

**MEMORIAL PARK DETENTION BASIN PROJECT**

**Attachment 7 – Technical Justification of Project**

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**Appendices:**

**Appendix 1:** MIKE FLOOD Hydraulic Modeling and Floodplain Mapping to Analyze Physical Benefits of Memorial Park Detention Basin Project in Flood Damage Reduction

**Appendix 2:** MMWD Billing Records

**Summary of Project Elements and Physical Benefits**

This attachment describes the expected measureable physical benefits of the Memorial Park Detention Basin Project. These benefits are also the basis for quantifying the monetized benefits in Attachment 8 – Project Benefits and Cost Analysis. The physical benefits were analyzed for both without- and with-Project conditions. Considering the Phoenix Lake IRWM Retrofit project was awarded in the 1<sup>st</sup> round application for Proposition 1E Stormwater Flood Management Grant, the without-Project condition for the Memorial Park Detention Basin Project is the condition with the Phoenix Lake IRWM Retrofit project in place (Refer to Figure 2a of Attachment 3 – Work Plan, which shows the relative locations of the Memorial Park Detention Basin Project and the Phoenix Lake IRWM Retrofit project). The following table summarizes elements of the Memorial Park Detention Basin Project and their expected physical benefits. In summary, the Memorial Park Detention Basin Project will provide multiple benefits, including flood damage reduction, water supply, water quality, ecosystem restoration, and recreation and public access.

**Table 1 Summary of Project Elements and Physical Benefits**

Element	Benefit					Explanation
	Flood Damage Reduction	Water Supply	Water Quality	Ecosystem Restoration	Recreation /Public Access	
Detention basin, earthen embankments, walls, and hydraulic control structures	X				X	Enables storage of floodwaters for peak flow attenuation and flood reduction; walls can enhance recreational use of the tennis courts (bounce-back walls) and provide rock climbing walls; embankments can be used for spectator viewing of athletic events.
Subsurface drainage features and stormwater BMPs, groundwater irrigation supply system, and wet utilities relocations	X	X	X	X	X	Enables keeping new playfields dry for recreational use, particularly during the wet season; provides water supply for irrigation and toilets and reduces demand on MMWD; enhances stormwater quality; enhanced stormwater quality improves ecosystem functions of Sorich/San Anselmo/Corte Madera Creek below the park; new enlarged Alderney storm drain inlet reduces nuisance flooding for nearby residences.
Creek daylighting and restoration		X	X	X	X	Enables re-establishment of an open creek and restoration of creek habitat and ecosystem functions; enhances stormwater quality via natural processes of plant uptake and filtration; enhances recreation opportunities by providing access to the creek and improved creek aesthetics; allows for recharge of groundwater through natural infiltration through the daylighted creek bottom.
Park rehabilitation		X			X	Enables improvement of recreational facilities, expanded public access for recreation, enhanced park aesthetics; new irrigation system will use water more efficiently and use of drought-tolerant turf grass will reduce water use.

X (red) denotes primary project benefit; X (black) denotes enhanced function, added value, and other secondary project benefits.

## 1.0 Flood Damage Reduction Physical Benefits

The following items are described in this section:

- 1) Historical flood damage data
- 2) Description of methods used to estimate without- and with-Project physical conditions
- 3) Physical benefit estimates of without- and with-Project conditions
- 4) Distribution of local, regional, and state-wide benefits and identification of beneficiaries
- 5) Acknowledgment of all new facilities, policies, and actions required to obtain the physical benefits
- 6) When the benefits will be received
- 7) Uncertainty of the benefits
- 8) Description of any adverse effects
- 9) Other flood damage reduction physical benefits not quantified

### 1.1 Historical Flood Damage Data

Floods in Ross Valley have occurred with varying degrees of severity. Prior to establishment in 1951 of the USGS streamflow gaging station on Corte Madera Creek in Ross, flooding was reported in 1914, 1925, 1937, and 1942. Since the gage in Ross has been in operation, flood flows have been recorded in calendar years 1951, 1955, 1958, 1967, 1969, 1970, 1982, 1983, 1986, 1994, and 2005. Of these, the two most severe floods occurred in 1982 and 2005, with peak discharges of approximately 7,200 cfs and 6,800 cfs; the percent-annual-chances of which were approximately 0.6 percent and 1 percent, respectively. Historical flooding has caused extensive property damage and economic hardship to residents, businesses, and local governments, and has threatened the lives of those living in the floodplain, with at least one recorded death occurring in the 1955 flood and at least one rescue of a stranded motorist reported by the Ross Valley Fire Department during the 2005 flood (see photo below showing floodwaters rage through downtown San Anselmo during the 2005 flood).



Flood waters rage through downtown San Anselmo during December 31, 2005 flood.

The flood of December 31, 2005, an approximate 100-year event, provided many real world examples of flood damage. The flood caused significant damage to private residences, private property, businesses, schools and municipal infrastructure in the Towns of Fairfax, San Anselmo, Ross, and Larkspur and in the unincorporated communities of Kentfield and Greenbrae. Total property damage has been estimated at well over \$100 million. Emergency crews expended considerable resources during and in the days after the flood event. Local governments spent millions of dollars in cleanup and repair of damaged public infrastructure. The business district of downtown San Anselmo was severely damaged. Many businesses shut down while repairs were made, and several businesses did not return in the towns of San Anselmo and Ross. Emergency bank repair in one location cost the Flood Control District over \$100,000. This was necessary to prevent the undermining of a private residence. Some structures in the creek were permanently damaged. While repairs were being made, there were significant losses of income from businesses, rentals, and wages as well as losses in local tax revenues. Emergency contracts for repairs and overtime pay for public safety personnel and public works staff magnified the burden on local governments. The Town Halls, fire stations, and other municipal buildings in Fairfax and San Anselmo were severely damaged and had to be vacated for over a year while major repairs or total rebuilds were carried out. Floodwater depth at the San Anselmo firehouse was over 4 feet at the peak of the flood. Although during the recovery period these Towns set up temporary offices in trailers, public services were not at their full, pre-flood performance levels and capacities. The recovery period lasted for three years for some public services in the Towns of Fairfax and San Anselmo.

The towns of San Anselmo and Ross in Ross Valley are particularly prone to flooding and flood damage. Both towns are downstream of Memorial Park and, therefore, both would directly benefit from this project. According to FEMA:

- ***San Anselmo ranks 7<sup>th</sup> among all communities in California for NFIP claims paid.*** In San Anselmo there are about 487 flood insurance policies in force, and policyholders pay an average annual premium of \$1,100 – that’s over \$500,000 per year. Since joining the National Flood Insurance Program (NFIP) there have been 255 claims in San Anselmo totaling \$11,265,000 in flood losses.
- ***Ross ranks 10<sup>th</sup> among all communities in California for NFIP claims paid.*** In Ross, there are over 200 policies in force, and policyholders pay an average annual premium of \$1,400 per year -- that’s over \$280,000 per year. Since the start of the NFIP program there have been 237 claims in the Ross totaling \$9,562,272 in flood losses.

The people of Ross Valley have clearly demonstrated a willingness and desire to reduce the potential for more damage in the future by electing to assess themselves a flood fee, which averages \$180 per parcel per year. The Memorial Park Detention Basin Project offers an excellent opportunity for the County, Town of San Anselmo, and State government to partner with the people of Ross Valley to significantly reduce the risk of such flooding in the future.

## 1.2 Description of Methods Used to Estimate Without- and With-Project Physical Conditions

In this analysis, MIKE FLOOD hydraulic modeling and GIS floodplain mapping were used to quantify the amount of land and types of land uses, number of parcels, and number of buildings protected from flooding for different flood events. Appendix 1 of this attachment provides detailed information about the MIKE FLOOD modeling and the data, methods, and assumptions used in the modeling analysis.

The following steps were taken to conduct quantitative analysis of physical benefits in flood damage reduction for the without-Project and with-Project conditions:

- Modeling and mapping the flood extent and inundation depth for a range of recurrence/probability floods (i.e., 5-year, 10-year, 25-year, 50-year, 100-year, 250-year, and 500-year floods) under without-Project and with-Project conditions.
- Analyzing the acreage of land and types of land uses, number of parcels, and number of buildings protected from flooding for each flood event under without-Project and with-Project conditions.

The MIKE FLOOD hydraulic model for the Ross Valley was used to map the flood extent and inundation depth (refer to Appendix 1 of Attachment 7 for descriptions of the MIKE FLOOD model).

## 1.3 Physical Benefit Estimates of Without-Project and With-Project Physical Conditions

Following the methods described above, flood inundations for the 5-year, 10-year, 25-year, 50-year, 100-year, 250-year, and 500-year flood recurrences/probabilities under without-Project and with-Project conditions were estimated. Table 1 shows the number of buildings protected from flooding by the Project (Note: “Protected from flooding” for buildings means a building with first finished floor (FFF) that would be inundated without-Project and not inundated with-Project). Table 2 shows the number of parcels protected from flooding by the Project. Table 3 shows the total acreage of land protected from flooding by the Project and Tables 4a to 4d show the acreages of different types of land protected from flooding, including residential, commercial, industrial, and public facilities (Note: “Protected from flooding” for parcels and lands means a land that would be inundated without-Project and not inundated with-Project).

<b>Table 1 – Annual Project Physical Benefits - Buildings Protected from Flood Damage</b>			
<b>Project Name: Memorial Park Detention Basin</b>			
<b>Type of Benefit Claimed: Buildings Protected from Flood Damage</b>			
<b>Measure of Benefit Claimed (Name of Units): Number of Buildings</b>			
<b>Additional Information About this Measure:</b>			
(a)	(b)	(c)	(d)
	<b>Number of Inundated Buildings</b>		
<b>Flood Event</b>	<b>Without Project (Buildings with FFF Inundation)</b>	<b>With Project (Buildings with FFF Inundation)</b>	<b>Change Resulting from Project (b) – (c)</b>
<b>5-Year Flood</b>	176	176	0
<b>10-Year Flood</b>	507	405	102
<b>25-Year Flood</b>	1,272	1,171	101
<b>50-Year Flood</b>	1,522	1,490	32
<b>100-Year Flood</b>	1,715	1,684	31
<b>250-Year Flood</b>	2,577	2,537	40
<b>500-Year Flood</b>	2,889	2,781	108
<b>Comments:</b>			

<b>Table 2 – Annual Project Physical Benefits - Parcels Protected from Flooding</b>			
<b>Project Name: Memorial Park Detention Basin</b>			
<b>Type of Benefit Claimed: Parcels Protected from Flooding</b>			
<b>Measure of Benefit Claimed (Name of Units): Number of Parcels</b>			
<b>Additional Information About this Measure:</b>			
(a)	(b)	(c)	(d)
	<b>Number of Inundated Parcels</b>		
<b>Flood Event</b>	<b>Without Project (Parcels with Inundation)</b>	<b>With Project (Parcels with Inundation)</b>	<b>Change Resulting from Project (b) – (c)</b>
<b>5-Year Flood</b>	122	122	0
<b>10-Year Flood</b>	314	255	59
<b>25-Year Flood</b>	835	768	67
<b>50-Year Flood</b>	1,004	982	22
<b>100-Year Flood</b>	1,132	1,108	24
<b>250-Year Flood</b>	1,576	1,547	29
<b>500-Year Flood</b>	1,819	1,726	93
<b>Comments:</b>			

<b>Table 3 – Annual Project Physical Benefits - Land Protected from Flooding</b>			
<b>Project Name: Memorial Park Detention Basin</b>			
<b>Type of Benefit Claimed: Land Protected from Flooding</b>			
<b>Measure of Benefit Claimed (Name of Units): Acre</b>			
<b>Additional Information About this Measure:</b>			
(a)	(b)	(c)	(d)
	<b>Inundated Land (acre)</b>		
Flood Event	Without Project (Acres inundated)	With Project (Acres inundated)	Change Resulting from Project (b) – (c)
<b>5-Year Flood</b>	26.6	26.6	0.0
<b>10-Year Flood</b>	90.0	67.9	22.1
<b>25-Year Flood</b>	248.0	233.4	14.6
<b>50-Year Flood</b>	308.0	281.6	26.4
<b>100-Year Flood</b>	392.6	357.1	35.5
<b>250-Year Flood</b>	688.2	666.3	21.9
<b>500-Year Flood</b>	805.3	775.0	30.3
<b>Comments:</b>			

<b>Table 4a – Annual Project Physical Benefits - Protected Residential Land from Flooding</b>			
<b>Project Name: Memorial Park Detention Basin</b>			
<b>Type of Benefit Claimed: Protected Residential Land from Flooding</b>			
<b>Measure of Benefit Claimed (Name of Units): acre</b>			
<b>Additional Information About this Measure:</b>			
(a)	(b)	(c)	(d)
	<b>Inundated Residential Land (acre)</b>		
<b>Flood Event</b>	<b>Without Project (Acres inundated)</b>	<b>With Project (Acres inundated)</b>	<b>Change Resulting from Project (b) – (c)</b>
<b>5-Year Flood</b>	24.0	24.0	0.0
<b>10-Year Flood</b>	73.0	56.5	16.5
<b>25-Year Flood</b>	199.1	185.3	13.8
<b>50-Year Flood</b>	230.8	227.1	3.7
<b>100-Year Flood</b>	255.7	252.1	3.6
<b>250-Year Flood</b>	337.3	332.0	5.3
<b>500-Year Flood</b>	380.6	360.4	20.2
<b>Comments:</b>			

<b>Table 4b – Annual Project Physical Benefits - Protected Commercial Land from Flooding</b>			
<b>Project Name: Memorial Park Detention Basin</b>			
<b>Type of Benefit Claimed: Protected Commercial Land from Flooding</b>			
<b>Measure of Benefit Claimed (Name of Units): acre</b>			
<b>Additional Information About this Measure:</b>			
(a)	(b)	(c)	(d)
	<b>Inundated Commercial Land (acre)</b>		
<b>Flood Event</b>	<b>Without Project (Acres inundated)</b>	<b>With Project (Acres inundated)</b>	<b>Change Resulting from Project (b) – (c)</b>
<b>5-Year Flood</b>	2.6	2.6	0.0
<b>10-Year Flood</b>	3.7	3.5	0.2
<b>25-Year Flood</b>	15.9	15.3	0.6
<b>50-Year Flood</b>	19.0	17.9	1.1
<b>100-Year Flood</b>	21.1	20.1	1.0
<b>250-Year Flood</b>	69.9	67.8	2.1
<b>500-Year Flood</b>	87.9	78.0	9.9
<b>Comments:</b>			

<b>Table 4c – Annual Project Physical Benefits - Protected Industrial Land from Flooding</b>			
<b>Project Name: Memorial Park Detention Basin</b>			
<b>Type of Benefit Claimed: Protected Industrial Land from Flooding</b>			
<b>Measure of Benefit Claimed (Name of Units): acre</b>			
<b>Additional Information About this Measure:</b>			
(a)	(b)	(c)	(d)
	<b>Inundated Industrial Land (acre)</b>		
<b>Flood Event</b>	<b>Without Project (Acres inundated)</b>	<b>With Project (Acres inundated)</b>	<b>Change Resulting from Project (b) – (c)</b>
<b>5-Year Flood</b>	0.0	0.0	0.0
<b>10-Year Flood</b>	0.0	0.0	0.0
<b>25-Year Flood</b>	0.0	0.0	0.0
<b>50-Year Flood</b>	0.0	0.0	0.0
<b>100-Year Flood</b>	0.0	0.0	0.0
<b>250-Year Flood</b>	5.8	5.8	0.0
<b>500-Year Flood</b>	6.7	6.7	0.0
<b>Comments:</b>			

<b>Table 4d – Annual Project Physical Benefits - Protected Public Facility Land from Flooding</b>			
<b>Project Name: Memorial Park Detention Basin</b>			
<b>Type of Benefit Claimed: Protected Public Facility Land from Flooding</b>			
<b>Measure of Benefit Claimed (Name of Units): acre</b>			
<b>Additional Information About this Measure:</b>			
(a)	(b)	(c)	(d)
	<b>Inundated Public Facility Land (acre)</b>		
<b>Flood Event</b>	<b>Without Project (Acres inundated)</b>	<b>With Project (Acres inundated)</b>	<b>Change Resulting from Project (b) – (c)</b>
<b>5-Year Flood</b>	0.0	0.0	0.0
<b>10-Year Flood</b>	13.2	7.9	5.3
<b>25-Year Flood</b>	32.9	32.8	0.1
<b>50-Year Flood</b>	58.2	36.6	21.6
<b>100-Year Flood</b>	115.7	84.9	30.8
<b>250-Year Flood</b>	275.2	260.7	14.5
<b>500-Year Flood</b>	330.0	329.9	0.1
<b>Comments:</b>			

#### **1.4 Description of the Distribution of Local, Regional, and State-Wide Benefits and Identification of Beneficiaries**

The Project will provide local benefits by providing improved flood protection to creekside and floodplain areas along lower San Anselmo Creek and the downstream Corte Madera Creek. The beneficiaries of improved flood protection are the residents, businesses, property owners, and public entities in the Towns of San Anselmo, Ross, and Larkspur and unincorporated communities of Kentfield, Greenbrae.

The Project will provide regional benefits by avoiding impacts of flooding on businesses and public agencies that employ people from surrounding regions. Businesses and public agencies in the Towns of San Anselmo, Ross, and Larkspur and unincorporated communities of Kentfield, Greenbrae employ people from throughout the Bay Area. To the extent that flood protection is improved, flood damage is avoided, and businesses are able to keep people employed, the Project will provide regional benefit to the greater Bay Area region.

The Project can provide statewide benefits by reducing flood damage and thereby reducing the potential need to draw from State disaster relief funds, as occurred during the great Ross Valley floods of 1982 and 2005. The statewide beneficiaries of reduced reliance on the State disaster relief funds are the other potential users of the funds within California.

#### **1.5 Acknowledgment of All New Facilities, Policies, and Actions Required to Realize the Physical Benefits**

To realize the physical benefits, the Phoenix Lake IRWM Retrofit project and the Memorial Park Detention Basin Project need to be completed and the two detention basins need to be operated as designed and in a coordinated fashion.

#### **1.6 When the Benefits Will Be Received**

As described in Attachment 5 (Schedule), construction of the Project will be completed and fully online by August 2016. Accordingly, the flood damage reduction benefits will be realized starting in water year 2017.

#### **1.7 Uncertainty of the Benefits**

The benefits of the Project depend on future hydrologic conditions in the Ross Valley watershed, specifically the frequency and severity of severe, flood-causing storms, which are always subject to a degree of uncertainty. Estimates of the future frequency and severity of flooding were derived from analyses using standard hydrologic methods based on historical hydrological data. It is possible that climate change or some other unforeseen factor may cause future hydrologic conditions to significantly differ from the

historical conditions that formed the basis of the estimates of the flood damage reduction benefits. However, that possibility cannot be quantified.

With respect to the precision of the hydrologic analyses that formed the basis of the estimates of the physical benefits in flood damage reduction, “uncertainty” is a measure of imprecision of knowledge of parameters, data, and functions used to describe the hydrologic, hydraulic, and topographic aspects of a flood damage reduction project plan. These parameters, data, and functions would result in some degree of uncertainty of the estimated benefit. Following is a list of main parameters, data, and functions that affect the estimated benefit:

- 1) Discharge-probability functions obtained from flood frequency analysis used as input in hydraulic modeling;
- 2) Imperfect channel geometry and floodplain topography used as input in hydraulic modeling and floodplain mapping;
- 3) Imperfect hydraulic modeling results for flood inundation extent and depth;
- 4) First finished floor elevations of buildings.

However, the uncertainty associated with these parameters has not been quantified.

### **1.8 Description of Any Adverse Effects**

Flood damage reduction is not expected to have any adverse effects exception for temporary construction-related impacts. Such impacts can include temporary interruption on recreational use of the park. These potential impacts will be mitigated to a less-than-significant level as required by CEQA.

### **1.9 Other Flood Damage Reduction Physical Benefits Not Quantified**

The physical benefit of the Project in flood damage reduction has been described and quantified above in terms of future prevented inundation of land, parcels, and buildings. It is important to point out that the Project would provide other additional flood damage reduction benefits which have not and cannot be quantified due to a lack of data needed for quantification. These benefits are economic and non-economic in nature and include, but are not limited to, the following benefit types:

- Avoided physical damage
  - Contents
  - Infrastructure
  - Landscaping
  - Vehicles
  - Equipment
  - Nursery crops
  - Ecosystems
- Avoided emergency response costs:
  - Evacuation and rescue costs
  - Security costs
  - Dewatering, debris removal and cleanup costs
  - Emergency flood management system repairs
  - Humanitarian assistance
- Avoided loss of functions:
  - Loss of business income
  - Loss of rental income
  - Loss of wages
  - Loss of public services
  - Loss of utility services
  - Transportation system disruptions
- Avoided public safety and health impacts:
  - Population at risk
  - Casualties
  - Displacement/shelter needs
  - Critical facilities
  - Sewer systems

## **2.0 Water Supply, Water Quality, Ecosystem Restoration, and Recreation/Public Access Physical Benefits**

The following items are described in this section:

- 1) Description of methods used to estimate without- and with-Project conditions and the resulting physical benefits
- 2) Distribution of local, regional, and state-wide benefits and identification of beneficiaries
- 3) Acknowledgment of all new facilities, policies, and actions required to obtain the physical benefits
- 4) When the benefits will be received
- 5) Uncertainty of the benefits
- 6) Description of any potential adverse effects
- 7) Other potential benefits

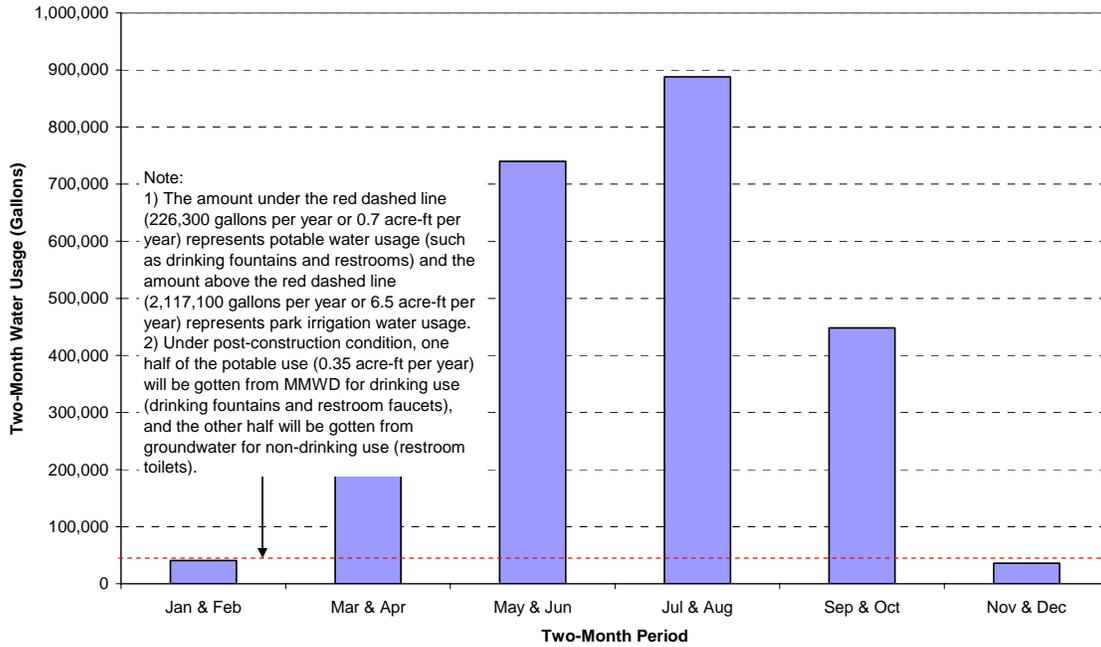
### **2.1 Description of Methods Used to Estimate Without- and With-Project Conditions and the Resulting Physical Benefits**

This section describes the methods used to estimate without- and with-Project conditions and the estimated results of physical benefits in water supply, water quality, ecosystem restoration, and recreation/public access.

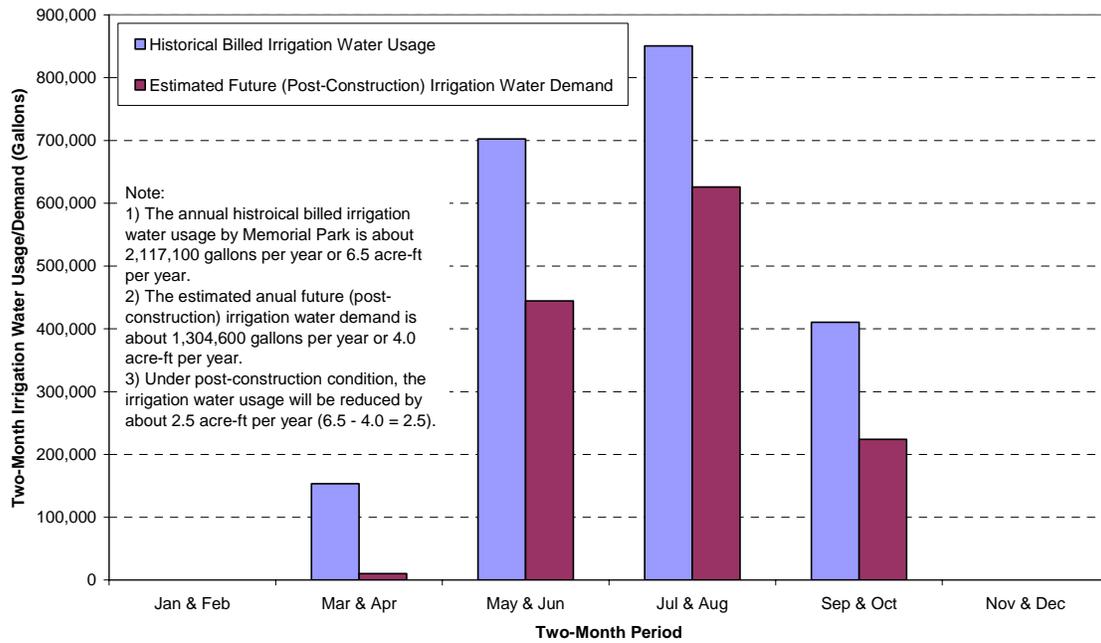
#### **2.1.1 Water Supply Benefits**

The Memorial Park Detention Basin Project will install a groundwater irrigation supply system to provide irrigation for the park grass play fields and restroom toilets and, thereby, reduce the water demand from the current water service provider, Marin Municipal Water District (MMWD). The groundwater irrigation supply system includes a subsurface drainage system intercepting and collecting subsurface seepage entering from around and beneath the park floor, supplemented by well water. According the historical billing records (see Appendix 2), the average annual water use by the park is about 7.2 acre-ft per year. Of which about 0.7 acre-ft is used for potable water (such as drinking fountains and restrooms) and about 6.5 acre-ft is used for park irrigation (see Figure 1). Using the installed groundwater supply system will not only avoid the purchase of MMWD water by about 6.5 acre-ft per year for irrigation and about 0.35 acre-ft (50% of 0.7 acre-ft) for restroom toilets, it will also provide more efficient irrigation by about 2.5 acre-ft per year (see Figure 2). Table 5 is a summary of quantitative annual physical benefit in water supply.

**Figure 1 Average Two-Month Water Usage by Memorial Park  
 Analyzed from MMWD Billing Records from May 2010 to August 2012**



**Figure 2 Comparison of Historical Billed Average Two-Month Irrigation Water Usage and Estimated Future (Post-Construction) Two-Month Irrigation Water Demand**



**Table 5 – Annual Project Physical Benefits  
 - Water Supply**

**Project Name: Memorial Park Detention Basin**

**Type of Benefit Claimed: Reduced Water Supply from MMWD**

**Measure of Benefit Claimed (Name of Units): Acre-ft**

**Additional Information About this Measure:**

(a)	(b)	(c)	(d)
	<b>Purchased Water Supply from MMWD</b>		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
<b>Project Life (50 Years)</b>	7.2	0.35	6.85

**Comments:** With project, an estimated 0.35 af/y will still need to be purchased from MMWD for drinking fountains and restroom faucets; groundwater will be used to supply irrigation and restroom toilets.

Installing a groundwater irrigation supply system will also be beneficial to MMWD. Describing the water supply benefits to MMWD requires some background on MMWD’s overall water supply picture.

MMWD supplies water to about 190,000 people over a 147-square mile area of southern and central Marin County. The primary source of MMWD’s raw water supply, on average about 71.5 % of the total water delivered to customers, is runoff from the high-yielding local Marin County watersheds that is captured and stored in seven reservoirs. Additional raw water, on average about 25.5 % of the total water delivered to customers, is imported Russian River water that is purchased and delivered through an interconnected system of the North Marin Water District and Sonoma County Water Agency. The cost to purchase and deliver Russian River water to MMWD is about \$850 per acre-foot.<sup>1</sup> Just under 2 % of MMWD’s supply comes from water recycling and 1 % is untreated for certain, limited accounts that use untreated water.

After treatment at one of the District's three water treatment plants, the treated water is distributed throughout the MMWD service area by gravity flow or booster pumps. MMWD’s recycled water system delivers an average of 650 acre-feet of recycled water per year through 323 service connections. Operation of the District is financed solely by revenue from the sale of water. Large-scale capital improvements have been funded by bond issues and certificates of participation.

For a variety of reasons<sup>2</sup> the current MMWD reliable water supply is close to the current water demand with little if any surplus supply reliability. MMWD has begun to implement an aggressive water conservation program, investing \$3.3 million in 2008–09

<sup>1</sup> Jon LaHaye, MMWD, personal communication, April 4, 2011.

<sup>2</sup> For details, refer to pp. 3-1 – 3-7, Final EIR, Marin Municipal Water District Desalination Project, December 2008 (URS) available at <http://www.marinwater.org/controller?action=menuclick&id=446>

to support a wide range of conservation program activities. In combination with implementation of the California Plumbing Code, these activities are projected to save enough water to meet the needs of the projected future MMWD customers until 2025. This program is an aggressive program, and its success is not guaranteed, so it does pose a significant risk for MMWD to rely on the projected demand savings. However, MMWD will closely monitor water supply and demand between now and 2025, and will determine whether other alternatives to balance supply and demand will need to be implemented.

Over the past few years, the MMWD Board of Directors has investigated a number of options to ensure a reliable long-term water supply for district customers. Ultimately, the Board decided that no single approach would provide the level of reliability the District needs, but that a combination of options would provide more reliability as well as flexibility. In 2009, the board adopted a long-range water supply plan that includes conservation (as described in the preceding paragraph), improvements to the existing reservoir system, more recycled water, and desalination. Improvements to the existing reservoir system and more recycled water will add some measure of reliability but not all that is needed.

Desalination converts raw bay water into drinking water by removing the salt and other impurities. MMWD first investigated desalination as a potential water source for Marin in 1990. In 2001, the District initiated work on the current environmental impact report and established a temporary pilot desalination plant in 2005. The pilot plant demonstrated that bay water could be purified to levels that exceed state drinking water standards. Desalination costs were found to range from about \$2,000 to \$3,000 per acre-foot.<sup>3</sup> The environmental impact report was certified by the MMWD Board in February 2009.

In April of 2010, the Board put the desalination option on hold, due primarily to a drop in demand (15 percent in the past three years) resulting from the District's conservation program efforts. Water usage figures for 2009-10 show that MMWD delivered to its customers 25,500 acre-feet of water during the 2009-10 fiscal year, or 8.3 billion gallons. At this level of usage, MMWD is already exceeding its own target for conservation as outlined in the 2007 Water Conservation Master Plan and is also meeting the year 2020 water conservation targets specified in last year's Water Conservation Act (SB X7 7), which requires a statewide reduction in urban water use of 20 percent by 2020. This is the lowest amount of water used since the drought year of 1991, when MMWD last asked customers to ration supplies.

Also figuring into the Board's decision to put desalination on hold is the District's estimate that existing water supplies would currently be adequate to meet customer needs, with 25-percent rationing, if a drought similar to that of 1976-77 were to occur.

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<sup>3</sup> For details, refer to Engineering Report on Desalination Pilot Program, Executive Summary, January 2007 (Kennedy Jenks) available at <http://www.marinwater.org/controller?action=menuclick&id=413>

Potential water supply benefits to MMWD include greater reliability during periods of shortage in local and imported Russian River water supplies and avoided need to impose further, more severe conservation measures on MMWD customers. Another potential benefit is avoided need for more costly water supplies, such as desalination. According to the San Francisco Bay Area IRWM Region’s Proposition 84 Implementation Grant Application (p. 7.1-8) the estimated average cost of water supplies to retail suppliers in the Bay Area is currently \$1,500 per acre-foot of treated water. Table 6 below summarizes the costs of various water supplies.

<b>Table 6. Summary of Water Supply Costs</b>	
<b>Supply</b>	<b>Cost (\$ per acre-foot)</b>
Imported Russian River water purchased and delivered to MMWD from SCWA	\$850
Desalinated seawater	\$2,000 to \$3,000
Average cost of water supply to Bay Area retailers	\$1,500

**2.1.2 Water Quality Benefits**

The Memorial Park Detention Basin Project will install a CONTECH’s CDS<sup>®</sup> hydrodynamic separation device (or similar device) at the enlarged inlet of the Alderney storm drain to improve stormwater quality. This device removes trash and debris by 100% at the design flow (3.2 cfs), and it also provides additional treatment of stormwater quality (oil and grease and suspended solids, and any other pollutants that are bound with the suspended solids).

The inlet to the Alderney storm drain located immediately west of the park will be enlarged. The storm drain collects urban stormwater from a 23-acre residential drainage area west of the park. This stormdrain passes beneath Memorial Park and discharges to the culverted reach of Sorich Creek below the detention basin. Urban stormwater runoff has been cited as a major nonpoint pollution source (NPS). The typical pollutants associated with the urban stormwater are trash/debris, sediment, nutrients, bacteria and viruses, oil and grease, metals, organics, and pesticides<sup>4</sup>. The installed CDS<sup>®</sup> hydrodynamic separation device will improve the stormwater quality in the discharge to Sorich Creek. The water quality benefits are summarized in the Table 7.

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<sup>4</sup> The sediment is typically originated from the construction of roads and parking lots, the disturbance of landscapes, and the removal of vegetation covers. The organic compounds are secondary products of automotive fluids, pesticides, and herbicides, whereas, nutrients (i.e., nitrogen and phosphorus) are mainly from organic litter, fertilizers, food waste, sewage, and sediment. Sources of trace metals include motor vehicles, roofing and construction materials, and chemicals. Pet waste and solid waste disposal areas contribute bacteria and viruses and motor vehicles are the dominant source of oil and grease compounds.

Table 7 – Annual Project Physical Benefits - Water Quality					
<b>Project Name: Memorial Park Detention Basin</b>					
<b>Type of Benefit Claimed: Improved Stormwater Quality</b>					
<b>Measure of Benefit Claimed (Name of Units): mg/l or µg/l</b>					
<b>Additional Information About this Measure: Design Flow = 3.2 cfs<sup>1</sup></b>					
(a)		(b)	(c)	(d)	
<b>Median Stormwater Concentrations</b>					
Year	Pollutant	Unit	Without Project	With Project (Removal Rate)	Change Resulting from Project (b) – (c)
<b>Project Life (50 Years)</b>	Trash/Debris		not estimated	100%	not estimated
	TSS <sup>2</sup>	mg/l	67	81%	13
	Oil and Grease <sup>2</sup>	mg/l	9	57%	4
<b>Comments:</b>					
1) The design flow is estimated to be about 3.2 cfs using the flow-based method documented in the California BMP Handbook (California Stormwater Quality Association, 2003).					
2) Source of urban stormwater quality concentrations and removal rates: U.S.EPA, 1999. Preliminary Data Summary of Urban Storm Water Best Management Practices.					

### 2.1.3 Ecosystem Restoration Benefits

The Memorial Park Detention Basin Project will daylight the 580-ft long culverted Sorich Creek during the park floor excavation process and restore its ecosystem function by vegetating the daylighted creek. The Project will also daylight the 70-ft long culvert at the Los Angeles Street and restore its ecosystem function. The ecosystem restoration benefit is summarized in Table 8.

Table 8 – Annual Project Physical Benefits - Ecosystem Restoration			
<b>Project Name: Memorial Park Detention Basin</b>			
<b>Type of Benefit Claimed: Restored Creek Ecosystem Length</b>			
<b>Measure of Benefit Claimed (Name of Units): Feet</b>			
<b>Additional Information About this Measure:</b>			
(a)	(b)	(c)	(d)
<b>Ecosystem Restoration</b>			
Year	Without Project	With Project	Change Resulting from Project (c) – (b)
<b>Project Life (50 Years)</b>	0	650	650
<b>Comments:</b>			
Based on Concept (30%) Design plan – See Section 3.2.3 of Attachment 3, Workplan.			

#### **2.1.4 Recreation and Public Access Benefits**

The Memorial Park Detention Basin Project will enhance opportunities for public enjoyment of the park, one of the most heavily used recreational areas in San Anselmo. The Project will daylight and restore Sorich Creek. Access to the creek will be encouraged by providing pathways leading to the creek, and the creek will be placed in a “nature grove” so as to integrate it into the overall park recreational area. An upgraded field and subsurface drainage system will be installed to increase public use of the park by allowing the expanded sports programs and use of the fields for longer periods during the wet season while reducing field upkeep and maintenance costs. Pathways and park elements will be ADA accessible, accommodating to a larger extent people with disabilities compared to the current park. All these improvements will aim to enhance public access, safety, aesthetics, and overall public enjoyment.

#### **2.2 Description of the Distribution of Local, Regional, and State-Wide Benefits and Identification of Beneficiaries**

The Memorial Park Detention Basin Project will provide local benefits by providing reduced water supply burden to the MMWD municipal drinking water system; improved stormwater quality and improved aquatic habitat to downstream creeks; restored aquatic habitat to Sorich Creek at the site; and enhanced recreation and public access to the park. The beneficiaries of these improvements are the residents, businesses, property owners, and public agencies in the Towns of San Anselmo, Ross and Larkspur and unincorporated communities of Kentfield, Greenbrae. These improvements will also provide regional benefits to the greater Bay Area.

The water supply benefits will provide regional benefit to the greater Bay Area region to the extent that the reliability of MMWD’s local supplies are improved and to the extent that the additional local supply created by the Project can replace imported supplies. This regional benefit results from potentially reducing the need for MMWD to draw from the Russian River during severe shortages, as occurred during the late 1980s and early 1990s when the District drew surplus water through its supply connection with the Sonoma County Water Agency. The regional beneficiaries of reduced reliance on Russian River water during shortages are the water users of the Russian River, including the Sonoma County Water Agency and other users, as well as public resources that depend on adequate flows in the Russian River (e.g., special-status anadromous salmonid species, recreation). In addition, the Project can provide statewide benefits by improving the reliability of MMWD’s local water supply sources and thereby reducing the potential need to draw from the State Water Project during severe shortages, as occurred during the 1976-77 when State Project Water was transferred to MMWD via an emergency hook-up to the EBMUD system. The Statewide beneficiaries of MMWD’s reduced reliance on the State Water Project during an emergency are the users of the State Water Project, as well as public resources (e.g., anadromous salmonids, recreation) that depend on adequate flows in the rivers that supply the State Water Project.

The improved stormwater quality can provide regional and statewide benefits by contributing to the recovery of steelhead and coho salmon in lower San Anselmo Creek and the downstream Corte Madera Creek. These creeks are considered “anchor” streams in statewide plans for the recovery of these special-status species of fish.

The restored ecosystem and the enhanced recreation and public access can provide regional and statewide benefits by improving access to the park and enhancing the overall enjoyment of the park to recreationalists and other visitors who use the park. Recreational visitors to the park come from throughout the Bay Area region, particularly for organized youth sports leagues, including visitors from disadvantaged and low-income areas.

### **2.3 Acknowledgment of All New Facilities, Policies, and Actions Required to Realize the Physical Benefits**

No other facilities, policies, or actions will be required to realize the above-described physical benefits in water supply, water quality, ecosystem restoration, and recreation and public access.

### **2.4 When the Benefits Will be Received**

As described in Attachment 5 (Schedule), construction of all of the Project elements will be completed by August 2016. So, the benefits generated by the Project will be received starting in water year 2017.

### **2.5 Uncertainty of the Benefits**

The water supply benefits of the Project depend on future subsurface hydrologic conditions in the vicinity of the park, which are always subject to a degree of uncertainty. Estimates of the annual subsurface seepage were derived from analyses using the groundwater level data observed in 2012. It is possible that climate change or some other unforeseen factor may cause future subsurface hydrologic conditions to significantly differ from the monitoring conditions that formed the basis of the estimates of the project groundwater yield benefits. However, that possibility cannot be quantified.

The water quality benefits of the Project depend on the estimates of the inflow stormwater quality and the future performance of the CONTECH CDS<sup>®</sup> hydrodynamic separation device. Existing data on stormwater quality conditions are not available, further stormwater quality testing will be needed. It is possible that the CONTECH CDS<sup>®</sup> hydrodynamic separation device may not perform as planned due to currently unknown water quality issues or some other unforeseen factor. However, this possibility cannot be quantified. Further water quality tests will be examined and the viability of the

CONTECH CDS<sup>®</sup> hydrodynamic separation device will be confirmed before they are purchased and installed.

The ecosystem restoration benefits of daylighting and restoring Sorich Creek have little uncertainty because of the clear increase in ecological function that a natural creek provides compared to a culverted creek. The ecosystem restoration benefits of improved stormwater quality similarly have little uncertainty.

The recreation and public access benefits of the Project have little uncertainty. Memorial Park is known to be a highly used recreational area, but the facilities are in poor condition. Rehabilitation of the park is highly certain to enhance users' recreational experience.

## **2.6 Description of Any Potential Adverse Effects**

Water supply may have a potential impact resulting from lowering of groundwater levels in the vicinity of the park. This potential impact will be evaluated in CEQA environmental review and, if necessary, mitigated to a less-than-significant level.

## **2.7 Other Potential Benefits**

The daylighting and restoration of Sorich Creek and rehabilitation of Memorial Park would enhance the aesthetics of the area which, in turn, could increase the values of nearby properties. This benefit will be monetized in Attachment 8 – Benefits and Cost Analysis. Increased property values also provide direct benefits to the Town of San Anselmo and Marin County in the form of increased property tax revenues.

## APPENDIX 1 TO ATTACHMENT 7

### MIKE FLOOD HYDRAULIC MODELING AND FLOODPLAIN MAPPING TO ANALYZE PHYSICAL BENEFITS OF MEMORIAL PARK DETENTION BASIN PROJECT IN FLOOD DAMAGE REDUCTION

Stetson Engineers Inc.  
December 7, 2012

A hydraulic modeling analysis and floodplain mapping were prepared for the Memorial Park Detention Basin Project (Project). The analysis mainly included:

- Modeling and mapping the flood extent and inundation depth for a range of recurrence/probability floods (i.e., 5-year, 10-year, 25-year, 50-year, 100-year, 250-year, and 500-year floods) under without-Project and with-Project conditions.
- Analyzing the acreage of land and types of land uses, number of parcels, and number of buildings protected from flooding for each flood event under without-Project and with-Project conditions and calculate the prevented inundation by the Project (i.e., physical benefit).

The simulated inundation extent and depth data will also be used in Attachment 8 to analyze the economic benefit of the Project in flood damage reduction.

Considering the Phoenix Lake IRWM Retrofit project was awarded in the 1<sup>st</sup> round application for the Proposition 1E Stormwater Flood Management Grant, the without-Project condition for the Memorial Park Detention Basin Project is the condition with the Phoenix Lake IRWM Retrofit project in place (Refer to Figure 2a of Attachment 3 – Work Plan for the relative locations of the Memorial Park Detention Basin Project and the Phoenix Lake IRWM Retrofit project).

#### **Floodplain Inundation Mapping under Without- and With-Project Conditions**

The extent and depth of flood inundation are basic information required for flood damage analysis. The extent and depth of flood inundation under without-Project and with-Project conditions were estimated for a range of recurrence/probability floods and are summarized in Table 1. No simulation is needed for a 5-year flood or less than 5-year flood under the with-Project conditions because Corte Madera Creek has a 5-year flow capacity and the Memorial Park Detention Basin will not be utilized. In other words, the extent and depth of flood inundation under without-Project and with-Project conditions are the same for a 5-year flood or less than 5-year flood.

**Table 1 Summary of Flood Events That Were Simulated for Floodplain Inundation Mapping and Depth of Inundation**

Condition	Flood Recurrence/Probability						
	5-yr/.2 prob.	10-yr/.1 prob.	25-yr/.04 prob.	50-yr/.02 prob.	100-yr/.01 prob.	250-yr/.004 prob.	500-yr/.002 prob.
<b>Without-Project</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
<b>With-Project</b>		<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>

The extent and depth of flood inundation for the flood events summarized in Table 1 under without-Project and with-Project conditions were mapped based on simulations using the Stetson-developed MIKE FLOOD unsteady flow hydraulic model for the Ross Valley<sup>1</sup>. The MIKE FLOOD was developed and used for the Ross Valley Flood Reduction and Creek Management Capital Improvement Study in 2011. So the MIKE FLOOD model domain (see Figure 1) covers the entire Ross Valley, including both the affected downstream by the Memorial Park Detention Basin Project and the unaffected areas upstream of the Project.

ArcGIS was used to map the extent of floodplain inundation by intersecting the MIKE FLOOD-computed water surface DEM with the floodplain topographic surface DEM. Figures 2 through 8 show the floodplain inundation maps for the 5-year, 10-year, 25-year,

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<sup>1</sup> MIKE FLOOD, developed by Danish Hydraulic Institute (DHI), is a specialized software package for analyzing water levels and flooding in an urban environment, river basin, and marine coastal area. It is one of the FEMA-approved models for the National Flood Insurance Program.

MIKE FLOOD integrates the MIKE 11 (one-dimensional model of river flow) and MIKE 21 (two-dimensional model of free-surface floodplain flow) models by linking MIKE 21 grid cells to a MIKE 11 river reach and dynamically solving the flow exchange between the two models. Using a coupled approach enables the best features of both one-dimensional and two-dimensional models to be utilized, while at the same time avoiding many of the limitations of resolution and accuracy often encountered when using a one-dimensional model or a two-dimensional model separately. Given the two-dimensional flow pattern in the Ross Valley floodplain, MIKE FLOOD can directly compute the flow pattern based on topography, building placement, and resistance.

Within the MIKE FLOOD model domain for the Ross Valley, the one-dimensional model, MIKE 11, covers the mainstem of Corte Madera Creek from the Bay upstream to the San Anselmo Creek confluence with Deer Park Creek, which is about 600 ft upstream of the Fairfax Creek confluence, and the lower portions of four major tributaries; Fairfax Creek, Sleepy Hollow Creek, Sorich Creek, and Ross Creek. The two-dimensional model MIKE 21 is implemented using detailed digitized topographic data for the river basin and the river floodplain at a grid cell size of 10 meters by 10 meters. Cells mostly occupied by buildings within the MIKE 21 model domain (i.e., more than 50% of the cell is occupied by building footprint) were de-activated by setting a high elevation in the DEM. The MIKE 21 model domain was oriented in the main flow direction along the San Anselmo Avenue in downtown San Anselmo. The MIKE 11 and MIKE 21 models were coupled using lateral links (i.e., lateral weir structures) along the top of the creek banks. The MIKE FLOOD model was first calibrated to the observed high water marks for the December 31, 2005 flood event and then verified to the observed high water marks for the January 4, 1982 flood event. The flow inputs for the MIKE FLOOD model were generated by the Stetson-developed HEC-HMS hydrologic model application for the Ross Valley watershed.

50-year, 100-year, 250-year, and 500-year recurrence/probability floods for without-Project and with-Project conditions.

### **Analysis Results of Flood Damage Reduction Physical Benefits**

In this analysis, the physical benefits in flood damage reduction were quantified for the acreage of land and types of land uses, number of parcels, and number of buildings protected from flooding for each flood event under without-Project and with-Project conditions. Tables 2 and 3 show results of inundation for the without-Project and with-Project conditions, respectively. The results are presented by towns or cities. Inundated buildings in the tables mean that a building's first finished floor is inundated and inundated parcels or lands mean that a land is inundated.

**Table 2 Ross Valley Flood Damage Analysis - Inundated Parcels, Buildings, and Land  
Without-Project Conditions**

		Flood Events						
Ross Valley Watershed		5yr	10vr	25vr	50vr	100vr	250vr	500vr
For Entire Ross Valley	Number of Inundated Buildings	176	507	1272	1522	1715	2577	2889
	Number of Inundated Parcels	122	314	835	1004	1132	1576	1819
	Total Damage Acres	26.6	90.0	248.0	308.0	392.6	688.2	805.3
	<b>Total Damage by Category Type<sup>1</sup></b>	<b>5yr</b>	<b>10vr</b>	<b>25vr</b>	<b>50vr</b>	<b>100vr</b>	<b>250vr</b>	<b>500vr</b>
	Commercial	2.6	3.7	15.9	19.0	21.1	69.9	87.9
	Industrial	0.0	0.0	0.0	0.0	0.0	5.8	6.7
	Residential	24.0	73.0	199.1	230.8	255.7	337.3	380.6
	Exempt	0.0	13.2	32.9	58.2	115.7	275.2	330.0
	Total Acres	26.6	90.0	248.0	308.0	392.6	688.2	805.3
	<hr/>							
<b>Total Damage by City/Town<sup>2</sup></b>		<b>5yr</b>	<b>10vr</b>	<b>25vr</b>	<b>50vr</b>	<b>100vr</b>	<b>250vr</b>	<b>500vr</b>
Corte Madera	0.0	0.0	0.0	0.0	0.0	82.1	96.1	
Fairfax	12.9	16.8	20.9	26.3	29.2	31.3	31.5	
Greenbrae	0.0	0.0	0.0	0.0	0.0	47.5	55.4	
Kentfield	0.0	18.6	26.5	31.0	62.4	74.7	101.8	
Larkspur	0.0	0.0	3.3	23.0	27.6	166.6	224.3	
Ross	11.2	45.1	68.0	76.6	83.2	86.4	88.6	
San Anselmo	2.6	9.5	129.3	151.1	190.1	199.7	207.6	
Total Acres	26.6	90.0	248.0	308.0	392.6	688.2	805.3	
<hr/>								
<b>Total Inundated Parcels by City/Town<sup>2</sup></b>		<b>5yr</b>	<b>10vr</b>	<b>25vr</b>	<b>50vr</b>	<b>100vr</b>	<b>250vr</b>	<b>500vr</b>
Corte Madera	0	0	0	0	0	47	65	
Fairfax	80	89	130	163	178	187	188	
Greenbrae	0	0	0	0	0	95	106	
Kentfield	0	82	110	120	125	134	210	
Larkspur	0	0	15	20	42	264	353	
Ross	32	109	178	198	215	223	230	
San Anselmo	10	34	402	503	572	626	667	
Total	122	314	835	1,004	1,132	1,576	1,819	
<hr/>								
<b>Total Damage by Category for Corte Madera</b>		<b>5yr</b>	<b>10vr</b>	<b>25vr</b>	<b>50vr</b>	<b>100vr</b>	<b>250vr</b>	<b>500vr</b>
Commercial	0.0	0.0	0.0	0.0	0.0	10.5	21.7	
Industrial	0.0	0.0	0.0	0.0	0.0	0.6	0.6	
Residential	0.0	0.0	0.0	0.0	0.0	3.1	4.4	
Exempt	0.0	0.0	0.0	0.0	0.0	67.9	69.3	
Subtotal Acres	0.0	0.0	0.0	0.0	0.0	82.1	96.1	
<hr/>								
<b>Total Damage by Category for Fairfax</b>		<b>5yr</b>	<b>10vr</b>	<b>25vr</b>	<b>50vr</b>	<b>100vr</b>	<b>250vr</b>	<b>500vr</b>
Commercial	2.6	2.6	3.0	3.0	3.2	3.2	3.2	
Industrial	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Residential	10.3	13.5	16.3	21.2	23.5	25.7	25.9	
Exempt	0.0	0.7	1.6	2.0	2.5	2.5	2.5	
Subtotal Acres	12.9	16.8	20.9	26.3	29.2	31.3	31.5	
<hr/>								
<b>Total Damage by Category for Greenbrae</b>		<b>5yr</b>	<b>10vr</b>	<b>25vr</b>	<b>50vr</b>	<b>100vr</b>	<b>250vr</b>	<b>500vr</b>
Commercial	0.0	0.0	0.0	0.0	0.0	14.1	20.3	
Industrial	0.0	0.0	0.0	0.0	0.0	5.3	6.2	
Residential	0.0	0.0	0.0	0.0	0.0	22.0	22.8	
Exempt	0.0	0.0	0.0	0.0	0.0	6.1	6.1	
Subtotal Acres	0.0	0.0	0.0	0.0	0.0	47.5	55.4	
<hr/>								
<b>Total Damage by Category for Kentfield</b>		<b>5yr</b>	<b>10vr</b>	<b>25vr</b>	<b>50vr</b>	<b>100vr</b>	<b>250vr</b>	<b>500vr</b>
Commercial	0.0	0.0	3.1	3.7	3.7	4.4	4.7	
Industrial	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Residential	0.0	17.7	22.1	23.2	23.8	25.4	39.1	
Exempt	0.0	0.9	1.3	4.2	35.0	44.9	57.9	
Subtotal Acres	0.0	18.6	26.5	31.0	62.4	74.7	101.8	
<hr/>								
<b>Total Damage by Category for Larkspur</b>		<b>5yr</b>	<b>10vr</b>	<b>25vr</b>	<b>50vr</b>	<b>100vr</b>	<b>250vr</b>	<b>500vr</b>
Commercial	0.0	0.0	0.0	0.7	2.2	25.0	25.3	
Industrial	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Residential	0.0	0.0	3.3	3.6	6.8	48.9	66.1	
Exempt	0.0	0.0	0.0	18.7	18.7	92.6	132.9	
Subtotal Acres	0.0	0.0	3.3	23.0	27.6	166.6	224.3	
<hr/>								
<b>Total Damage by Category for Ross</b>		<b>5yr</b>	<b>10vr</b>	<b>25vr</b>	<b>50vr</b>	<b>100vr</b>	<b>250vr</b>	<b>500vr</b>
Commercial	0.0	1.1	1.1	1.4	1.4	1.4	1.4	
Industrial	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Residential	11.2	32.3	54.6	62.9	69.5	72.3	74.5	
Exempt	0.0	11.6	12.3	12.3	12.3	12.6	12.6	
Subtotal Acres	11.2	45.1	68.0	76.6	83.2	86.4	88.6	
<hr/>								
<b>Total Damage by Category for San Anselmo</b>		<b>5yr</b>	<b>10vr</b>	<b>25vr</b>	<b>50vr</b>	<b>100vr</b>	<b>250vr</b>	<b>500vr</b>
Commercial	0.0	0.0	8.7	10.2	10.7	11.3	11.3	
Industrial	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Residential	2.6	9.5	102.9	119.9	132.1	139.8	147.7	
Exempt	0.0	0.0	17.7	21.0	47.3	48.7	48.7	
Subtotal Acres	2.6	9.5	129.3	151.1	190.1	199.7	207.6	

Notes:

<sup>1</sup> Categories summarized from tax records.

<sup>2</sup> City/Town as designated in tax records.

**Table 3 Ross Valley Flood Damage Analysis - Inundated Parcels, Buildings, and Land**  
**With-Project Conditions**

	Flood Events						
	5yr	10yr	25yr	50yr	100yr	250yr	500yr
<b>Ross Valley Watershed</b>							
Number of Inundated Buildings	176	405	1,171	1,490	1,684	2,537	2,781
Number of Inundated Parcels	122	255	768	982	1,108	1,547	1,726
Total Damage Acres	26.6	67.9	233.4	281.6	357.1	666.3	775.0
<b>Total Damage by Category Type<sup>1</sup></b>	<b>5yr</b>	<b>10yr</b>	<b>25yr</b>	<b>50yr</b>	<b>100yr</b>	<b>250yr</b>	<b>500yr</b>
Commercial	2.6	3.5	15.3	17.9	20.1	67.8	78.0
Industrial	0.0	0.0	0.0	0.0	0.0	5.8	6.7
Residential	24.0	56.5	185.3	227.1	252.1	332.0	360.4
Exempt	0.0	7.9	32.8	36.6	84.9	260.7	329.9
Total Acres	26.6	67.9	233.4	281.6	357.1	666.3	775.0

	5yr	10yr	25yr	50yr	100yr	250yr	500yr
<b>Total Damage by City/Town<sup>2</sup></b>							
Corte Madera	0.0	0.0	0.0	0.0	0.0	80.4	92.4
Fairfax	12.9	16.8	20.9	26.3	29.2	31.3	31.5
Greenbrae	0.0	0.0	0.0	0.0	0.0	45.4	49.5
Kentfield	0.0	10.9	23.4	26.9	31.5	63.7	90.7
Larkspur	0.0	0.0	2.8	3.8	25.4	160.5	216.1
Ross	11.2	31.6	62.4	74.9	82.7	86.4	87.9
San Anselmo	2.6	8.6	123.9	149.8	188.2	198.6	206.9
Total Acres	26.6	67.9	233.4	281.6	357.1	666.3	775.1

	5yr	10yr	25yr	50yr	100yr	250yr	500yr
<b>Total Inundated Parcels by City/Town<sup>2</sup></b>							
Corte Madera	0	0	0	0	0	37	62
Fairfax	80	89	130	163	178	187	188
Greenbrae	0	0	0	0	0	98	101
Kentfield	0	51	94	113	122	129	146
Larkspur	0	0	13	17	32	254	341
Ross	32	87	168	192	214	223	226
San Anselmo	10	28	363	497	562	619	662
Total	122	255	768	982	1,108	1,547	1,726

	5yr	10yr	25yr	50yr	100yr	250yr	500yr
<b>Total Damage by Category for Corte Madera</b>							
Commercial	0.0	0.0	0.0	0.0	0.0	10.5	18.4
Industrial	0.0	0.0	0.0	0.0	0.0	0.6	0.6
Residential	0.0	0.0	0.0	0.0	0.0	1.5	4.2
Exempt	0.0	0.0	0.0	0.0	0.0	67.9	69.3
Subtotal Acres	0.0	0.0	0.0	0.0	0.0	80.4	92.4

	5yr	10yr	25yr	50yr	100yr	250yr	500yr
<b>Total Damage by Category for Fairfax</b>							
Commercial	2.6	2.6	3.0	3.0	3.2	3.2	3.2
Industrial	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Residential	10.3	13.5	16.3	21.2	23.5	25.7	25.9
Exempt	0.0	0.7	1.6	2.0	2.5	2.5	2.5
Subtotal Acres	12.9	16.8	20.9	26.3	29.2	31.3	31.5

	5yr	10yr	25yr	50yr	100yr	250yr	500yr
<b>Total Damage by Category for Greenbrae</b>							
Commercial	0.0	0.0	0.0	0.0	0.0	12.0	14.4
Industrial	0.0	0.0	0.0	0.0	0.0	5.3	6.2
Residential	0.0	0.0	0.0	0.0	0.0	22.0	22.8
Exempt	0.0	0.0	0.0	0.0	0.0	6.1	6.1
Subtotal Acres	0.0	0.0	0.0	0.0	0.0	45.4	49.5

	5yr	10yr	25yr	50yr	100yr	250yr	500yr
<b>Total Damage by Category for Kentfield</b>							
Commercial	0.0	0.0	2.5	3.1	3.7	4.4	4.4
Industrial	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Residential	0.0	10.0	19.6	22.5	23.7	24.3	28.5
Exempt	0.0	0.9	1.3	1.3	4.2	35.0	57.8
Subtotal Acres	0.0	10.9	23.4	26.9	31.5	63.7	90.7

	5yr	10yr	25yr	50yr	100yr	250yr	500yr
<b>Total Damage by Category for Larkspur</b>							
Commercial	0.0	0.0	0.0	0.2	1.2	25.0	25.0
Industrial	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Residential	0.0	0.0	2.8	3.6	5.6	47.3	58.2
Exempt	0.0	0.0	0.0	0.0	18.7	88.2	132.9
Subtotal Acres	0.0	0.0	2.8	3.8	25.4	160.5	216.1

	5yr	10yr	25yr	50yr	100yr	250yr	500yr
<b>Total Damage by Category for Ross</b>							
Commercial	0.0	0.9	1.1	1.4	1.4	1.4	1.4
Industrial	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Residential	11.2	24.4	48.9	61.2	69.0	72.3	73.8
Exempt	0.0	6.3	12.3	12.3	12.3	12.6	12.6
Subtotal Acres	11.2	31.6	62.4	74.9	82.7	86.4	87.9

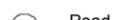
	5yr	10yr	25yr	50yr	100yr	250yr	500yr
<b>Total Damage by Category for San Anselmo</b>							
Commercial	0.0	0.0	8.7	10.2	10.7	11.3	11.3
Industrial	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Residential	2.6	8.6	97.7	118.6	130.3	138.8	147.0
Exempt	0.0	0.0	17.6	21.0	47.2	48.5	48.7
Subtotal Acres	2.6	8.6	123.9	149.8	188.2	198.6	206.9

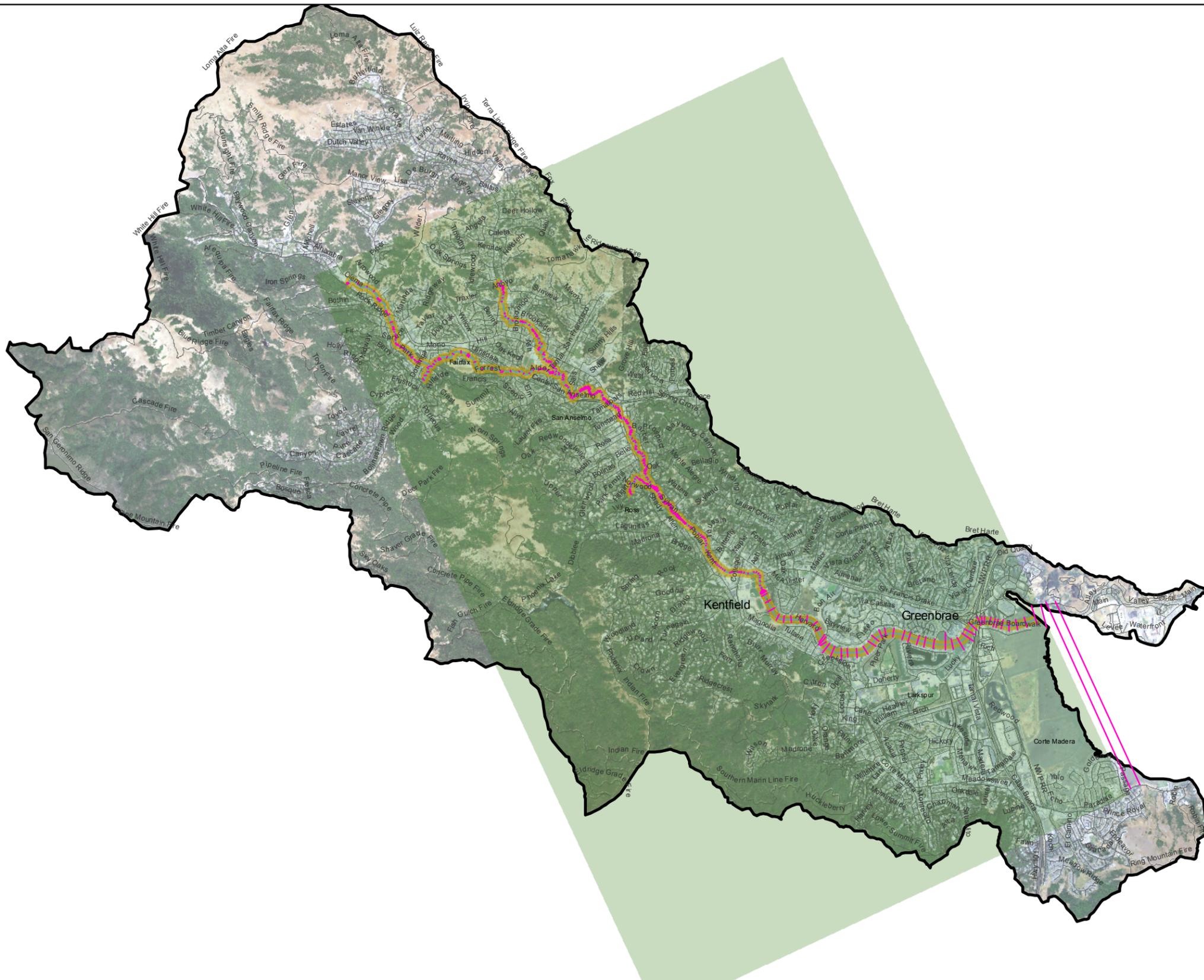
Notes:  
<sup>1</sup> Categories summarized from tax records.  
<sup>2</sup> City/Town as designated in tax records.

For Entire Ross Valley

By City/Town



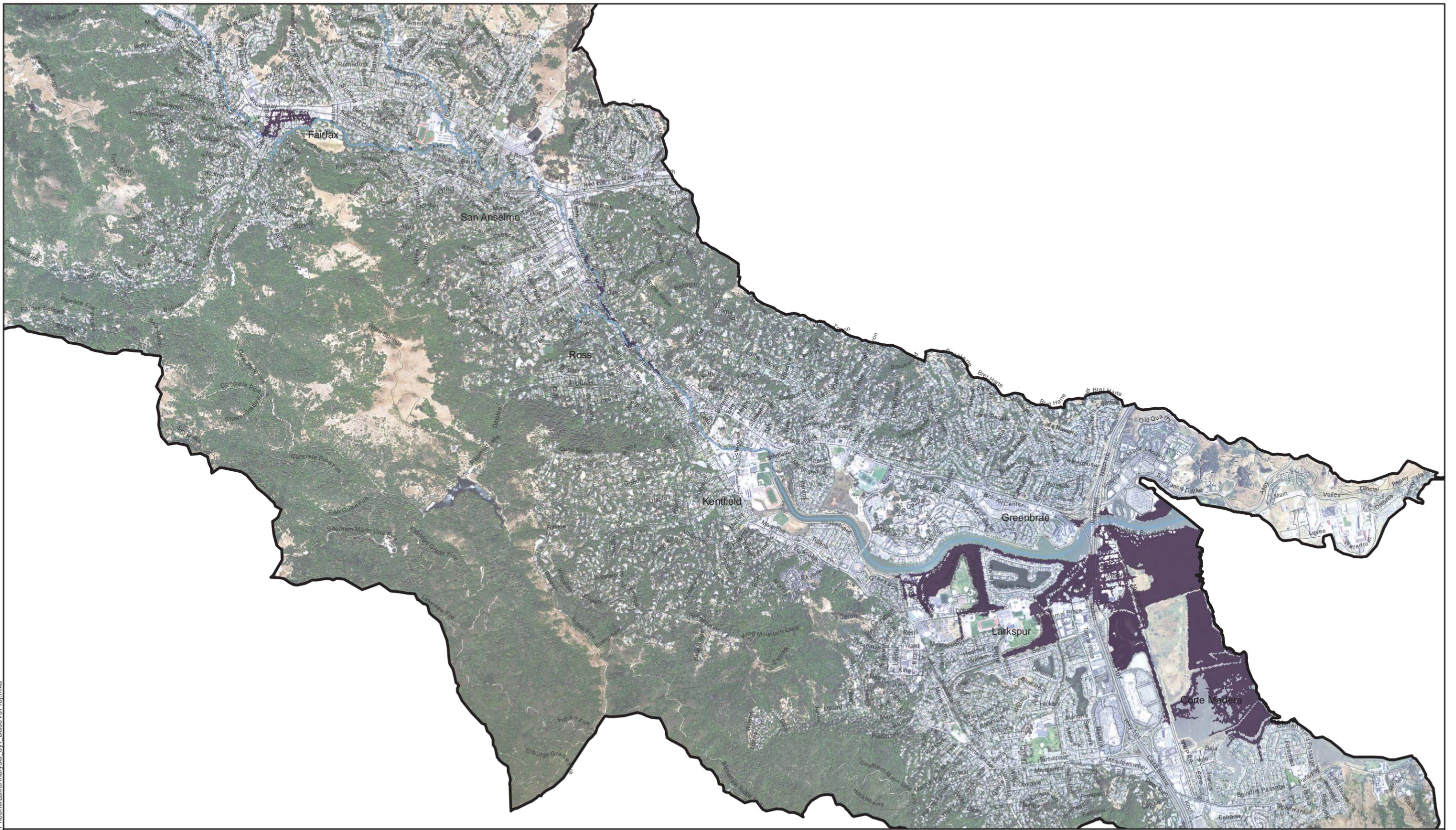
-  Mike 11 Channel Cross-section
-  Creek
-  Road
-  Mike 21 Model Domain (2-D)
-  Mike 11 Model Domain (1-D)
-  Ross Valley Watershed Boundary



MIKE FLOOD MODEL DOMAIN  
ROSS VALLEY WATERSHED

0 0.5 1 Miles

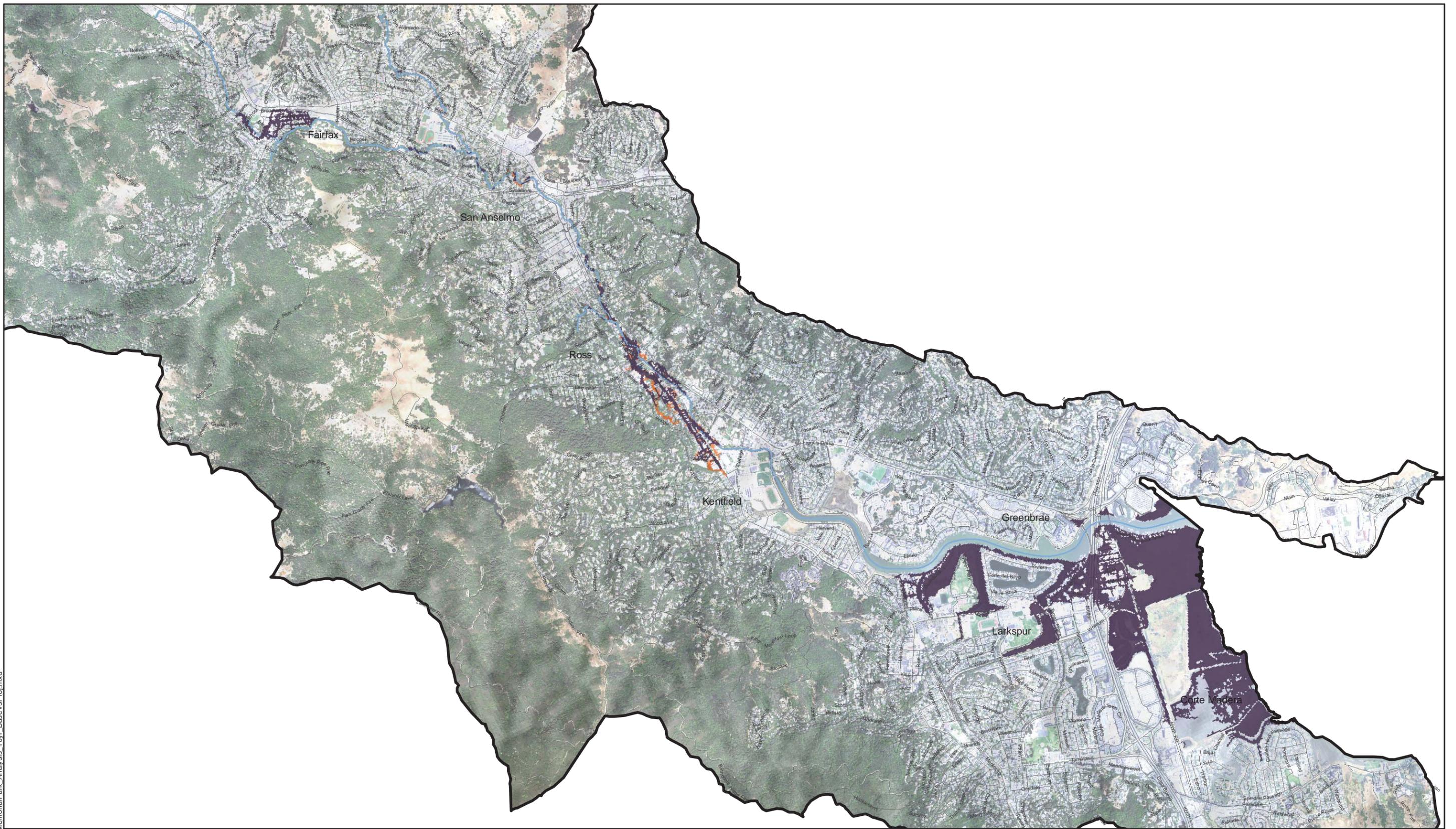




-  Ross Valley Watershed Boundary
-  Creek
-  Road
-  5yr Flood Inundation, Without-Project Conditions
-  5yr Flood Inundation, With-Project Conditions
-  5yr Flood Inundation, With- and Without-Project Conditions

**5yr FLOOD EVENT INUNDATION  
WITHOUT-PROJECT VS. WITH-PROJECT CONDITIONS  
ROSS VALLEY WATERSHED**



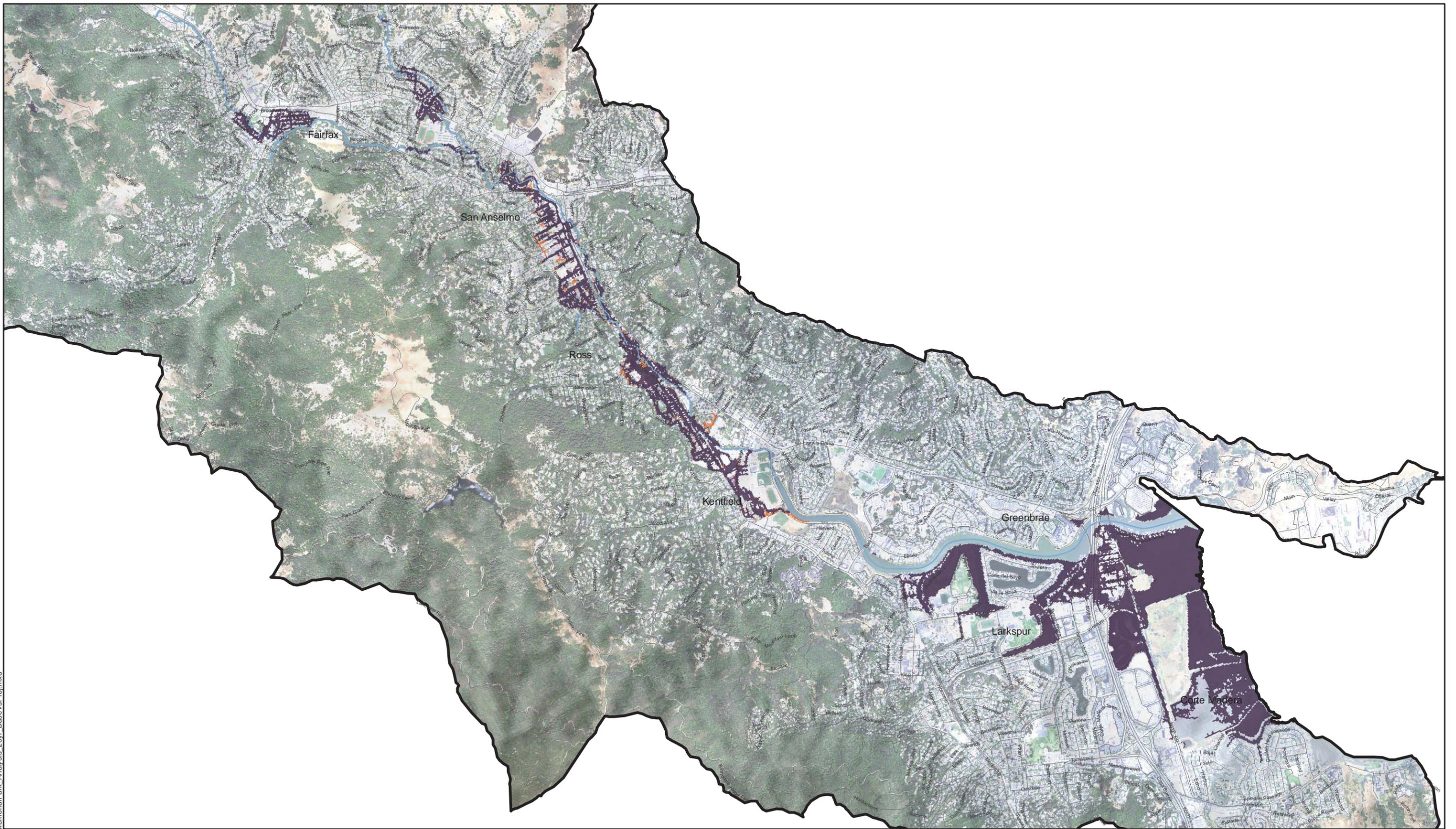


- Ross Valley Watershed Boundary
- Creek
- Road

- 5yr Flood Inundation, Without-Project Conditions
- 5yr Flood Inundation, With-Project Conditions
- 5yr Flood Inundation, With- and Without-Project Conditions

**10yr FLOOD EVENT INUNDATION  
WITHOUT-PROJECT VS. WITH-PROJECT CONDITIONS  
ROSS VALLEY WATERSHED**





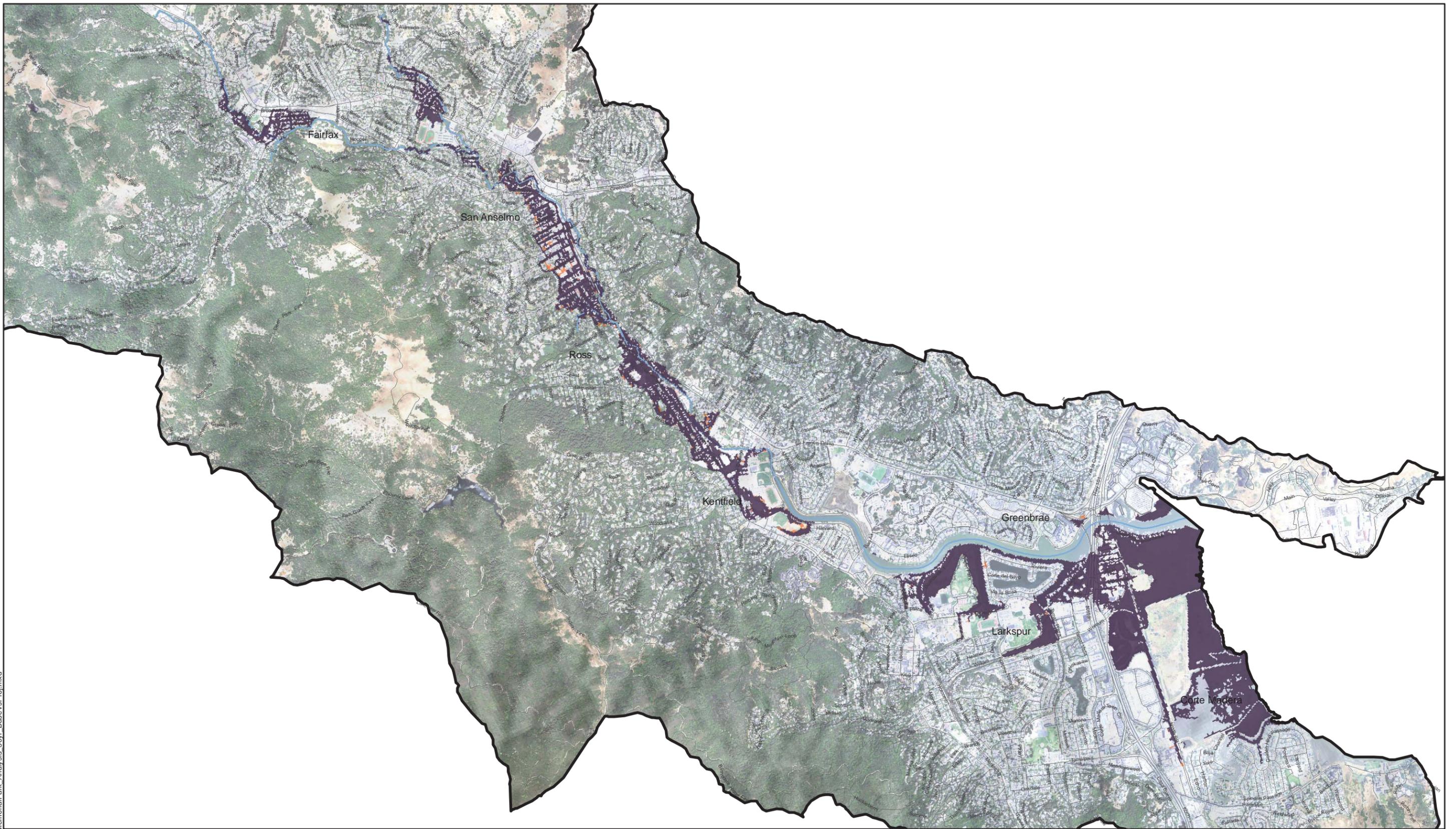
- Ross Valley Watershed Boundary
- Creek
- Road

- 25yr Flood Inundation, Without-Project Conditions
- 25yr Flood Inundation, With-Project Conditions
- 25yr Flood Inundation, With- and Without-Project Conditions

**25yr FLOOD EVENT INUNDATION  
WITHOUT-PROJECT VS. WITH-PROJECT CONDITIONS  
ROSS VALLEY WATERSHED**



FIGURE 4

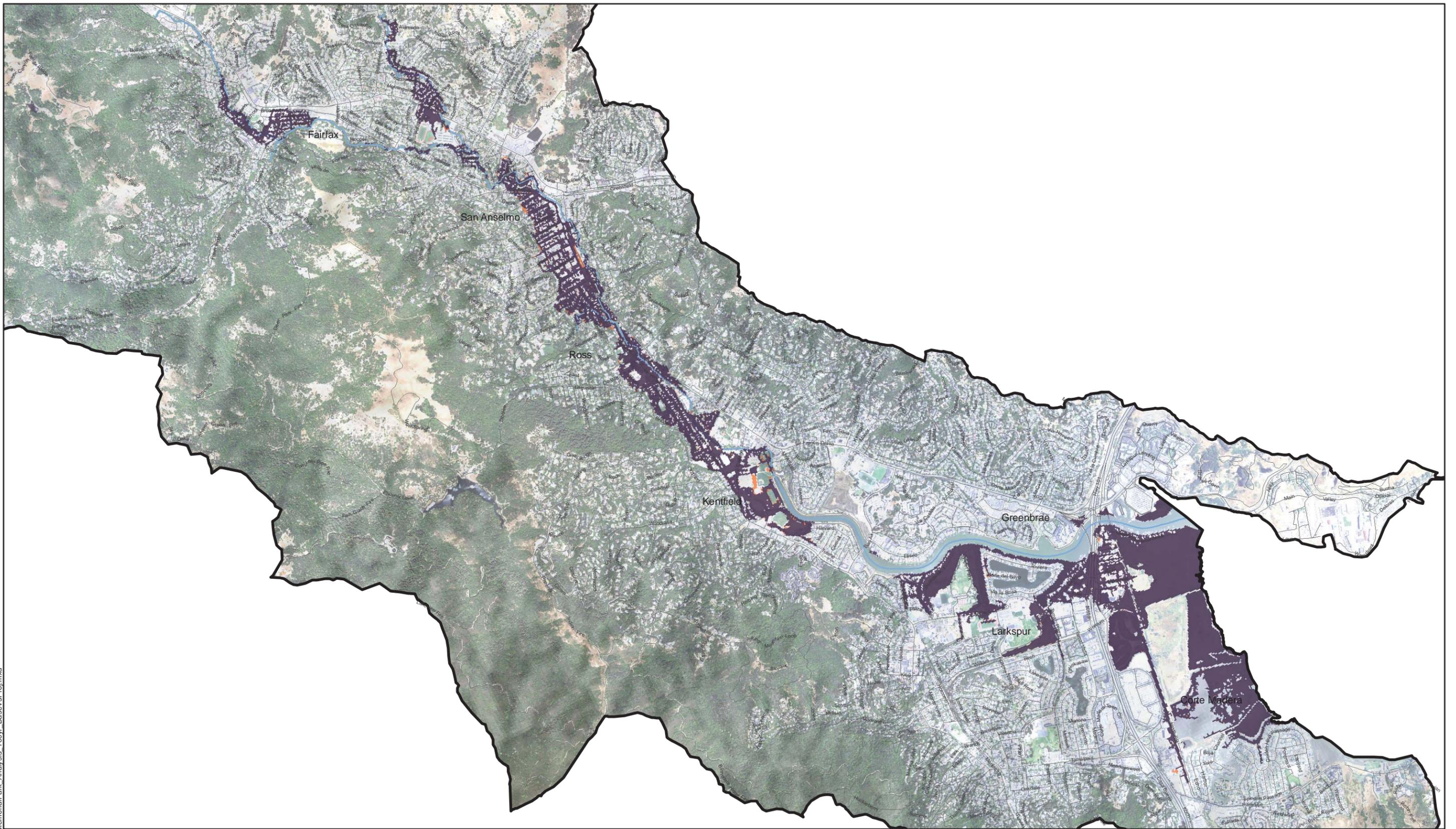


- Ross Valley Watershed Boundary
- Creek
- Road

- 50yr Flood Inundation, Without-Project Conditions
- 50yr Flood Inundation, With-Project Conditions
- 50yr Flood Inundation, With- and Without-Project Conditions

**50yr FLOOD EVENT INUNDATION  
WITHOUT-PROJECT VS. WITH-PROJECT CONDITIONS  
ROSS VALLEY WATERSHED**



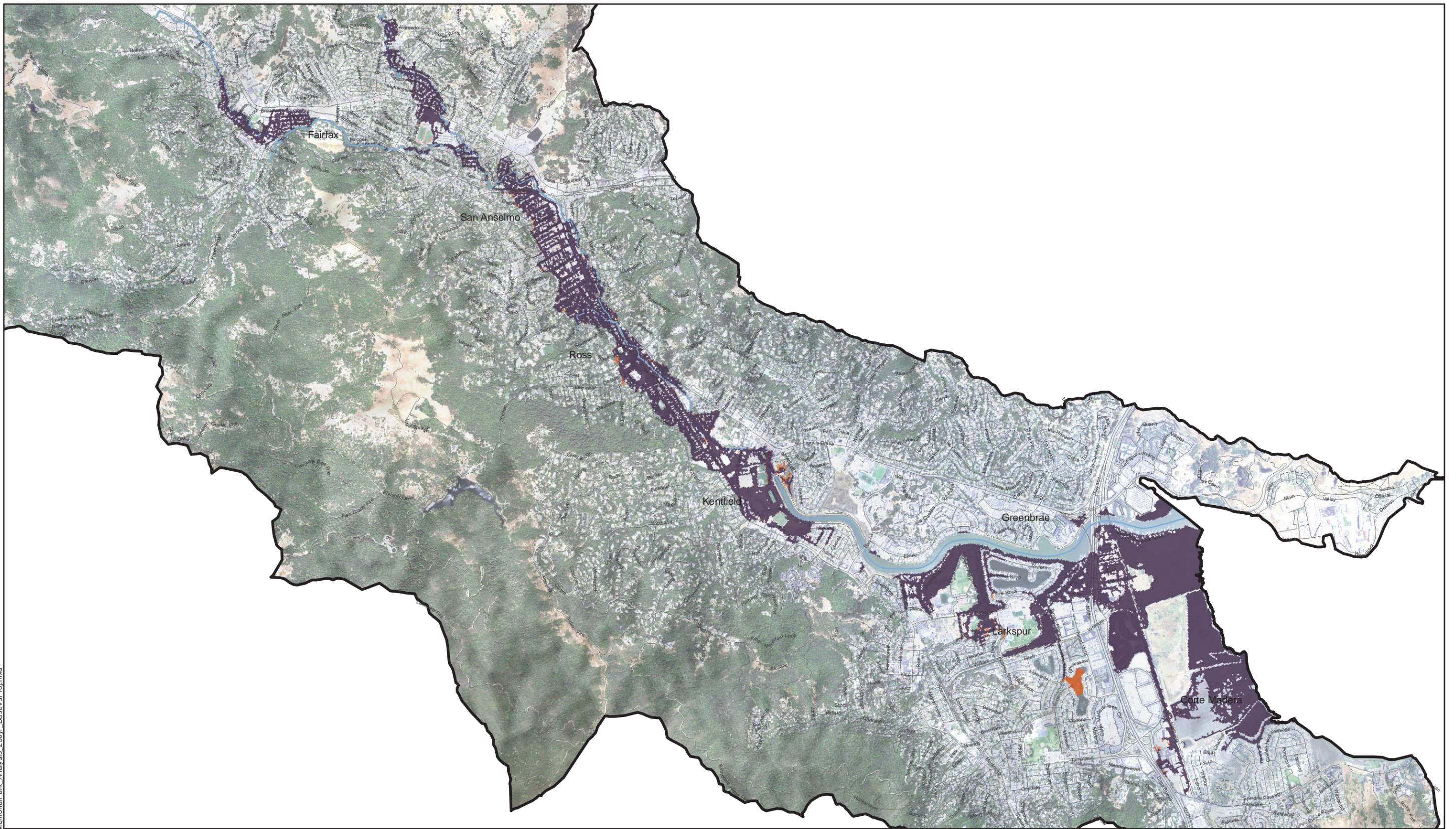


-  Ross Valley Watershed Boundary
-  Creek
-  Road

-  100yr Flood Inundation, Without-Project Conditions
-  100yr Flood Inundation, With-Project Conditions
-  100yr Flood Inundation, With- and Without-Project Conditions

**100yr FLOOD EVENT INUNDATION  
WITHOUT-PROJECT VS. WITH-PROJECT CONDITIONS  
ROSS VALLEY WATERSHED**



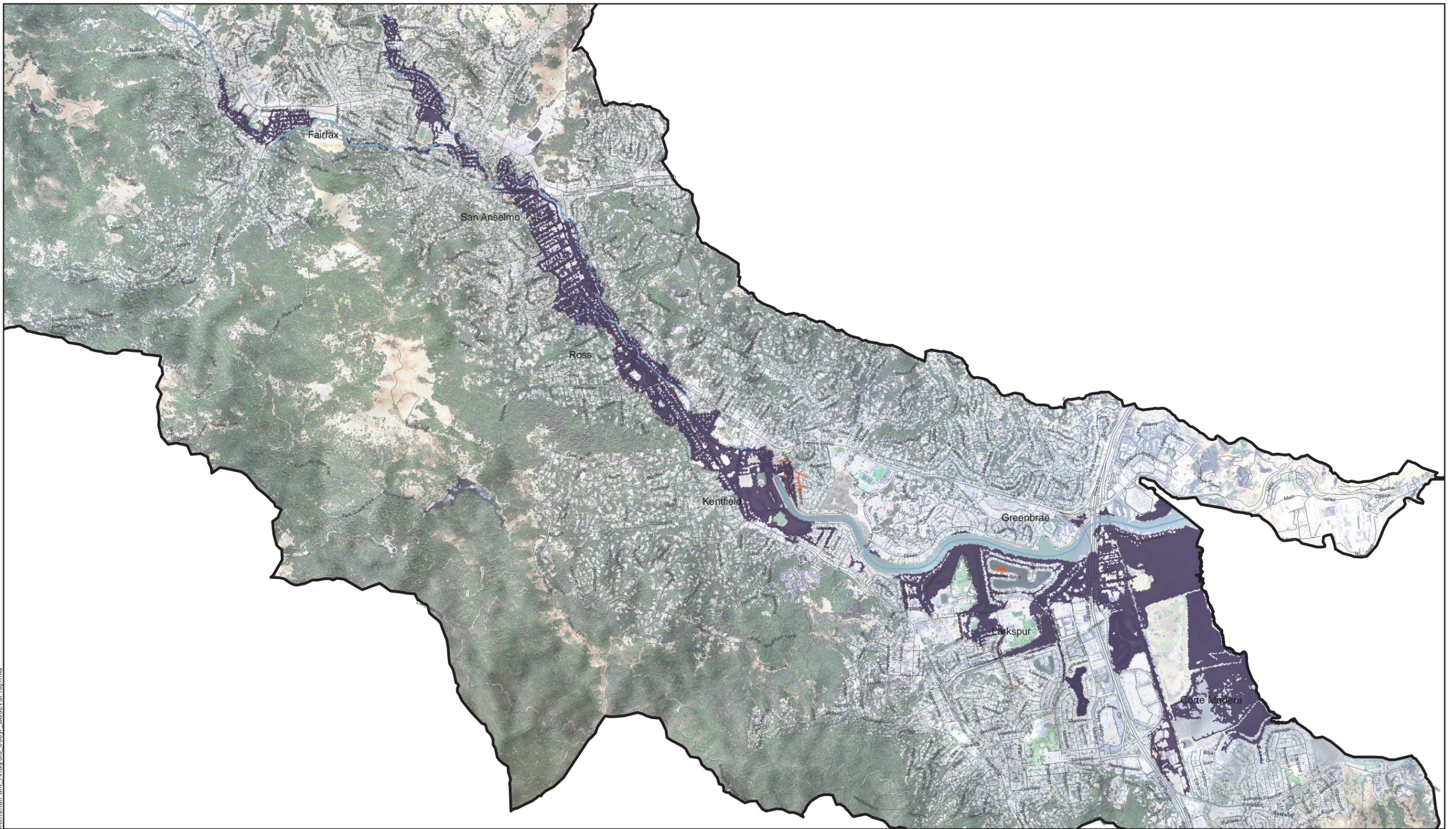


- Ross Valley Watershed Boundary
- Creek
- Road

- 250yr Flood Inundation, Without-Project Conditions
- 250yr Flood Inundation, With-Project Conditions
- 250yr Flood Inundation, With- and Without-Project Conditions

**250yr FLOOD EVENT INUNDATION  
WITHOUT-PROJECT VS. WITH-PROJECT CONDITIONS  
ROSS VALLEY WATERSHED**





- Ross Valley Watershed Boundary
- Creek
- Road

- 500yr Flood Inundation, Without-Project Conditions
- 500yr Flood Inundation, With-Project Conditions
- 500yr Flood Inundation, With- and Without-Project Conditions

**500yr FLOOD EVENT INUNDATION  
WITHOUT-PROJECT VS. WITH-PROJECT CONDITIONS  
ROSS VALLEY WATERSHED**



**APPENDIX 2 TO ATTACHMENT 7**

**MMWD Historical Billing Records**



**Marin Municipal Water District**  
 220 Nellen Avenue  
 Corte Madera, CA 94925-1105

TOWN OF SAN ANSELMO  
 525 SAN ANSELMO AVE  
 SAN ANSELMO CA 94960-2682

**Billing Inquiries:** (415) 945-1400  
**Emergency:** (415) 945-1500

**Important Information**

**New Water Rates Now in Effect; Save Water Outdoors**

The MMWD Board of Directors recently approved an increase of 4 percent to the water rate and the bi-monthly service charge effective for water used on or after June 1, 2011. The new rates are reflected in water bills issued on or after August 1, 2011. The new rates can be viewed online at [marinwater.org](http://marinwater.org) or contact our Customer Service Department at (415) 945-1400. MMWDs free Weekly Watering Schedule can help you save water outdoors this summer. The schedule is based on current weather conditions, so your plants always get just the right amount of water. There are four ways to get the schedule:

- Call the Water Saver Tip Line at (415) 945-1578.
- Find the schedule online at [marinwater.org](http://marinwater.org).

**Account Information**

**Customer Number:** 135752  
**Service Number:** 35101  
**Billing Date:** 07/14/2011  
**Service Address:** SUNNY HILLS DR (MEM PARK)

**Meter Reading**

Meter Read Date: 05/11/2011 - 07/11/2011

Service/Meter	Prior	Current	Water Use CCF* Current
35101	21745	22443	698

	This Year	Last Year
Days	62	60
CCFs	698	959
Gallons	522104	717332
Avg Gal/Day	8421	11956

\*1 CCF = 748 gallons

**Account Summary**

Last Payment Received 07/05/2011	Thank You	-736.20
SERVICE CHARGE FOR 2 " METER	=	75.15
Tier One (0-922)	698 CCFS X 3.39	= 2366.22
Tier Two (923-1628)	0 CCFS	= 0.00
Tier Three (1629+)	0 CCFS	= 0.00

CURRENT CHARGES DUE BY 08/28/2011 2441.37

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**TOTAL DUE \$2,441.37**

Please see reverse for important information.



**Marin Municipal Water District**  
 220 Nellen Avenue  
 Corte Madera, CA 94925-1105

107756 062455121

TOWN OF SAN ANSELMO  
 525 SAN ANSELMO AVE  
 SAN ANSELMO CA 94960-2682

PLEASE CHECK BOX FOR CHANGES (SEE BACK)

**Customer Number:** 135752  
**Service Number:** 35101  
**TOTAL DUE:** \$2,441.37  
**Current Charges Due By:** 08/28/2011

**Amount Enclosed:**

Please return this portion with check payable to:  
**Marin Municipal Water District**

**"Friends of the Watershed"**

A Marin Community Foundation fund for habitat and stream restoration on the Mt. Tamalpais Watershed

Amount of donation \_\_\_\_\_ (tax deductible)

Donation included with payment

Separate check payable to: "Friends of the Watershed"



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**Marin Municipal Water District**  
 220 Nellen Avenue  
 Corte Madera, CA 94925-1105

TOWN OF SAN ANSELMO  
 525 SAN ANSELMO AVE  
 SAN ANSELMO CA 94960-2682

Billing Inquiries: (415) 945-1400  
 Emergency: (415) 945-1500

**Important Information**

**Schedule a Bay-Friendly Garden Walk**

Receive a FREE residential garden evaluation from a Marin Master Gardener! Through our popular Bay-Friendly Garden Walk program, an MMWD-trained Master Gardener will visit your home and provide a personalized landscape assessment. Learn about sustainable gardening practices and get water-wise tips for a beautiful, healthy landscape. The onsite visits usually take about one hour and will be available through mid-October. To make an appointment, please call (415) 499-4204.

**Account Information**

Customer Number: 135752  
 Service Number: 35101  
 Billing Date: 09/14/2011  
 Service Address: SUNNY HILLS DR (MEM PARK)

**Meter Reading**

Meter Read Date: 07/12/2011 - 09/09/2011

Service/Meter	Prior	Current	Water Use CCF*
			Current
35101	22443	23688	1245

	This Year	Last Year
Days	60	62
CCFs	1245	1056
Gallons	931260	789888
Avg Gal/Day	15521	12740

\*1 CCF = 748 gallons

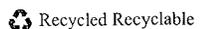
**Account Summary**

Last Payment Received 08/29/2011 Thank You -2441.37  
 SERVICE CHARGE FOR 2 " METER = 78.16  
 Tier One (0-1004) 1004 CCFS X 3.53 = 3544.12  
 Tier Two (1005-1772) 241 CCFS X 7.06 = 1701.46  
 Tier Three (1773+) 0 CCFS = 0.00  
 CURRENT CHARGES DUE BY 10/29/2011 5323.74

**TOTAL DUE \$5,323.74**

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Please see reverse for important information.





**Marin Municipal Water District**  
 220 Nellen Avenue  
 Corte Madera, CA 94925-1105

TOWN OF SAN ANSELMO  
 525 SAN ANSELMO AVE  
 SAN ANSELMO CA 94960-2682

Billing Inquiries: (415) 945-1400  
 Emergency: (415) 945-1500

**Important Information**

**Prepare for Emergencies**

One of the easiest yet most essential steps you can take to prepare for an earthquake or other disaster is to set aside an emergency water supply. Every household should keep at least a 72-hour (three-day) emergency supply of water handy. Store one gallon per person per day, or a total of three gallons per person, for a 72-hour period. Store extra water for pets and family members with special needs. Tap water from MMWD can be safely stored in well-sanitized, food-grade plastic containers such as soft drink bottles. Avoid containers that will decompose or break. Label water and store in an easily accessible, dark, cool, dry area away from any solvents and chemicals. Replace every six months. Don't forget your other emergency supplies (get a complete list at [www.ready.gov](http://www.ready.gov)).

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**Account Information**

Customer Number: 135752  
 Service Number: 35101  
 Billing Date: 11/15/2011  
 Service Address: SUNNY HILLS DR (MEM PARK)

**Meter Reading**

Meter Read Date: 09/10/2011 - 11/09/2011

Service/Meter	Prior	Current	Water Use CCF* Current
35101	23688	24220	532

	This Year	Last Year
Days	61	60
CCFs	532	666
Gallons	397936	498168
Avg Gal/Day	6524	8303

\*1 CCF = 748 gallons

**Account Summary**

Last Payment Received 10/10/2011	Thank You	-5323.74
SERVICE CHARGE FOR 2 " METER	=	78.16
Tier One (0-450)	450 CCFS X 3.53	= 1588.50
Tier Two (451-794)	82 CCFS X 7.06	= 578.92
Tier Three (795+)	0 CCFS	= 0.00
<b>CURRENT CHARGES DUE BY 12/30/2011</b>		<b>2245.58</b>

**TOTAL DUE**

**\$2,245.58**

Thank you for conserving.

Please see reverse for important information.

Recycled Recyclable



**Marin Municipal Water District**  
 220 Nellen Avenue  
 Corte Madera, CA 94925-1105

TOWN OF SAN ANSELMO  
 525 SAN ANSELMO AVE  
 SAN ANSELMO CA 94960-2682

**Billing Inquiries:** (415) 945-1400  
**Emergency:** (415) 945-1500

**Important Information**

**In the News: Discounted Rate Programs, 100 Years**

- MMWD offers a Service Charge Waiver Program and a Medical Disability Discount Program for single-family residential customers who qualify. For either program, customers must complete an application and meet certain water conservation requirements. To learn more, please see the enclosed issue of On the Water Front (page 2) or contact Customer Service at 945-1400.  
 - MMWD is turning 100! On April 25, 1912, MMWD received its charter as the first municipal water district in California. We will be celebrating our centennial all this year with community events, the publication of a history photo book and special watershed programs. We invite you to join in. Learn more in the enclosed issue of On the Water Front, and remember to check marinwater.org throughout the year for updates.

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**Account Information**

**Customer Number:** 135752  
**Service Number:** 35101  
**Billing Date:** 01/13/2012  
**Service Address:** SUNNY HILLS DR (MEM PARK)

**Meter Reading**

Meter Read Date: 11/10/2011 - 01/10/2012

Service/Meter	Prior	Current	Water Use CCF*
			Current
35101	24220	24314	94

	This Year	Last Year
Days	62	64
CCFs	94	2
Gallons	70312	1496
Avg Gal/Day	1134	23

\*1 CCF = 748 gallons

**Account Summary**

Last Payment Received 12/28/2011	Thank You	-2248.58
SERVICE CHARGE FOR 2 " METER	=	78.16
Tier One (0-320)	94 CCFS X 3.53	= 331.82
Tier Two (321-564)	0 CCFS	= 0.00
Tier Three (565+)	0 CCFS	= 0.00
CURRENT CHARGES DUE BY 02/27/2012		409.98
Correction for overpayment		-3.00

**TOTAL DUE \$406.98**

Thank you for conserving.



**Marin Municipal Water District**  
 220 Nellen Avenue  
 Corte Madera, CA 94925-1105

TOWN OF SAN ANSELMO  
 525 SAN ANSELMO AVE  
 SAN ANSELMO CA 94960-2682

Billing Inquiries: (415) 945-1400  
 Emergency: (415) 945-1500

**Important Information**

**Proposed Rate Increase and Fire Flow Fee Extension**

-MMWD is proposing an increase of 6 percent to the water rate and the bi-monthly service charge that would take effect on May 1, 2012, and be reflected in bills for meter readings on or after July 1, 2012. MMWD will hold a public hearing on Thursday, April 19, to accept written and oral public comments on the proposed rate increase. For more information visit [marinwater.org](http://marinwater.org) or call our Customer Service Department at (415) 945-1400.

-MMWD is proposing to extend a \$75 per parcel fire flow fee, begun in 1997, for 19 years (2012 through 2031). The fee, which is reflected on property tax bills, would fund such water system improvements as the replacement of about 52 miles of inadequate pipe and seismic stabilization/retrofits of district facilities. MMWD will hold a public hearing on Thursday, May 17, to accept written and oral public comments on the proposed fee extension. For more information visit [marinwater.org](http://marinwater.org) or call our Engineering Department at (415) 945-1541 (recorded message).

**Account Information**

Customer Number: 135752  
 Service Number: 35101  
 Billing Date: 03/14/2012  
 Service Address: SUNNY HILLS DR (MEM PARK)

**Meter Reading**

Meter Read Date: 01/11/2012 - 03/09/2012

Service/Meter	Prior	Current	Water Use CCF* Current
35101	24314	24422	108

	This Year	Last Year
Days	59	56
CCFs	108	1
Gallons	80784	748
Avg Gal/Day	1369	13

\*1 CCF = 748 gallons

**Account Summary**

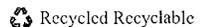
Last Payment Received 02/13/2012	Thank You	-406.98
SERVICE CHARGE FOR 2 " METER	=	78.16
Tier One (0-50)	50 CCFS X 3.53	= 176.50
Tier Two (51-89)	39 CCFS X 7.06	= 275.34
Tier Three (90+)	19 CCFS X 14.12	= 268.28
<b>CURRENT CHARGES DUE BY 04/28/2012</b>		<b>798.28</b>

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**TOTAL DUE \$798.28**

Please see reverse for important information.





**Marin Municipal Water District**  
 220 Nellen Avenue  
 Corte Madera, CA 94925-1105

TOWN OF SAN ANSELMO  
 525 SAN ANSELMO AVE  
 SAN ANSELMO CA 94960-2682

**Billing Inquiries: (415) 945-1400**  
**Emergency: (415) 945-1500**

**Important Information**

**New Rates in Effect May 1; Fire Flow Fee Extension Proposed**

-On April 19 the MMWD Board of Directors approved an increase of 6 percent to the water rate and the bi-monthly service charge effective for water consumed on or after May 1, 2012. The new rates will be reflected in water bills issued on or after July 1, 2012. For more information visit [marinwater.org](http://marinwater.org) or call our Customer Service Department at (415) 945-1400.

-MMWD is proposing to extend a \$75 per parcel fire flow fee, begun in 1997, for 19 years (2012 through 2031). The fee, which is reflected on property tax bills, would fund such water system improvements as the replacement of about 52 miles of inadequate pipe and seismic stabilization/retrofits of district facilities. MMWD will hold a public hearing on Thursday, May 17, to accept written and oral public comments on the proposed fee extension. For more information visit [marinwater.org](http://marinwater.org) or call our Engineering Department at (415) 945-1541 (recorded message).

**Account Information**

**Customer Number:** 135752  
**Service Number:** 35101  
**Billing Date:** 05/14/2012  
**Service Address:** SUNNY HILLS DR (MEM PARK)

**Meter Reading**

Meter Read Date: 03/10/2012 - 05/09/2012

Service/Meter	Prior	Current	Water Use CCF*
			Current
35101	24422	24737	315

	This Year	Last Year
Days	61	63
CCFs	315	195
Gallons	235620	145860
Avg Gal/Day	3863	2315

\*1 CCF = 748 gallons

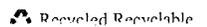
**Account Summary**

Last Payment Received 04/23/2012	Thank You	-798.28
SERVICE CHARGE FOR 2 " METER	=	78.16
Tier One (0-482)	315 CCFs X 3.53	= 1111.95
Tier Two (483-851)	0 CCFs	= 0.00
Tier Three (852+)	0 CCFs	= 0.00
<b>CURRENT CHARGES DUE BY 06/28/2012</b>		<b>1190.11</b>

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**TOTAL DUE \$1,190.11**

Please see reverse for important information





**Marin Municipal Water District**  
 220 Nellen Avenue  
 Corte Madera, CA 94925-1105

TOWN OF SAN ANSELMO  
 525 SAN ANSELMO AVE  
 SAN ANSELMO CA 94960-2682

Billing Inquiries: (415) 945-1400  
 Emergency: (415) 945-1500

**Important Information**

**New Rates Now in Effect; Save Water Indoors and Out**

-On April 19 the MMWD Board of Directors approved an increase of 6 percent to the water rate and the bi-monthly service charge effective for water consumed on or after May 1, 2012. The new rates are reflected in water bills issued on or after July 1, 2012. For more information visit [marinwater.org](http://marinwater.org) or call our Customer Service Department at (415) 945-1400.

-Are you looking for ways to reduce your water use and your water bill? MMWD's conservation partners can help you find ways to save in your home and in your garden. Indoors, receive a free efficiency evaluation from California Youth Energy Services' friendly and professional young staff, plus free installation of energy- and water-saving equipment. Call (415) 532-7566 to schedule. Outdoors, receive a free residential garden evaluation from Marin Master Gardeners and get water-wise tips for a beautiful, healthy landscape. Call (415) 473-4204 to schedule. See enclosed bill insert for more details.

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**Account Information**

Customer Number: 135752  
 Service Number: 35101  
 Billing Date: 07/13/2012  
 Service Address: SUNNY HILLS DR (MEM PARK)

**Meter Reading**

Meter Read Date: 05/10/2012 - 07/10/2012

Service/Meter	Prior	Current	Water Use CCF* Current
35101	24737	26047	1310

	This Year	Last Year
Days	62	62
CCFs	1310	698
Gallons	979880	522104
Avg Gal/Day	15805	8421

\*1 CCF = 748 gallons

**Account Summary**

Last Payment Received 06/27/2012	Thank You	-1190.11
SERVICE CHARGE FOR 2 " METER		= 82.85
Tier One (0-922)	922 CCFS X 3.74	= 3448.28
Tier Two (923-1628)	388 CCFS X 7.48	= 2902.24
Tier Three (1629+)	0 CCFS	= 0.00

CURRENT CHARGES DUE BY 08/27/2012 6433.37

**TOTAL DUE \$6,433.37**

Thank you for conserving.

Please see reverse for important information.

Recycled Recyclable



**Marin Municipal Water District**  
 220 Nelten Avenue  
 Corte Madera, CA 94925-1105

TOWN OF SAN ANSELMO  
 525 SAN ANSELMO AVE  
 SAN ANSELMO CA 94960-2682

Billing Inquiries: (415)945-1400  
 Emergency: (415)945-1500

**Important Information**

**Looking for Ways to Save Water? Look for the Label**

Did you know you can reduce your water use by 20 to 30 percent by installing more water-efficient fixtures in your home? The U.S. Environmental Protection Agency's (EPA) WaterSense program helps consumers make smart water choices by offering a simple way to identify water-efficient products and services. Products can only earn the WaterSense label if they have been independently tested and certified to use less water and perform just as well as, if not better than, conventional models. As a partner in the WaterSense program, MMWD encourages our customers to "look for the label" on toilets, showerheads, bathroom faucets, smart irrigation controllers and other products and services. Visit [epa.gov/watersense](http://epa.gov/watersense) for a list of water-efficient products that have earned the label or [marinwater.org](http://marinwater.org) to learn more.

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**Account Information**

Customer Number: 135752  
 Service Number: 35101  
 Billing Date: 09/14/2012  
 Service Address: SUNNY HILLS DR (MEM PARK)

**Meter Reading**

Meter Read Date: 07/11/2012 - 09/11/2012

Service/Meter	Prior	Current	Water Use CCF* Current
35101	26047	27308	1261

	This Year	Last Year
Days	63	60
CCFs	1261	1245
Gallons	943228	931260
Avg Gal/Day	14972	15521

\*1 CCF = 748 gallons

**Account Summary**

Last Payment Received 08/08/2012	Thank You	-6433.37
SERVICE CHARGE FOR 2 " METER	=	82.85
Tier One (0-1020)	1020 CCFS X 3.74	= 3814.80
Tier Two (1021-1788)	241 CCFS X 7.48	= 1802.68
Tier Three (1789+)	0 CCFS	= 0.00

CURRENT CHARGES DUE BY 10/29/2012 5700.33

**TOTAL DUE \$5,700.33**  
 Thank you for conserving.