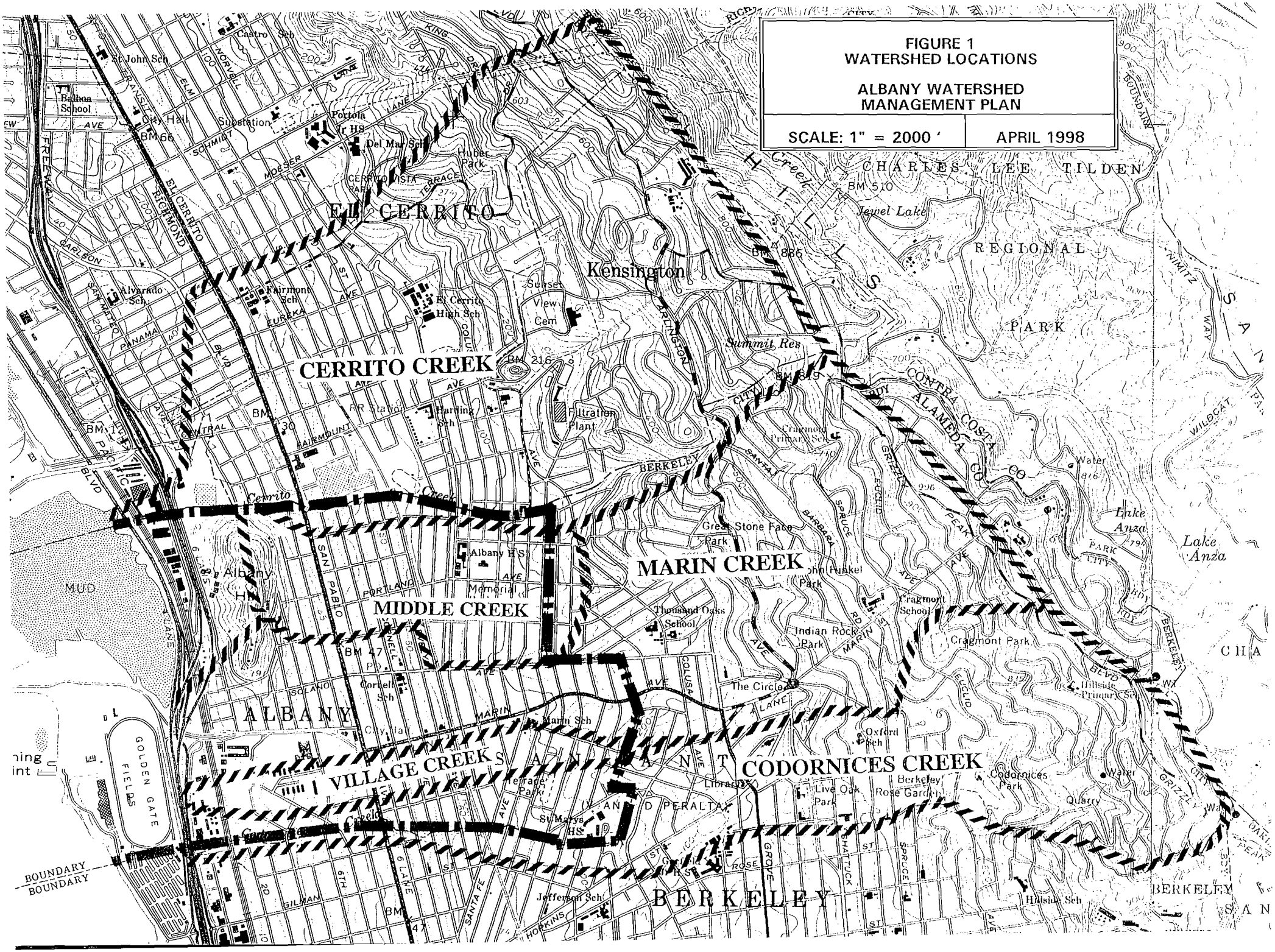


FIGURE 1
WATERSHED LOCATIONS
ALBANY WATERSHED
MANAGEMENT PLAN
SCALE: 1" = 2000 '
APRIL 1998
EL CERRITO
CERRITO CREEK
Kensington
MARIN CREEK
MIDDLE CREEK
ALBANY
VILLAGE CREEK
CODORNICES CREEK
BERKELEY
CHARLES LEE TILDEN
REGIONAL
PARK
Jewel Lake
Lake Anza
Summit Res
Cerrito Creek
Castro Sch
St John Sch
Ballton School
City Hall
Substation
Portola Jr HS
Del Mar Sch
Huber Park
Alvarado Sch
Fairmont Sch
El Cerrito High Sch
Sunset View Cem
Filtration Plant
Harding Sch
Albany H S
Albany Memorial
Thousand Oaks School
Great Stone Face Park
John Hunkel Park
Indian Rock Park
Cragmont School
Cragmont Park
Hillside Primary Sch
Cornell Sch
Marin Sch
Oxford Sch
The Circle
Live Oak Park
Berkeley Rose Garden
Codornices Park
Quarry
Terrace Park
St Mary's HS
Jefferson Sch
Hillside Sch
GOLDEN GATE FIELDS
MUD
BOUNDARY
BOUNDARY

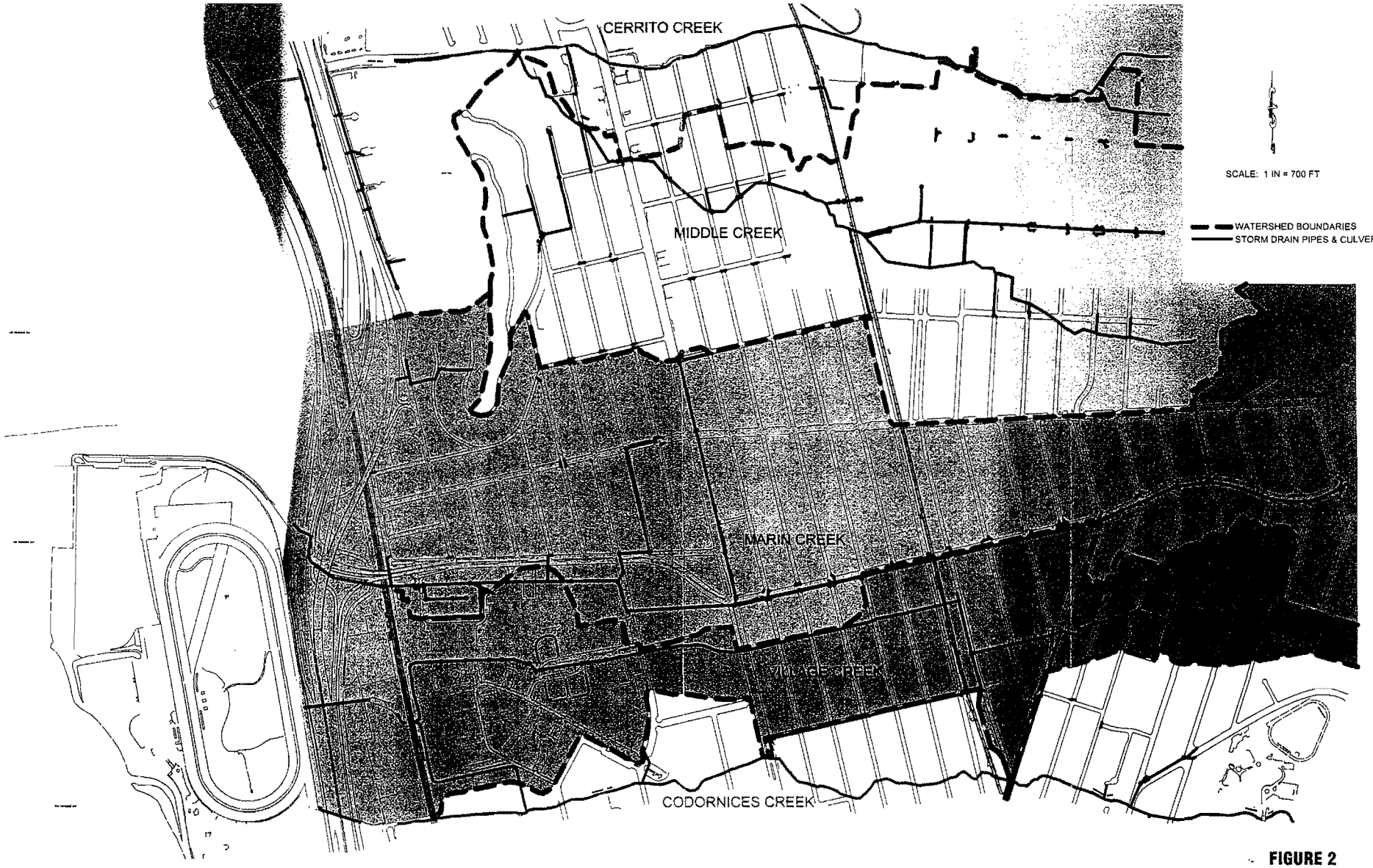


FIGURE 2

EXISTING DRAINAGE SYSTEM

ALBANY WATERSHED MANAGEMENT PLAN

MATTERN & ASSOCIATES

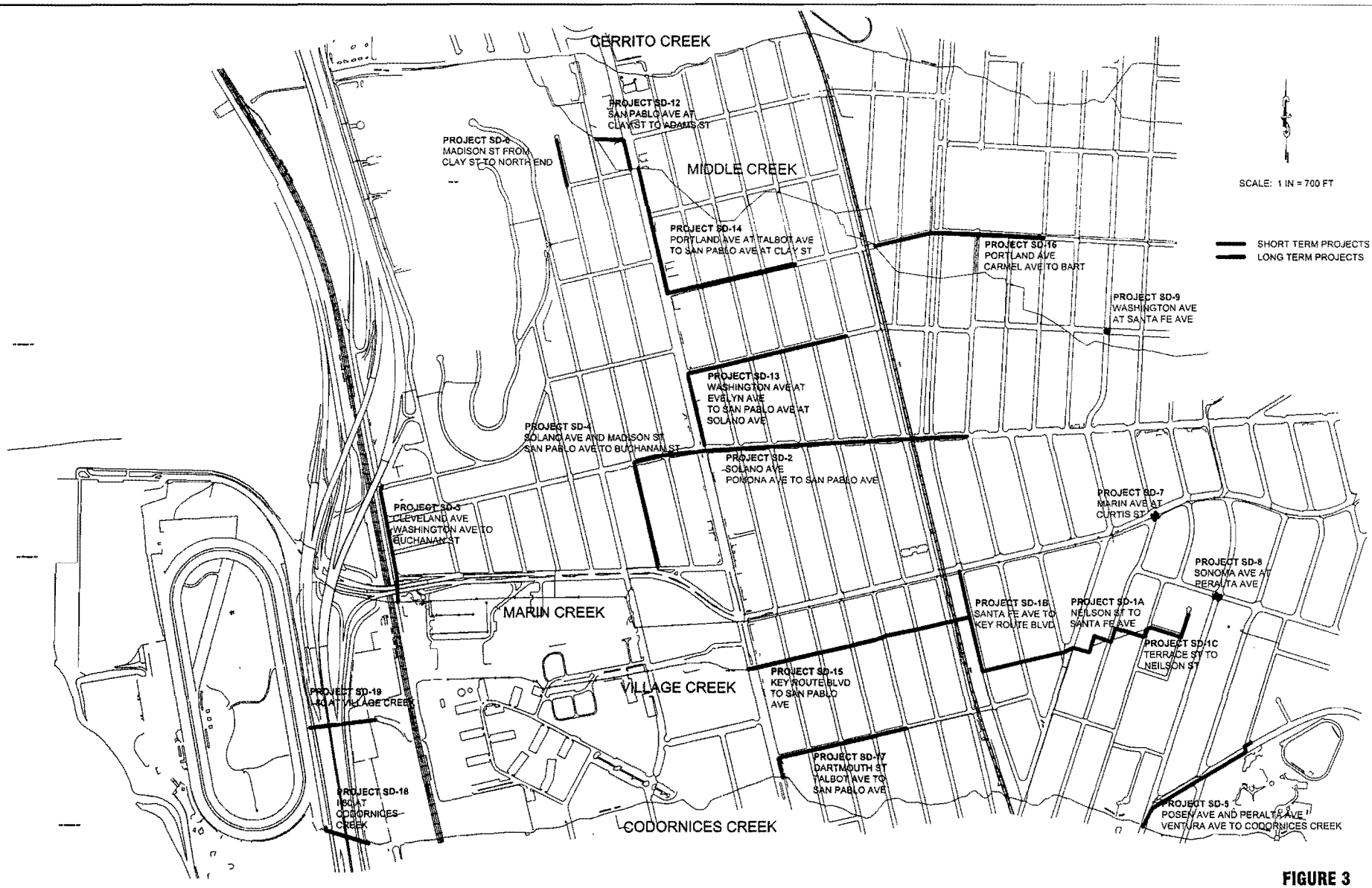


FIGURE 3

ALBANY WATERSHED MANAGEMENT PLAN

STORM DRAIN PROJECTS

MATTERN & ASSOCIATES

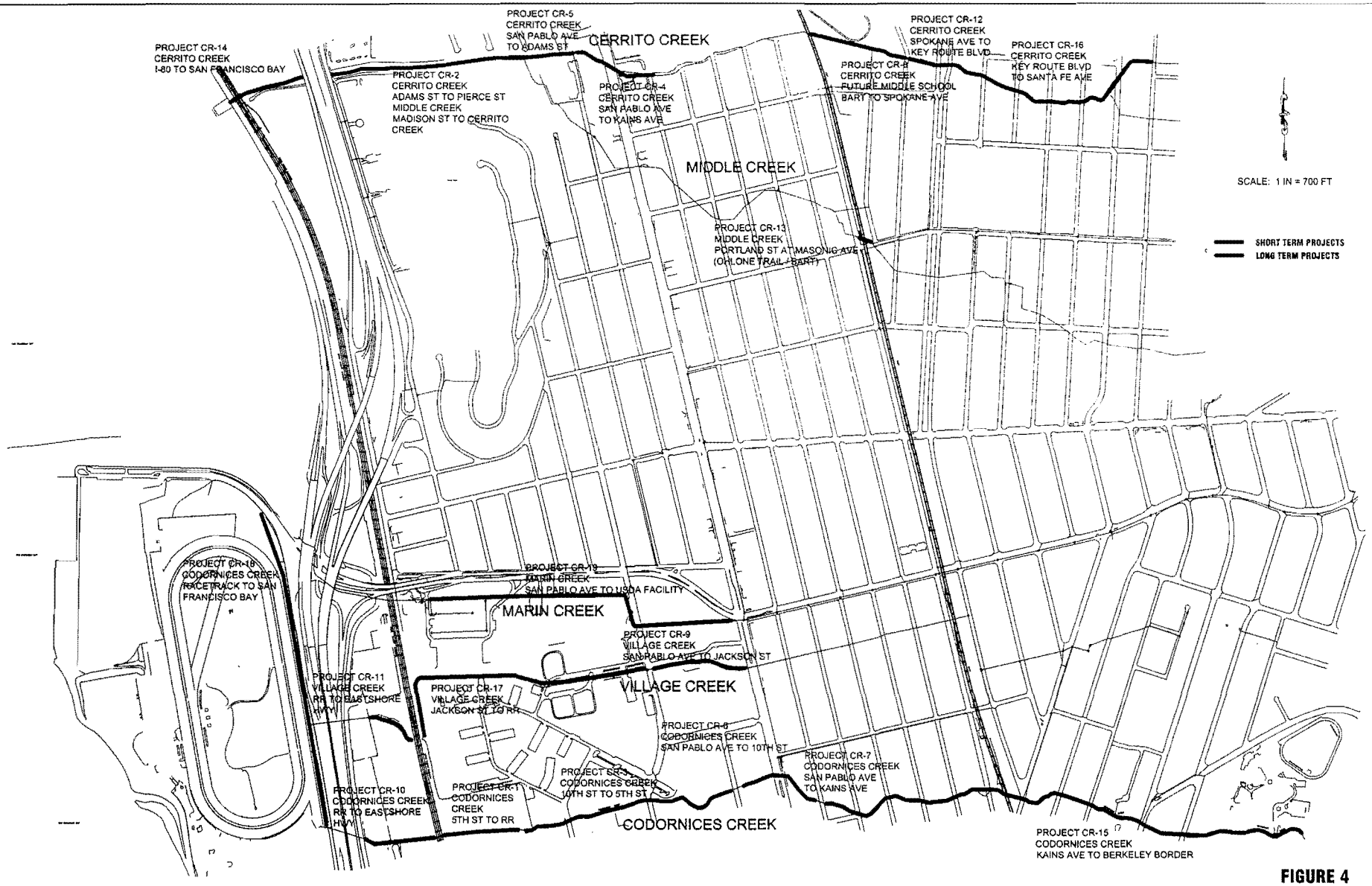


FIGURE 4

ALBANY WATERSHED MANAGEMENT PLAN

CREEK RESTORATION PROJECTS

MATTERN & ASSOCIATES

INTRODUCTION

Purpose of the Watershed Management Plan

The purpose of the Watershed Management Plan is to provide a guide for City policy makers, administrators, and residents to the watersheds in Albany. It assesses the existing conditions, including deficiencies and opportunities, in the watershed system. The Plan provides recommendations for improvements and maintenance efforts within each of the watershed areas. Recognizing the limited City resources, the Plan identifies those projects anticipated to provide the most benefits to the residents. It also provides a menu of recommended actions and goals for the near future (five year period), and over a longer period of time (beyond five years). The Plan is a management tool intended to assist in the preservation and restoration of the Albany water resources. As such, it also serves as an educational tool.

Importance of Watersheds

A watershed consists of all the lands that are drained by a particular creek or river. Activities and decisions that affect local watersheds may affect larger regional watersheds.

Watersheds and their drainage channels were an important part of early civilization. Creeks and rivers provided basic life essentials such as water supply for drinking and agriculture. Flood plains next to rivers provided flat, fertile areas suitable for growing required food supplies. Rivers served as early transportation routes.

With urban development, many of the functions of the watershed changed. Water supply in most cases became centralized and delivered from a remote location, rather than from the local creek. Agricultural use of the land was changed to residential, commercial and industrial use. Creeks may remain only for their utilitarian function of carrying storm water runoff away from the city.

Even the drainage function of watersheds has been altered. Urban development has added roof areas and paving that reduces the ability of the land to absorb water. To minimize the land space required, creeks and swales may have been converted to underground pipes and concrete channels, which greatly speeds the flow of water. Both of these changes have dramatically increased the volume and peak flow rate of runoff that occurs in urban watersheds during storm events. These increases, along with urban encroachment into the natural watercourse areas and floodplains, have increased the potential for flooding damage during major storms.

Many creeks in urban areas have been neglected and ignored, but because of their drainage function, they have not been eliminated. They may remain as some of the few

natural open space areas in the city. Many remaining wildlife species use these areas for basic necessities -- water, food, habitat. In some cases, the value of creeks as resources has been recognized and they have been preserved in parks, recreation areas, or wildlife habitats in the community.

Elements of the Management Plan

The City of Albany has various programs to address environmental issues and infrastructure needs related to watersheds, storm water, creeks, and water quality within the City. These programs fall under the City's Clean Water Program. The City's Clean Water Program is composed of several elements: the National Pollutant Discharge Elimination System (NPDES) permit, a federally mandated program; urban creeks, an environmental restoration program; and storm drain/flood control, a public health and safety program. Each of these elements is currently planned and managed as if it were unconnected with the others. However, they are connected geographically by the network of water courses and topography that are the Albany watersheds.

The preparation of the Watershed Management Plan evaluated three interlinked elements, both individually and together. These elements are: storm drainage and flooding, creek restoration, and water quality.

Storm Drainage and Flooding

This element considered the evaluation and management of the water runoff that occurs throughout the City during rain storms. This element is part of the City's public health and safety programs, designed to protect residents and businesses in the City from damage caused by flood waters.

For the purpose of this report, the drainage system in Albany's watershed consists of four distinct components: overland (surface) flows, storm drain inlets, storm drain pipes or culverts, and creek channels. Ultimately all water that flows through Albany flows to the San Francisco Bay.

Overland flow is the water that flows over the land (i.e., lawn, streets, and other surfaces). This water flows down hill, overland to a low point where it either forms a puddle or a pond, absorbs into the ground through a porous surface, or enters an underground drainage system.

A storm drain inlet is the entry point of water to either a storm drain pipe, a culvert, or a creek channel. Storm drain inlets can be simply the direct entry of water into a pipe or it can include a catch basin. A catch basin is a box below the surface of the inlet that allows material to settle out of the water before the water enters the pipe.

A storm drain pipe and culverts are usually round, made of plastic, concrete, clay, or metal ranging in size from 8" to 24" in diameter in Albany. Storm drain pipes generally carry water underground from an inlet to either a larger culvert or a creek channel. Box culverts containing greater flow, such as those containing the entirety of a creek, are typically square or rectangular concrete boxes. Although, the Marin Creek system is almost entirely contained within a round culvert.

A creek channel is defined as an open channel with either earth lined or artificial (e.g., concrete) bottom.

The storm drainage and flooding element is primarily an engineering evaluation of the capacity of streets, storm drain inlets, storm drain pipes, and creek channels to carry a 10-year storm event.

Issues considered in this element include:

- Inspection, survey, and inventory of existing storm drain facilities;
- Estimation of flows throughout the city for design storms of various frequencies;
- Estimation of the capacity of existing storm drain facilities;
- Appropriate standards to be used for the planning and design of storm drainage facilities;
- Alternative solutions for storm drainage facilities;
- Priorities for implementation of additional storm drainage facilities; and
- Cost of new or improvements to storm drainage facilities.

This element is sometimes called a storm drain master plan.

Creek Restoration

Creek restoration returns a previously natural creek from an engineered or closed state to a natural state. It is a term that can be used to describe a broad range of creek alteration projects. Water is one of nature's most powerful elements and must be treated with respect. Creeks not only function to transport water, sediment, and woody debris but also provide habitat and food for many varieties of birds and aquatic organisms. Creek restoration employs science, hydrology, and geomorphology to address the functional requirements for moving storm flows efficiently through an urban environment (flood control). Project designs are based on the storm water flow needs of the creek, as well as biology and ecology, to address the aspects of a storm water management system that only creeks can provide. These aspects can include riparian vegetation, wildlife habitat, and community benefits such as recreation/open space and pedestrian greenways.

Restoration can include widening creek channels, stabilizing creek banks, removing fish

migration barriers, altering the vegetation of existing creek channels, and removing culverts. Where possible, creek restoration should include creation of pedestrian and bicycle trails to create alternative transportation connections in a community.

Creeks are ecological systems that evolve and change. In most of the creeks in the San Francisco Bay Area, urbanization has encroached into the historic floodplain of the creeks. This poses constraints that require a variety of techniques to achieve a stable channel.

Replacing existing culverts at road crossings with bridges or removing crossings entirely is often desirable because culverts usually restrict the flow of water. The entrance of culverts can also collect debris that can block the opening. Bridges allow a more continuous natural habitat to be established and easier passage for wildlife through the area, with sand and gravel creek bed material instead of concrete.

Criteria for prioritizing the recommended projects are function, location, opportunity and habitat.

Function describes necessary improvements for the channel to carry 10-year storm water flow.

Location/Habitat defines locations where a restoration project would provide benefits to the greatest number of users (human and wildlife). Included in any design analysis is consideration for low-flow conditions. The creation of pools and other year-round habitat are as important in creating a healthy creek as creating a system that transports wet-weather, high-flow conditions.

Opportunity is a situation where other projects are occurring that would make creek restoration possible and/or more cost effective than creek restoration without the other project.

Projects with necessary functional repairs are rated the highest priority.

The creek restoration analysis verified the functional role of the creeks, evaluated the opportunities and feasibility of restoring creeks to a more natural condition, and reviewed policy issues relating to creek enhancements. Examples included improving existing creeks, and re-opening culverted creeks.

Issues considered in this element included:

- Evaluation of existing conditions in creeks
- Identification of existing riparian vegetation and wildlife habitats
- Location of areas of erosion problems and impediments to flow
- Location of sites for potential recreational and greenway enhancements
- Identification of possible community building and education opportunities

- Evaluation of potential creek improvements to provide additional flow capacity
- Identification of opportunities for vegetation and wildlife habitat restoration and enhancement
- Determination of appropriate type of restoration, including widening of channels, removal of exotic and invasive plant material, and revegetating creek areas
- Evaluation of priorities for creek restoration opportunities
- Estimation of construction costs of creek restoration projects

Water Quality

This element assessed the City's existing practices and the opportunities to enhance water quality in Albany's creeks. Analysis included evaluating the City's Clean Water Program efforts for compliance with regulatory requirements, reviewing literature and procedures for effectiveness and completeness, and identifying opportunities to cost-effectively incorporate treatment Best Management Practices (BMP) into flood control, storm drain improvement, and channel restoration projects.

Issues considered in this element included:

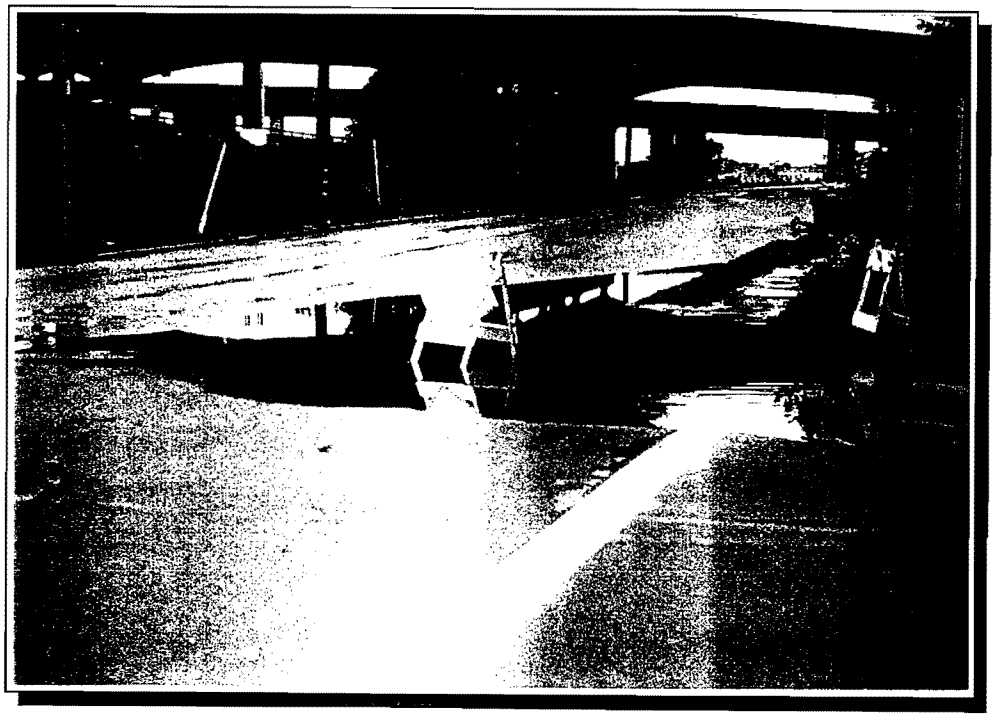
- Current City of Albany practices and evaluation of the City's efforts to comply with Alameda County Clean Water Program Best Management Practices
- Existing clean water laws and regulations, including federal, state, and local
- Available data on water quality in Albany's creeks
- Opportunities and methods to improve water quality

Project Cost Estimates

Costs have been estimated for each storm drain and creek project. The cost varies with the difficulty of each project. Project estimates include planning and engineering design.

Localized Flooding

PONDING ON POMONA AVENUE NORTH OF SOLANO AVENUE
JANUARY 1998

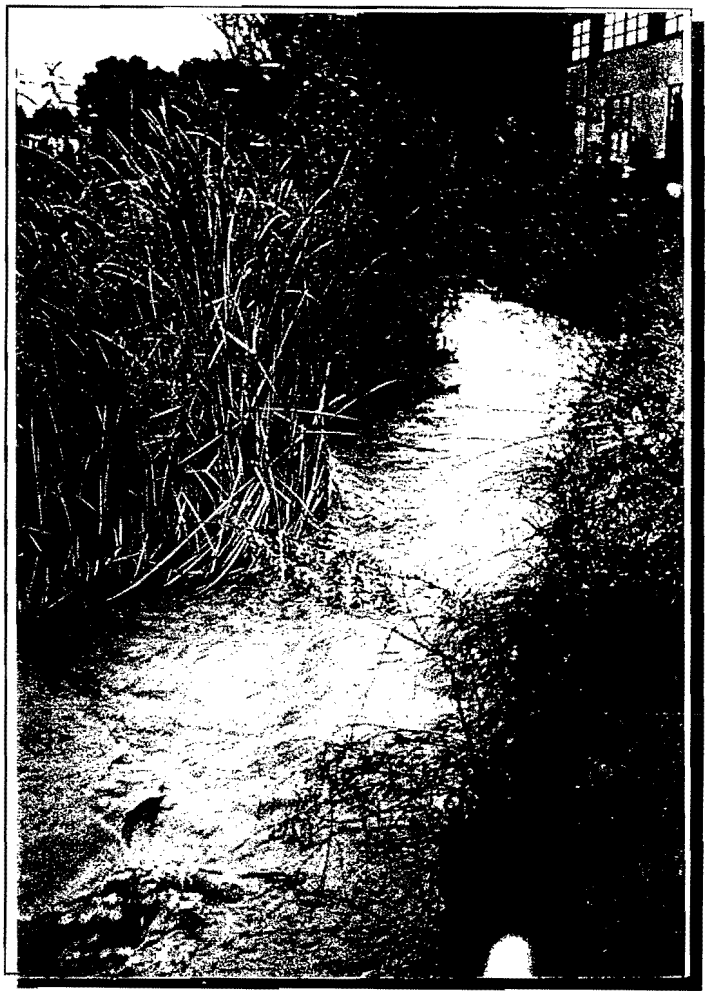


CLEVELAND AVENUE AT SOLANO AVENUE

JANUARY 1998

Codornices Creek Watershed

CODORNICES CREEK AT BYPASS TO VILLAGE CREEK
AND 1997 CHANNEL RESTORATION PROJECT



VEGETATION IN CHANNEL OF CODORNICES
CREEK UPSTREAM OF 8TH STREET JANUARY 1998

CODORNICES CREEK WATERSHED

Codornices Creek forms the southern boundary of Albany. It extends from just west of Monterey Avenue in Berkeley approximately 1.4 miles to Interstate 80. The creek runs another one-half mile northward between Interstate 80 and the Golden Gate Fields racetrack to San Francisco Bay.

Codornices Creek drains about 700 acres, and the watershed extends to the ridge of the Berkeley Hills. Most of the watershed is located in Berkeley, and only about 30 acres (4% of the drainage area) originates in Albany.

Many of the existing culverts in Codornices Creek are a standard design consisting of a poured in place concrete culvert six feet wide and six feet high, with a circular arch top section. This is true of all the culverts from Ordway Street to Kains Avenue, and the culvert under Interstate 80. The exception is the culvert under the BART right-of-way (Ohlone Greenway), which is eight feet wide. Other creek crossings include a bridge at the entrance to St. Mary's College High School, box culverts at San Pablo Avenue and street crossings within University Village, a trestle at the Union Pacific Railroad tracks, and a bridge at Second Street.

Upstream of San Pablo Avenue, the culverts are generally adequate to carry 75% to 85% of the estimated 10-year flow in the area. At Interstate 80, the culvert is estimated to have a capacity of about 50% of the estimated 10-year flow the lowest estimated capacity of the culverts on Codornices Creek. These calculations consider the effects of the high-flow by-pass channel that connects Codornices Creek to Village Creek in the University Village property. The joint flow of the by-pass and Village Creek discharges through the Union Pacific Railroad right-of-way, across private property, and into a culvert beneath Eastshore Highway and Interstate 80.

Existing Conditions

The following description of the watershed begins at the upstream, or easternmost limits of the creek. Field observations of the creek were made in June 1997.

Beginning in Berkeley, Codornices Creek flows through a combination of closed conduits and open channel reaches. Two major branches of the creek join in Berkeley at Codornices Park, then flow through the Berkeley Rose Garden.

In Albany, between Monterey Avenue and San Pablo Avenue, the creek consists of a narrow channel corridor through residential neighborhoods with alternating open and culverted sections. Some of the culverts extend beyond the street right-of-way onto adjacent private property. The entire reach between Peralta Avenue and Ordway Street is contained in a culvert. Except for street crossings, creek sections are located on

private property controlled by adjacent owners. Open channel sections have generally been modified from their natural form, with concrete walls in some locations, and broken concrete rubble in many locations.

East of San Pablo Avenue, the existing vegetation consists of ornamental trees and shrubs, ruderal herbs, native trees and aquatic plants that have persisted or re-colonized the banks and channel bottom. Native habitat present in the upper portion of Codornices Creek is restricted to scattered remnants of Central Coast riparian scrub, coast live oak woodland and coastal freshwater marsh.

Downstream of the St. Mary's College High School bridge, an extensive piece of filter fabric used under riprap for bank repair on the Berkeley side of the creek is not securely attached to the bank. Should this fabric tear loose, it could block culverts further downstream and cause flooding and property damage.

There are several storm drain pipes that flow directly into Codornices Creek. These include a 12-inch clay drain from Peralta Avenue and Posen Avenue, a 24-inch box culvert in Santa Fe Avenue (which carries flow from as far north as Marin Avenue), a 12-inch clay pipe that enters the creek at San Pablo Avenue from Dartmouth Avenue, and an 18-inch concrete pipe on Eighth Street in University Village. Other minor areas of street flow also enter the creek at various locations through individual drain inlets.

The hydraulic evaluation showed that the existing 12-inch clay drain on Posen Avenue, Ordway Street, and Peralta Avenue that connects to Codornices Creek, can carry about 40% of the required 10-year flow. There have been reports of periodic flooding at the southeast corner of the intersection of Posen Avenue and Ordway Street. The houses at this corner are located well above street level, but interference with traffic may occur.

Between Curtis Street and Santa Fe Avenue, one very wide section exists where the south bank is eroding. On the east side of Santa Fe Avenue, several concrete buttresses cross the creek to support a retaining wall on the southern (Berkeley) side of the creek. Between Santa Fe Avenue and Masonic Avenue, a concrete wall on the south bank is leaning into the channel, and one section is collapsing.

On Dartmouth Street from Talbot Avenue to San Pablo Avenue, the hydraulic analysis showed that the existing 18-inch CMP drain that flows west on Dartmouth Street lacks adequate capacity from Talbot Avenue west to San Pablo Avenue. In addition, the short 12-inch clay drain in San Pablo Avenue from Dartmouth Street to Codornices Creek is also inadequate to carry the 10-year flow. It was not possible to confirm the slope or condition of this drain along Dartmouth Street, since the only direct access point is a manhole at San Pablo Avenue and Dartmouth Street. The slope used for the hydraulic evaluation was based on the catchbasin inlet elevations along Dartmouth Street.

Interestingly, even though the model indicates flooding should occur, there has not been

any report of flooding problems in this area. Overflows likely follow the street gutters to San Pablo Avenue. It is possible that storm water is collected in the sanitary sewer system through cross connections, which cause the sewer system to fail, but relieve the storm drain system. This is considered a possibility, as the sewer manhole cover in San Pablo Avenue at Dartmouth Street does dislodge in large storms. The City continues to maintain an aggressive program identifying and eliminating cross connections between sewer and storm drain systems.

Between Cornell Avenue and Stannage Avenue, there is one small area of erosion and collapse in the creek bank. In this same area, many branches hang down into the creek, and trees are growing down in the low flow channel on the north bank, which may catch debris and obstruct flow. These trees are located on private property and should be maintained by the individual property owners.

Downstream (west) of San Pablo Avenue the creek channel is open, except for short culverts beneath streets. Downstream of Interstate-80, Codornices Creek is confined to a man-made earthen channel. In this reach, the creek is subject to tidal influence.

Bed material throughout the creek is a mixture of natural sediment (sand and gravel) and concrete debris that has fallen or been placed into the creek. A few sections of the creek bed consist of poured concrete.

Bank material varies widely, from natural earth to poured concrete. The residential areas upstream of San Pablo Avenue generally consist of hard material bank protection, such as concrete debris or poured concrete walls. However, the banks between Peralta Avenue and Santa Fe Avenue consist in large part of natural soil. Downstream of San Pablo Avenue the creek banks consist more of fill which may contain considerable debris. In general, the most downstream sections of the creek (where tidal influence occurs) have mostly natural earth banks.

Due to the flatter channel slope, the section of Codornices Creek west of San Pablo Avenue is more subject to sedimentation than upstream reaches. This sediment tends to lower channel capacity by reducing the channel cross sectional area.

Codornices Creek tends to be narrower and deeper in the upstream residential sections as compared to downstream areas. It is narrowest between Talbot Avenue and San Pablo Avenue. The section near St. Mary's College High School is very deep.

The creek has a number of locations where buildings are less than twenty feet from the top of the creek bank. Some of these structures are homes, some are industrial or commercial, and many were garden sheds. In some cases, home foundations form the creek bank.

A portion of the flow from Codornices Creek is diverted into the Village Creek watershed, in a culvert located in the University Village area just east of the Union

Pacific Railroad tracks. Low flows remain in the Codornices Creek channel at this location, and higher flows are split between the diversion to Village Creek and the original creek channel.

Some localized flooding occurred during the January 1997 storm in the areas east of San Pablo Avenue, based on conversations with residents and observed high water marks. The areas where flooding occurred were generally at residences that are adjacent to and/or encroaching on the overbank and floodplain area of the creek and have a portion of the structure below street elevation. Apparently no overflows to the streets occurred in these areas.

Flooding problems have occurred a number of times in the lower Codornices Creek area west of San Pablo Avenue. During the January 1997 storm, overflows occurred at Sixth Street, in the area east of the Union Pacific Railroad tracks, and in the area between Interstate 80 and the Union Pacific Railroad tracks. Water overflowing to the north flooded businesses on the Eastshore Highway, and hampered access to the City of Albany maintenance center. Water also flowed to the south along the east side of the Union Pacific Railroad tracks, and was reported to be ten inches deep at the homeless shelter on Harrison Street in Berkeley.

Some flooding occurred in the University Village area in 1982, with flooding in Dowling Park east of the Union Pacific Railroad tracks and near Fifth Street and Sixth Street. There are also reports that flooding occurred in 1986.

Between San Pablo Avenue and Interstate-80, vegetation is mostly ruderal (on ground that has been disturbed), although native vegetation consisting of scattered mature willows and coastal freshwater marsh is also present.

Downstream of Interstate-80, both banks have been highly modified; the top of the west bank has been planted with ornamental trees and the east bank has been planted recently with native shrubs and trees as part of a CalTrans project for Interstate-80. The lower banks support coastal brackish marsh and salt marsh herbaceous species. A well-developed stand of northern coastal salt marsh is present at the downstream end of the creek.

Despite the highly urbanized nature of Codornices Creek, numerous native, presumably indigenous tree species are still present. Creek sections supporting noteworthy native species include the following:

1. Monterey Avenue to Ordway Street, at Saint Mary's School: densely wooded slopes with an abundance of native trees including coast live oak, California bay laurel, California buckeye, Mexican elderberry and box elder;
2. Peralta Avenue to Neilson Street: dense stands of arroyo willow and a few box elder;

3. Neilson Street to Curtis Street: two large arroyo willows;

4. Curtis Street to Santa Fe Avenue: several dense stands of arroyo willows, three box elder, one California buckeye, and a pond supporting a fish, possibly steelhead trout;

5. BART tracks to Masonic Avenue: numerous large Fremont's cottonwood and one box elder;

6. Masonic Avenue to Evelyn Avenue: several large Fremont's cottonwood, two box elder and one large big-leaf maple;

7. Evelyn Avenue to Talbot Avenue: one large California buckeye and one small arroyo willow;

8. Talbot Avenue to Cornell Avenue: a dense stand of arroyo willows and one box elder;

9. Stannage Avenue to Kains Avenue: two white alder and one big-leaf maple;

10. San Pablo Avenue to 10th Street: several large arroyo willows, one large box elder and one Mexican elderberry;

11. 10th Street to 8th Street: one California buckeye, two white alders and a clump of arroyo willows;

12. 8th Street to 6th Street: two medium arroyo willows and one box elder;

13. 6th Street to 5th Street: two arroyo willows and one Mexican elderberry;

14. 5th Street to the railroad tracks: one large clump of arroyo willows. A mature western pond turtle was also sighted on two separate occasions;

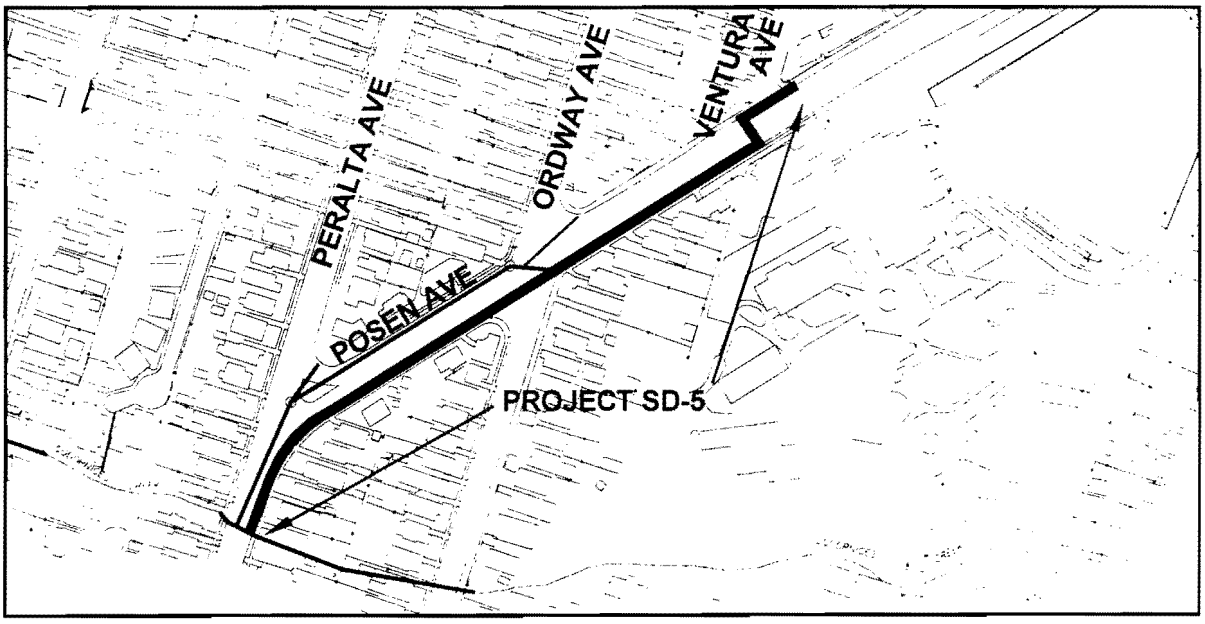
15. Union Pacific Railroad tracks to Eastshore Highway: one small red willow.

Recommended Projects

Project SD-5: Replace the existing 12-inch storm drain pipe in Peralta Avenue Posen Avenue and Ordway Street (approximately 1,400 lf).

Estimated Cost: $220,000

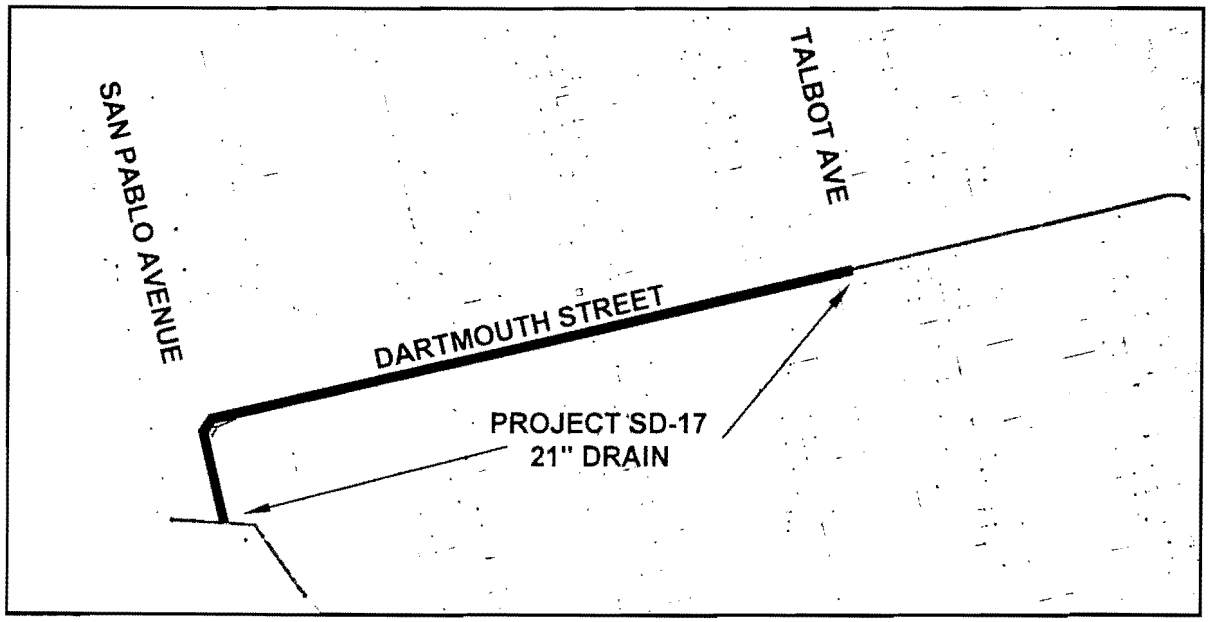
Description: The project will replace the existing system with a new 21-inch pipe and a series of catch basins. This project is currently in design by the City using mitigation funds from the expansion of the St. Mary's College High School gymnasium facility. Construction funds have not been allocated.



Project SD-17: Replace existing 12-inch storm drain pipe in San Pablo Avenue, and 18-inch pipe in Dartmouth between San Pablo Avenue and Talbot Avenue (approximately 1,150 lf).

Estimated Cost: $360,000

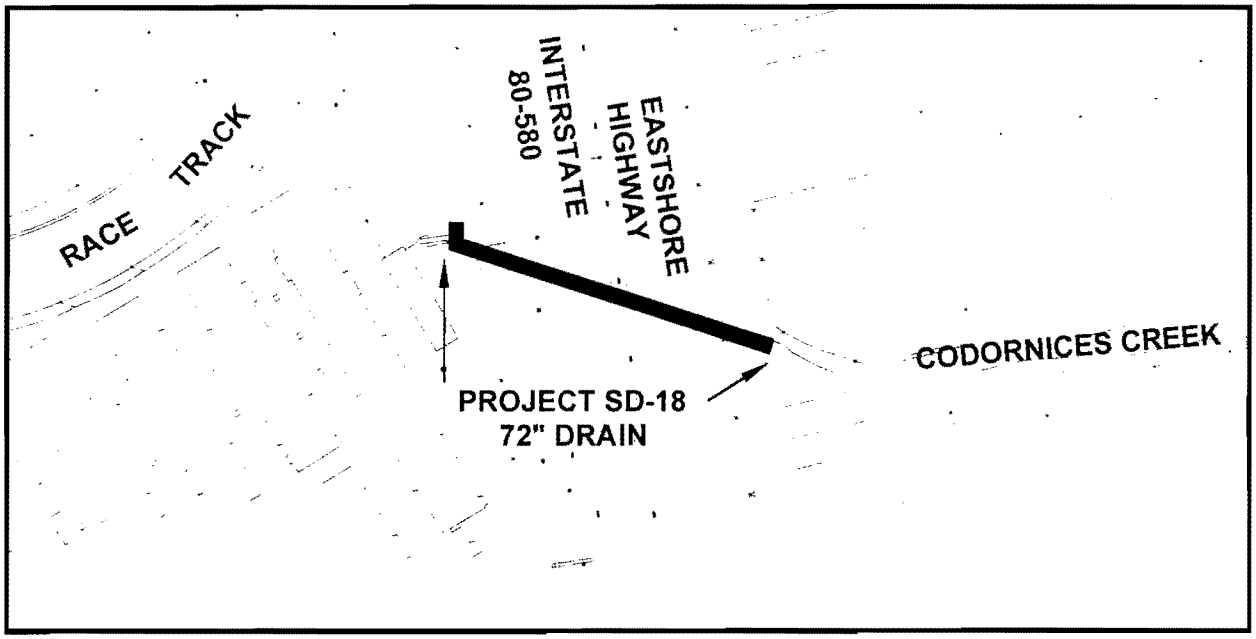
Description: The existing storm drain is a deficient metal pipe. Replacing this pipe would provide the capacity needed to carry a 10-year storm event. A new 21-inch pipe is recommended to replace the existing 18- and 12-inch pipes.



Project SD-18: I-80 at Codornices Creek.

Estimated Cost: $720,000

Description: Install a new 72-inch storm drain pipe parallel to the existing six-foot by five-foot concrete arch drain crossing I-80 at Codornices Creek. This would provide additional flow capacity and help eliminate flooding problems between I-80 and the railroad tracks. In order to cross I-80, pipe jacking construction methods would probably be required.

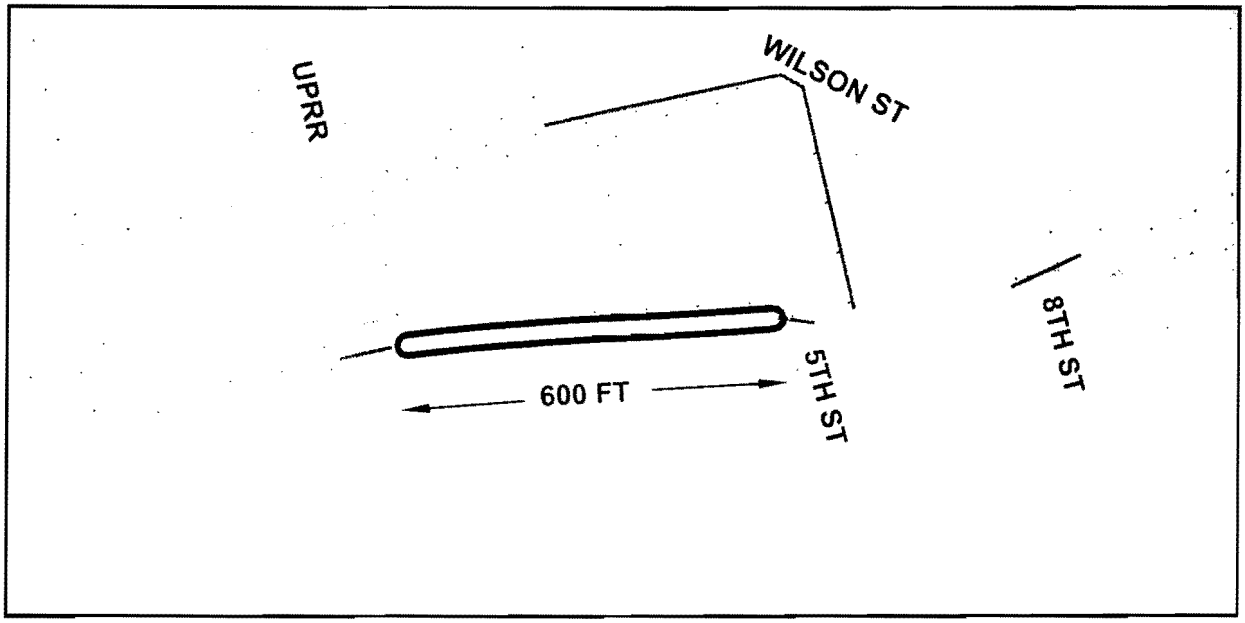


Project CR-1: Codornices Creek: Fifth Street to the Union Pacific Railroad tracks (approximately 600 lf)

Estimated Cost: $120,000

Description: The goal of this project is to increase the creek's capacity for storm flows and to restore the creek channel and creek corridor to a more natural form. This restoration can provide The area on both sides of the creek is currently owned by the University of California, Berkeley. The City has grant funds to design and construct a bicycle/pedestrian trail along the creek to connect San Pablo Avenue with the Bay Trail. Recommended elements include:

- A pedestrian link between future Eastshore Highway commercial development, new play fields on Dowling Park, future San Pablo commercial development, and Albany's residential community.
- Excavation of the creek sections between 5th Street and the railroad tracks to widen the existing channel to form a multi-stage channel with gentle meanders.
- Removal of vegetation and debris to increase flow capacity. Only vegetation or portions of vegetation directly in the creek should be removed; vegetation that is rooted halfway up the bank or higher should be left intact to stabilize the banks and provide shade canopy.
- Pruning of branches of trees or shrubs that hang down into the channel to prevent flooding but leave intact branches which provide shade to the creek.

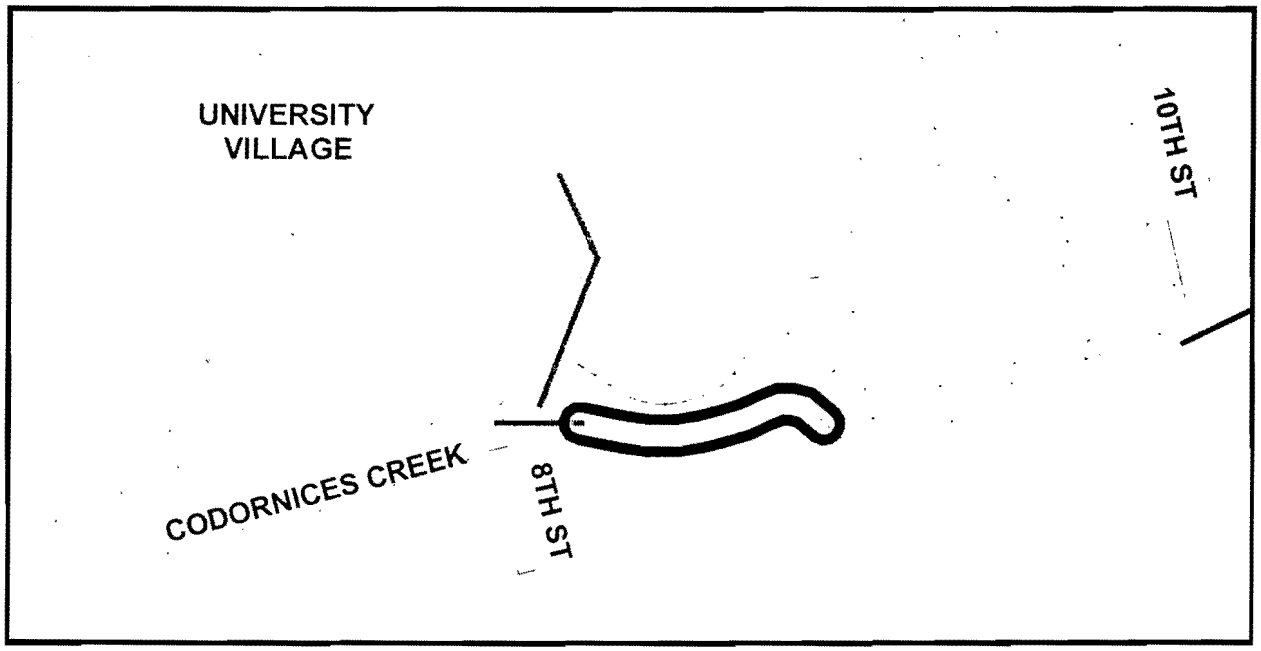


Project CR-3: Codornices Creek between 5th Street and 10th Street, approximately 1,500 lf.

Estimated Cost: $420,000

Description: The creek forms the boundary between University Village housing and the City of Berkeley. Nine hundred feet of creek is open (300 lineal feet east of 9th Street and 600 lineal feet east of 6th Street). The property between 6th Street and 8th Street south of the creek is owned by the University of California. The goal of this project is to increase the creek's flow capacity, to restore the creek channel and creek corridor to a more natural form, and connect to other planned and recently restored creek sections. Recommend project elements include:

- Removing debris and exotic plants and re-vegetating with native species
- Widening channels and introducing meanders where right-of-way is available
- Incorporating trail and bike paths, overlooks, creek identification and educational signs
- Replacement of existing street box culverts with new bridge structures



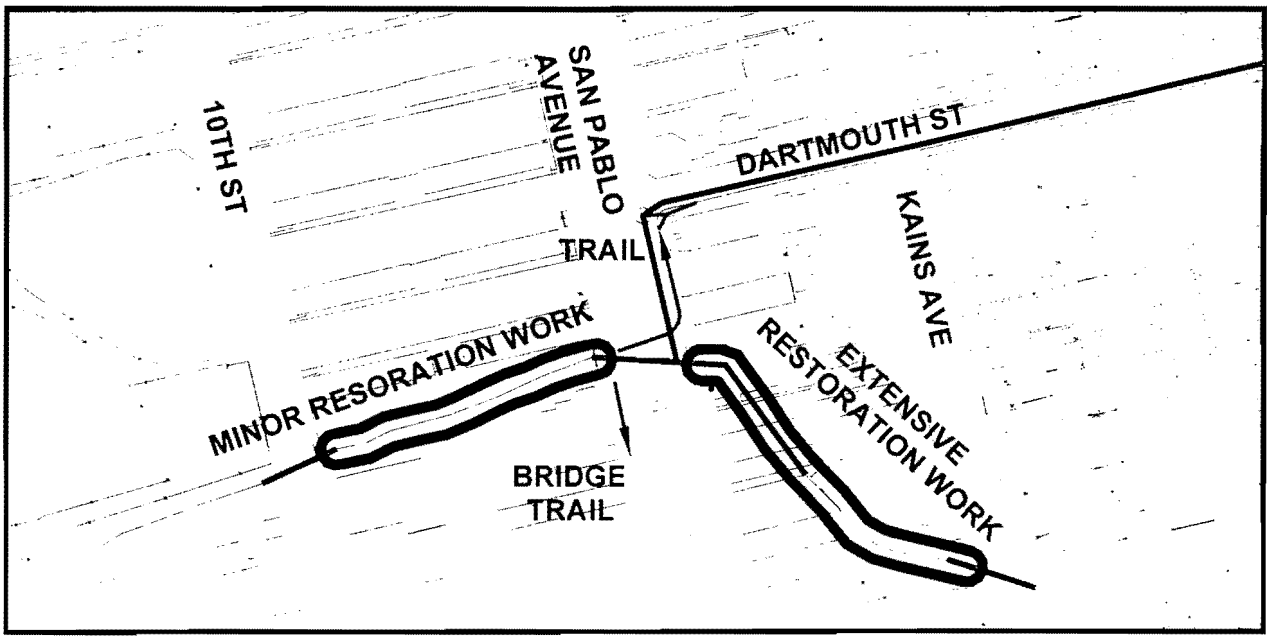
Project CR-6: Between San Pablo Avenue and Tenth Street (approximately 300 lf).

Estimated Cost: $160,000

Description: Codornices Creek is open on the west side of San Pablo Avenue. The project will enhance this site as a "gateway" to Albany. Acknowledging the creek with such elements as bridge rails, special paving and pedestrian scale lights along the creek would bring a greater awareness to those who live near or pass by the creek. Recommended project elements include:

- Removing debris and exotic plant material and re-vegetating with native species
- Constructing a trail and bike path and overlooks
- Installing creek identification and educational signs
- Design and construct gateway elements on San Pablo Avenue, such as bridge railings and special paving

The map below shows this project and project CR-7. CR-6 is the left hand project.



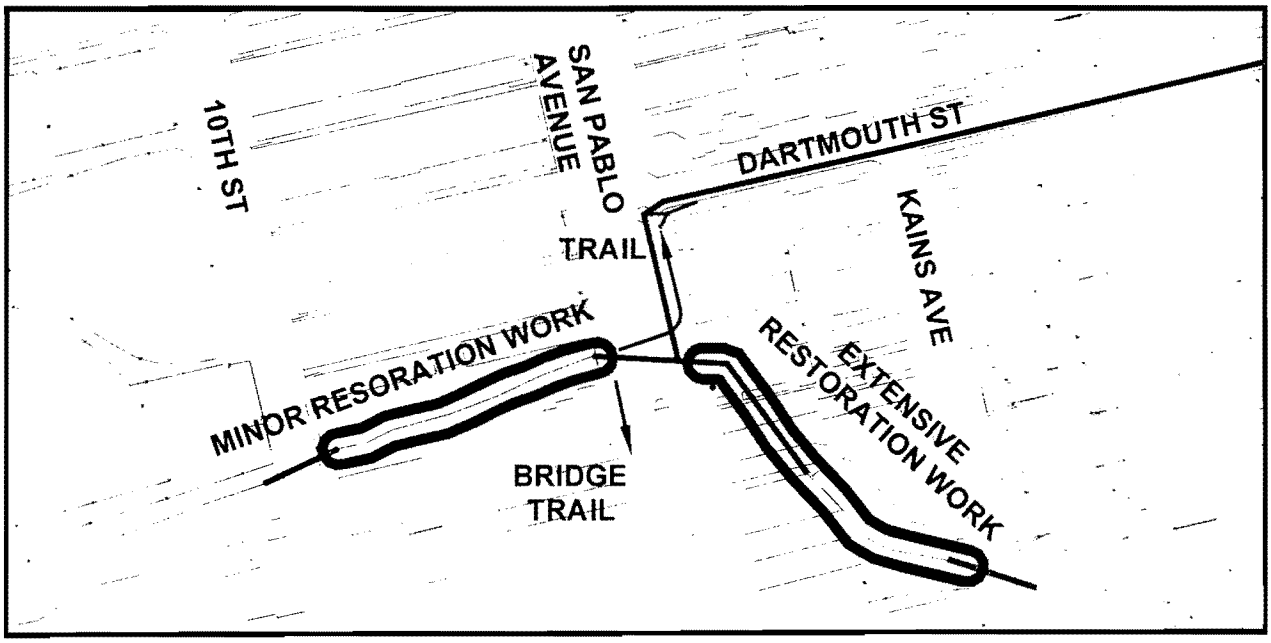
Project CR-7: Between San Pablo Avenue and Kains Avenue (approximately 300 lf)

Estimated Cost: $95,000

Description: The location of the creek at the City border with Berkeley provides an opportunity to enhance the area as a "gateway" to Albany. Acknowledging the creek with such elements as bridge rails, special paving on Kains Avenue, and pedestrian scale lights along the creek would bring a greater awareness to those who live near or pass by the creek. Improvements to this creek section should be coordinated as a part of the re-use and development of the former Villa Motel site. Recommended enhancement elements include:

- Removing debris and the concrete channel
- Recreating a new stream channel geometry by widening and constructing meanders
- Re-vegetating with native species
- Designing and installing Creek identification and educational signs

The map below shows both projects CR-6 and CR-7. CR-7 is the right hand project.

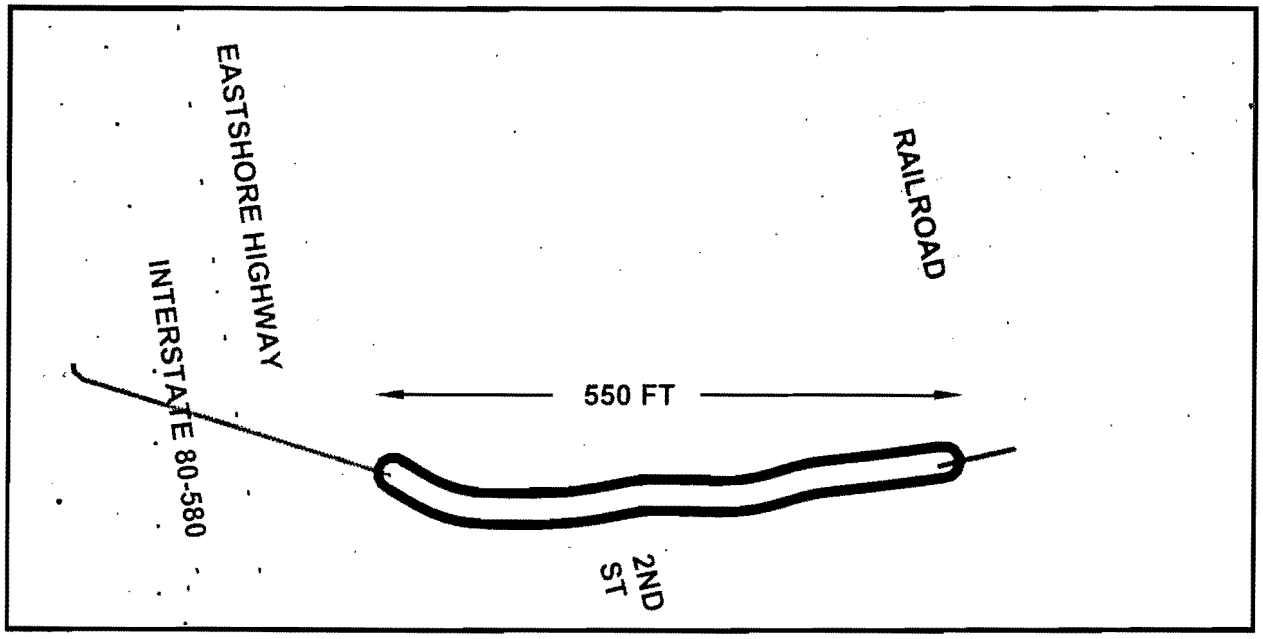


Project CR-10: Between the Union Pacific Railroad tracks and Eastshore Highway (approximately 550 lf)

Estimated Cost: $195,000

Description: This reach of Codornices Creek is continuously open between the Union Pacific Railroad Tracks and Eastshore Highway, except for the bridge at 2nd Street. The purpose of this restoration is to improve the flow capacity of the creek, enhance wildlife habitat, and provide a trail along Codornices Creek to the Eastshore Highway and the San Francisco Bay Trail. Recommended project elements include:

- Removing exotic plants and re-vegetating with native species
- Widening the channel and constructing meanders
- Constructing a trail and bike path and overlooks
- Constructing creek identification and educational signs

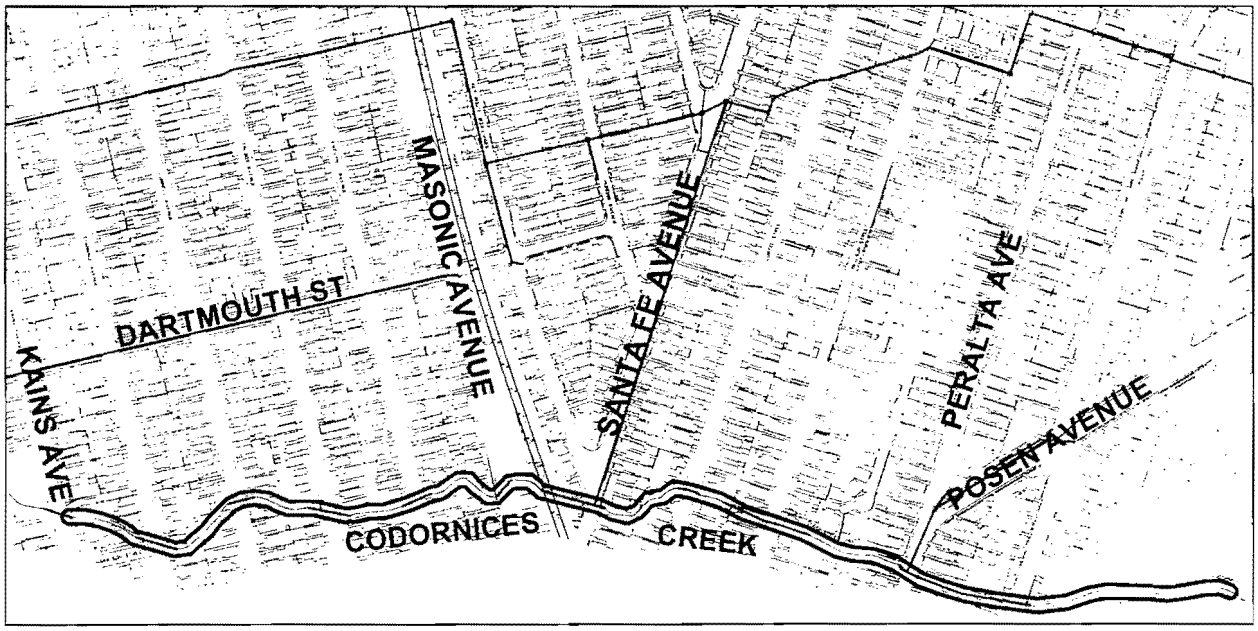


Project CR-15: Between Kains Avenue and the eastern Albany city limits (approximately 3,600 LF)

Estimated Cost: $105,000

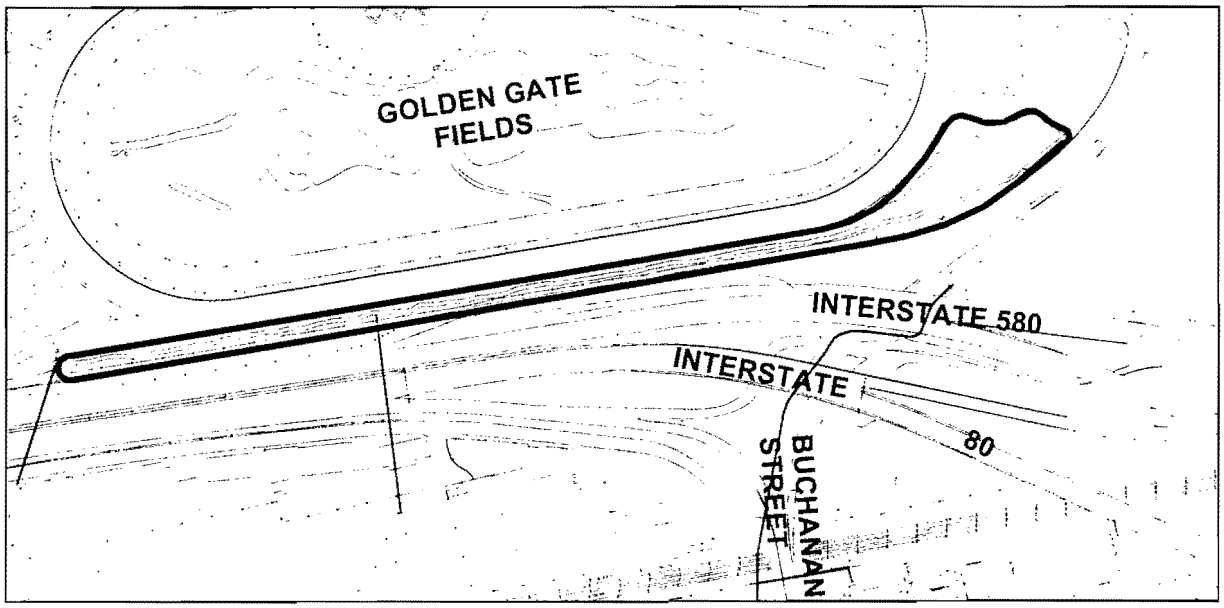
Description: Kains Avenue to the Berkeley border near Monterey Avenue is a residential neighborhood. The creek is open within each block with the exception of Ordway Street to Posen Avenue and several partially culverted sections. This project will provide education to the homeowners to encourage better understanding of the relationship between water quality, creek maintenance, and restoration. Education could begin as a short term project with mailings and lead to longer term projects such as workshops and demonstration projects. A secondary, much longer term project, would open the culverts under the roads with bridges for better hydraulic flow conditions. Recommended project elements include:

- Providing educational mailings and workshops on how to:
  - Remove debris and exotic plants
  - Widen channels and introduce meanders where right of ways allow this to happen
  - Stabilize eroding slopes with biotechnical methods
  - Revegetate with native species
  - Provide vegetation management and maintenance
- Construct bridges at street crossings for improved flow capacity (longer term)



Project CR-18: Golden Gate Fields to the Albany Mudflats (approximately 2,000 lf)
Estimated Cost: $30,000
Description: Codornices Creek now flows in an improved channel between Golden Gate Fields and Interstate 80. Recent freeway work included revegetation on most of the east bank of the channel. The area is not readily accessible to the public due to its location. Recommended project elements include:

- Removing Exotic Plants
- Re-vegetating the west bank (Golden Gate Fields side) with native species



Village Creek Watershed

VILLAGE CREEK UPSTREAM OF RAILROAD JANUARY 1998

VILLAGE CREEK CULVERT UPSTREAM OF EASTSHORE HWY

VILLAGE CREEK WATERSHED

Village Creek drains an area of about 157 acres, and is almost entirely located within Albany in an area south of Marin Avenue. About three acres (2% of the drainage area) drains into the watershed from Berkeley. Village Creek is not shown on any of the maps of historic creeks in Albany. Its name comes from its function as the major drainage way in University Village. Marin Creek may have drained through portions of the existing Village Creek channel at one time.

Based on the degree of deficiency and the potential for continued flooding of residences in this area, the Village Creek system immediately east and west of Santa Fe Avenue rate as high priorities for storm drain improvements.

The problems presented in this system are some of the most difficult to solve. The existing culverts between streets are located on private property, with very limited access under houses and foundation walls. The lowest point of the streets is located in the middle of the block (which defines the centerline of the drainage basin). It would be difficult or impractical to reroute the storm drain pipes entirely such that they remain solely in public streets. Construction along or near the existing storm drain pipes would require tunneling or other expensive construction techniques.

Existing Conditions

The drainage of the Village Creek watershed east of San Pablo Avenue is entirely contained within underground pipes and culverts. Many sections of the existing system are on private property, located between or under existing houses and foundations.

The existing storm drain pipes and creek culvert in this area consist of 14-inch to 18-inch clay pipes east of Key Route Boulevard, with a 10-inch plastic insert in the pipe between Curtis Street and Neilson Street. At Santa Fe Avenue, there is a 15-inch pipe that carries some water during high flows into the 24-inch box culvert flowing south into Codornices Creek. From Masonic Avenue west to San Pablo Avenue, drainage is carried in a box culvert, which varies slightly in size from 24-inches by 24-inches to 24-inches by 26-inches.

Nearly all the existing storm drain pipes and inlets in the Village Creek watershed east of San Pablo Avenue are in need of repair or replacement. Those needing replacement have capacity deficiencies. The culverts east of Peralta Avenue are adequately sized, but have collapsed and are in need of repair. Since this Watershed Management Plan study began, the City has replaced two portions of this drainage system. These improvements are located between Ventura Avenue and Ordway Street and between Ordway Street and Peralta Avenue, the two most easterly portions of this drainage system.

Existing conditions within the Village Creek Watershed are discussed below. The discussion that follows evaluates the system beginning from the most upstream portion near the intersection of Ventura Avenue and Beverly Place, continuing to its eventual outfall in the San Francisco Bay.

The most serious capacity problem is the 14-inch pipe that runs from Santa Fe Avenue and Ramona Avenue west to Pomona Avenue. This section has only 11% of the required capacity to carry the 10-year flow. This problem is somewhat ameliorated by the upstream overflow capacity in the 15-inch pipe in Santa Fe, which connects to the Codornices Creek watershed system.

Periodic flooding occurs on the east side of Santa Fe Avenue near the Ramona Avenue intersection. Water apparently crosses over the street on occasion and floods a garage below street level on the west side of Santa Fe. A resident reported that overflows occurred at the storm drain manhole on the east side during the January 1997 storm. After a small storm in June 1997, there was a large amount of debris in the manhole on the west side of Santa Fe. There may be a defect in the downstream culvert west of Santa Fe that causes frequent plugging of the line. A more detailed inspection of this line should be undertaken to determine if there is a serious problem requiring immediate action, rather than waiting to implement a long term solution.

The 10-inch plastic storm drain pipe between Neilson Street and Curtis Street has only 16% of the minimum required capacity. During recent storms, water has regularly backed up at this location, and overflowed through properties on the west side of Neilson Street.

The drainage system east of Santa Fe has capacities of 20% to 25% of the 10-year flow, and the box culverts west of Key Route Boulevard have capacities of 40% to 60% of the 10-year flow. All of these systems are recommended for replacement and increased capacity to accommodate the 10-year storm criterion.

Localized drainage problems exist at the corner of Sonoma Avenue and Peralta Avenue. A videotape recording of the drains at this intersection in February 1998, showed that the drainage on the west side of the intersection is carried from the northwest corner to the southwest corner in a shallow 12-inch CMP drain that is in very poor condition. Portions of the pipe bottom are completely separated from the sides. There is no indication of an impending structural failure of the pipe, it is probably encased in concrete; however the sharp points of the corroded pipe probably cause debris to collect inside the pipe and restrict flow. The storm drain pipe on the east side of the intersection from the northeast corner to the southeast corner is a shallow, rectangular drain, and does not appear to have any serious problems.

For the area east of Santa Fe Avenue (i.e., between Peralta Avenue and Santa Fe Avenue), the best approach appears to be construction of larger storm drain pipes along

or near the existing culvert. The City Engineer has already developed preliminary routing that appears to be feasible. This preliminary concept directs the culvert between residences rather than under them.

For the storm drain system extending from Santa Fe west across San Pablo Avenue, there may be alternatives available. An existing 24-inch by 24-inch box culvert carries some overflows from the Village Creek culvert south into Codornices Creek along Santa Fe Avenue. Although Santa Fe Avenue in this area slopes slightly to the north, the drain actually slopes back towards the south and Codornices Creek. If water levels are very high in Codornices Creek, the effective hydraulic capacity of this overflow drain may be reduced. Increasing the size of the 15-inch overflow drain may provide benefits in this area, as well.

Village Creek between San Pablo Avenue and Jackson Street supports numerous non-native trees such as Eucalyptus. This creek section is considered to have high enhancement potential. However, it would require the removal of a substantial number of mature non-native trees. Wildlife values would not necessarily be improved as a result of replacement of non-native trees with native riparian habitat because this site does not connect directly with other natural areas. The existing ornamental trees provide abundant nesting and perching opportunities for resident and migratory birds, including raptors.

Village Creek west of San Pablo Avenue to the Union Pacific Railroad tracks flows through land owned by the University of California. This reach has several restoration opportunities that could be included in the redevelopment of the University Village Housing, which is scheduled to begin in 1998. The open section of Village Creek between San Pablo Avenue and Jackson Street passes through a densely wooded lot consisting primarily of tall, mature horticultural trees to Jackson Street. Other than two small patches of willows, no naturally occurring native vegetation is present along this section.

West of Jackson Street, there is a culvert section of 30- to 42-inch CMP about 1,500 feet long within University Village. Based on the hydraulic analysis by Philip Williams Associates (which is included in this Plan by reference), this culvert does not have enough capacity to carry a 10-year flow.

Along the western boundary of the University Village Housing property, the pipe containing Village Creek is diverted south until it meets the Codornices Creek diversion channel. The overflow channel that diverts high-flow water from Codornices Creek joins Village Creek at a trestle beneath the railroad tracks, approximately 500 feet south of the United States Department of Agriculture (USDA) research facility. This section is delineated by a windbreak of large eucalyptus trees, lacking understory vegetation. The downstream part of this section, near the confluence with the Codornices Creek overflow by-pass, supports coastal freshwater marsh that has become established in open areas. This habitat consists of a dense stand of cattail and scattered bulrush,

California oenanthe, and numerous non-native aquatic plants. This area is historically susceptible to cattails and other impediments to the free-flow of the creek and storm water. These were recently cut back, but continued private maintenance will be needed at this location to maintain flow capacity.

The trestle under the railroad has inadequate capacity for the 10-year storm. The 60-inch culvert under Eastshore Highway and Interstate 80 also has inadequate capacity, which contributes to flooding problems in the area between the Union Pacific tracks and Eastshore Highway. Most of these problems are probably related to the overflows from Codornices Creek rather than flows from the Village Creek watershed itself.

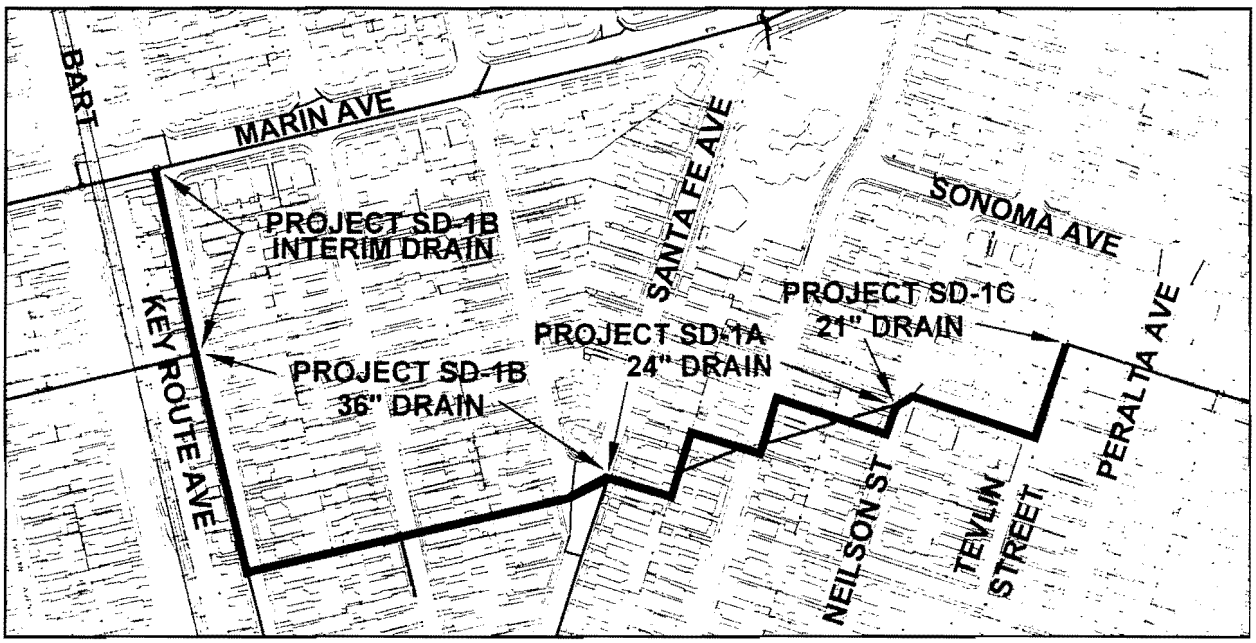
At the time of the field inspection, the culvert located on Union Pacific property had about two feet of sediment and gravel blocking the lower part of the entrance to the pipe, leaving about three feet of clear opening. Union Pacific, subsequent to the 1997 field surveys, effectuated a major clean up of the creek within their property. Included in this clean up was the removal of debris and non-native vegetation.

After passing through the 60-inch culvert under the building at 1057 Eastshore Highway, the frontage road itself, and Interstate 80, the creek empties into the Codornices Creek channel west of Interstate-80, alongside Golden Gate Fields. This artificial channel directs the creek flows of both Codornices and Village Creeks into the mudflats of San Francisco Bay.

Recommended Projects

Project SD-1A, 1B, 1C: Between Ventura Avenue and Key Route Boulevard

Description: This project is the number one priority because of the existing flooding problems that occur on Neilson Street and Santa Fe Avenue. The project is divided into three separate sections, 1A, 1B, and 1C, which could be constructed separately. Project 1A is considered the highest priority because the existing storm system runs beneath private residences and other structures. Ideally the project identified as SD-15 would be constructed prior to any upstream projects. However, the cost of this project, and the absence of immediately identified problems, places this (SD-15) as a lower priority. Nonetheless, to accommodate the improved flow from project SD-1A, project SD-1B is required to eliminate overflows and ponding on Santa Fe Avenue at Ramona Avenue. Localized ponding on Santa Fe Avenue and Ramona Avenue serves as a detention basin to regulate the rate of flow into both Village Creek and Codornices Creek.

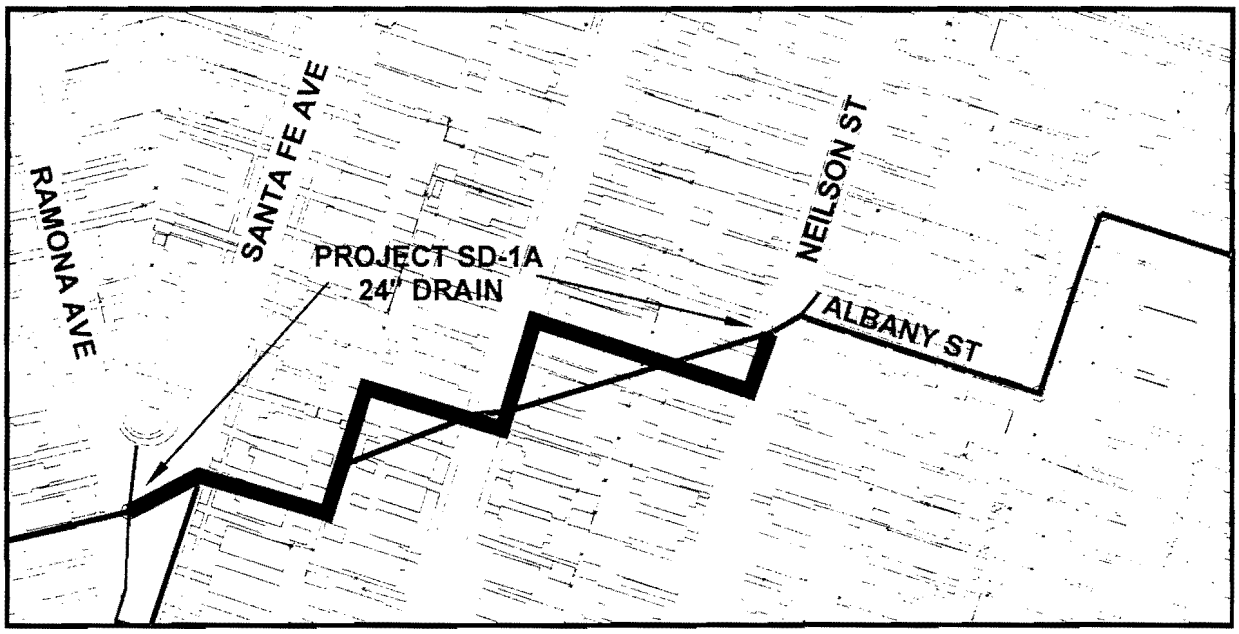


Project SD-1A: Install a 24-inch pipe between Neilson Street and Santa Fe, to replace the existing 10-inch PVC pipe and 14-inch VC pipe in this location.

Estimated Cost: $315,000

Description: The existing pipes are located under residences. A conceptual route for the 24" pipe has been evaluated by the City. Preliminarily it appears feasible to pass the new system between houses rather than under them. Easements would be required from property owners along the new route. Because of limited access, construction is expected to be difficult and expensive. Alternative and innovative construction techniques may be required.

If this project were constructed by itself as an interim project, it is recommended that the City increase the size of the existing 15-inch overflow connection to the existing 24-inch box culvert flowing south on Santa Fe. This would provide additional capacity during normal storm events, although during major floods when water levels in Codornices Creek are high, this connection may not provide much additional flow capacity.

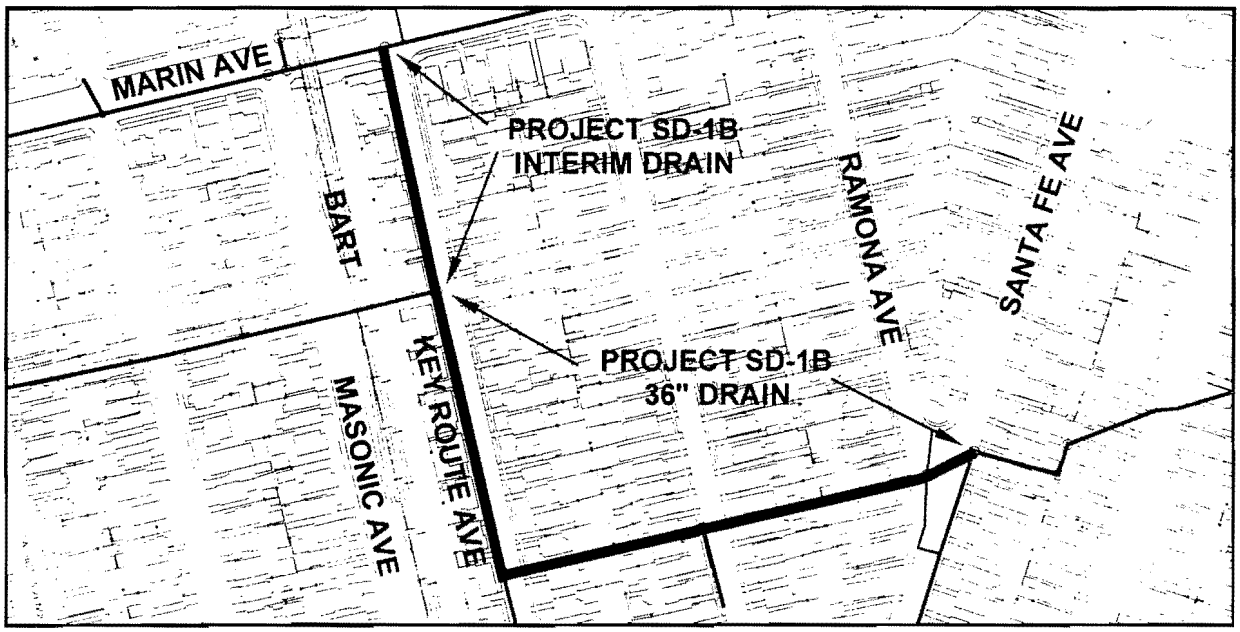


Project SD-1B: Replace the existing 14-inch and 18-inch pipes with a new 36-inch pipe between Santa Fe Avenue and Key Route Boulevard.

Estimated Cost: $504,000

Description: This storm drain pipe would be connected to the existing 24-inch drain which carries flows to the west across the BART right-of-way.

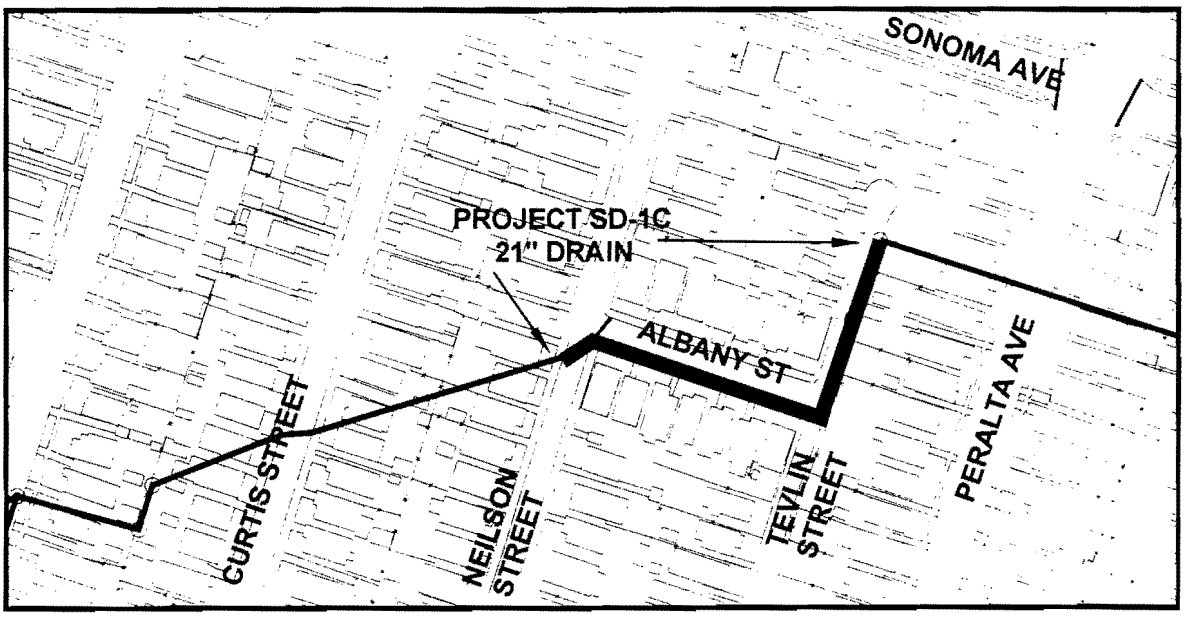
As an interim project, without downstream improvements, a connection to the existing storm drain in Marin Avenue is recommended be provided to carry excess flows. The Marin Avenue drain does not have excess flow capacity for the 10-year flow, so this would probably not provide a long term solution. However, the Marin Avenue drain currently has upstream constraints (east of Ventura Avenue), so for most storms, this connection would provide drainage benefits. The street level at the existing 24-inch drain in Key Route Boulevard is slightly lower than the street at Marin Avenue, so the possibility of backflows from Marin Avenue during large storms would also have to be considered.



Project SD-1C: Replace the existing 14-inch pipes with a new 21-inch pipe along Albany Terrace and Tevlin Street to Neilson Street.

Estimated Cost: $151,000

Description: Because the storm drain pipes upstream, between Ventura Avenue and Neilson Street, were replaced with larger pipes as a part of recent City of Albany sewer repairs, it is necessary and appropriate to continue the improvements downstream to accommodate the improved storm flow.

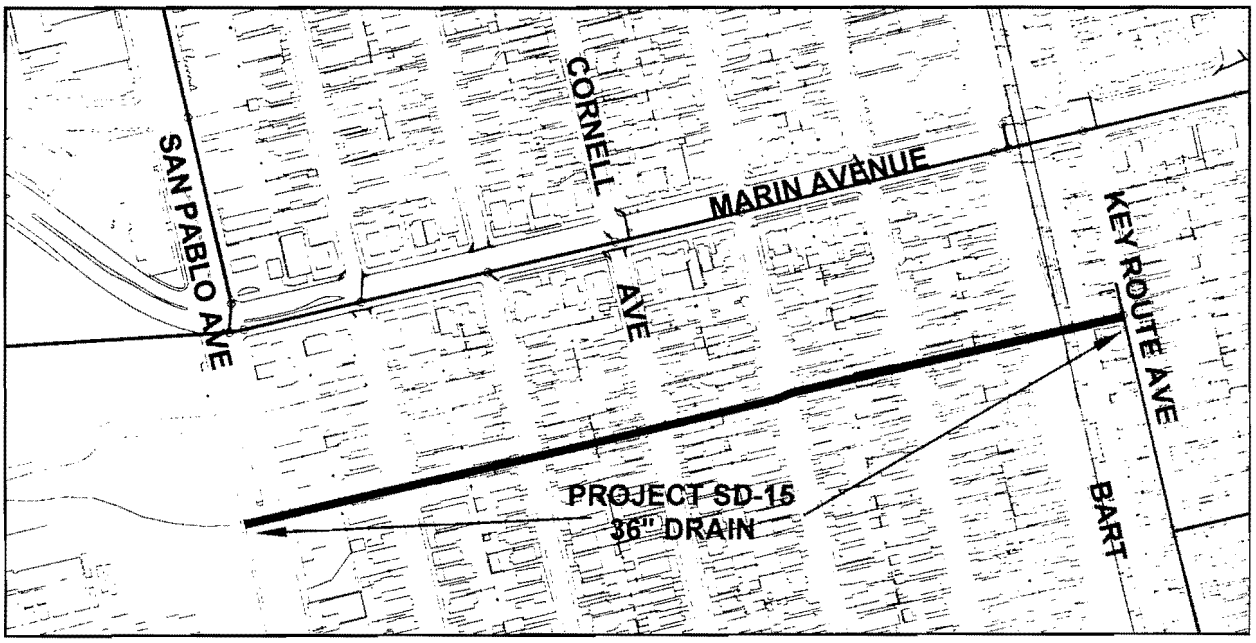


Project SD-15: Replace the existing 24-inch x24-inch and 24-inch x 26-inch box culverts that pass between and under houses with a 36-inch pipe from Key Route Boulevard across San Pablo Avenue.

Estimated Cost: $780,000

Description: Construction along the existing alignment will be difficult and expensive. Additional easement space is necessary to construct and maintain both the existing system and any new system installed in the current alignment. The construction estimate does not include the cost of acquiring easements for either construction or permanent maintenance. A minimum 10-foot easement is recommended for maintenance access.

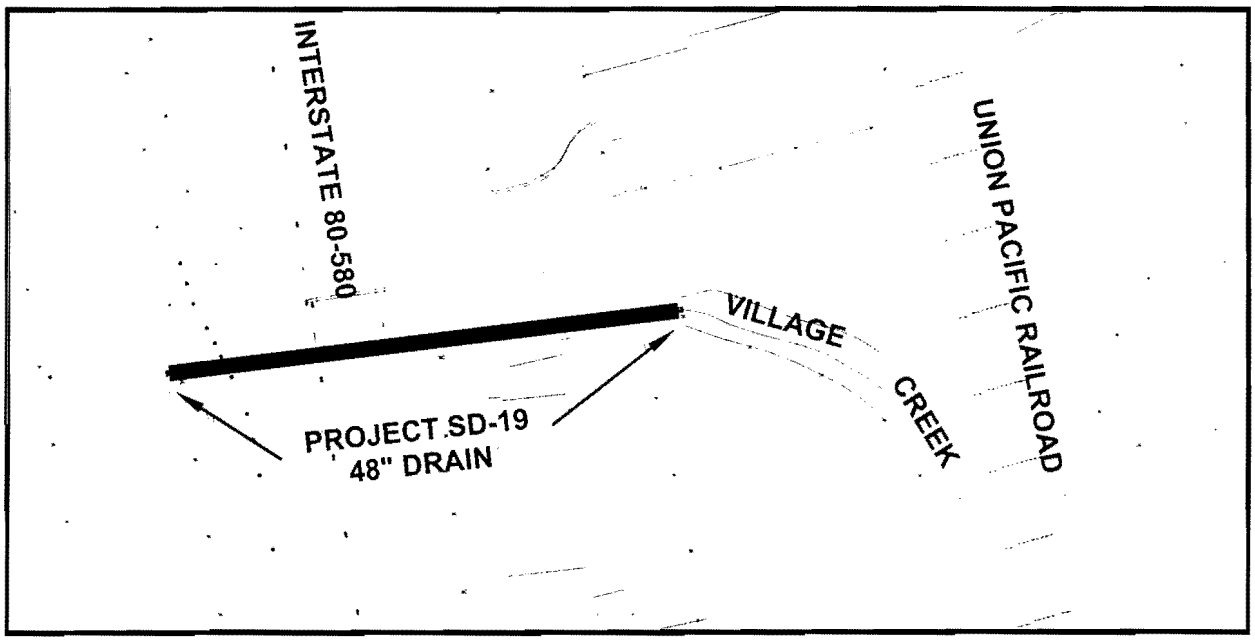
An alternative route to be considered would be expansion of the drainage system along Marin Avenue. The Marin Avenue drainage system is in the Marin Creek Watershed, therefore water would be transferred from one watershed to another. This is not the standard solution to drainage problems. Under this alternative the 36-inch pipe could be placed in Marin Avenue from Key Route Boulevard to San Pablo Avenue. In San Pablo Avenue, the system should turn south and reconnect to the Village Creek watershed.



Project SD-19: Install a new storm drain parallel to the existing drain crossing Interstate-80 at Village Creek.

Estimated Cost: $450,000

Description: This would provide additional flow capacity and help eliminate flooding problems between Interstate-80 and the railroad tracks. In order to cross Interstate-80, pipe jacking construction methods would probably be required.



Project CR-9: Village Creek between San Pablo Avenue and Jackson Street, approximately 700 lf.

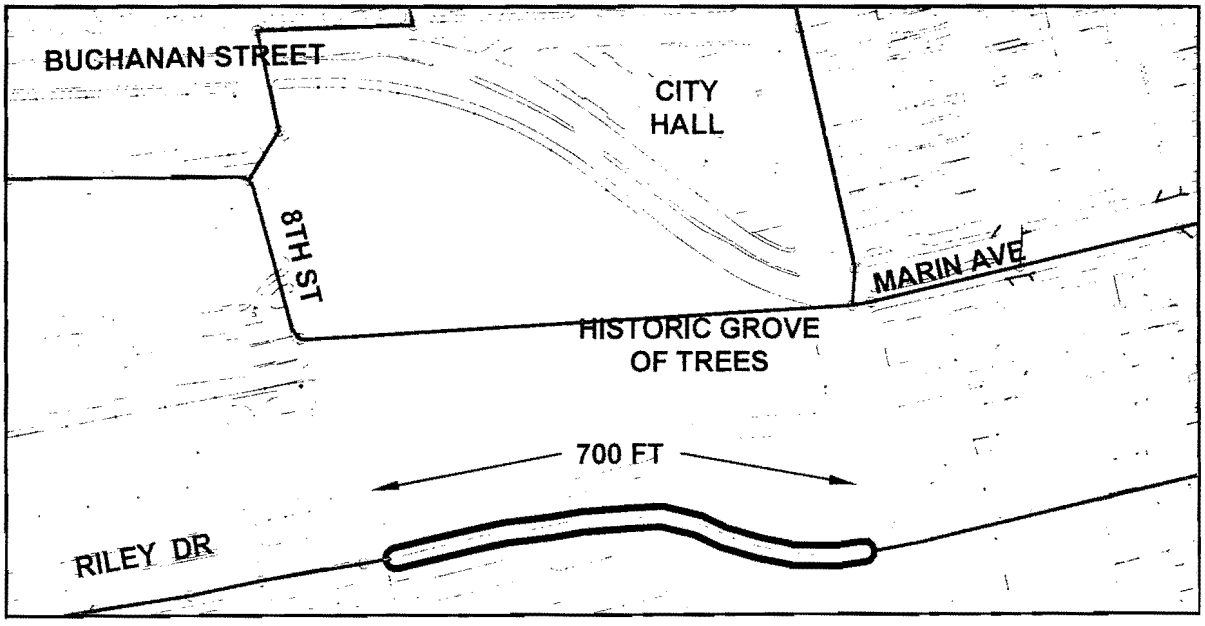
Estimated Cost: $380,000

Description: Restoration enhancements recommended for this reach of Village Creek include: removal of exotic flora, re-vegetation with native species, vegetation management, trails and overlooks, and education. Restoration projects are most likely to become feasible in the long term, that is beyond the year 2003 (five years from the development of this Watershed Management Plan). In general, this is because of funding and the realistic need to complete the initial phases of the University Village Housing redevelopment.

The following elements are recommended for this project:

- Remove exotic plants and re-vegetate with native species
- Incorporate a trail/bike path and creek overlooks, creek identification and educational signs
- Provide vegetation management / maintenance strategies
- Replace culvert under access roads to University Village with a bridge

An alternative to removing the non-native trees would be to only restore the shrub and groundcover vegetation.



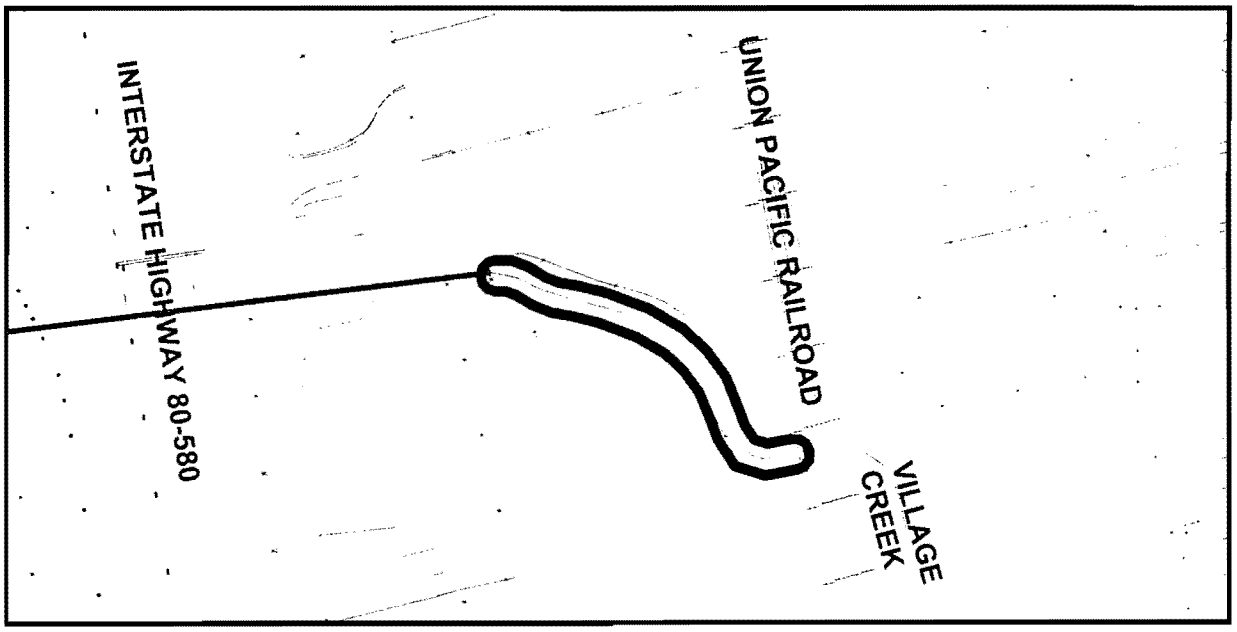
Project CR-11: Village Creek between the Union Pacific Railroad right-of-way and Eastshore Highway, approximately 350 lf.

Estimated Cost: $90,000

Description: The following elements are recommended for the restoration and enhancement of the reach of, recognizing that the land through which the Creek runs is owned by the Union Pacific Railroad Company.

- Remove debris and exotic plants and any concrete bed material
- Widen channel and introduce meanders
- Re-vegetate with native species
- Provide vegetation management and maintenance strategies

As an alternative, the Cleveland Avenue/Eastshore Highway Redevelopment Plan considers re-routing this section of creek, either to Codornices Creek or Marin Creek. Such an project is dependent upon development projects in the area.



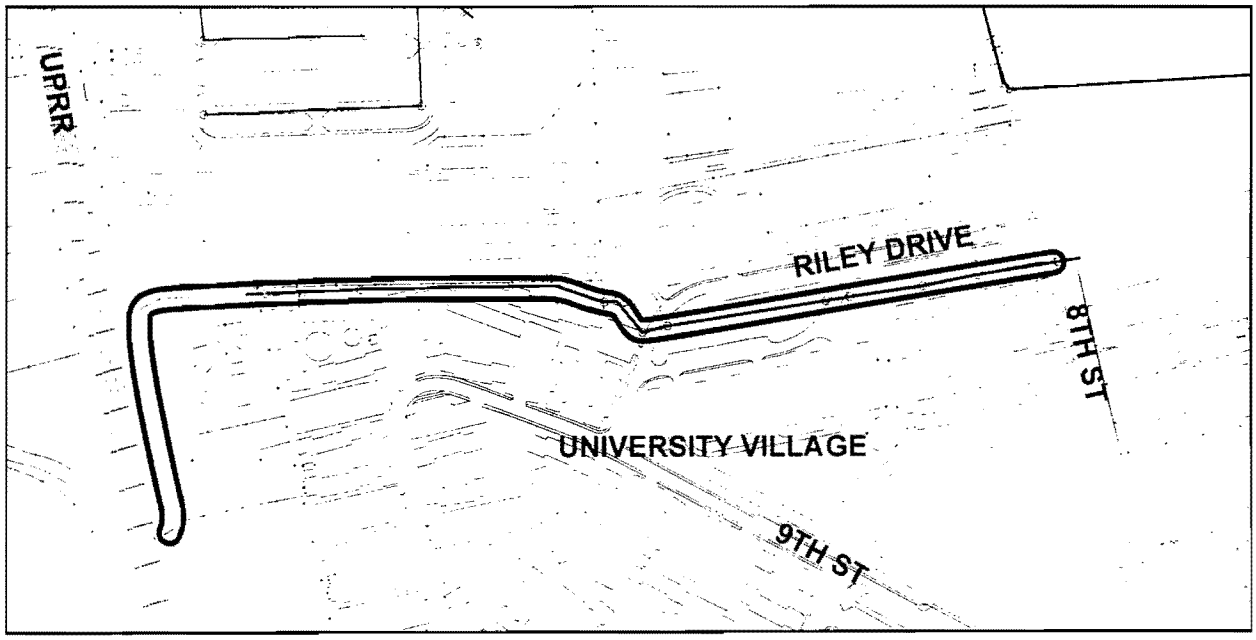
Project CR-17: Between Jackson Street and the western boundary of the University Village property (approximately 1,500 lf) and along the western boundary of the University Village approximately 600 lf

Estimated Cost: $875,000

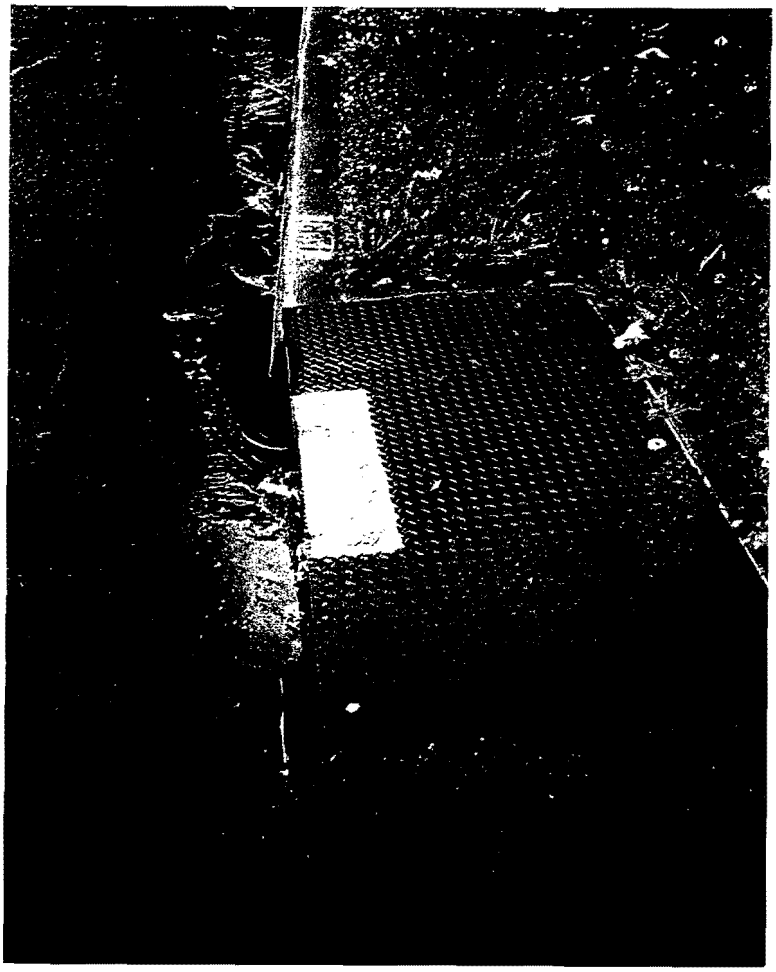
Description: Recommended enhancements include the removal of a row of Monterey pine trees and replacement with appropriate upland trees and shrubs as well as riparian species. Reconstruction efforts should be incorporated into redevelopment plans for the University Village Housing project undertaken by the University of California.

The following elements are recommended for the restoration and enhancement of the reach of Village Creek between Jackson Street and the Union Pacific Railroad right-of-way, recognizing that the land through which the Creek runs is owned by the University of California.

- Remove debris and exotic plants and re-vegetate with native species
- Provide vegetation management
- Open the existing culvert by removing existing pipes



Marin Creek Watershed



AN INLET LEADING INTO
THE MARIN CREEK CULVERT
AT CURTIS STREET
MAY 1998

MARIN CREEK OUTFALL AT THE SAN FRANCISCO BAY
MAY 1998

MARIN CREEK WATERSHED

Marin Creek drains an area of about 958 acres, 27% of which is located within Albany, the remainder lies within Berkeley. The eastern portion of this watershed in Albany extends from the Berkeley border to the Ohlone Greenway between Solano Avenue and Marin Avenue. West of BART the watershed extends to the San Francisco Bay between Washington Avenue and Solano Avenue.

The Marin Creek Watershed drainage system consists of a culvert, miscellaneous storm drain pipes, and overland (surface) flows. Marin Creek is contained within a round culvert for its entire length and generally follows the location of the historic creek. The culvert flows west under Marin Avenue from the Berkeley/Albany border, continues beneath San Pablo Avenue, crosses the Gill Tract just south of Buchanan Street, flows under the Albany Middle School fields and the United States Department of Agriculture (USDA) research center grounds, moves under Interstates 80 and 580, and flows out to the San Francisco Bay in the Albany mudflats.

The existing drainage area is significantly larger than the historic watershed. The existing storm drain pipe on Los Angeles Avenue in Berkeley directs water to the Marin Creek culvert from areas that formerly drained into Codornices Creek. A storm drain pipe on Spruce Street in Berkeley directs water to the Marin Creek culvert that formerly drained into Middle Creek. In addition, a storm drain pipe in Capistrano Street in Berkeley directs water to the Marin Creek culvert that formerly drained into Capistrano Creek and Blackberry Creeks. This storm drain was constructed under the Solano Avenue ridge and connects with the Marin Creek culvert at Marin Avenue and Peralta Avenue.

Existing Conditions

The Marin Creek culvert ranges in size throughout its length from a 42-inch round to 84-inch round concrete culvert along Marin Avenue from the Berkeley border to the Union Pacific Railroad tracks. There are three storm drain pipes in the Marin Creek watershed, on Peralta Avenue, San Pablo Avenue and on Madison Street. The largest storm drain pipe in the Marin Creek watershed carries water south along Peralta Avenue in Berkeley, just north of Solano Avenue, to the Marin Creek culvert. It is quite large and ranges in size from a 57-inch pipe at the northern end to a 42-inch pipe where it connects to the culvert. The storm drain pipe was found to be in good condition.

The San Pablo Avenue storm drain pipe ranges in size from 12-inches to 27-inches. It flows west from the corner of Kains Avenue and Washington Avenue to San Pablo Avenue and south along San Pablo Avenue to the Marin Creek culvert.

A 12-inch clay pipe carries water along Solano Avenue between Adams Street and Madison Street. The 18-inch Madison Street storm drain pipe flows west from the corner of Adams Street and Solano Avenue to Madison Street and south along Madison Street to Buchanan Street. In Buchanan Street water flows south to Jackson Street in a 27-inch pipe. At Jackson Street the pipe changes again to a 30-inch diameter and crosses south until it connects with the 84-inch Marin Creek culvert near the entrance to the Albany Middle School site.

The entire storm drain system is contained within public rights-of-way, primarily within streets east of San Pablo Avenue, and a 25-foot wide utility easement (which also contains a sanitary sewer) for sections west of San Pablo Avenue.

There is a capacity problem with the section of the culvert under I-80. This problem is probably responsible for the reported flooding at the U.S.D.A. research center in January of 1995. The culvert at this location reduces from an 84-inch pipe to a 78-inch pipe for most of this section to the San Francisco Bay. (There are some parts that are larger box culverts in this reach). The culvert under the U.S.D.A. research center is the section most affected by this problem. The hydraulic analysis indicates that some flooding may occur as well on Cleveland Avenue and/or Buchanan Street near Polk Street during major storms because of the constriction under I-80. Most of the area that is undersized is located near Interstate-80, and upgrading this storm drain would require coordination with Caltrans. Although replacing only a portion of this culvert would not solve all the flooding problems, it would provide additional capacity and reduce the occurrence of problems.

The 18-inch clay pipe on San Pablo Avenue between Washington Avenue and Solano Avenue carries only 60% of the required flow for a ten-year storm. The 12-inch CMP drain on Washington Avenue between Kains Avenue and San Pablo Avenue is substantially undersized, as it carries only 29% of the required flow for a ten-year storm.

The 18-inch drain on Madison Street between Solano Avenue and Buchanan Street is undersized. As it carries 77% of the required flow for a ten year storm.

Frequent ponding also occurs at the intersection of Adams Street and Solano Avenue, at the northeast and northwest corners. This may be due to problems with the local drain pipes from the catchbasins, which were observed to be in poor structural condition, as the inlets are obstructed with broken concrete curb and gutter.

Solano Avenue has a number of drainage problems due to the absence of underground storm drain pipes to carry storm flows. Surface water flows along the curb and gutter system into storm drain inlets at corners. These inlets connect to CMP arches that carry the flow through the pedestrian bulbs to discharge on the west side of intersections and flow down the gutter to the next inlet. These inlets are undersized and do not allow enough water into the underground pipes under the roadways. In addition,

many of the inlets are deteriorating. Flooding problems occur regularly at Kains Avenue, Key Route Boulevard, and Pomona Avenue, all on the north side of the street. As part of the 1998 sewer replacement project in Solano Avenue from San Pablo Avenue to Pomona Avenue, an underground storm drainage system is being constructed between Masonic Avenue and San Pablo Avenue.

Storm flows on Cleveland Avenue at Washington Avenue and Solano Avenues discharge to the east side of the railroad tracks. At Washington Avenue, the six-inch storm drain pipe crosses under Cleveland Avenue and discharges into an unlined ditch next to an abutment of Interstate-80. In 1997 the six-inch storm drain pipe from Solano Avenue that crossed Cleveland Avenue was removed at the request of Union Pacific Railroad Company, because the discharge affected track improvements. In the absence of a new discharge system, runoff ponds at the northeast corner of Solano Avenue and Cleveland Avenue.

Problems have been observed at the southeast corner of Marin Avenue and Curtis Street. Inspection showed that there is standing water in the catchbasin. Water entering the catchbasin is not flowing to the main sixty-inch culvert in Marin Avenue. Video observation was not effective in determining the cause of the blockage, but the sunken curb and possible small sinkhole near the storm drain pipe indicate that the pipe may have collapsed.

There are no existing open creek areas within the Marin Creek Watershed in Albany, so there is no existing vegetation or habitat. As there are no existing creek habitats in this watershed, any enhancement would be an improvement. If a section of the creek were restored, the habitats that could be created would be similar to those in nearby areas of other watersheds.

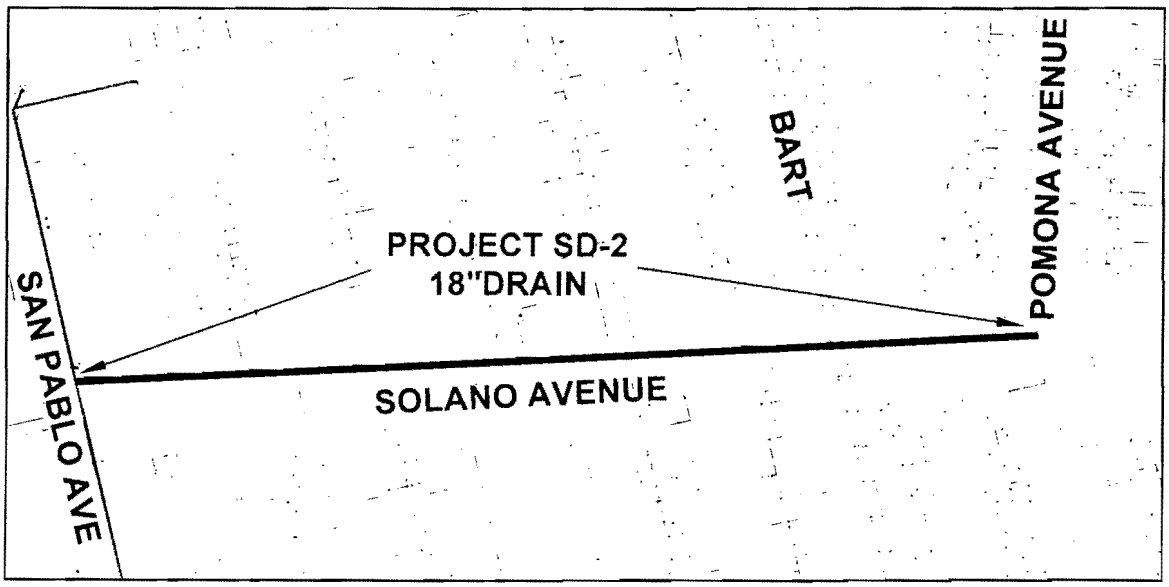
Opportunities for creek restoration in Marin Creek include removing the existing culvert in locations where it is possible. The primary location for these opportunities are west of San Pablo Avenue, in publicly owned areas such as the Gill Tract, Albany Middle School lawn areas, and the Middle School Park lawn areas. In these areas the existing culvert is not constrained by above ground structures or roadways.

Recommended Projects

Project SD-2: Solano Avenue from Pomona Avenue to San Pablo Avenue.

Estimated Cost: $500,000

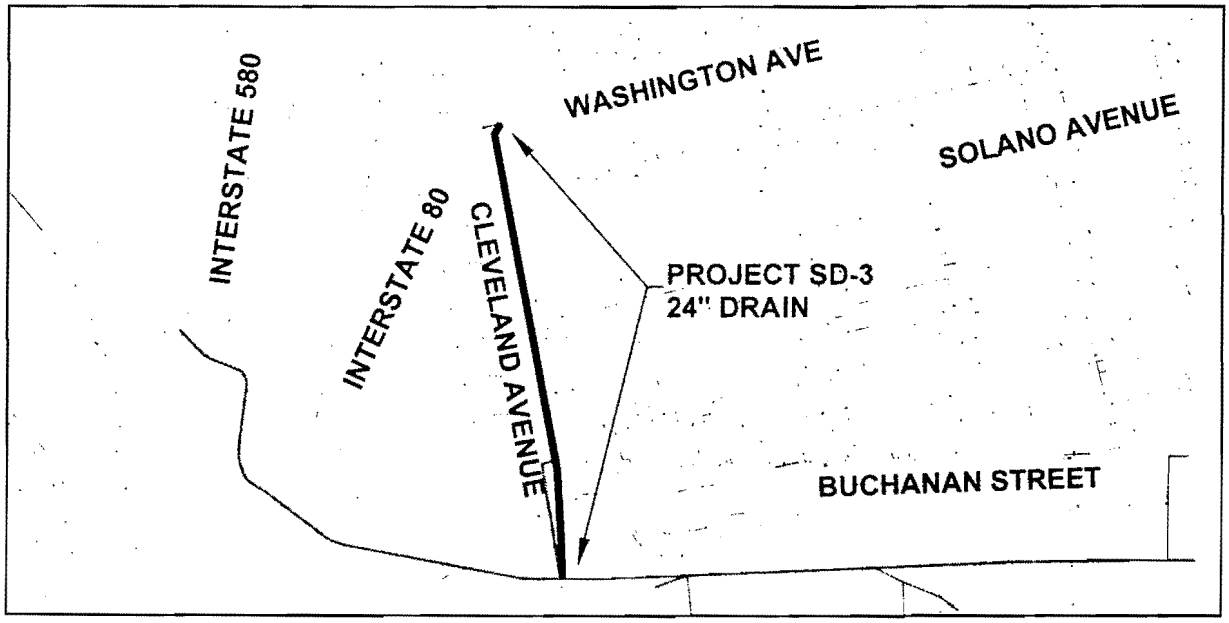
Description: This project is to be constructed as a part of the Solano Avenue Project during the summer and fall of 1998. The project includes a 19-inch by 30-inch elliptical pipe between the Caltrans drain pipe in San Pablo Avenue and Kains Avenue, a 24-inch pipe between Kains Avenue and Stannage Avenue, and an 18-inch pipe between Stannage Avenue and Masonic Avenue. New catch basins and connecting drains are also constructed at each of the intersections between Masonic Avenue and San Pablo Avenue. Additional storm drain pipe should be installed above Masonic, at least to Pomona Avenue to eliminate additional areas of ponding. This extension of the drain system is estimated to cost approximately $200,000 for construction, based on the Solano Avenue Project costs.



Project SD-3: Install a new a new 24-inch storm drain pipe along Cleveland Avenue from Washington Avenue to Buchanan Street.

Estimated Cost: $238,000

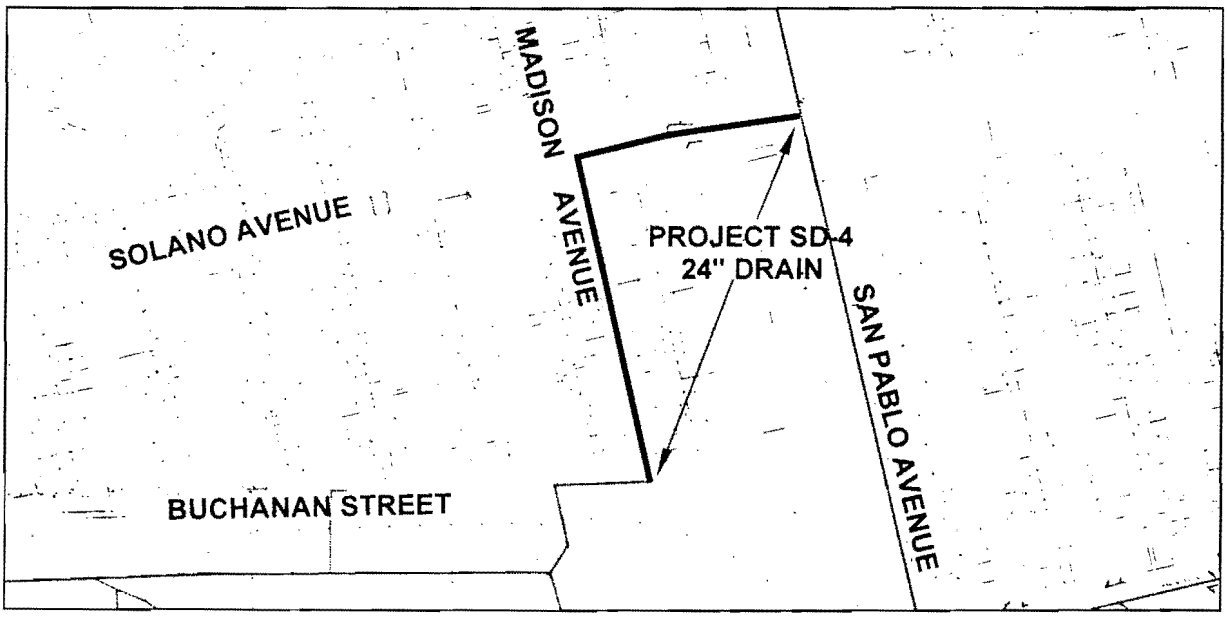
Description: There is presently no storm drain in this location, and drainage problems are currently being experienced on Cleveland Avenue at Washington Avenue and Solano Avenue. This storm drain would connect into the existing Marin Creek drain on the north side of the USDA research center.



Project SD-4: Solano Avenue from San Pablo Avenue to Madison Avenue and Madison Avenue to Buchanan Street.

Estimated Cost: $411,000

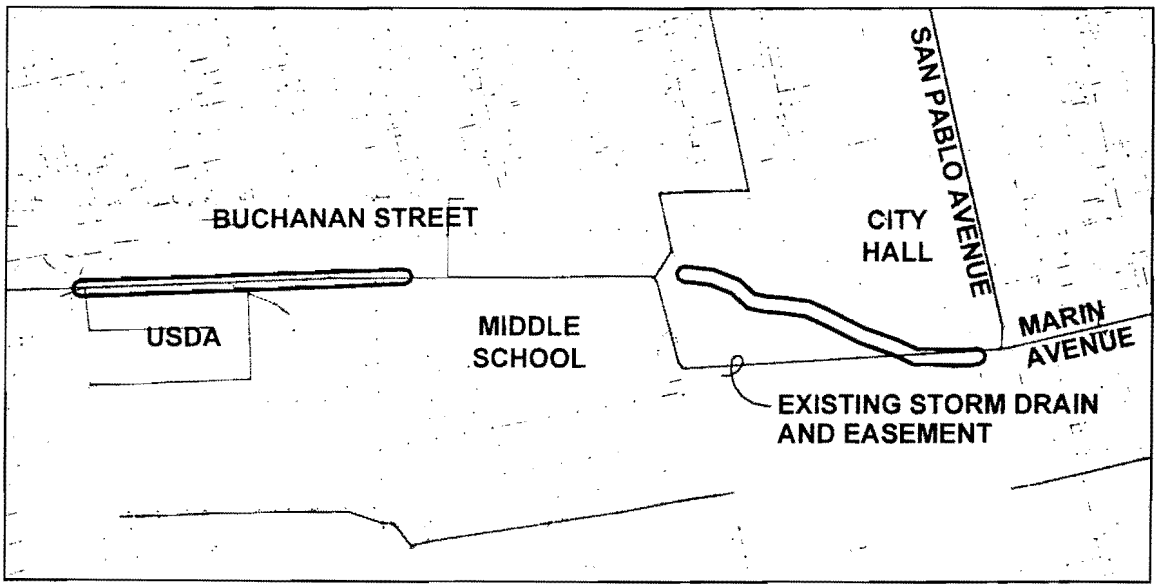
Description: The proposed project would replace the existing 12-inch and 18-inch pipes with a 24-inch pipe within the street rights-of-way. New drain inlets and catch basins would also be included in the construction. The project would correct existing drainage problems at Adams Street and Solano Avenue, as well as provide adequate drainage capacity on Madison Street.



Project CR-19: San Pablo Avenue west to the eastern border of the USDA research center (approximately 2,200 lf)

Estimated Cost: $600,000

Description: Remove 2,200 feet of the culvert, restore the creek to a natural condition by regrading and revegetating the banks, provide open space, pedestrian access to a riparian corridor, and improve water quality by enabling the natural cleaning properties of creeks.



Middle Creek Watershed

MIDDLE CREEK "WATER FALL" AT THE CONFLUENCE WITH CERRITO CREEK, MAY 1998

MIDDLE CREEK WEST OF THE CALIFORNIA ORIENTATION CENTER FOR THE BLIND, MAY 1998

MIDDLE CREEK WATERSHED

The Middle Creek watershed includes most of the area in Albany north of Solano Avenue, and has a drainage area of about 302 acres. Of this, about 90% of the drainage area is from Albany, and about 10% is from Berkeley. Middle Creek formerly drained a much larger area, but a portion was diverted by the City of Berkeley through storm drain pipes into the Marin Creek watershed.

Middle Creek starts north of Solano Avenue at the Berkeley border, and flows in a northwesterly direction until it converges with Cerrito Creek, west of Adams Street near Creekside Park in El Cerrito.

Middle Creek is a tributary of Cerrito Creek. Its run through Albany is approximately 6,000 feet. The majority, approximately 5,000 feet, is contained in a series of culverts. There are three sections of creek, totaling approximately 1,000 feet, in open channels. A small section west of Masonic Avenue is contained in an open channel in backyard areas. The section west of Adams Street flows in an open channel except for a culvert through the California Orientation Center for the Blind. West of the Orientation Center it is also an open creek channel.

Existing Conditions

The drainage system in the Middle Creek Watershed consists of a creek culvert, several storm drain pipes, overland flows, and short sections of open creek channel. The mostly underground creek flows in a culvert that varies slightly in size throughout its length but is predominantly a four-foot by five-foot rectangular concrete culvert. This culvert originates on Peralta Avenue just south of Washington Avenue in Berkeley. This drain follows what was probably the original location of Middle Creek, and passes through private residential and commercial property and under City streets for most of its length. Easements have not been granted to the City for most sections of this drain.

The primary storm drain pipe in this watershed runs along Portland Avenue from Neilson Street in Berkeley in a 16-inch PVC pipe west to Curtis Street, where it increases in size to 18-inches. At San Carlos Avenue the pipe increases again to 24-inches. The pipe diameter increases again at Spokane Avenue to 27-inches in diameter. Near San Gabriel Avenue the storm drain pipes enter a four-foot by five-foot concrete box culvert in the apparent alignment of the historic Middle Creek.

Other storm drain pipes include a number of relatively short pipes on north-south streets that convey storm water from overland flows into the Middle Creek culvert. On Pomona Avenue an 18-inch pipe does not connect to the 24-inch pipe in Portland Avenue with the box culvert to the south. Also within Pomona Avenue a 14-inch pipe connects storm drain inlets from Portland Avenue to the box culvert to the south. The

concrete box culvert crossing Pomona Avenue is four-foot ten-inches by five feet.

On Key Route Boulevard a 14-inch pipe connects drain inlets at the southeast corner of Portland Avenue and Key Route Boulevard with a four-foot by five-foot concrete box culvert, located to the south. North of Portland Avenue, in Key Route, the City recently constructed an 18-inch pipe from a mid-block inlet to the 24-inch pipe in Portland Avenue.

There is also a storm drain pipe system at the west end of the Middle Creek watershed that drains overland flows from the Jackson Street and Madison Street area. A 10-inch concrete pipe runs east, down Albany Hill, under private residential property to Jackson Street. On Jackson Street the system collects overland flow from Jackson Street into a 12-inch clay pipe and continues under Jackson Street and on down the hill, under private residential property, to Madison Street. On Madison Street, the system turns north in a 15-inch clay pipe, which at some point transitions into an arched 10-inch by 17-inch CMP. The CMP discharges at the end of the paved section of Madison Street onto bare ground, which is eroded and forms a gulley conveying the water to the largest open portion of Middle Creek.

During field investigations water flow and dye tests were used to determine how the storm drains pipes were connected throughout the watershed. Based on this testing, it was discovered that there are two storm drain pipes running south along Pomona Avenue from Portland Avenue to the Middle Creek culvert. The water that drains from the Albany High School and Memorial Park area at the north side of Portland Avenue at Pomona Avenue does not enter the 24-inch storm drain in Portland Avenue, but flows approximately 350 feet south on Pomona Avenue in an 18-inch storm drain pipe, and empties into the Middle Creek culvert. Surface water flowing west from beyond Pomona Avenue enters the storm drain inlet on the southeast corner of Portland Avenue and Pomona Avenue. Water then flows south through a 14-inch pipe along Pomona Avenue to the Middle Creek culvert . These two pipes along Pomona Avenue were apparently installed to carry water to the culvert, because 24-inch drain in Portland Avenue did not have enough capacity.

Key Route Boulevard surface water that enters a storm drain inlet on the west side of Key Route Boulevard is carried in an 18-inch storm drain pipe approximately 300 feet to the 24-inch storm drain pipe on Portland Avenue.

Based on the hydraulic analysis, the Middle Creek culvert has sufficient capacity to carry the 10-year flow for the current watershed area. This culvert appears to have been designed to carry flows from Capistrano Creek and Blackberry Creek (which are technically within the Middle Creek Watershed) before these areas were diverted to the Marin Creek Watershed.

Because of the age and location of the culverts an issue for additional study in the Middle Creek culvert is not flow capacity, but structural adequacy. There are no

known areas of structural problems with this storm drain, but only limited sections were inspected due to lack of access points. Structural failure of the culvert could result in settlement of structures where the drain passes near or under existing buildings or roadways.

The 42-, 45-, and 48-inch storm drain pipes west of San Pablo Avenue, just north of Clay Street, have inadequate ten-year storm capacity. They are also located under the Albany Bowl building. There is a constriction at the junction between the culvert under San Pablo Avenue and these pipes, which causes water to pond and sediment to accumulate. This, plus the fact that the culvert is wide and shallow (3-foot x 7-foot), has caused about one foot of rock and sediment to accumulate in the box culvert at San Pablo Avenue. Just to the west, there are two sections of CMP arch pipe that lack ten-year storm capacity. One is located east of Adams Street in the Albany Bowl parking area, and the other is located west of Adams Street.

Problems also have been observed at the intersection of Portland Avenue and Santa Fe Avenue on the northeast and southeast corners. Although there is a storm drain pipe in Portland Avenue, the runoff at this corner apparently does not flow directly into that drain, but is carried in shallow pipes under Santa Fe Avenue. A video inspection in February 1998 showed that these drains are 15-inch clay pipes, and that there is a considerable amount of gravel and debris collected in the drain line from the southeast corner to the southwest corner under the intersection. The drain from the northeast corner to the northwest corner has some fractures, but was clear and open at the time of the inspection.

At Portland Avenue and San Carlos Avenue on the northeast and southeast corners drainage problems also have been reported. These storm drain inlets (which have catchbasins) direct the flow to the storm drain pipe in Portland Avenue. A video inspection in February 1998 showed that there are some fractures in these pipes, but the pipes were not obstructed. The defects in the pipes may cause debris to collect at this location, creating backups of water during some storms.

The hydraulic analysis for the Middle Creek Watershed indicates the following drainage capacity deficiencies:

- The storm drain pipe in Portland Avenue, but the amount of the deficiency is probably not enough to cause frequent overflows. There also has been some overflows of the Berkeley sewer main which is located in Portland Avenue, and reports of flooding in this area may have actually been sanitary sewer overflows rather than storm water.

- The gutter on the east side of San Pablo Avenue between Portland Avenue and Clay Street. There have not been any reports of flooding problems occurring at this location. The flow probably continues along San Pablo Avenue north to Cerrito Creek, without causing major problems.

- There are reports of drainage problems at Washington Avenue and Santa Fe Avenue. Drainage here is carried 100 feet south in a 12-inch clay pipe to the Middle Creek culvert just south of Washington Avenue. A video inspection of this drain in February 1998 showed that the pipe was half full of rocks and debris toward the southern side of this intersection.
- The 10-inch storm drain pipe carrying flows from Portland Avenue to the culvert on Masonic Avenue is undersized for the ten-year storm. However, the current storm drain construction on Solano Avenue will decrease flow to this area.

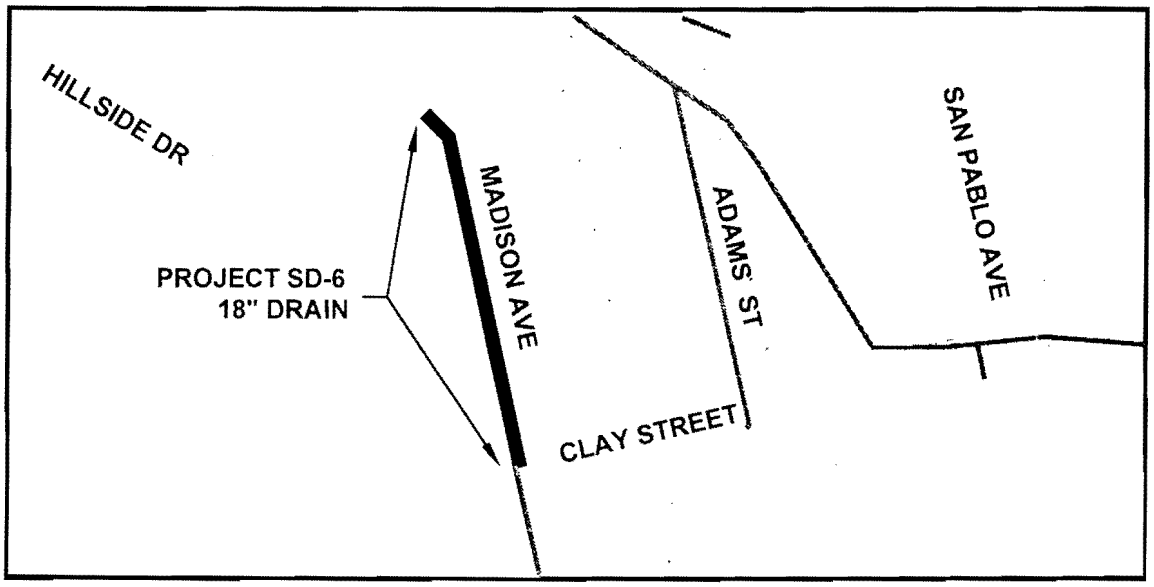
The vegetation along the open sections of Middle Creek consists of dense Central Coast riparian scrub mixed with exotic trees, shrubs and vines. The section of Middle Creek near Cerrito Creek has high enhancement opportunities because of the abundant native tree species (arroyo willow and coast live oak) and because it is contiguous with extensive native habitats on Albany Hill.

Recommended Projects

Project SD-6: Along Madison Street from Clay Street north to the end of the paved section of Madison Street.

Estimated Cost: $75,000

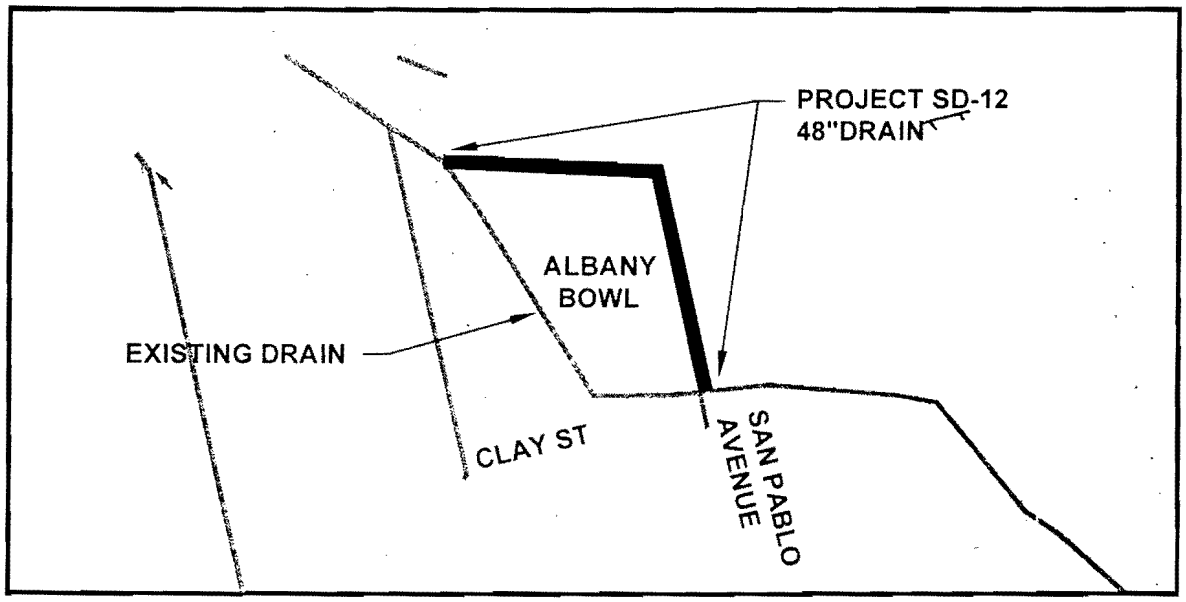
Description: The CMP at the north end of Madison is deteriorating. This project will replace the existing arch pipe with an 18-inch pipe to increase flow capacity. The flow from the existing pipe contributes to erosion within the unpaved section of the Madison Street right-of-way, which accesses Creekside Park. A recommended alternative solution to the outfall of the new pipe is to construct a rip-rap energy dissipator to slow the flow of storm water and spread it over a wider area so as to lessen its erosive powers.



Project SD-12: Replace the two box culverts currently located beneath the Albany Bowl building.

Estimated Cost: $160,000

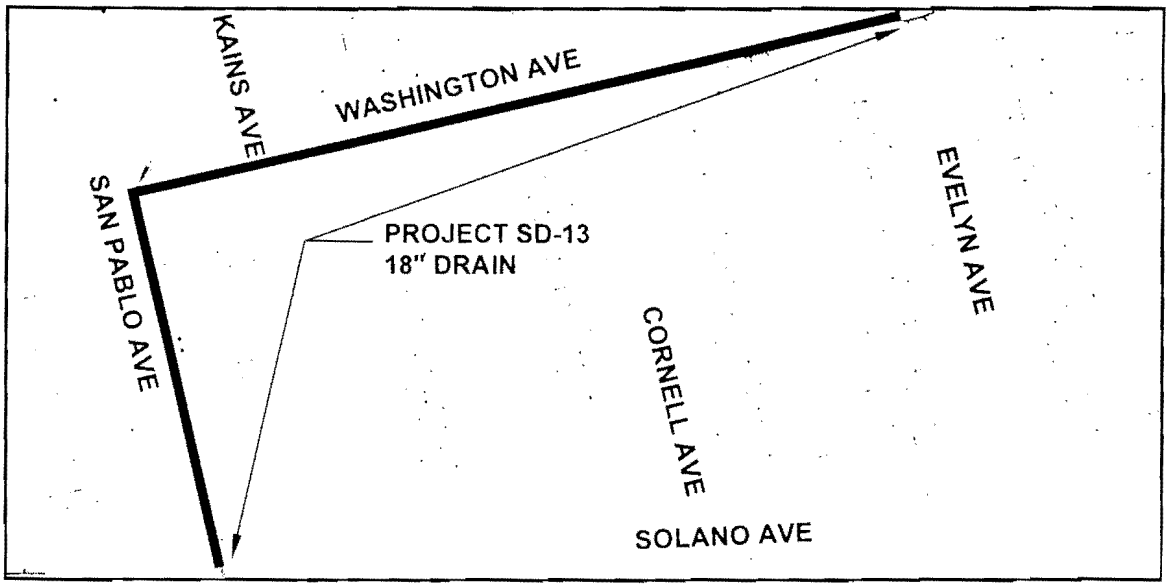
Description: The culverts run from San Pablo Avenue at Clay Street to Adams Street. This project would solve the existing capacity deficiency in this location, and eliminate the storm drain located under the Albany Bowl building. The recommended alignment for the replacement system is north on San Pablo Avenue from Clay Street, then west across the existing Albany Bowl parking area. An alternative alignment entirely on existing public rights-of-way would be west on Clay Street and north on Adams Street. However this alternative may be more costly because of the required deeper excavation depths on Clay Street.



Project SD-13: Install a new 18-inch storm drain pipe from Washington Avenue at Evelyn Avenue to San Pablo Avenue at Solano Avenue.

Estimated Cost: $445,000

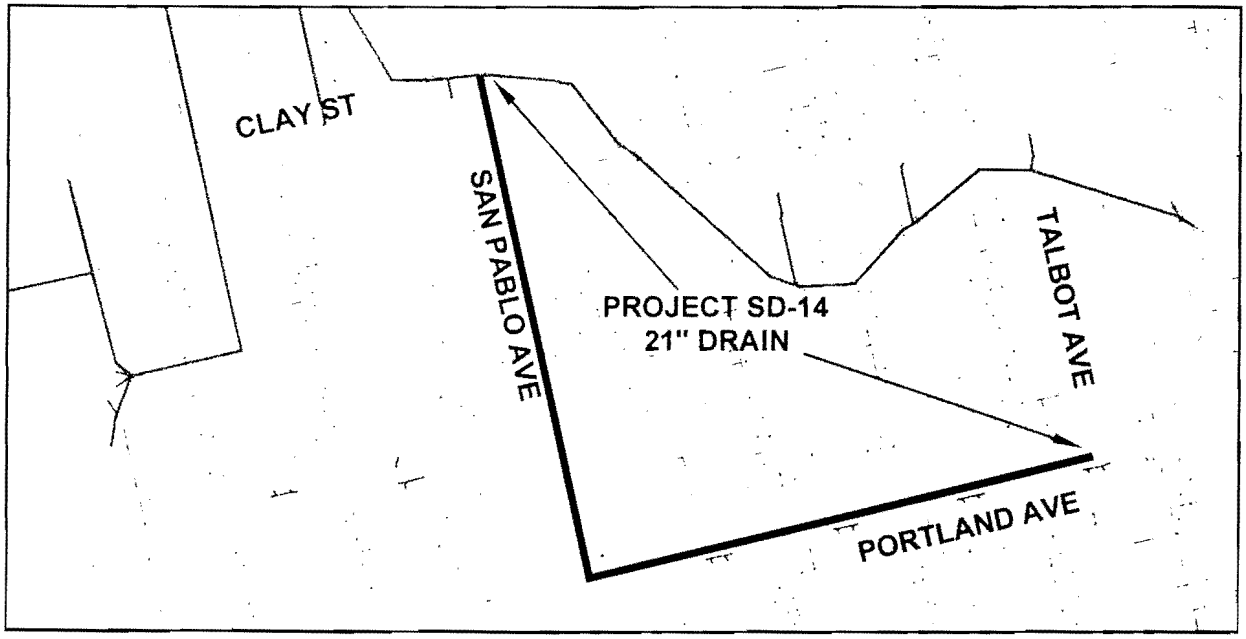
Description: This would eliminate the capacity deficiency in the existing 12-inch CMP storm drains on Washington Avenue from Kains Avenue to San Pablo Avenue, and in the existing 18-inch drain on San Pablo Avenue from Washington Avenue to Solano Avenue. It would also extend the storm drain on Washington Avenue to carry flow in an underground pipe instead of the street gutter and shallow cross street drains which are presently utilized. The existing system contributes to the ponding of water at the intersection of San Pablo Avenue and Washington Avenue. Additionally, as a part of the 1998 San Pablo Avenue Sewer Project, the storm drain from Washington Avenue was disconnected from the sanitary sewer. Consequently, more storm water will now flow in the San Pablo Avenue storm drain. The increased pipe size is necessary to accommodate this increased, but naturally occurring, flow.



Project SD-14: Install a new 21-inch storm drain pipe in Portland Avenue from Talbot Avenue to San Pablo Avenue. then along San Pablo Avenue to Clay Street.

Estimated Cost: $550,000

Description: This is an area where there are no existing storm drains, and where high flows are expected in the existing gutter and cross street drainage system during the 10-year flow.

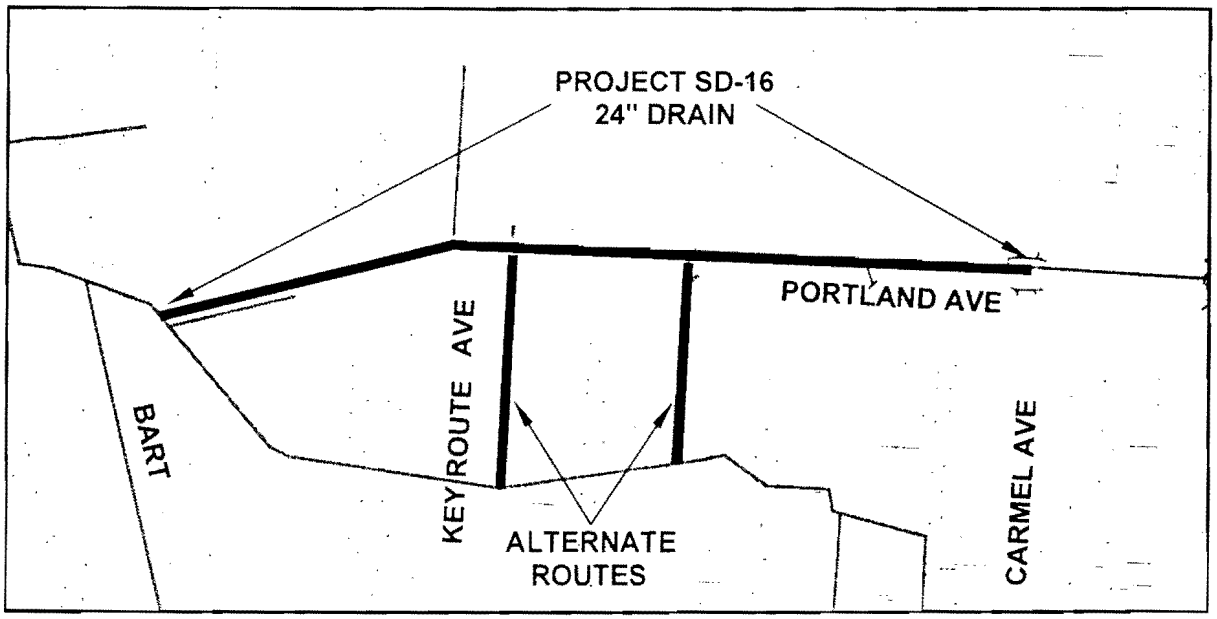


Project SD-16: Install an additional 24-inch storm drain pipe parallel to the existing 24-inch storm drain pipe in Portland Avenue from Carmel Avenue to the BART right-of-way (Ohlone Greenway).

Estimated Cost: $390,000

Description: To relieve the recurring ponding at the intersections between Carmel Avenue and Masonic Avenue, additional drainage capacity is recommended. The most direct route is to construct a new, parallel 24-inch pipe line between Carmel Avenue and Masonic Avenue. However, it is also possible to reduce the impact of Portland Avenue drainage on Masonic Avenue and the connection with the creek culvert by diverting some of the flow from Portland Avenue down side streets. This has the effect of moving water from Portland Avenue to upstream portions of the Middle Creek culvert, where there may be additional capacity in high volume storms.

Alternative routes to be considered would include diverting some flow south on Pomona Avenue or Key Route Boulevard to the Middle Creek box culvert, which has excess capacity in this area.



Cerrito Creek Watershed

CERRITO CREEK WEST OF THE MIDDLE CREEK CONFLUENCE
DECEMBER 1995

CERRITO CREEK DETENTION POND IN EL CERRITO
DECEMBER 1995

CERRITO CREEK WATERSHED

Cerrito Creek flows along the northern boundary of Albany. In Albany it extends from the Berkeley border at Curtis Street approximately 1.4 miles to the San Francisco Bay. The creek separates Albany from the cities of El Cerrito and Richmond. The total drainage area is about 1,330 acres, of which only about 2% is located in Albany. The creek originates in the Berkeley Hills but most of the watershed area is located within the City of El Cerrito. The largest portion of the El Cerrito drainage joins the main creek through storm drains located west of San Pablo Avenue. In Albany, many portions of the creek flow in open channel sections, with culverts at street crossings. The longest covered section is between Spokane Avenue and the Ohlone Greenway.

The Cerrito Creek channel is generally smaller than Codornices Creek, reflecting the smaller watershed area. Cerrito Creek tends to be narrower in the upstream residential areas, and is shallower at the downstream end. The deepest sections of Cerrito Creek are along El Cerrito Plaza, and the widest sections are downstream of Adams Street.

Open creek sections are, for the most part, highly urbanized, having been modified to fit between or under residences.

Existing Conditions

Except for the drainage structures in Cerrito Creek itself, there are only a few existing storm drain pipes in the Albany portion of the Cerrito Creek watershed. At the northeast corner of Albany, there is a 15-inch clay pipe that originates on Neilson Street, in Berkeley. The drain passes between houses to Curtis Street and Santa Fe Avenue. Just west of Santa Fe Avenue, it empties into Cerrito Creek. The outlet of this drain has been located, but no inlet or access point has been located in Santa Fe Avenue, and the exact route of this drain is uncertain.

Other areas east of San Pablo Avenue drain along streets into the creek. There is a short drain from the north end of Adams Street into the creek.

The channel sections located upstream of Spokane Avenue are entirely on private property. Consequently, they are considered to be poorly suited for enhancement. Although these sections support scattered native tree, shrub and vine species and may represent remnants of the native vegetation, they are isolated from one another by streets and homes and are connected only via buried culverts. The enhancement potential of these sections is severely limited by the narrowness of the creek corridor between residences and the presence of steep banks. Most sections have been highly altered by the planting of ornamental species. At best, enhancement might include the eradication of non-native species and replacement with native species. Existing wildlife values of the vegetation in these sections is expected to be moderate, limited to nesting

and perching opportunities for resident and migratory birds. Enhancement of these creek sections by the replacement of non-native species with native plantings is not expected to result in a significant increase in wildlife usage.

The Plan recommends that a public information program be developed to provide property owners with resources for creek protection and an understanding of the responsibilities of living on a creek. The Community Development & Environmental Resources Department produced a brochure "Albany's Creeks - Property Owner Rights, Responsibilities and Opportunities" in May 1998.

The middle stretch of the creek, between Santa Fe Avenue and San Pablo Avenue, consists of alternating open channel sections and underground culverts. Open channel sections have been significantly altered by development and horticultural plantings.

The estimated capacity of the culverts and channels in Cerrito Creek east of San Pablo Avenue is generally adequate for the estimated 10-year flow. Opportunities for enhancing riparian habitat are limited by the narrowness of the creek corridor, the presence of a large number of ornamental trees, shrubs and vines as well as invasive non-native species, and intense use by adjacent property owners.

Across the creek from the northern end of Adams Street three large box culverts carrying drainage from El Cerrito connect to the main Cerrito Creek channel. The drainage area contributing runoff to these culverts is larger than the area providing flow to the areas east of San Pablo. Therefore, there is more flow in the portion of Cerrito Creek west of San Pablo Avenue than there is in the portion of Cerrito Creek east of San Pablo Avenue.

Problems with flooding have been experienced in the area of El Cerrito around Creekside Park, and this area is located in a FEMA 100-year floodplain area. No areas in Albany are believed to be affected by this flooding, however flooding problems in adjacent areas would need to be considered in any planned channel modification of Cerrito Creek in this area. The flooding is believed to be caused by low street elevations in El Cerrito (about elevation 9.5 feet above sea level at the southern end of Belmont Avenue, and about elevation 7 feet farther north on Belmont Avenue in El Cerrito), and the capacity of downstream crossings at Interstate-80, the Union Pacific Railroad lines, and Interstate 580. Some clearing of the Cerrito Creek channel was done by the City of El Cerrito in the area near Creekside Park in the fall of 1997.

A 30-inch drain along Pierce Street, which carries some runoff from I-80, joins the creek at the box culvert at Pierce Street. On Cleveland Avenue, a 12-inch drain empties directly into the creek.

There are no known problems or capacity deficiencies with any of the storm drains in the Cerrito Creek watershed.
Downstream of San Pablo Avenue, while the creek has been channelized and

straightened, it is open all the way to San Francisco Bay, with crossing structures at Interstate-80, the railroad, and Interstate-580.

West of San Pablo Avenue, the vegetation along Cerrito Creek is dense and contiguous. While altered by urbanization and landscaping, the tree canopy is strongly influenced by native riparian trees characteristic of Central Coast riparian scrub. The channel bottom in the upper end of this creek section is dominated by native aquatic plant species and supports a well-developed band of coastal freshwater marsh. Within the City of Albany's Creekside Park is an extensive stand of coast live oak woodland. Coastal brackish marsh habitat extends from the Interstate 80 overpass upstream approximately 1,200 feet and downstream to the Interstate 580 overpass. Northern coastal saltmarsh habitat is present at the downstream end of Cerrito Creek on the San Francisco Bay side of Interstate 580 and parallel to the Union Pacific Railroad tracks east of the Interstate.

Despite the highly urbanized nature of Cerrito Creek, numerous native, presumably indigenous tree species are still present. Creek sections supporting noteworthy native species include the following:

1. Santa Fe Avenue to San Carlos Avenue: one large California buckeye, two large coast live oak trees, one Mexican elderberry and one arroyo willow;
2. Carmel Avenue to Ramona Avenue: one big-leaf maple;
3. Pomona Avenue to Key Route Boulevard: one small coast live oak;
4. Key Route Boulevard to Spokane Avenue: one large California buckeye;
5. Talbot Avenue to Cornell Avenue: one large coast live oak and one large arroyo willow;
6. Cornell Avenue to Stannage Avenue: two large arroyo willows, one large Mexican elderberry, one large coast live oak, and a band of low quality freshwater marsh;
7. Stannage Avenue to Kains Avenue: one large big-leaf maple and one large arroyo willow;
8. San Pablo Avenue west to 1,350 feet downstream: moderate to high quality freshwater marsh dominated by Pacific oenanthe, numerous large arroyo willows, one spectacular California sycamore, numerous coast live oak trees, two large Mexican elderberry trees, one alder;
9. Pierce Street east to 700 feet upstream: moderate quality coastal brackish marsh dominated by evergreen thornless blackberry (*Rubus ulmifolius* var. *inermis*) on the banks and cattail, California bulrush and saltmarsh bulrush within the channel itself. Large numbers of the special-status species marsh gumplant are also present along the banks;
10. Interstate 80 west to Interstate 580 and parallel to railroad tracks: disturbed coastal brackish marsh dominated by the special-status species marsh gumplant along banks of channel; side channel supports disturbed northern coastal salt marsh dominated by salt grass, alkali heath, jaumea and pickleweed.

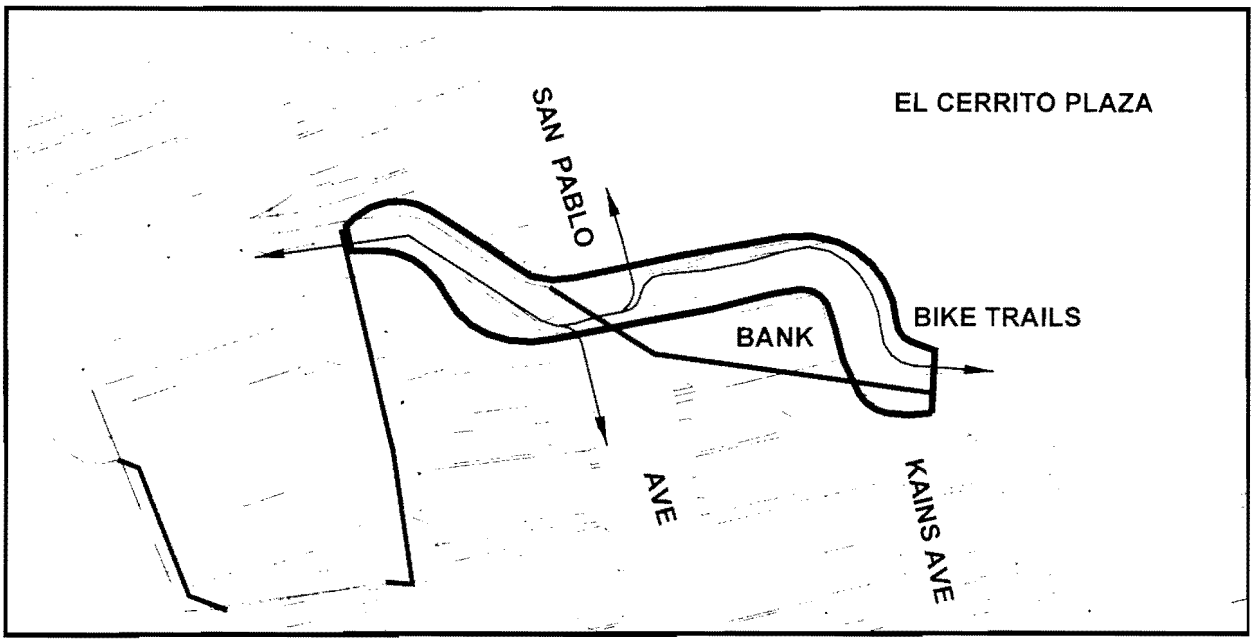
Project CR-4: San Pablo Avenue to Kains Avenue, approximately 300 lf.

Estimated Cost: $465,000

Description: The project plans for the removal of section of the creek from a culvert and the rerouting of the creek north and west around existing commercial development. The creek is contained within a culvert under an existing building east of San Pablo Avenue. Although this section of creek is located within the City of El Cerrito, the project would also serve to create a gateway into the City of Albany. It is anticipated that any construction project would be jointly funded by the cities of Albany and El Cerrito, or by the ultimate developer of the El Cerrito Plaza. Project elements would include:

- Opening of the buried creek as part of the El Cerrito Plaza revitalization
- Relocation of approximately 300 feet of creek north into El Cerrito
- Design elements, such as bridge railings, signs and banners, at San Pablo Avenue to create a gateway to Albany.
- Creek identification and educational signs

The map below shows projects CR-4 and CR-5, which form an integrated project to create the northern gateway of Albany. CR-4 is the right hand project, routing the creek around the bank building.



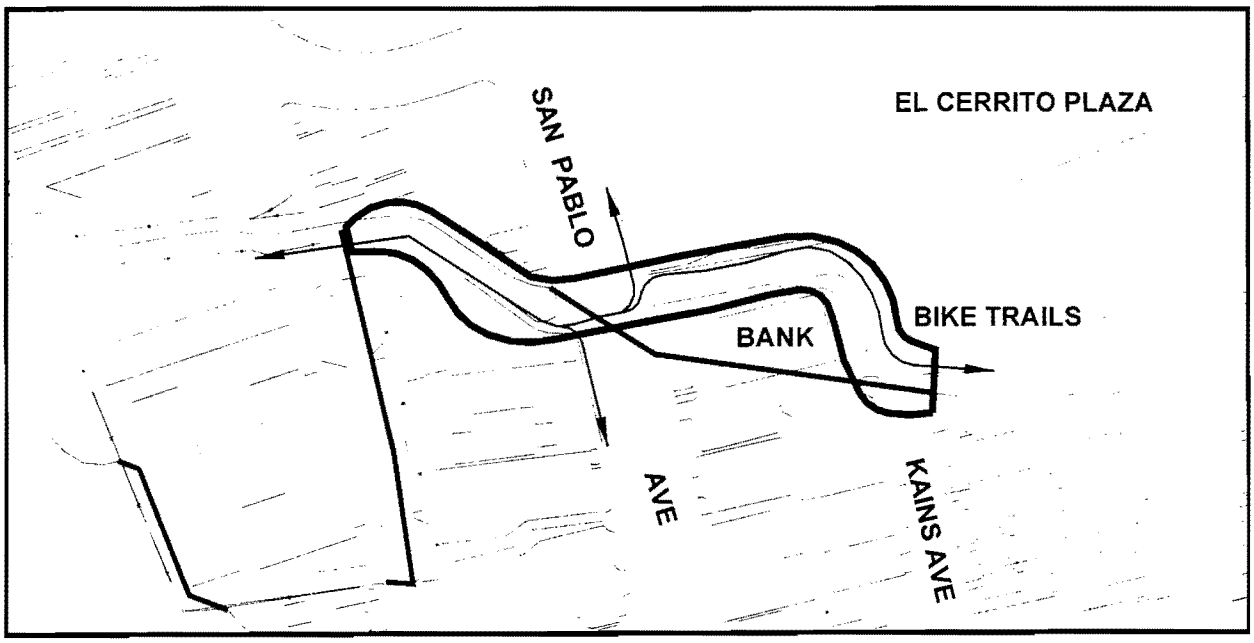
Project CR-5: San Pablo Avenue to Adams Street, approximately 200 lf.

Estimated Cost: $245,000

Description: Continued trails, restoration of native vegetation and creek are included in this project. Elements such as a bridge rails, special paving and pedestrian walk lights would bring a greater awareness to local residents and those who frequent the commercial area.

The map below shows projects CR-4 and CR-5, which form an integrated project to create the northern gateway of Albany. CR-5 is the left hand project extending gateway improvements to the confluence with Middle Creek. Along this reach of the creek there is an existing asphalt trail and lights. Generally, improvements would be to restore native vegetation and provide signs.

- Removing debris and exotic plants and re-vegetating with native species
- Regrading the channel where the right-of-way allows
- Constructing a trail and bike path, overlooks, creek identification and educational signs
- Constructing gateway elements on San Pablo Avenue, such as bridge railings and special paving



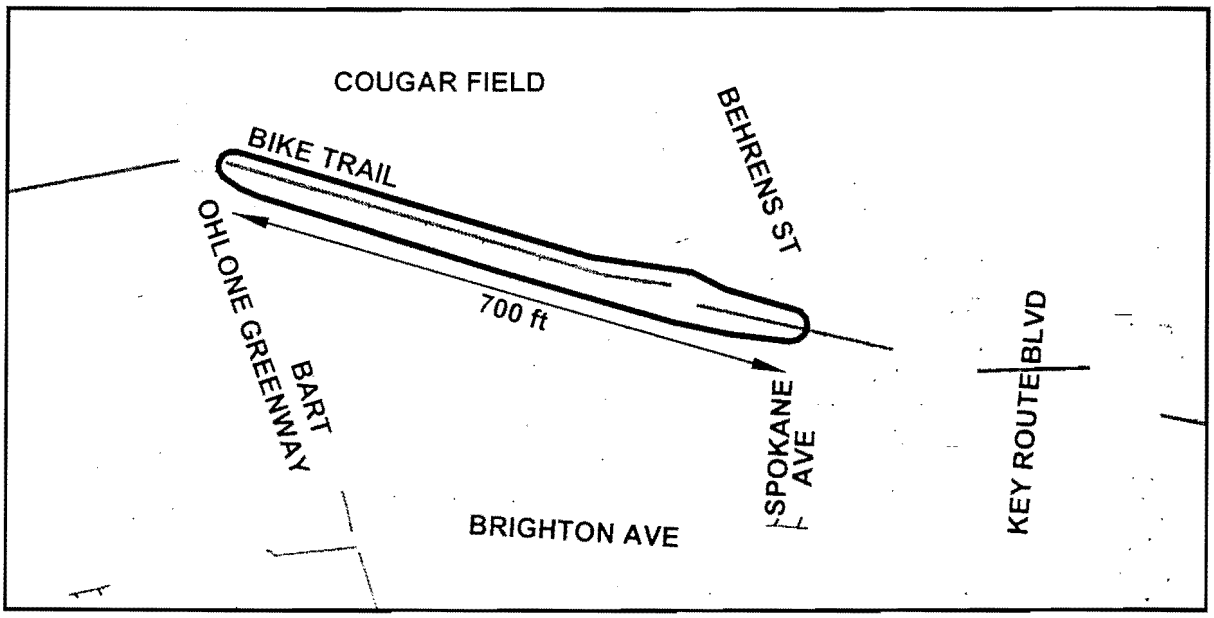
Project CR-8: Between Spokane Avenue and the Ohlone Greenway, approximately 700 lf.

Estimated Cost: $700,000

Description: Remove concrete culvert and regrade banks. Cerrito Creek is contained in a culvert between Spokane Avenue and the BART right-of-way. Development of the proposed new Middle School by the Albany Unified School District would allow for the possibility of opening all or part of this creek segment. Current plans for the Middle School project do not include the restoration of Cerrito Creek.

Restoration elements include:

- Removing the existing culverts to open the creek
- Constructing a trail and bike path along the creek bank to connect Spokane Avenue with the Ohlone Greenway bicycle trail
- Installing creek identification and educational signs

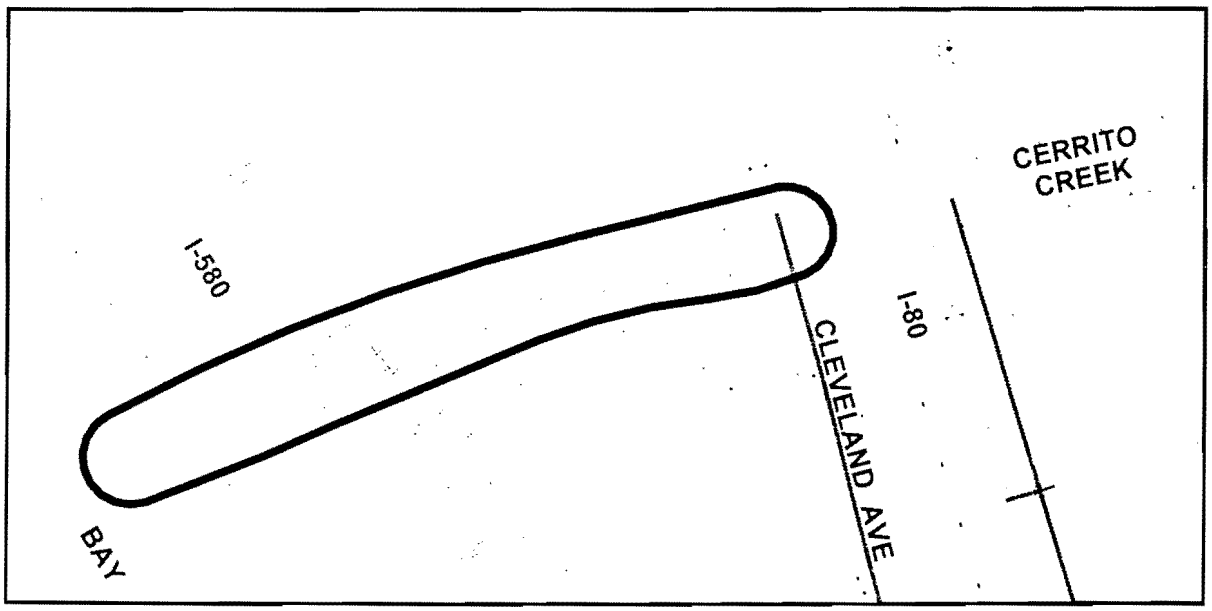


Project CR-14: Between Interstate 80 and the San Francisco Bay, approximately 500lf.

Estimated Cost: $50,000

Description: This is a vegetation restoration and enhancement project. No public access of significant channel improvements are recommended. Project elements include:

- Removing exotic plants
- Re-vegetating with native species
- Installing educational signs along Cleveland Avenue



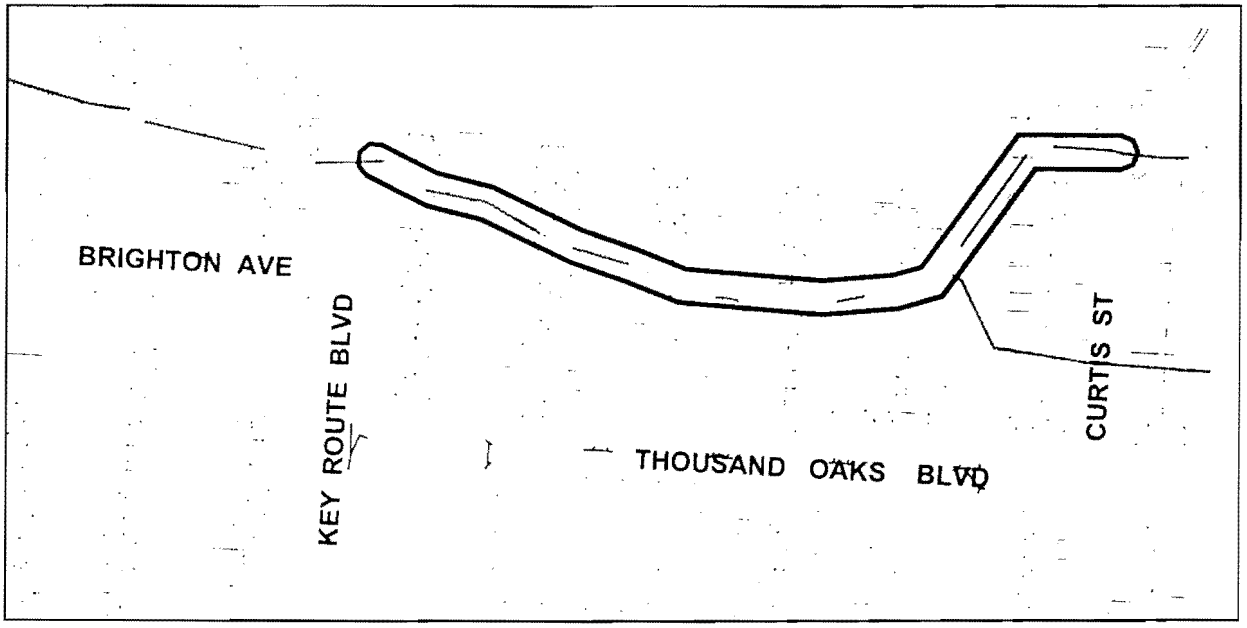
Project CR-16: Between Key Route Boulevard and the Berkeley border (approximately 1,400 lf)

Estimated Cost: $242,000

Description: This project will provide information on appropriate creekside landscaping to homeowners adjacent to the creek. Information could include direct mail, workshops, and demonstration projects. A long term project would include removing the culverts at the road crossings and installing bridges to improve storm flow capacity.

Recommended project elements include:

- Providing informational mailings and workshops on how to:
- Remove debris and exotic plants
- Widen channels and introduce meanders where rights-of-way allow
- Methods to stabilize eroding banks
- Re-plant with native species
- Designing and installing bridges at street crossings



WATER QUALITY

The term water quality refers to the various physical and chemical characteristics of water from a particular source, including concentrations of dissolved ions and compounds, and suspended particles. These characteristics provide a measure of the uses and values, such as drinking (potable) water or aquatic habitat, which might be sustained from that source. Water quality is always assessed in relation to a particular end-use. For example, water classified as "excellent" because it meets the California Department of Health Services' most-restrictive standards for potable supply may be less productive for fisheries than "poor" quality water with higher concentrations of nutrients.

In urban streams, such as Cerrito and Codornices Creeks, and in the San Francisco Bay, water quality and the health of the ecosystem depends both on natural conditions, such as rainfall and geology, as well as the type and pattern of land use in the watershed, and management of the surrounding urban environment. High flows of storm runoff can also impact water quality by eroding streambanks and scouring away vegetation, causing an increase in turbidity.

The type and pattern of land use in the surrounding watershed can play a role in influencing water quality. Runoff from undeveloped areas typically exhibits the lowest concentrations of contaminants. Municipalities can improve water quality in urban streams by implementing a variety of control measures, or best management practices (BMPs), to reduce pollution.

BMPs may be divided into two groups: "source-reduction" and "treatment" measures. Source-reduction BMPs, such as collection programs for used motor oil or household hazardous wastes, emphasize prevention, managing potential contaminants before they enter storm drains or the sanitary sewer system. In contrast, treatment BMPs are physical measures selected based on their effectiveness in removing pollutants after they have already been mobilized in stormwater runoff. Oil-water separators, detention ponds and stormwater wetlands are examples of commonly-used treatment BMPs. While BMP choices vary depending on local geography, staff availability and budgets, the likelihood of improving water quality is greatest when BMPs are integrated into a comprehensive municipal program focused on addressing identified water-quality needs and risks.

Because Albany's creeks are largely protected and open in their lower reaches, they already distinguish the city from other East Bay cities where the creeks have been covered, modified in irreversible ways, or degraded by industrial practices. Codornices and Cerrito Creeks and their riparian corridors are an existing resource to the local community, providing habitat for fish and wildlife, opportunities for recreation and education, and increased value for housing and commercial properties.

Efforts to further reduce the amount of pollutants entering the creeks through storm drains and in runoff will enhance present benefits, be consistent with municipal goals and plans, and help improve water quality in the San Francisco Bay. These efforts will likely involve a combination of approaches, including new or expanded programs, installation of treatment BMPs, monitoring and/or enforcement.

Clean Water Laws and Regulations

Federal Regulations

The Clean Water Act (CWA), enacted by the federal government in 1972, provides the basis for regulation of water quality throughout the United States. A primary goal of the CWA was to maintain and restore water quality for support of wildlife, fisheries, and recreational uses by reducing contaminants entering ground and surface waters. States were directed to establish water quality standards for "waters of the United States" and to review and update these standards every three years. The CWA authorized the U.S. Environmental Protection Agency (EPA) to regulate discharge of pollutants from "point" sources, such as sewage treatment plants, under the National Pollutant Discharge Elimination System (NPDES) permit system.

The CWA was amended in 1987, expanding the NPDES program to include regulation of "nonpoint" (diffuse) sources, including storm runoff from municipal storm drains, industrial facilities, and construction sites. Municipal aggregations of over 250,000 residents were required to "effectively" prohibit non-storm water discharges into the storm sewer, and to implement controls to reduce the discharge of pollutants from storm sewer systems to waters of the United States to the "maximum extent practicable." Albany is included with other Alameda County urban areas, which collectively exceed the 250,000 population threshold.

State Regulations

California's landmark water quality control legislation, the Porter-Cologne Water Quality Control Act, was enacted in 1969 and became law on January 1, 1970, predating the federal CWA. The Act authorized the State Board to adopt policies for all of the state's waters, and directed the Regional Boards to develop regional Water Quality Control Plans (Basin Plans). The Basin Plans compiled existing policies, water quality objectives and narrative standards for receiving waters into a single comprehensive document based on major surface watersheds and ground water basins.

Through the present, the State and Regional Boards have chosen to implement NPDES permits using a strategy of voluntary compliance, rather than attempt to establish regulations applicable across a range of physical and social settings. Applicants for the

permit are required to develop and implement a comprehensive storm water management program (SWMP) consistent with NPDES regulations. The Regional Board then reviews the application and suggests modifications to be made prior to adoption. The permit is reviewed and updated at five-year intervals.

The Alameda Countywide Clean Water Program

Subsequent to the finalization of the EPA regulations, representatives of Albany and the thirteen other cities in Alameda County, the Alameda County Flood Control and Water Conservation District (ACFC&WCD), Zone 7 of the ACFC&WCD, and Alameda County, joined together to develop the urban runoff control program now known as the Alameda Countywide Clean Water Program (ACCWP). Following Regional Board review of the initial joint city-county NPDES storm water permit for municipal discharges, the first SWMP was approved when the permit was granted in October 1991.

The SWMP incorporates a phased and tiered approach that defines the priorities in developing and implementing best management practices for preventing pollution and summarizes the major activities to be accomplished during the five-year permit period. Progress towards specific goals is reported in semiannual reports which are collected and submitted to the Regional Board for review. The ACCWP not only met all of the original requirements for compliance with NPDES regulations during the first term but was also awarded the U.S. EPA's 1994 Second Place National Stormwater Control Program Excellence Award. The second five-year plan (SWMP) developed for the NPDES permit reissued in February 1997 largely maintains the directions established in the initial plan, with several important enhancements: inclusion of a "focused watershed management approach" element; an expanded focus on protection of local streams and wetlands; inclusion in annual reports of work plans for the coming year; increased member participation in developing the new SWMP; and incorporation of performance standards for current and future activities by ACCWP members related to major program components.

The City of Albany Clean Water Program

Municipalities and agencies developed their own Clean Water Programs to coordinate local activities and enforcement within their own jurisdictions. The Albany Clean Water Program (CWP) is administered through the Community Development & Environmental Resources Department. Through this arrangement, Albany effectively integrates management of local creeks with the storm water runoff and flood control program.

The storm water management and discharge control program was established in

December 1992, when the Albany City Council amended Chapters 15 and 16 of the Albany Municipal Code to add a new section (Sec. 15-4) entitled "Storm Water Management and Discharge Control". Section 15-4 states "protect and enhance the water quality in our water courses, water bodies and wetlands, in a manner pursuant to and consistent with the Clean Water Act." This goal is met through elimination of all non-storm water discharges to the municipal storm sewer system; control of accidental spills, disposal or dumping; and reduction of pollutants in storm water discharges to the maximum extent practicable. The Chapter explicitly prohibits illicit discharges and connections, requires implementation of best management practices (BMPs) at facilities known to be a source of pollution (e.g, gas stations), and specifies measures for watercourse protection and maintenance. Section 15-4 also provides City staff with the authority for inspection, monitoring and enforcement action against violators.

Impacts of Urban Runoff on Water Quality in Albany's Creeks

Water enters local creeks through a number of pathways: direct rainfall, ground water seepage, discharges from storm drains and surface runoff from streets. Direct rainfall does not usually impair water quality, since concentrations of solutes are typically low, and ground water seepage is only a water-quality problem where percolate has traversed contaminated soil. However, studies have shown that urban storm runoff from streets and other impervious surfaces plays a major role in affecting water quality in streams.

Water Quality in Local Creeks

The environmental consulting firm of Woodward-Clyde Associates collected water quality data for lower Codornices Creek (at Eighth Street) during the period 1986 to 1991, as part of regional urban runoff studies. Results indicate that water quality in Codornices Creek is similar to that of other urban streams draining residential and commercial areas (Appendix E, Table E-1). Total concentrations of copper, zinc, and lead tend to exceed the acute toxicity objective during wet weather. Concentrations of nitrogen species, ammonia, nitrate, and total Kjeldahl (organic) nitrogen, were higher in wet weather than in dry weather, although all values were within the range expected in an urban stream and within the allowable range for drinking water. Total coliform and fecal coliform bacteria levels in both wet- and dry- weather samples were above the acceptable range for water-contact recreation but below the limit for non-contact recreation. Concentrations of both nitrogen and bacteria were highest during wet-season flows, as rains flush debris and litter from lawns, streets and hillsides into storm drains and streams.

Woodward-Clyde also performed limited dry-weather sampling of stream bottom sediments for the regional study. Concentrations of metals and nitrogen species were

found to be higher in sediment than observed in either wet- or dry weather stream flows (Appendix E, Table E-2), although well below levels of concern. Elevated sediment-concentrations of these constituents is normal, since both metals and organic nitrogen are typically mobilized as particulates in runoff, rather than as dissolved constituents, and particles would settle-out to the bottom in quiescent waters.

More recent data has been collected by the community group "Friends of Five Creeks." With financial assistance from the City of Albany, and through a $2,000 Community Stewardship Grant, volunteers use test kits to monitor a number of water quality parameters in Codornices and Cerrito Creeks. The monitoring record for Codornices Creek extends from December 1995 to August 1996, then resumes in July 1997 and continues at present. Monitoring of Cerrito Creek at Creekside Park, above the zone of tidal influence yet below the confluence with Middle Creek, has been more regular -- at least biweekly from February 1996 to the present.

Results indicate that both streams are generally healthy, with low turbidity, pH averaging around 8.1, and dissolved oxygen concentrations typically greater than 6.0, reflecting more than 70 percent oxygen saturation. Although limited in number (four), values for ammonia on Codornices Creek are similar to those reported by Woodward Clyde (Appendix E, Table E- 3); no nitrate data are available. The more extensive record for Cerrito Creek shows low (0.04 mg/l nitrate-nitrogen) to zero nitrate levels in most samples but elevated concentrations (to 2.64 mg/l) following rainfall; no ammonia data are available. Total phosphate concentrations averaged 0.40 to 0.45 mg/l in the two creeks, well within the normal range for an urban stream.

Specific conductance in Cerrito Creek was highest near Interstate 80, where streamflows mix with more saline Bay waters, and lowest at El Cerrito's Creekside Park, where storm drains contributed more than half of summer flows. Water quality in Middle Creek, which discharges to Cerrito Creek just upstream of the park, appeared good with no indication of impairment by pollutants, and many apparently healthy tadpoles. Above San Pablo Avenue, the Cerrito Creek channel was dry until flows resumed near Pomona Avenue. In both the lower and upper reaches, water quality in Cerrito Creek appeared acceptable, with healthy vegetation in and alongside the creek and no observations of off-odors, coloration, sheen, or suds, either in the stream or in discharges from drain pipes.

On Codornices Creek, the zone of tidal influence extends upstream from the mouth of the creek into the culvert beneath the Interstate 80. From the Interstate east to Sixth Street, where flows are diverted through a bypass to Village Creek, the channel was either dry or ponded with stagnant water. Above Sixth Street, the Creek flowed freely and water quality appeared to be excellent. The creek surfaces in a concrete-lined channel after passing under San Pablo Avenue, then threads between houses, opening up only on the St. Mary's College High School grounds. Water quality in the upper reaches of Codornices Creek appeared to be unimpaired, with no observations of off-odors, coloration, sheen, or suds.

Village Creek was dry from just west of San Pablo Avenue to the confluence with the Codornices Creek bypass channel, except for ponded water adjacent to the U.S.D.A. parking lot. Abundant cattails in the channel from this point downstream indicate that this reach supports perennial flows.

Opportunities and alternatives to improve water quality

The Albany Clean Water Program (CWP) is the local entity with the authority and the responsibility for implementing the Storm Water Management Plan (SWMP) component of the NPDES permit. The following sections evaluate CWP compliance with the requirements of the NPDES permit program, and recommend improvements for implementation.

Compliance of the Albany Clean Water Program with NPDES permit requirements

The Alameda County SWMP is comprised of five elements to focus efforts:

- Public Information/Participation (PI/P)
- Municipal Maintenance Activities
- New Development and Construction Controls
- Illicit Discharge Controls
- Industrial and Commercial Discharge Controls

Each element is divided into three "Tiers" of performance standards. Tier 1 performance standards (Appendix E, Table E-5), represent the baseline level of implementation expected of cities as permit-holders. As of the close of the most recent reporting period (December 1997), Albany is in compliance with almost all Tier 1 standards and had made considerable progress towards meeting the Tier 2 standards (Appendix E, Table E-6). Tier 2 standards, which expand upon or refine the baseline standards, are to be implemented at different times during the five-year term of the current NPDES permit (1997 to 2002). Tier 3 standards (Appendix E, Table E-7) are being studied and evaluated by ACCWP members for possible future implementation. The direction and focus of Albany's Clean Water Program as it relates to implementing the performance standards for each of these elements is further discussed below.

Performance standards may be broadly partitioned into three activity areas: source control/education, facility maintenance/operations, and monitoring/enforcement. (See Elements and their Tiered Performance Standards in Appendix E.) Source control through education has been the major emphasis of the SWMP and Albany's Clean Water Program (CWP). This is because preventing pollutants from entering runoff or creeks is a preventative and is easier to do than to remove contaminants. Similarly, municipalities are responsible for many activities having a high potential for water quality impairment, so educating staff and implementing changes in routine procedures

can reduce risks of pollutant discharges.

Source control through education both internally among municipal staff, as well as externally to businesses, schoolchildren and residents is at the center of Element 5.0 (Public Information and Participation, or PI/P). Albany is in compliance with all Tier 1 standards for this element, and far surpasses the Tier 2 standards for the number of education events. In particular, development of a Watershed Management Plan and municipal sponsorship of regular creek walks, creek clean-up days, and creek monitoring have been consistent with the SWMP's recently expanded focus on promoting a watershed perspective to build awareness of the importance of local creeks. The Tier 3 standards provide for expanded outreach to local schools and makes an excellent extension of current PI/P efforts.

Element 6.0 of the SWMP (Municipal maintenance) provides for education of city employees and contractors responsible for different aspects of municipal maintenance. These responsibilities include inspection and maintenance of drainage facilities, and implementation of source controls and spill response systems at sites where potential pollutants are used, maintenance is performed or toxics are stored (e.g, corporation yard). Albany has implemented all relevant Tier 1 performance standards for this element. Tier 2 standards for this element are more extensive than those for the PI/P element, reflecting the numerous areas of municipal activity. BMPs to be adopted in the first year (e.g., cleaning storm drains at least annually) have already been implemented. Other relevant BMPs can be implemented as scheduled during the next four years with relatively little effort, since they mostly expand upon or refine baseline standards, rather than introducing new directions. Similarly, implementation of current Tier 3 standards will not require a significant investment of time or energy.

Element 7.0 (New Development and Construction Site Controls) is less applicable to Albany than to most other cities in Alameda County because Albany is built-out, and the only sizeable sites requiring NPDES Storm Water Pollution Prevention Plans and installation of conventional storm water controls (e.g., detention basins) appear to be those slated for redevelopment. However, Albany has already implemented most of the relevant Tier 1 standards and will be in full compliance when a local grading ordinance, currently in development, has been adopted. While inspection of construction sites is a major focus of this element, most building projects in Albany are for remodels or additions, rather than new homes. To make the best use of limited staff time, Albany has chosen to train its building inspectors in water-quality issues and include inspection for illicit discharges as a regular component of building code enforcement. Increased efficiency and cost savings will also be realized by routing discharge reports to the Community Development office first, rather than the Fire Department.

Two particularly relevant Tier 2 standards concern requirements that water-quality control measures be included in new development projects (7.3), and that a watershed resource inventory be undertaken (7.7). Although Albany is unlikely to process any permits to subdivide undeveloped land in the near future, a number of major

redevelopment projects within the city limits and adjacent to Albany's creeks are in the planning stages, when means to minimize storm runoff and impacts on storm water quality can be most effectively included. Municipal staff can also work with neighboring cities to verify that designs for redevelopment projects along Albany's borders include storm water controls protective of riparian functions and values. These standards also recommend establishment of riparian buffer zones and creek restoration as a means to improve water quality, recognizing that these goals are more easily accomplished during redevelopment than as retrofits of existing individual lots.

Comprehensive management of water quality and drainage requires an intimate and integrated knowledge of the relationships between land use, drainage facilities, and waterways. This Watershed Management Plan will provide the city with an inventory of storm drain conditions and creek resources so that sensitive areas can be identified and actions to improve water quality and restore creeks can be prioritized. By commissioning this Plan, Albany has complied with the watershed-planning standard in advance of the suggested schedule and will be better prepared to advance the city's interests as they relate to local creeks when reviewing and commenting upon proposed projects. Preparation of the Plan early in the Tier 2 process allows for clearer coordination with adjoining jurisdictions sharing these watersheds, and sets standards for them to meet or exceed as they develop guidelines of their own.

The majority of performance standards under Element 8.0 (Illicit Discharge Controls) have been designated as baseline (Tier 1) standards. This element specifies development of an Action Plan to guide inspections and focus activities on high-priority areas. It also provides standards for investigation and enforcement activities. Albany has prepared an Action Plan and recently developed an Illicit Discharge Report form for building inspectors. Because Albany has limited resources and no code enforcement staff, it has been important to revise internal reporting procedures to streamline operations and coordinate spill responses. Calls are now initially routed through the Community Development & Environmental Resources Department, so that the Fire Department only responds where appropriate. Once the Watershed Management Plan is completed, and city staff have information on the location and condition of the municipal storm drain system, Albany will be in complete compliance with all Tier 1 standards for this element, and better able to investigate and respond to spills.

By requiring that outflows from local businesses be inventoried, Element 9.0 (Industrial Discharger Identification and Runoff Control) performance standards are consistent with the emphasis on identifying higher-risk sources and prioritizing them for education, monitoring and inspection. Albany has complied with all Tier 1 standards for this element. Staff have prepared an Industrial and Commercial Business Inspection Plan, including a priority list of businesses to be inspected, and are using the Plan to direct inspection efforts. Albany has only 17 small industrial businesses and two commercial areas. Automobile-related businesses have been a priority for outreach and inspections because there are a sizeable number of them in the city and they are a potential source of priority pollutants. However, city staff have also inspected Golden

Gate Fields, where water-quality control has been an ongoing problem, and Caltrans' I-80 project, where 'housekeeping' and BMP maintenance have apparently been low priorities. The only Tier 2 standard for this element requests that the Inspection Plan be re-evaluated and revised annually. Tier 3 standards expand the inspection and outreach components of the CWP inspection program, and also expand outreach between Albany staff and the other entities in the ACCWP sharing the NPDES permit.

Review of BMP flyers, handouts and compliance procedures

Albany makes available a number of BMP flyers developed by the ACCWP for participating cities and a "Creek Care Guide" published by the National Park Service. BMP flyers are well-produced, with eye-catching artwork and readable text that clearly explains the relevant concepts and recommended behaviors. Different flyers address water-quality protection measures for home maintenance, car repairs, urban runoff, and pest control. Each flyer discusses low-risk or least-toxic materials for different tasks, appropriate methods and disposal options. The flyers also provide local phone numbers to contact relevant departments, agencies and programs, and cite references as sources of additional information.

Albany has also developed hand-outs. One is for building maintenance and remodeling which is given out with building permits. The flyer explains contractor responsibilities to minimize storm water pollution, and recommends BMPs for housekeeping, materials storage, and cleanup activities. A new flyer promotes residential safe alternatives to hazardous household cleaning products and provides proper disposal information. In addition, the City has produced a brochure called Albany's Creeks, Rights, Responsibilities and Opportunities to outline the regulations and provide recommendations to property owners. The City distributes clean-up day flyers through the schools and prints articles on the clean water topics in the quarterly City-wide newsletter.

Potential locations to site structural BMPs for further water-quality improvement

For purposes of this discussion, Cerrito and Codornices Creeks may be divided into two sections: (1) the lower portion, a relatively low-gradient reach, that passes from the mouth of the stream through the zone of tidal influence to the base of the hills, with most adjacent uses of a commercial/industrial nature; and (2) steeper upper reaches, where the creek channel is narrowly confined as it passes through residential neighborhoods.

Upstream of Key Route Boulevard on both Cerrito and Codornices Creek no suitable sites for structural BMPs exist. Sites for water-quality treatment centers, such as wet ponds or dual-purpose detention basins, are limited by residences or yards which closely abut the creek. Downstream of Key Route Boulevard, water-quality basins or other BMPs could potentially be incorporated into redevelopment of larger parcels.

For example, on Cerrito Creek, BMPs could be integrated with the proposed Middle School site, whether or not the creek channel is restored through that reach. Another promising location to treat storm runoff is El Cerrito Plaza. While buildings, parking lots, slopes and streets constrain siting basins or terraces on the Albany side of the creek, the north side is currently in the planning stages of redevelopment, and it may be possible to include improved runoff treatment measures in the redesigned commercial space.

On Codornices Creek, BMPs could be employed as part of a coordinated program with the City of Berkeley. Storm runoff BMPs might readily be designed into the proposed renovation of University Village, or adjoining portions of Dowling Park.

No areas appear available for storm-runoff BMPs on Village or Marin Creeks, either upstream of Key Route Boulevard or between Key Route Boulevard and San Pablo Avenue. Introducing BMPs of this type might be accomplished as part of planning for University Village redevelopment. Another opportunity might be presented by post-flood planning after the 1998 storms at the USDA Western Regional Laboratory. Storm runoff BMPs might effectively be integrated with other measures to reduce probable inundation levels, even after culvert capacities are restored (see recommended improvements for the Marin Creek Watershed).

Placement of BMPs along Middle Creek will also be limited to possible redevelopment of larger lots along San Pablo Avenue. Current plans call for the creek to remain in a culvert near the Albany High School campus. The only other open space within Albany in the Middle Creek watershed is in the southeastern corner of Memorial Park, adjoining the newly-constructed community daycare center and the playground facilities. Child-safety and space considerations realistically preclude this use of the site.

Existing City Policies

A number of the elements of the watershed management plan are found in current goals, policies, and regulations of the City.

Albany Municipal Code Section 15-4 - Storm Water Management and Discharge Control

Purpose

Ensure the future health, safety, and general welfare of City of Albany citizens by eliminating non-storm water discharges to the municipal separate storm sewer, controlling the discharge to storm sewers from spills, dumping or disposal of materials other than storm water, reducing pollutants in storm water discharges to the maximum extent practicable. The intent is to protect and enhance the water quality of our watercourses, water bodies, and wetlands in a manner pursuant to and consistent with the Clean Water Act.

Discharge of Pollutants

The discharge of non-storm water into the City storm sewer system is prohibited. All discharges of material other than storm water must be in compliance with a NPDES permit issued for the discharge. It is prohibited to establish, use, maintain, or continue illicit drainage connections to the City storm sewer system.

Any person engaged in activities which will or may result in pollutants entering the City storm sewer system shall undertake all practicable measures to reduce such pollutants. Examples of such activities include ownership and use of facilities which may be a source of pollutants such as parking lots, gasoline stations, industrial facilities, commercial facilities, stores fronting City streets, etc.

Sidewalks, Gutters and Roadways

Paved sidewalks and parking strips shall be maintained free of dirt,. debris, or litter to the maximum extent practicable. Sweepings shall not be swept into the gutter or roadway, but shall be disposed of in receptacles as required for disposal of garbage.

Parking Lots and Similar Structures

Parking lots, gas station pavement or similar structure shall be cleaned as frequently and thoroughly as practicable in a manner that does not result in discharge of pollutants to the City storm sewer system.

Best Management Practices for New Developments and Redevelopments

Any construction contractor performing work in the City shall endeavor to provide filter materials at the catch basin to retain any debris and dirt flowing into the City storm sewer system.

Best Management Practices

Any activity, operation, or facility which may cause or contribute to storm water pollution or contamination, illicit discharges, and/or discharge of non-storm water to the storm water system, shall comply with best management practices, guidelines or requirements adopted by any Federal, State, regional, and/or City agency.

Watercourse Protection

Obstruction of watercourses is prohibited.

Watercourses on private property shall be maintained reasonably free of trash, debris, excessive vegetation, and other obstacles which would pollute, contaminate, or significantly retard the flow of water through the watercourse. Healthy bank vegetation shall not be removed beyond that actually necessary for watercourse maintenance, or in such a manner as to increase erosion.

Prohibitions

The following are prohibited without written permit from the Community

Development & Environmental Resources Director:

- Discharge into or connect any pipe of channel to a watercourse.
- Modify the natural flow of water in a watercourse
- Locate structures closer than twenty feet from the top of the natural creek bank.
- Deposit in, plant in, or remove any material from a watercourse including its banks, except for necessary maintenance.
- Place any loose material along the side of or within a watercourse as to cause a diversion or that may be carried away by storm waters.

Permit

Any wall, culvert, drain bulkhead or other depression which carries any storm waters require a permit from the Community Development & Environmental Resources Director.

Nuisances

Any wall, bulkhead, culvert or drain erected without permit, and any structure or accumulation of materials, debris or dirt that will obstruct the flow of any natural watercourse may be declared a nuisance. After notice, the Community Development & Environmental Resources Director may abate such nuisance by removal.

Fee

The City may charge a reasonable storm sewer service fee for residential, industrial, and commercial users of the City storm sewer system, based on the amount of storm water generated on the site and adjusted for site specific uses. Revenues shall be used for the enforcement, implementation, and administration of the Urban Runoff Clean Water Program.