Multi-Hazard Mitigation Plan

6.1 Sacramento County Community Element
The purpose of this section is to discuss in more detail the hazards that affect the whole of Sacramento County. Based on the Hazard Identification and Vulnerability Assessment in sections 4-1 and 4-2 of this plan, flooding is the main concern for the County. This section focuses on the County’s floodplain management concerns and supercedes and in all ways replaces the 2001 County of Sacramento Floodplain Management Plan, originally adopted by the Board of Supervisors on September 16, 1997 (resolution 97-1112).

Sacramento County’s location within the northern portion of the alluvial trough of California’s Central Valley lends itself to serious flood problems from the American and Sacramento rivers and their tributaries. This section follows on to the historic flood problems listed in the Sacramento County Flood History section of this plan and provides a more detailed perspective of the watersheds, flood hazards and risks within the unincorporated areas of the County.

The total population of Sacramento County is 1,379,440, with 662,300 people in the incorporated portions. The County encompasses 955.01 square miles total, of which 813.25 square miles are unincorporated. The population density of the county 1,444 persons/square mile total and 804persons/sq mile in the unincorporated portions.

**TOTAL VALUES AT RISK FROM HAZARDS**

The total exposure of the building stock in unincorporated Sacramento County is represented in the table below. This gives a baseline as to what is exposed to large-scale events such as an earthquake. The assessor’s data does not include the values of infrastructure, government and church facilities, or the local economy, so it does not give a complete representation of county assets. Additionally, Assessed Values in California are lower than actual because they are frozen to only reflect the value at the time of the last sale.

<table>
<thead>
<tr>
<th>Type</th>
<th>Total Value</th>
<th>Land Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/3/4PLEX</td>
<td>$1,043,804,983</td>
<td>$ 311,074,014</td>
</tr>
<tr>
<td>COMMERCIAL/INDUSTRIAL</td>
<td>$6,314,076,111</td>
<td>$ 1,889,731,402</td>
</tr>
<tr>
<td>MULTI-FAMILY</td>
<td>$2,190,395,227</td>
<td>$ 391,349,321</td>
</tr>
<tr>
<td>SINGLE FAMILY</td>
<td>$24,849,643,520</td>
<td>$6,862,602,682</td>
</tr>
<tr>
<td>VACANT LAND/AG</td>
<td>$1,443,304,668</td>
<td>$1,263,908,429</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$35,841,224,509</td>
<td>$10,718,665,848</td>
</tr>
</tbody>
</table>

Source: Sacramento County Assessor’s Office, 9/10/2004

There are very few events that would destroy an entire community, so in any given disaster event, one could expect the damages to be less than the $35.8 Billion displayed. The Risk Assessment portion of this plan also supports the statement that the County does not face a catastrophic natural disaster. However, the risk varies within the County watersheds. Therefore, the following section takes a closer look at the County’s vulnerability to flooding.
FLOOD PROBLEM IDENTIFICATION

Sacramento County is vulnerable to four types of floods: localized street flooding, river flooding, levee overtopping/failure, and dam failure. Certain health hazards are common to all of these events. Standing water and wet materials in structures can become a breeding ground for microorganisms such as bacteria, mold, and viruses. This can cause disease, trigger allergic reactions, and damage materials long after the flood. When floodwaters contain sewage or decaying animal carcasses, infectious disease is of concern. Direct impacts such as drowning can be limited with adequate warning and public education about what to do during floods. Due to the large amount of population at risk, warning and evacuation will be paramount to reduce life and safety impacts with any of these types of flood events.

River Flooding. River flooding can result from either flash or slow rise flooding in any of the four stream groups that affect the City. Many areas in Sacramento are subject to sheetflow, which is broad shallow, overland flooding generally less than 2 feet deep and characterized by unpredictable flow paths. The warning time associated with slow rise floods will enable life and property protection. Flash floods, however, usually require immediate evacuation within the hour. Once flooding begins, personnel will be needed to assist in rescuing persons trapped by floodwaters, securing utilities, cordoning off flooded areas, and controlling traffic. This could overtax local response capabilities and require outside mutual aid.

The County of Sacramento Department of Water Resources has identified six "hot spot" areas along local creeks where out of bank flooding has caused damage to adjacent structures. These areas are: Lower Dry Creek, Lower Chicken and Strong Ranch Sloughs, Arcade Creek, the Cosumnes River, Morrison Creek near Highway 99, and the Beach-Stone Lakes area. To identify the likelihood of flooding in these areas detailed GIS and AUTOCAD mapping showing historical flooding, finished floor elevations, and depth of flooding during a ‘100-year’ storm have been created. Potential flood fight and sandbag locations are also shown on the maps. These maps are on file with the County Department of Water Resources.

Localized Street Flooding. This problem results from an increase in runoff from impervious surfaces associated with development and urbanization and inadequate storm drainage systems.

Levee Failure/Overtopping. Generally, levees fail due to overtopping or collapse due to seepage, subsidence, erosion, or any combination thereof. A catastrophic failure resulting from collapse can occur very quickly with relatively little warning. Levee failure usually occurs when the levee is saturated from high flows or there is an inherent defect in the levee. Floodwater will flow in a relatively shallow path and collect in low-lying areas.

Dam Failure. The remote possibility of dam failure flooding also exists from Folsom and Nimbus Dams. A catastrophic dam failure could easily overwhelm local response capabilities and require mass evacuations to save lives. Impacts to life safety will depend on the warning time available and the resources to notify and evacuate the public. Major loss of life could result and there would be associated health concerns as well as problems with the identification and burial of the deceased.
The Watershed System

There are five major watersheds within Sacramento County, each with their individual watercourses and respective flood zone areas (Source: County Floodplain Management Plan 2001). These include the following watersheds as further described in the following paragraphs:

- Sacramento River
- Dry Creek/Natoms East Main Drain
- Natural Stream Group & Tributaries
- Morrison Creek Stream Group
- Southern Portion of the County (Cosumnes River)

Sacramento River. The majority of Sacramento County drains ultimately to the Sacramento River, which defines the west border of the County and flows to the southwest. There are hundreds of structures that are located along the banks of the river; records indicate that many of these structures have experienced flooding during record storm events. There are 23 unmitigated repetitive loss structures that are located adjacent to the Sacramento River.
**Dry Creek/NEMDC & Tributaries.** Dry Creek and the Natomas East Main Drainage Canal (NEMDC, also known as Steelhead Creek) along with their tributaries are located within the northwestern portion of the County. Dry Creek drains to NEMDC, which drains to the American River, which drains to the Sacramento River. The major out-of-bank flooding problems within this drainage basin occur where the north and south branches of Dry Creek converge starts at the Placer/Sacramento County line and continues downstream to the NEMDC or Steelhead Creek. Dry Creek splits into two branches just downstream of Elverta Road and the area between the two branches does flood during almost any major storm. The island formed by the two branches is called Cherry Island and is about 4.5 miles long and averages from 0.25 to 0.5 miles wide. Many of the structures on Cherry Island have been removed or raised recently.

There are 22 unmitigated repetitive loss structures located within this drainage area.

Watercourses within this drainage area include:

- Dry Creek
- Basin "A"
- Magpie Creek
- Robla Creek
- Sierra Creek
- NEMDC (Steelhead Creek)
- NEMDC Tributary F
- NEMDC Tributary G
- NEMDC Tributary I
- Linda Creek & Tributaries

In 1911 the Reclamation District No. 1000 was created and approximately 43 miles of levees were constructed around approximately 55,000 acres. This area came to be known as the Natomas Basin. It is bounded on the west by the Sacramento River, on the north by the Natomas Cross Canal, on the east by the Pleasant Grove Creek and Natomas East Main Drainage Canals and on the south by the American and Sacramento Rivers.

**Natural Stream Group and Tributaries.** There is a group of 23 streams (not including tributaries) within the northeastern portion of the County that are commonly referred to as the natural stream group. The major collectors are Arcade Creek and the American River. Many of these creeks will not contain the 100-year flood event. There are limitations to the types of improvements allowed to these creeks due to their natural stream status with the County and other regulatory agencies. There are 42 unmitigated repetitive loss structures that are located within this drainage area.

Watercourses within this drainage area include:

- American River  •  Manlove Creek
- Arcade Creek  •  Kohler Creek
- Arcade Creek South Branch  •  Linda Creek
- Brooktree Creek  •  Buffalo Creek
- Mariposa Creek  •  Mayhew Slough
- Carmichael Creek  •  Minnesota Creek
- Chicken Ranch Slough  •  Strong Ranch Slough
- Cripple Creek  •  Sunrise Creek
- Diablo Creek  •  Verde Cruz Creek
- Fair Oaks Stream Group  •  Boyd Station Channel
- Alder Creek  •  Cordova/Coloma Stream Group
The American River drains a mountain watershed before it is dammed at Folsom Reservoir at the northeast corner of the county. Below Folsom Reservoir it flows through roughly 25 miles of mostly flat terrain until it joins the Sacramento River near downtown Sacramento. A worst-case scenario would be a large rain event on top of a heavy snowpack and saturated soils. The result would be the Probable Maximum Flood (PMF), which is considered to be a very large flood discharge that is highly unlikely to be exceeded. A USBR study calculated a three-day runoff PMF of 29.07 inches and a maximum three-day average flow of 485,000 cfs. This flow is assuming saturated soil for unfrozen ground and snow cover for frozen ground. Most experts agree that this would inundate most of the City of Sacramento and large portions of the County, approximately the size of the 400-year floodplain developed by the USACE. (Source: ‘Improving American River Flood Frequency Analyses’ Water Science and Technology Board, 1999)

**Morrison Creek Stream Group.** Morrison Creek is located within the mid-southern portion of the County. There are approximately eleven creeks that drain into Morrison Creek, where summer flows drain to the Sacramento River and flood flows can spill to the Mokelumne River. Because development in this area of the County has been fairly recent, many of the creeks are being constructed/improved as part of overall development projects. This has lead to many of the creeks providing adequate freeboard and 100-year flood protection. There are six unmitigated repetitive loss structures within this drainage area.

Watercourses within this drainage area include:
- Elder Creek
- Elk Grove Creek
- Florin Creek
- Gerber Creek
- Laguna Creek (& Tributary)
- Morrison Creek
- Strawberry Creek (all branches)
- Unionhouse Creek
- Whitehouse Creek

**Delta and Cosumnes River.** There are 10 unmitigated repetitive loss structures within this drainage area, which approximately comprises the entire southern region of the county and is bounded by the City of Sacramento and Grant Line Road to the north. The area is predominantly zoned AG-80, meaning agricultural use and 80-acre minimum parcels.

The Sacramento River Delta area is that portion of Sacramento County bounded on the east by the Western Pacific Railroad tracks, on the north by the southern city limits of the City of Sacramento, and on the south and west by the Sacramento County Boundary. Reclamation levees were constructed in the early 1860’s and the Army Corps of Engineers, the State Department of Water Resources and the Reclamation Districts have fortified these levees over the years.

The Cosumnes River originates in the Sierra Nevada foothills and flows through the southern part of Sacramento County. Major flooding has occurred due to levee breaches on the Cosumnes River with the latest occurring in January1997. Although predominantly zoned AG-80, this area also comprises many smaller residential parcels as well.

**Beach-Stone Lakes/Point Pleasant.** This region of Sacramento County is a low-lying area that receives flows from the Morrison Creek Stream Group. The area is bounded to the north and
south by the city limits of the City of Sacramento and Twin Cities Road respectively and to the west and east by the Sacramento River and Franklin Road.

FLOODPLAIN INVENTORY

MAP OF FLOODPLAINS OF UNINCORPORATED SACRAMENTO COUNTY
The following map and table identify the existing FIRM maps and effective dates for Sacramento County.

**SACRAMENTO COUNTY: NFIP COMMUNITY # 060262**

![Map of Sacramento County showing FIRM panels]

**FIRM PANEL INDEX**

<table>
<thead>
<tr>
<th>Effective Date</th>
<th>7/6/98</th>
<th>9/30/88</th>
<th>2/4/98</th>
</tr>
</thead>
<tbody>
<tr>
<td>10E</td>
<td>20E</td>
<td>30E</td>
<td>40E</td>
</tr>
<tr>
<td>35E</td>
<td>45E</td>
<td>55E</td>
<td>65E</td>
</tr>
<tr>
<td>70E</td>
<td>80E</td>
<td>90E</td>
<td>10E</td>
</tr>
<tr>
<td>105E</td>
<td>115E</td>
<td>125E</td>
<td>20E</td>
</tr>
<tr>
<td>180E</td>
<td>190E</td>
<td>195E</td>
<td>265E</td>
</tr>
<tr>
<td>210E</td>
<td>215E</td>
<td>220C</td>
<td>250C</td>
</tr>
<tr>
<td>255D</td>
<td>265D</td>
<td>295D</td>
<td>305D</td>
</tr>
<tr>
<td>310D</td>
<td>315D</td>
<td>320D</td>
<td>330D</td>
</tr>
<tr>
<td>335D</td>
<td>340D</td>
<td>345D</td>
<td>40D</td>
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<tr>
<td>400D</td>
<td>405D</td>
<td>410D</td>
<td>415D</td>
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<tr>
<td>420D</td>
<td>430D</td>
<td>440D</td>
<td>445D</td>
</tr>
<tr>
<td>505D</td>
<td>510D</td>
<td>515D</td>
<td>550D</td>
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<tr>
<td>555D</td>
<td>560C</td>
<td>570C</td>
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<td>620D</td>
</tr>
<tr>
<td>650C</td>
<td>655C</td>
<td>665C</td>
<td>680C</td>
</tr>
</tbody>
</table>

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NFIP Policies

NFIP Insurance data indicates that as of 2/29/04, there are 17,228 flood insurance policies in Sacramento County. There have been 1,442 claims and a total of $18,043,554 paid since the inception of the program. *Source: FEMA Region IX*

Structure Types and Values exposed to flood hazards

Community vulnerability can be quantified in those instances where there is a known, identified hazard area, such as a mapped floodplain. In these instances the numbers and types of buildings subject to the identified hazard can be counted and their values tabulated. Further, other information can be collected, such as the location of critical community facilities (e.g., a fire station), historic structures, and valued natural resources (e.g., an identified wetland or endangered species habitat) that are within the specific hazard area. Together, these values portray the impact, or *vulnerability*, of that area to that hazard.

The following methodology was used to model the exposure of values at risk to floods in Sacramento County. The best available data was used to quantify the exposure of people and the building stock located in flood zones. The County used GIS to overlay the 100-year floodplain boundary on the unincorporated parcels layer. The following table is a summary of all parcels that touched the 100 year floodplain.

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>PARCEL COUNT</th>
<th>STRUCTURES</th>
<th>DWELLING UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single family</td>
<td>14,265</td>
<td>14,265</td>
<td>14,265</td>
</tr>
<tr>
<td>Double family</td>
<td>830</td>
<td>830</td>
<td>1,660</td>
</tr>
<tr>
<td>Triple family</td>
<td>23</td>
<td>23</td>
<td>69</td>
</tr>
<tr>
<td>Quad family</td>
<td>133</td>
<td>133</td>
<td>532</td>
</tr>
<tr>
<td>5+ Residential</td>
<td>222</td>
<td></td>
<td>15,209</td>
</tr>
<tr>
<td>Mobile home parks</td>
<td>45</td>
<td>2941</td>
<td>2,941</td>
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<tr>
<td>Mobile homes</td>
<td>251</td>
<td>251</td>
<td>251</td>
</tr>
<tr>
<td>Misc. Residential</td>
<td>111</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ag-Residence</td>
<td>757</td>
<td>947</td>
<td>947</td>
</tr>
<tr>
<td>Ag-non-residence</td>
<td>618</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial</td>
<td>438</td>
<td>unknown</td>
<td></td>
</tr>
<tr>
<td>Industrial</td>
<td>392</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office</td>
<td>218</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal Care and Health</td>
<td>31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Church and Welfare</td>
<td>60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recreational</td>
<td>107</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vacant</td>
<td>1,108</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Misc.</td>
<td>292</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public/Utilities</td>
<td>1,316</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Schools</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>295</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td><strong>21,462</strong></td>
<td><strong>35,874</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Source: Sacramento County*
Floodplain Population Estimate. An estimated 93,990 people out of 627,000 in unincorporated Sacramento County live in the 100-year flood plain. This is based on multiplying the total dwelling unit’s value of 35,874 by an average population per residential unit of 2.62 persons recognized by the Chamber of Commerce.

Vulnerability Analysis Using HAZUS-MH Data

The following methodology was used to model the exposure of values at risk to floods in Sacramento County. The best available data was used to quantify the exposure of people and the building stock located in flood zones. Parcel level data was also available for the County, but due to the limitations with California’s Proposition 13, the assessed valuations would not accurately reflect housing values. Census block level data supplied with FEMA’s HAZUS-MH loss estimation tool was used instead. This data provides a detailed breakout of valuation of residential, commercial, industrial, agricultural, and public buildings and their contents by Census Block, as well as demographic information. The information had numerous categories that were too detailed for this scale of analysis. More general categories were created and summarized using the classification below:

**HAZUS-MH Occupancy Class Reclassification**

<table>
<thead>
<tr>
<th>Residential</th>
<th>Commercial</th>
<th>Industrial</th>
<th>Public</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-Family Dwelling</td>
<td>Retail Trade</td>
<td>Heavy</td>
<td>Non-Profit Religious</td>
</tr>
<tr>
<td>Multi-Family Dwelling</td>
<td>Wholesale Trade</td>
<td>Light</td>
<td>Institute</td>
</tr>
<tr>
<td>Mobile Home</td>
<td>Personal and Repair Service</td>
<td>Food/Drugs/Chemicals</td>
<td>General Service (Government)</td>
</tr>
<tr>
<td>Temporary Lodging</td>
<td>Professional/Technical Service</td>
<td>Metals/Minerals</td>
<td>Emergency Response (Government)</td>
</tr>
<tr>
<td>Institutional Dormitory</td>
<td>Bank</td>
<td>Processing</td>
<td>School/University</td>
</tr>
<tr>
<td>Nursing Home</td>
<td>Hospital</td>
<td>High Technology</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medical Office/Clinic</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Entertainment &amp; Recreation</td>
<td>Agriculture</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Theater</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parking</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Floodplain Data Analysis. Flood exposure for the City of Sacramento was analyzed by the Morrison and Magpie Creek Floodplains and American/Sacramento River Floodplain. The county has developed a composite digital version of the FIRM from individual scanned FIRM maps. This was the best available data and was used as the flood overlay for the purposes of this analysis. Sacramento County has several different flood zones including some that attempt to account for the existence of levees, such as the A99 zone. These zones and descriptions are listed in below. Exposure was aggregated by these zones as well as Stream Groups to refine the analysis.
FEMA Flood Zones within Sacramento County

<table>
<thead>
<tr>
<th>ZONE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>No base flood elevations determined.</td>
</tr>
<tr>
<td>AE</td>
<td>Base flood elevations determined.</td>
</tr>
<tr>
<td>AH</td>
<td>Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.</td>
</tr>
<tr>
<td>AO</td>
<td>Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding; velocities also determined.</td>
</tr>
<tr>
<td>A99</td>
<td>Area of special flood hazard where enough progress has been made on a protective system, such as dikes, dams, and levees, to consider it complete for insurance purposes.</td>
</tr>
<tr>
<td>A99/AE</td>
<td>This area subject to flooding from two sources.</td>
</tr>
</tbody>
</table>

Tables that summarized the number, structure and content values for each occupancy class (Residential, Commercial, Industrial, Public) categories were and linked to the Census Blocks layer in the GIS. Data discrepancies across HAZUS-MH data tables were found during the analysis. These include structure counts of zero in some blocks where there are building and content values for commercial and industrial buildings. No attempt was made to adjust what was the best available data. The floodplains were overlaid on the Census Blocks using a GIS analysis function called “union”. This merges the two layers into one layer and retains the fields from both layers.

A proportional division methodology was used to account for values in blocks that were either partially covered by the flood zone polygon or was split between two different flood zones. This method assumes an equal distribution of a particular value across the block. For example let’s assume a hypothetical Census Block was split by the floodplain and 50% of the block is in the floodplain. The structure and population values associated with that block would be multiplied by the portion of the block in and out of the floodplain. Assuming the block contained 20 people then the model would calculate 10 persons in the floodplain, and 10 outside the floodplain. The size and shape of the Census Block affects the accuracy of this model. The larger and more irregular the Census Block, typically found in rural areas, the less accurate this method becomes. Since Sacramento is largely urbanized with small Census Block areas, we feel this method to be reasonable accurate. Other limitations of this model are the inaccuracies inherent to the HAZUS-MH data. The results of this analysis are general and inaccuracies may exist.
FLOODPLAIN AREA AND POPULATION TABLE
(Unincorporated Area Summary)

<table>
<thead>
<tr>
<th>Flood Plain</th>
<th>Residential Count</th>
<th>Population</th>
<th>Area Sq Mi</th>
<th>Area Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1,141</td>
<td>2,950</td>
<td>114.5</td>
<td>73,281</td>
</tr>
<tr>
<td>AE</td>
<td>4,505</td>
<td>14,052</td>
<td>109.2</td>
<td>69,878</td>
</tr>
<tr>
<td>AH</td>
<td>1</td>
<td>6</td>
<td>0.0</td>
<td>1</td>
</tr>
<tr>
<td>AO</td>
<td>839</td>
<td>2,700</td>
<td>1.7</td>
<td>1,066</td>
</tr>
<tr>
<td>A99</td>
<td>10,252</td>
<td>42,198</td>
<td>8.00</td>
<td>5,097</td>
</tr>
<tr>
<td>A99/AE</td>
<td>357</td>
<td>3,000</td>
<td>0.2</td>
<td>135</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td><strong>17,095</strong></td>
<td><strong>64,905</strong></td>
<td><strong>233.5</strong></td>
<td><strong>149,458</strong></td>
</tr>
</tbody>
</table>

Data Source HAZUS-MH Census Block level, Floodplains - County of Sacramento

Estimating Potential Losses

The result of the exposure analysis summarizes the values at risk in the floodplain. When a flood occurs seldom does the event cause total destruction of an area. Potential losses from flooding are related to a variety of factors including flood depth, flood velocity, building type and construction. Based on FIA flood damage data the percent of damage is directly related to the flood depth. FEMA’s flood benefit/cost module uses this simplified approach to model flood damage based on building type and flood depth. While there are several limitations to this model, it does present a methodology to estimate potential damages.

One of the limitations to using this approach for Sacramento is the lack of Base Flood Elevations (BFE’s) in a digital format. A damage estimation of 20 percent of the total value was used based on FEMA FIA Depth-Damage Data based assumption of damage of at least 22 percent of the value of the structure and 20 percent of the contents value to a one-story structure with no basement flooded to two feet.

The results of the floodplain population modeling for the unincorporated County is depicted the following table.
Vulnerabilities and Repetitive Losses by Stream Group

The following table shows the number of repetitive losses by the five major watersheds located within Sacramento County. Sacramento County maintains a database of these repetitive loss locations.

<table>
<thead>
<tr>
<th>Watershed</th>
<th># of Repetitive Losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sacramento River</td>
<td>23 Structures</td>
</tr>
<tr>
<td>Dry Creek/NEMDC &amp; Tributaries</td>
<td>22 Structures</td>
</tr>
<tr>
<td>Natural Stream Group &amp; Tributaries</td>
<td>42 Structures</td>
</tr>
<tr>
<td>Morrison Creek Stream Group</td>
<td>6 Structures</td>
</tr>
<tr>
<td>Southern Portion of the County (Cosumnes River)</td>
<td>10 Structures</td>
</tr>
</tbody>
</table>

Source: County Floodplain Management Plan 2001
Sacramento River. For the purposes of this report, Sacramento River includes properties on the river or levee bank and on the Delta Islands. The repetitive loss properties are located adjacent to either the Sacramento River, or a watercourse (slough) that drains directly to the river. Many of the repetitive loss properties are along the Garden Highway, which is a levee road that runs along the Sacramento River north of Sacramento. Typically, these repetitive loss structures were built many years ago and are situated on the "wet side" of the levee road. Some of these properties have finished floors above the base flood elevation and had claims based on damage other than into the main living areas. There are also repetitive loss properties located on two islands in the Sacramento River Delta near the City of Isleton.
Dry Creek/NEMDC & Tributaries. Dry Creek, fed by several tributaries from a total shed area of 116 square miles, experiences flooding problems in even moderate rainfall events. Dry Creek Tributaries include Basin “A” and “B” as identified in the Antelope Drainage Study, Magpie
Creek, Sierra Creek and Robla Creek. These areas are either currently urbanized or planned for development in the future.

There are two branches of Dry Creek with a designated federal floodway located in-between. The County of Sacramento Department of Water Resources is in the process of acquiring and removing structures located within the floodway due to recurrent flooding. To date, 20 of the structures have
been removed. More mitigation measures will be required in the surrounding area as well since a large volume of overbank storage occurs outside the floodway.

The Natomas East Main Drain Canal (NEMDC) is a drainage channel conveying flows from neighboring Sutter County down to the upper Sacramento River. Within Sacramento County, tributaries for the NEMDC are a collection of narrow ditches located north and west of Rio Linda in a largely agricultural area. Although the tributaries are narrow ditches under normal conditions, they are effected by backwater from the NEMDC in peak flow events and have quite broad floodplains associated with them. The NEMDC pump station was installed to lower water surface elevations by reducing this backwater effect. In 1998, the flood insurance rate maps were revised to reflect the lowered water surface elevations due to the installation of the pump station.

An estimated 5,810 people live in the various A Zones based on HAZUS-MH block level data. The following table details the number, types and values of structures located in the floodplain of the Dry Creek/NEMDC Stream Group.

### FLOODPLAIN VALUES AND DAMAGE ESTIMATION – DRY CREEK/NEMDC GROUP

<table>
<thead>
<tr>
<th>Structure Type by Various A Flood Zones (A, AE, AO)*</th>
<th>Number of Structures</th>
<th>Structure and Contents Total Value</th>
<th>20% of Total Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Total</td>
<td>1,764</td>
<td>$378,099,000</td>
<td>$75,619,800</td>
</tr>
<tr>
<td>Commercial Total</td>
<td>23</td>
<td>$86,824,000</td>
<td>$17,364,800</td>
</tr>
<tr>
<td>Industrial Total</td>
<td>4</td>
<td>$25,669,000</td>
<td>$5,133,800</td>
</tr>
<tr>
<td>Public Total</td>
<td>1</td>
<td>$6,129,000</td>
<td>$1,225,800</td>
</tr>
<tr>
<td>Grand Total</td>
<td>1,792</td>
<td>$496,721,000</td>
<td>$99,344,200</td>
</tr>
</tbody>
</table>

Data Source HAZUS-MH Census Block level, Floodplains - County of Sacramento

*No A-99 in this stream group

**Natural Stream Group and Tributaries.** This includes most of north Sacramento County. Most of this area is completely developed, with houses built many years ago before current FEMA and County regulations. During large storm events, some of these watercourses experience out of bank flows. Flooding can occur, in peak storm events, due to over-bank flows, overland surface water flows, or overwhelmed piped storm drain systems.

An estimated 36,993 people live in the various A Zones based on HAZUS-MH block level data. Out of that total an estimated 31,799 live in the A99 zone. The following table details the number, types and values of structures located in the floodplain of the Natural Stream Group and Tributaries.
Local Floodplain Management Plan - Natural Streams Group

- FEMA 100-year floodplain
- Fire Station
- Hospital
- Repetitive loss property
- Mitigation action taken
- City/County Emergency Operations Center
## Floodplain Values and Damage Estimation – Natural Streams Group

<table>
<thead>
<tr>
<th>Structure Type by Flood Zone</th>
<th>Number of Structures</th>
<th>Structure and Contents Total Value</th>
<th>20% of Total Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A (various)</td>
<td>1,797</td>
<td>$477,643,000</td>
<td>$95,528,600</td>
</tr>
<tr>
<td>A99</td>
<td>8,199</td>
<td>$2,759,697,000</td>
<td>$551,939,400</td>
</tr>
<tr>
<td><strong>Residential Total</strong></td>
<td><strong>9,996</strong></td>
<td><strong>$3,237,340,000</strong></td>
<td><strong>$647,468,000</strong></td>
</tr>
<tr>
<td>Commercial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A (various)</td>
<td>21</td>
<td>$77,161,000</td>
<td>$15,432,200</td>
</tr>
<tr>
<td>A99</td>
<td>165</td>
<td>$679,630,000</td>
<td>$135,926,000</td>
</tr>
<tr>
<td><strong>Commercial Total</strong></td>
<td><strong>186</strong></td>
<td><strong>$756,791,000</strong></td>
<td><strong>$151,358,200</strong></td>
</tr>
<tr>
<td>Industrial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A (various)</td>
<td>1</td>
<td>$8,445,000</td>
<td>$1,689,000</td>
</tr>
<tr>
<td>A99</td>
<td>3</td>
<td>$40,376,000</td>
<td>$8,075,200</td>
</tr>
<tr>
<td><strong>Industrial Total</strong></td>
<td><strong>4</strong></td>
<td><strong>$48,822,000</strong></td>
<td><strong>$9,764,400</strong></td>
</tr>
<tr>
<td>Public</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A (various)</td>
<td>3</td>
<td>$14,685,000</td>
<td>$2,937,000</td>
</tr>
<tr>
<td>A99</td>
<td>10</td>
<td>$61,596,000</td>
<td>$12,319,200</td>
</tr>
<tr>
<td><strong>Public Total</strong></td>
<td><strong>13</strong></td>
<td><strong>$76,280,000</strong></td>
<td><strong>$15,256,000</strong></td>
</tr>
<tr>
<td><strong>Total of each Total</strong></td>
<td><strong>10,199</strong></td>
<td><strong>$4,119,233,000</strong></td>
<td><strong>$823,846,600</strong></td>
</tr>
</tbody>
</table>

*Data Source HAZUS-MH Census Block level, Floodplains - County of Sacramento*

**Morrison Creek Stream Group.** The Morrison Creek watershed consists of both urbanized and agricultural areas. The urbanized areas have been developed with piped storm water conveyance, pump stations, and concrete lined channels. Much of this development occurred many years ago, prior to current floodplain management policies. In the agricultural areas, the drainage is by roadside ditches and the channels are unimproved. The Morrison Creek Stream Group discharges into Beach Stone Lakes flowing southwest to the Delta.

An estimated 16,191 people live in the various A Zones based on HAZUS-MH block level data. Out of that total an estimated 13,354 live in the A99 zone. The following table details the number, types and values of structures located in the floodplain of the Natural Stream Group and Tributaries.
Delta and Cosumnes River. All drainage from Sacramento County, as well as outflow from most of the rivers of the Central Valley, ultimately flows to the Delta and then the Pacific Ocean. In the early 1860’s, extensive levees were constructed there in order to reclaim large areas for agricultural uses. The Army Corps of Engineers, the State Department of Water Resources and the Reclamation Districts have fortified these levees over the years. The effect of this reclamation activity has been to remove precious floodplain volume needed to contain the rising rivers and backwater caused by high tides in the Pacific Ocean.

There is a stream gage at Michigan Bar, near Rancho Murieta, in the Cosumnes River that has been in place for many decades. The data generated from this gage provides reasonable flood forecasting capabilities; however, if there were a stream and rain gage higher up the watershed it is likely that better flood warning could be provided to the property owners in the Cosumnes River floodplain.
Beach-Stone Lakes and Point Pleasant. This area lies within the 100-year floodplain and is a recipient of all the drainage for the south county streams. Problems are exacerbated when the Cosumnes River floods. All watercourses within the Morrison Creek Stream Group flow into the City of Sacramento outfalling to Beach Stone Lakes and ultimately to the Sacramento River Delta.

Point Pleasant, Glanville Tract, and Interstate 5 rely upon a railroad (WPRR) grade to function as their upstream levee, and that embankment (which was not constructed to levee standards) failed in both 1986 and 1997. The County is working with State Department of Water Resources (DWR) staff to formulate a project that upgrades existing RD 1002 levees, that improves the function of the WPRR grade pursuant to levee standards, and to evaluate alternatives for protecting the area from south-to-north flows. Finally, there is an effort to examine means of reducing flood hazard upstream of the WPRR.

For the past several years, a developer fee has been collected to mitigate volume impacts to the Beach-Stone Lake and Point Pleasant areas. All of Zone 11A (drainage developer impact fees
for the greater Morrison Creek Streams Group) contributes to the Interstate 5 / Point Pleasant Flood Protection Project in the amount of $220.00 per acre (in 2003 dollars). Additionally, fees have been collected from Lakeside/Laguna and Elliott Ranch South Developments as compensation for impacts. Furthermore, developers encroaching into the floodplain have paid additional impact fees. These funds are to be held in reserve for contribution toward a flood damage reduction project that will be formulated by California Department of Water Resources as it advances the CALFED North Delta program in coordination with flood control elements at Lambert Road and Point Pleasant.

An estimated 5,874 people live in the various A Zones based on HAZUS-MH block level data. Out of that total an estimated 43 live in the A99 zone. The following table details the number, types and values of structures located in the floodplain of the Delta and Cosumnes River Stream Group.

### FLOODPLAIN VALUES AND DAMAGE ESTIMATION – DELTA AND COSUMNES RIVER GROUP

<table>
<thead>
<tr>
<th>Structure Type by Flood Zone</th>
<th>Number of Structures</th>
<th>Structure and Contents Total Value</th>
<th>20% of Total Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A (various)</td>
<td>2,017</td>
<td>$408,265,000</td>
<td>$81,653,000</td>
</tr>
<tr>
<td>A99</td>
<td>24</td>
<td>$4,610,000</td>
<td>$922,000</td>
</tr>
<tr>
<td>Residential Total</td>
<td>2,041</td>
<td>$412,874,000</td>
<td>$82,574,800</td>
</tr>
<tr>
<td>Commercial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A (various)</td>
<td>9</td>
<td>$47,159,000</td>
<td>$9,431,800</td>
</tr>
<tr>
<td>A99</td>
<td>1</td>
<td>$2,752,000</td>
<td>$550,400</td>
</tr>
<tr>
<td>Commercial Total</td>
<td>10</td>
<td>$49,911,000</td>
<td>$9,982,200</td>
</tr>
<tr>
<td>Industrial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A (various)</td>
<td>3</td>
<td>$40,647,000</td>
<td>$8,129,400</td>
</tr>
<tr>
<td>A99</td>
<td>1</td>
<td>$346,000</td>
<td>$69,200</td>
</tr>
<tr>
<td>Industrial Total</td>
<td>4</td>
<td>$40,993,000</td>
<td>$8,198,600</td>
</tr>
<tr>
<td>Public</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A (various)</td>
<td>1</td>
<td>$5,718,000</td>
<td>$1,143,600</td>
</tr>
<tr>
<td>A99</td>
<td>0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Public Total</td>
<td>1</td>
<td>$5,718,000</td>
<td>$1,143,600</td>
</tr>
<tr>
<td>Total of each Total</td>
<td>2,056</td>
<td>$509,496,000</td>
<td>$101,899,200</td>
</tr>
</tbody>
</table>

Data Source HAZUS-MH Census Block level, Floodplains - County of Sacramento

### Critical Facilities Inventory and Impacts

Critical Facilities are defined as any property that, if flooded, would result in severe consequences to public health and safety. Facilities in Sacramento that met this definition within existing data sources included schools, hospitals, fire departments, police stations, and utilities such as above ground water storage reservoirs and water treatment plants. HAZUS-MH
supplemented this data with EOC locations, wastewater treatment plants, and electrical power substations.

The following is a summary list of critical facilities at risk to flooding by flood zone for the aggregate County FIRM. The locations are not displayed on maps in this plan due to the sensitive nature of these facilities and the challenge of mapping them at scales appropriate to this plan. The facility locations are accessible to County staff through their GIS capabilities for further details and analysis.

The following is a summary list of critical facilities at risk to flooding by flood zone for the all 100-year floodplains in the County, excluding the City of Sacramento. The locations are not displayed on maps in this plan due to the sensitive nature of these facilities and the challenge of mapping them at scales appropriate to this plan. The facility locations are accessible to County staff through their GIS capabilities for further details and analysis.

### SACRAMENTO COUNTY CRITICAL FACILITY SUMMARY BY FLOOD ZONE – EXCLUDING THE CITY OF SACRAMENTO

<table>
<thead>
<tr>
<th>FACILITY TYPE</th>
<th>A99</th>
<th>AE</th>
<th>AO</th>
<th>A</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire Department</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Police Department</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Hospitals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schools</td>
<td>17</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>22</td>
</tr>
<tr>
<td>Sewer Pump Stations</td>
<td>8</td>
<td>11</td>
<td>2</td>
<td>2</td>
<td>23</td>
</tr>
</tbody>
</table>

Source data: County GIS

### HISTORIC SITES INVENTORY

The following structures and districts are listed in the National Register of Historic Places for Sacramento County.

**Alta Mesa Farm Bureau Hall** (added 1987 - Building - #86003577)
Also known as **Alta Mesa Hall; Alta Mesa Community Center Hall**
10195 Alta Mesa Rd., Wilton

**Imperial Theatre** (added 1982 - Building - #82000980)
Also known as **Grove Theatre**
Market St., Walnut Grove

**Rosebud Ranch** (added 1979 - Building - #79000521)
Also known as **Rosebud Farm**
N of Hood, Hood

**Runyon House** (added 2000 - Building - #00001193)
Also known as **Alchorn Residence**
12865 River Rd., Courtland
**NATURAL RESOURCES INVENTORY**

The California Natural Diversity Database contains all known occurrences of rare plants and animals, and terrestrial and aquatic communities. This includes all federally and state listed plants and animals, all species that are candidates for listing, all species of special concern, and those species that are considered "sensitive" by government agencies and the conservation community. This database includes 54 ecologically sensitive plant or animal communities within the city limits of Sacramento.

**Natural and Beneficial Functions**

The areas in the following table are within the Sacramento County floodplain which are in an undeveloped state, have been restored to a natural state, or protect natural and beneficial floodplain functions. These areas are protected in their natural state by the City Council adoption of various Park Master Plans, Community Plans, and County General Plan. The 23 mile-long American River Parkway lies along the American River within the Sacramento County. The Parkway is managed according to the American River Parkway Plan, which was
adopted by Sacramento City Council, the Sacramento County Board of Supervisors, and the California State Legislature in 1985. The Parkway Plan is written to ensure preservation of the natural environment while providing limited developments to facilitate human enjoyment of the Parkway.

Based on GIS analysis of point locations the following parks and natural areas are in floodplains within unincorporated Sacramento County:

<table>
<thead>
<tr>
<th>Landmark Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>American River Parkway</td>
</tr>
<tr>
<td>Ancil Hoffman Park</td>
</tr>
<tr>
<td>Arcade Creek Nature Area</td>
</tr>
<tr>
<td>Ashton Park</td>
</tr>
<tr>
<td>Bowling Green Park</td>
</tr>
<tr>
<td>Central (Rio Linda) Park</td>
</tr>
<tr>
<td>Charles C Jensen Botanical Park</td>
</tr>
<tr>
<td>Cosumnes River Parkway</td>
</tr>
<tr>
<td>Creekside Park</td>
</tr>
<tr>
<td>Del Paso Park</td>
</tr>
<tr>
<td>Depot Park</td>
</tr>
<tr>
<td>Dry Creek Parkway</td>
</tr>
<tr>
<td>Elkhorn Boat Access</td>
</tr>
<tr>
<td>Florin Creek Park</td>
</tr>
<tr>
<td>Fountain Plaza Park</td>
</tr>
<tr>
<td>Gibson Ranch Co Park</td>
</tr>
<tr>
<td>Howe Park</td>
</tr>
<tr>
<td>Larchmont Community Park</td>
</tr>
<tr>
<td>Larchmont Park</td>
</tr>
<tr>
<td>Linda Creek Park</td>
</tr>
<tr>
<td>Manlove Park</td>
</tr>
<tr>
<td>Mather Regional Park</td>
</tr>
<tr>
<td>Mission North Park</td>
</tr>
<tr>
<td>Nicholas Park</td>
</tr>
<tr>
<td>Northbrook Park</td>
</tr>
<tr>
<td>Oak Meadow Park</td>
</tr>
<tr>
<td>Park Oaks Park</td>
</tr>
<tr>
<td>Ponderosa Farm Community Park</td>
</tr>
<tr>
<td>Sand Cove Park</td>
</tr>
<tr>
<td>Sandy Beach Park</td>
</tr>
<tr>
<td>Santa Anita Park</td>
</tr>
<tr>
<td>Sheldon Park</td>
</tr>
<tr>
<td>Stone Lakes National Wildlife Refuge</td>
</tr>
<tr>
<td>Swanston Park</td>
</tr>
</tbody>
</table>
EXISTING MITIGATION CAPABILITIES

Similar to the HMPC’s effort to describe hazards, risks and vulnerability where they differ across the planning area, this mitigation capability assessment describes the policies and procedures and plans that apply to Sacramento County. This is the next step prior to forming Goals and Objectives for improving the County’s ability to reduce the impacts of these risks. This step coordinates this planning process with existing plans and procedures and inventories what is already “on the books” in terms of mitigation.

The HMPC took two approaches in conducting this assessment for the County. First, an inventory of common mitigation activities was made through the use of a matrix. The purpose for this effort was to identify activities and actions that were either in place, needed improvement, or could be undertaken, if deemed appropriate. Second, the HMPC conducted an inventory of existing policies, regulations and plans was made. These documents were collected and reviewed to determine if they contributed to reducing hazard related losses, or if they inadvertently contributed to increasing such losses.

The following matrix examines summarizes the results of the mitigation capability assessment. Excerpts from applicable plans, rules and regulations follows that provide more detail on the existing policies related to hazard mitigation, and highlight where Sacramento County has made efforts above and beyond the standard floodplain management requirements of the NFIP.
<table>
<thead>
<tr>
<th>Capability</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comp Plan/General Plan</td>
<td>Y</td>
</tr>
<tr>
<td>Land Use Plan</td>
<td>Y</td>
</tr>
<tr>
<td>Subdivision Ord</td>
<td>Y</td>
</tr>
<tr>
<td>Zoning Ordinance</td>
<td>Y</td>
</tr>
<tr>
<td>NFIP/FPM Ordinance</td>
<td>Y</td>
</tr>
<tr>
<td>- Substantial Damage language?</td>
<td>Y</td>
</tr>
<tr>
<td>- Certified Floodplain Manager?</td>
<td>Y</td>
</tr>
<tr>
<td>- # of Floodprone Buildings?</td>
<td>17,369</td>
</tr>
<tr>
<td>- # of NFIP policies</td>
<td>17,228</td>
</tr>
<tr>
<td>- Maintain Elevation Certificates?</td>
<td>Y</td>
</tr>
<tr>
<td>- # of Repetitive Losses?</td>
<td>128</td>
</tr>
<tr>
<td>CRS Rating, if applicable</td>
<td>5</td>
</tr>
<tr>
<td>Stormwater Program?</td>
<td>Y</td>
</tr>
<tr>
<td>Building Code Version</td>
<td>UBC 1997</td>
</tr>
<tr>
<td>Full-time Building Official</td>
<td>Y</td>
</tr>
<tr>
<td>- Conduct &quot;as-built&quot; Inspections?</td>
<td>Y</td>
</tr>
<tr>
<td>BCEGS Rating</td>
<td>?</td>
</tr>
<tr>
<td>Local Emergency Operations Plan</td>
<td>Y</td>
</tr>
<tr>
<td>Hazard Mitigation Plan</td>
<td>Y</td>
</tr>
<tr>
<td>Warning System in Place?</td>
<td>N</td>
</tr>
<tr>
<td>- Storm Ready Certified?</td>
<td>N</td>
</tr>
<tr>
<td>- Weather Radio reception?</td>
<td>Y</td>
</tr>
<tr>
<td>- Outdoor Warning Sirens?</td>
<td>?</td>
</tr>
<tr>
<td>- Emergency Notification (R-911)?</td>
<td>N</td>
</tr>
<tr>
<td>- Other? (e.g., cable over-ride)</td>
<td>Y</td>
</tr>
<tr>
<td>GIS System?</td>
<td>Y</td>
</tr>
<tr>
<td>- Hazard Data?</td>
<td>Y</td>
</tr>
<tr>
<td>- Building footprints?</td>
<td>N</td>
</tr>
<tr>
<td>- Tied to Assessor data?</td>
<td>Y</td>
</tr>
<tr>
<td>- Land-Use designations?</td>
<td>Y</td>
</tr>
<tr>
<td>Structural Protection Projects</td>
<td>Y-Levees/Dams</td>
</tr>
<tr>
<td>Property Owner Protection Projects</td>
<td>Y-Acq/El.</td>
</tr>
<tr>
<td>Critical Facilities Protected?</td>
<td>Y-Levees</td>
</tr>
<tr>
<td>Natural Resources Inventory?</td>
<td>Y-aggregates, mining, soil, prime farmlands</td>
</tr>
<tr>
<td>Cultural Resources Inventory?</td>
<td>Inventories for specific planning areas</td>
</tr>
<tr>
<td>Erosion Control procedures?</td>
<td>Y</td>
</tr>
<tr>
<td>Sediment Control procedures?</td>
<td>Y</td>
</tr>
<tr>
<td>Public Information Program/Outlet</td>
<td>Y</td>
</tr>
<tr>
<td>Environmental Education Program?</td>
<td>Y</td>
</tr>
</tbody>
</table>
Sacramento County relies upon several documents to enforce floodplain regulations. Below is a list of these documents, along with a brief summarization of the document contents, and when the document was adopted.

**Sacramento County General Plan, Adopted 12/15/93, Revised 5/2/97: (Update currently underway)**

- The General Plan is considered a county "constitution" for rational decision-making concerning long-term physical development. The plan recognizes that environmental impacts of growth must be mitigated at the regional scale. The plan also recognizes natural hazards as a constraint to growth.

- The Land Use Element provides a broad outline of future land use patterns in the unincorporated county and illustrates the existing and potential open space, agricultural, conservation, and recreational land uses of the county. This Element provides an inventory of existing land supply and recognizes hazard-related constraints to future development. For example, it states that approximately 23,800 acres of the County are identified as vacant residential land; however, 4,900 acres are considered not developable because they reside within flood zones, airport noise contours, or aggregate resource areas. The Rural Growth Management Strategy section states that all growth of the Delta communities of Freeport, Hood, Courtland, Locke, and Walnut Grove should occur within the limitations of sewage disposal facilities and flood protection. The Delta Community Area Plan, which is incorporated by reference into the Community Planning Element of this General Plan, provides further guidance for the expansion of the Delta area towns. Further, Combining Land Use designations have been established to recognize the underlying zoning as the guide to land uses which are permitted on any particular piece of property. This approach preserves selected natural resources without imposing unnecessary restrictions on the use of the land.

- The Conservation Element discusses policies associated with managing water, mineral, soil, biological, and cultural resources. Erosion control and urban runoff policies are provided. Claims oxidation is the primary contributing factor to subsidence of Delta croplands and has the potential, to significantly alter agricultural production. Includes policies to discourage storage of hazardous materials in areas where they could potentially contaminate water resources (e.g., within 100-year floodplain). Identifies 25,000 acres of riparian habitat existing in the Sacramento River Valley today. Recognizes that increasing development greatly effects the Cosumnes River and its associated unique resources. Plan suggests that the County should reestablish jurisdiction (currently under the State Reclamation Board) over encroachments in the Cosumnes River floodplain and regulate so as to minimize impacts on the riparian corridor. One objective within the Vegetation and Wildlife section is to stabilize river banks to protect levees and riparian values. Another objective is to preserve the natural 100-year floodplain by minimizing fill; policy gives specific circumstances where fill may be used. The Cultural Resources section discusses the need for County-wide comprehensive knowledge of archeologic and historic site locations. The Cultural section could be
strengthened by compiling a County-wide, up to date cultural resources inventory, and also implement policies to protect historic resources in the event of floods and other hazards, where possible.

- The Hazardous Materials Element mentions how the floods of 1986 and 1995 resulted in the spread of hazardous materials, such as zinc-contaminated ash, over a wide area. Due to such incidents, this element recognizes the need to restrict and improve storage standards for hazardous materials.

- The Housing Element contains a Flood Control and Drainage section, which refers to Ordinance No. 1 of the County Water Agency as the principal policy tool for insuring flood protection through construction of drainage facilities. The ordinance prescribes collection of drainage fees when land is developed. Mentions the Sacramento Metropolitan Flood Protection Task Force, created in 1989, to oversee efforts in the development of flood control policy and protection. A three-phase strategy established by the Task Force includes stabilization of the levees; achievement of a 100-year levels of flood protection; and achievement of a 200-year level of flood protection.

- The Open Space Element also discusses the importance of retaining floodplains as open space areas. The first policy of the element is to, “permanently protect, as open space, areas of natural resource value, including wetlands preserves, riparian corridors, woodlands, and floodplains.”

- The Public Facilities Element emphasizes fire protection and emergency services within the County. Main objectives are implementation of fire and emergency safety measures into all neighborhood and building design, and adequate funding for new fire protection facilities, equipment, and personnel.

- The Safety Element focuses on policies related to seismic events, flooding, and fires. One of the implementation measures for the seismic and geological hazard goal is, that the County shall designate generalized areas subject to seismic and geological hazards. The second implementation measure calls for drafting an ordinance to establish a program for the removal or strengthening of poorly anchored parapets on existing buildings. A few of the flood policies are stated below:

  - SA-6. The County will participate through the Sacramento Area Flood Control Agency in obtaining federal authorization for construction of a backbone flood control project along the Sacramento and American Rivers and the immediate connection of local internal streams to these rivers. The backbone project should provide 200-year flood protection.
  - SA-7. New and modified bridge structures shall not cause and increase in water surface elevations of the 100-year floodplain exceeding one foot, unless analysis clearly indicates that the physical and/or economic use of upstream property will not be adversely affected.
o SA-12. The County shall require all new urban development projects to incorporate runoff control measures to minimize peak flows of runoff and/or assist in financing or otherwise implementing Comprehensive Drainage Plans.

o SA-15. Deny creation of parcels that do not have buildable areas outside the 100-year floodplain. The buildable area may be constructed by the placement of fill as long as it conforms with other adopted floodplain policies.

o SA-17. Vehicular access to the buildable area of newly created parcels must be at or above the 10-year flood elevation. Exceptions may be made when the existing public street from which access is obtained is below the 10-year flood elevation.

o If levee construction is approved to reclaim floodplain for new development then 200-year flood protection is required.

**Zoning Code, 3/03**

- The Zoning Code is the tool to achieve the objectives of the General Plan. It addresses setbacks, buffers, natural resources protection, and drainage. For example, the Parkway Corridor Combining Zone has been established to regulate property along the American River. This zone contains defined erosion zones with development setbacks identifying areas potentially subject to erosion within the next 100 years. Development standards have been created for buildings within erosion zones, for buildings protected by levees, and for buildings not protected by levees.

- The Flood Combining Land Use Zone comprises all land covered by rivers, creeks, and streams and land subject to flooding. Recognizes the need for strict regulation of flood lands in order to protect prospective buyers of land from “deception as to the utility of the land within flood zones”.

**Local Floodplain Management Plan, Adopted 9/16/97, Revised 2001, and updated and replaced herein.**

**County of Sacramento Development Policies**

**General Plan and Community Plan Policies** - The recently adopted County General Plan (County of Sacramento Department of Planning and Community Development, *General Plan: Planning for the 21st Century*, December 15, 1993) includes a comprehensive set of policies stressing flood hazard avoidance and mitigation in the planning and approval of new development. Policies applicable to drainage and flood control planning are included in the Safety Element, Conservation Element, and Open Space Element.

**Drainage Ordinance** - On November 23, 1993 (effective December 23, 1993), the Board of Supervisors adopted *Ordinance No. SCZ 93-0061, An Ordinance Adding Title IX to the Sacramento County Zoning Code Relating to Floodplain Management*. Title IX updated County floodplain management standards, construction standards in floodplain areas, and permit and mapping requirements relating to the National Flood Insurance Program.
Sacramento County Water Agency Code and Drainage Impact Fee – The Zone 11 Fee Plan and updated Water Agency Code Titles 1 and 2 were approved by the Board of Directors of the Sacramento County Water Agency, effective August 16, 2004. Since December 1991, flood control detention in Morrison Creek Stream Group watershed had been funded through the interim mechanism of a fair-share contribution by new development.

Repetitive Loss Plan - Unincorporated Sacramento County (FEMA Community Number 060262) has 103 unmitigated repetitive loss properties. Methods for mitigation include elevation, acquisition, flood proofing, floodwalls, storm drain system improvements, and site specific improvements to keep the lowest floor from flooding.

Drainage Master Planning Program - Since 1990, the Department of Water Resources has advance an extensive program of drainage master planning, to provide for the ultimate storm water quality, drainage, and flood control needs of the County. In planning and implementing cost-effective drainage and flood control systems, the master plans must: accommodate development, provide the objective levels of service and protection to existing and future communities, minimize continuing maintenance and operation costs, and minimize/mitigate downstream flooding and water quality impacts. One goal of the planning program is to plan and implement drainage and flood control projects that protect and enhance habitat, visual, recreational, and other water-related and riparian values. Drainage master plans have been completed for four watersheds, and several others are nearing completion. Future planning efforts will include flood hazard mitigation for Morrison Creek and Arcade Creek watershed.

Floodplain Management Policies - On March 9, 1993, Sacramento County Board of Supervisors adopted the Floodplain Management and Interim Floodplain Development Policies, which were developed by the Department of Water Resources of the Sacramento County Municipal Services Agency in consultation with Region IX of the Federal Emergency Management Agency. The floodplain Policies establish requirements and guidelines for minimizing and mitigating impacts of new development upon floodplains in most areas of Sacramento County, and how new development may be planned in or near floodplains.

Stormwater Ordinance and Grading and Erosion Control Ordinance – Address discharge of pollutants to storm drainage system.

New Development Policies

The following is a list of policies that are applicable to development within the entire County, with the exception of the Delta area. The Delta is defined as that portion of the County bounded on the east by the Western Pacific Railroad tracks, on the north by the southern city limits of the City of Sacramento, and on the south and west by the Sacramento County boundary.

Buildable Area. The lack of buildable area above the 100-year floodplain is a constant problem. Homeowners expect to be able to construct swimming pools and other structures associated with residential property. In the past, lots have been created that do not allow enough area above the 100-year floodplain to construct such structures, and in some cases only the residence or commercial structure itself is located above the floodplain. The proposed policies regarding fill
in the floodplain will prohibit such structures from being constructed. Specific minimum buildable areas are proposed to create areas where normal property uses will not be prohibited by policy.

1. Deny creation of parcels that do not have buildable areas outside the 100-year floodplain. The buildable area may be constructed by the placement of fill as long as it conforms to the other policies contained herein. The minimum buildable area per lot required for specific zoning is defined below. Note that for the purposes of this policy, "buildable area" only refers to the area above the 100-year floodplain. The entirety of this area may not be buildable due to setbacks or other requirements.

   - AR-5 or larger: 1.00 acre
   - AR-1, AR-2, RD-1: 0.50 acre
   - RD-2: 0.25 acre
   - RD-3, RD-4: 7,500 square feet
   - RD-5 to RD-7: entire lot or 5,200 square feet, whichever is less
   - RD-10 and denser: entire area except parking lots, streets, and open common areas
   - Commercial and Industrial: Entire area except parking lot, streets, and landscaping, unless pier foundations are approved.

2. For residential zoning, the area outside the 100-year floodplain must be contiguous or reasonably situated to provide buildable area for a residence and associated structures, such as pools, sheds, barns, and detached garages.

3. Buildable areas above the 100-year floodplain must be constructed prior to map recodrdation. Floodplain and/or floodway easement will be required over the floodplain outside the buildable area. Exceptions may be made for parcel maps provided a condition of approval is attached to the map requiring site plan review prior to issuance of building permits. Requirements including locations of excavation and fill, limitations on fill in the floodplain, etc. will be clearly indicated in the conditions of approval.

Access. Minimum access is required for all newly created parcels to allow ingress-egress during storm events. This is required for emergency access and to avoid creating "islands" during normal flooding. The idea is to provide "reasonable" access, but what is reasonable is highly subjective. At a minimum, access should be above the 10-year flood elevation, to minimize the occurrences of restricted access.

The least number of watercourse crossings are encouraged to minimize the impact to flood elevations, as well as to the riparian corridor.

Possible Activities for Dry Creek / NEMDC Area are as Follows:

Flood Control. For the Natomas tributaries, flood control detention may be required for subdivisions and any commercial sites larger than one acre, as deemed necessary and to be determined on a case-by-case basis.
**Property Protection.** For new development, all structures are required to be constructed at least one-foot above the highest 100-year base flood elevation determined by the County. The most effective protection for existing structures will be the acquisition of properties in the Dry Creek Parkway between the North and South branches of Dry Creek, and the elevation of properties in the floodway fringes. A total of 13 properties have been acquired, including eight repetitive loss properties. Five of the repetitive loss structures in this area have been elevated.

1. Vehicular access to the buildable area of newly created parcels must be at or above the 10-year flood elevation. Exceptions may be made when the existing public street from which access is obtained is below the 10-year elevation

2. Watercourse crossings shall be minimized. Creation of lots that require watercourse crossings for single lots, or that will likely encourage watercourse crossings to be built by property owners (lots with useable area on both sides of a watercourse) will not be allowed. Exceptions may be granted on a case-by-case basis for Agricultural and Agricultural-Residential zoned parcels larger than five acres.

**Fill in the Floodplain**

Reclaiming floodplain by importing fill has the effect of increasing flow downstream. Importing fill into the existing floodplain removes floodplain storage. Water that may have otherwise ponded outside the effective flow area of a watercourse will be forced downstream instead, thereby increasing the flow and water surface elevations downstream. Merely replacing fill with an offsetting amount of excavation will not always be adequate to mitigate any impact on flood elevations. The most important loss of storage in most watercourse situations is the fill that occurs at elevations near where the peak flood elevation will occur. Off-stream storage that occurs at the time of peak runoff will be the most effective in attenuating peak flow. It is therefore recommended that in-kind replacement storage be provided whenever fill is allowed to be placed within the 100-year floodplain for most watercourses. In-kind replacement is defined as excavating at the same elevation (hydraulically equivalent) as fill occurs. The impact of lost floodplain storage to flood elevations will vary from watercourse to watercourse depending on several factors such as width of the floodway, total in-stream and off-stream storage, etc.

1. Fill should not be allowed where the depth of the 100-year flood is greater than two feet. Exceptions may be made on a case-by-case basis, including for the following:
   
   (a) Agricultural and Agricultural-Residential zoned parcels;
   (b) Minor tributary swales and areas where piped drainage is required by County Improvement Standards;
   (c) Watercourse crossings;
   (d) Entitled construction in a manner that does not have an unmitigated adverse impact on upstream, downstream or adjacent neighboring property.

2. There will be no net loss of storage with the 100-year floodplain. In-kind replacement of lost storage will be required, with the following exceptions allowed:
(a) Morrison Basin in-fill areas;
(b) Basin "A", Sierra Creek, and Magpie Creek, on a case-by-case basis;
(c) Agricultural and Agricultural-Residential zoned parcels of five acres or more, on a case-by-case basis;
(d) Areas where piped drainage is required by the County Improvement Standards.

Pier Foundations

Pier foundations allow structures to be built in areas subject to flooding by elevating the structure above the adjacent low-lying lands. In no case should a pier foundation be placed in areas where storm water is conveyed. On a case-by-case basis, some structures may be allowed where floodwaters pond, as opposed to areas where the flow velocities are significant.

1. Pier foundations for structures are acceptable only when outside the conveyance area of a watercourse. Pier foundations may be allowed on a case-by-case basis for the following:

   (a) Agricultural and Agricultural-Residential zoned parcels;

   (b) Existing parcels that are within the 100-year floodplain and do not meet the buildable area criteria.

Fencing

Fencing within the floodplain occurs frequently and can significantly increase flood elevations. This is due to the fences collecting debris and effectively creating a dam. Limited fencing will be allowed within the floodplain provided it does not create flow restrictions and allows for the free flow of water. The policies will not apply to Agricultural or Agricultural-Residential zoned parcels greater than five acres, except where flood elevations are significantly impacted.

1. Fencing will be prohibited within the floodway of a watercourse. Open fencing parallel to the flow direction may be allowed within the floodway on a case-by-case basis.

2. Fencing outside the floodway but within the conveyance area of a watercourse will be restricted to the least flow-restrictive types of open fencing (3-strand wire, 3-board rail, etc.). Chain link, spaced board fencing, etc. will not be allowed.

3. Fencing outside the conveyance area of a watercourse but within the 100-year floodplain will be restricted to fencing that allows the passage of water.

Open Watercourse Easements

The County is requiring fee title or easements be dedicated over the 100-year floodplain on sites that are developed or subject to discretionary actions. Different types of easements will be required dependent on the flow situation within the specific floodplain. Dedication of the easement will be required to prevent any development within the floodplain that would impact flooding, including post-development fencing, grading, importation of fill, and construction of secondary structures. The easements are intended to provide some measure of assurance that the floodplain will not be

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significantly altered, thereby impacting flooding. Easements will be required as conditions of discretionary actions, including rezone and map approval.

1. Upon development of a site, including rezones, and certain applications for building or use permits, the following easements will be required to be dedicated to the County:

   (a) Floodway easement will be required over the area of a watercourse necessary to pass the peak 100-year flow at an elevation designated by the Department of Water Resources.

   (b) Floodplain easement will be required over the remainder of the 100-year floodplain outside areas to be master planned, or consistent with provisions of an adopted Drainage Master Plan, if the site will be fully built-out under the proposed zoning.

   (c) When a site is not being fully built-out under the present zoning, or if a Drainage Master Plan has not yet been adopted, then a Conditional Floodplain Easement may be granted over that portion of the floodplain that is less than two feet below the 100-year water surface elevation. A Conditional Floodplain Easement is an easement over that portion of the 100-year floodplain where the depth is less than two feet, only used when a site is not fully built-out. It is intended to delineate the area where, at some later date and in accordance with County policies regarding development within the floodplain, a property owner may grade to create additional buildable area. The premise is not to take a normal easement over the entire floodplain before a site is fully built-out, since the property owner generally feels once the easement is given, the County has no reason to abandon a part of it later to allow the creation of additional buildable area. Therefore, the conditional easement is to be created with specific conditions under which portions of the easement may be abandoned at a later date.

2. Floodplain easements as set forth in policy 1(b) and 1(c) above will not be required for Agricultural and Agricultural-Residential parcels except on a case-by-case basis.

Levees

Levee construction to reclaim floodplain for new development is strongly discouraged by the Department of Water Resources. There are several possible impacts arising from levee construction. Levees may increase flood elevations outside the protected areas due to loss of floodplain storage and decreased conveyance area, possibly protecting one area only to increase the flood risk elsewhere.

Levees also put newly reclaimed areas unnecessarily at risk for a variety of reasons:

   (a) Levees must be maintained to assure they will work when needed. Despite the best maintenance programs, levees may fail when subjected to extended flooding.

   (b) Pumping may be required to evacuate local storm runoff. The pumps will require maintenance, which have the potential of failure during a storm event. Also, when an event occurs that is greater than the design event for a pump, there is no overland release for the excess storm water.
It should also be recognized that levees and associated pumping systems are expensive to construct initially as well as to maintain in perpetuity.

There is also the problem of an event in excess of the design event occurring and overtopping the levee. For example, if a levee is designed for the 100-year event, and an event in excess of the 100-year event occurs, the levee could be breached, causing significant flooding to occur behind the levee. In this scenario, the flooding could be catastrophic if the flood depths behind the levee are significant. For this reason, it is proposed that if a levee is allowed to be constructed, the levee be designed to withstand a 200-year flood. Besides providing greater than 100-year protection, this requirement also provides some assurance that if the 100-year flood elevation is increased in the future due to new information, the area behind the levee will be protected and will not suddenly be placed within FEMA's 100-year floodplain and subject to new insurance and development restrictions. It also lessens the chances of catastrophic flooding and possible fatalities associated with deep flooding.

It is not the intent of these policies to prevent the construction of levees to protect existing development. However, such proposals must be reviewed very carefully on a case-by-case basis to assure they will not adversely impact flooding elsewhere.

1. Levees should not be allowed to be constructed in order to reclaim floodplain for new development.

2. If levee construction is approved to reclaim floodplain for new development, then 200-year flood protection is required, to the satisfaction of the Director of the Sacramento County Department of Water Resources.

**Miscellaneous**

It is proposed that newly improved watercourses be designed to allow for low maintenance. The watercourses will be sized properly to allow for increased vegetative growth that may be expected. This is particularly important in areas within watercourses that are designated as wetland mitigation areas.

It is also proposed that street frontage be encouraged adjacent to floodplains where physically reasonable. Street frontage allows access to floodplain areas, typically provides additional floodplain storage, and discourages property owners from dumping trash in the floodplain by putting it in full public view.

1. Improvements to watercourses in currently undeveloped areas will be designed for low maintenance. Appropriate Manning's "n" values will be used in design of the watercourse to reflect future vegetative growth (including mitigation plantings) associated with the low maintenance concept.

2. Development adjacent to floodplains shall, where physically reasonable, provide a public street paralleling at least one side of the floodplain.
3. Naturally appearing channels will be encouraged for watercourses in newly developing areas (outside of identified in-fill areas).

4. The placement of concrete lining within watercourses will be strongly discouraged. However, it will not be prohibited in identified in-fill areas where it is consistent with the existing adjacent reaches of the watercourse. Concrete drainage outfall structures, access ways, bicycle trails, roadway crossings, etc. will not be prohibited.

5. Areas within a 100-year floodplain shall not be up zoned to a more intensive use unless and until a Master Drainage Plan is prepared that identifies areas of the floodplain that may be developed, except where development is allowed under the other policies contained within this document. For example, AR-5 zoning within a floodplain shall not be rezoned to RD-5.

**Flood Mitigation Assistance.** In order to mitigate against the long term risk of flood damage to repetitive loss structures county wide, and reduce or eliminate flood claims, Sacramento County Department of Water Resources applied for a Federal Emergency Management Agency sponsored Flood Mitigation Assistance Grant (FMA). These funds were used to acquire or elevate repetitive loss structures located in Sacramento County in accordance with the County General Plan. The priority properties are those repetitive loss structures contained within the NFIP Repetitive Loss List, ranked in the order they appear. In the FMA application, Sacramento County Department of Water Resources included other viable elevation applicants in addition to the repetitive loss properties reflecting the fact that many structures on the National Flood Insurance Program (NFIP) Repetitive Loss List have already been mitigated under the HMGP Home Elevation Program. Additional mitigation opportunities are being pursued with help from the Pre-Disaster Mitigation (PDM) grant program.

**COUNTYWIDE EMERGENCY SERVICES ACTIVITIES**

Emergency preparedness is part of the County’s strategy to protect life and property from floods and other disasters. The following is a listing of the emergency services activities that the County has undertaken.

**Emergency Management Program**

**Sacramento County Multi-Hazard Disaster Plan. (July, 1997)**
This plan provides the planned response to extraordinary events associated with natural disasters and technological incidents. The plan outlines roles and responsibilities, and is designed to be part f the California Standardized Emergency Management System.

**Dam Emergency Preparedness Plans.** The county has copies of the emergency plans and inundation maps for Folsom Dam that were prepared by the US Bureau of Reclamation. For homeland security reasons, the inundation maps are not included with this plan.
County Sandbag locations. The county has an inventory of sandbag stockpiles and a map showing where these resources are located. These sites are posted on the Web at www.floodready.org. Sandbag locations are stocked and opened when there is recognized threat of impending high intensity storms. However, many property owners have addressed their site specific flooding issues with the help and technical expertise of Water Resources staff, so that cumbersome sandbags are no longer needed.

Sacramento County Flood ALERT system. ALERT, developed by National Weather Service (NWS), stands for Automated Local Evaluation in Real Time and signals the County Department of Water Resources of possible flooding. It provides continuous and automatic reports from river levels and rainfall gauges. These monitoring stations provide data to determine when to initiate evacuation procedures.

The primary warning for storms and flooding is the County’s ALERT system at www.floodready.org. This is a widespread arrangement of stream and rain gages with data available in real time around the clock. Input into the system are flood monitoring and warning levels. There are links on the Web page to stream/river/reservoir gage systems managed by other entities. Additionally, the County and City are working with OneRain, Inc. to develop real time Doppler radar information, giving a broad and accurate account of the storm event. Field crews are activated to areas of known concern ahead of the storms such as debris-laden inlets. Specific concerns may be directed to the dispatcher at (916) 875-RAIN.

Sacramento County website. Emergency Information can be found on the Web at (www.saccodwr.org or www.floodready.org). Includes links to several municipalities serving the county to contact if power goes out, flood occurs, etc. (SMUD, PG&E, fire and police department links, sand bag locations, etc.)

Dry Creek/NEMDC specific warning. The County of Sacramento Department of Water Resources (County DWR) offers continuous technical assistance to property owners who want to protect themselves for flood risk. County DWR has a web site with real time rain gage, creek, stream and river flow information. Flood warning is done in conjunction with the County Sheriff and emergency operation personnel. Unfortunately, this area is prone to flooding with very little warning time. It is incumbent upon property owners to pursue sandbagging or other floodproofing measures for their flood-prone structure.

COUNTYWIDE PUBLIC INFORMATION ACTIVITIES

Map Determinations. Water Resources provides flood zone information, including FEMA mapped Flood Insurance Studies and County flood data to anyone who inquires. The flood zone hot line number is (916)874-7517 on which anyone may leave a message with address, parcel number and contact information and Water Resources staff will provide flood zone information within two business days. There is also a public counter at 827-7th Street Room 301, at which during business hours, an interested party can view the various flood and drainage maps.
Near term goal: Water Resources will work to put this information on the Web based GIS map.

**Outreach Projects**

The following brochure is the County Insert annual mailer sent to everyone in urban unincorporated Sacramento County, approximately 260,000 properties.
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Be Flood Ready!

Protect your family and property from flood hazards

A History of Flooding

In 1998, heavy rains caused the Sacramento region to experience widespread flooding, particularly in the Yolo, Merced, Stanislaus, and San Joaquin areas. Two major rivers, the Sacramento and San Joaquin, overflowed their banks and flooded surrounding areas. The flooding was exacerbated by the construction of the Delta-Mendota Canal, which diverted water from the Sacramento River to the San Joaquin River, increasing the flow of water into the Sacramento area.

Flood Insurance

If you live in a floodplain, you should have flood insurance. Flood insurance is the only federal insurance policy that will cover losses due to flooding. The National Flood Insurance Program (NFIP) makes flood insurance available to everyone in the country. The county's sales tax to support floodplain management is used to fund the NFIP.

Flood Warning

When high water threatens homes even through Sacramento County, flood warning officials will issue accurate information quickly. The Department of Water Resources will develop a flood warning system that can alert people within minutes. Local weather stations, which will be part of the alert system, will be installed throughout the county.

Protecting Property

The highest point of the flood within an area would have avoided flood damage by taking minor actions to divert water away from your property. This can be done by:

- Clearing debris from gutters and downspouts to allow water to flow away from your home.
- Placing sandbags around windows, doors, and other openings to prevent water from entering.
- Raising susceptible areas above the flood line.

Safeguarding Your Property

If you live in an area prone to flooding, you can take steps to protect your property. This includes:

- Clearing debris from gutters and downspouts to allow water to flow away from your home.
- Placing sandbags around windows, doors, and other openings to prevent water from entering.
- Raising susceptible areas above the flood line.

Floodplain Development Requirements

All structures built within a floodplain require a floodplain management permit. Permits are required for new construction in flood plains. Substantially damaged or damaged structures must be restored to their original function and elevation before a permit can be issued. All new structures built within a floodplain area are required to be constructed and equipped with the following:

- A floodproof barrier that is at least 30 inches above the ground level.
- A floodproof roof that is 50% higher than the ground level.
- A floodproof wall that is at least 2 feet above the ground level.

Floodplain System Maintenance

In 1998, the Sacramento County Flood Control and Drainage District implemented a comprehensive program to maintain the floodplain system. The program includes:

- Regular inspection and maintenance of the floodplain system.
- Removal of debris and obstructions to prevent water from flowing into the storm drain system.
- Regular cleaning of storm drains and culverts.

Sacramento Stormwater Management

The city of Sacramento has implemented a Stormwater Management Program to reduce the amount of runoff entering storm drains. The program includes:

- Stormwater treatment facilities, such as detained basins and wetlands.
- Rainwater harvesting systems.
- Stormwater quality improvement practices.

If you would like to find more information on stormwater management, please contact the Sacramento County Water Management at 916-384-5000.
OTHER ONGOING MITIGATION ACTIVITIES

Placer County/Dry Creek. Because Dry Creek flows through the City of Roseville in Placer County before entering the County of Sacramento, agencies from all three locations have banded together to devise strategies for reducing peak flows. As part of this ongoing effort, the Sacramento County Board of Supervisors and the Sacramento County Water Agency Board approved, by resolution, the Dry Creek Watershed Flood Control Program (Control Number 95-0577) and its associated Environmental Impact Report on January 23, 1996. Through this program, fees are collected within Sacramento County for development in the Linda Creek and Dry Creek watersheds to someday fund regional flood control detention, bridges and culverts, floodplain mapping, channel maintenance, flood warning, local projects, etc. Placer County Flood Control is taking the lead on locating viable projects within the shed area.

Sacramento County Department of Water Resources, along with the Federal Emergency Management Agency, Sacramento Area Flood Control Agency, and Sacramento Parks Department continues to further other mitigation projects in the Dry Creek area. Notable examples are the HMGP and FMA Home Elevation programs as well as the Dry Creek Parkway project for the purpose of clearing homes within the floodway and returning the area to open space.

Sacramento County Department of Water Resources, Stormwater Utility District operates and maintains stormwater system for Citrus Heights and unincorporated areas of Sacramento County. Their website has a ‘flood-ready’ web page, providing information to citizens on how to be prepared for a flood; what to do before, during and after a flood; how to prepare a family disaster plan; and how to find weather information. Their website also provides information about the NFIP, how to find out what flood zone your home may be located in, and how to purchase flood insurance. Further, one can find sandbag locations on their website, rainfall totals, stream levels, weather data, and other storm and flood related information.
BUILDING PERMITS TRENDS

138 building permits within the SFHA were issued within the past two years.
Source: Sacramento County Dept. of Water Resources

REVIEW OF POSSIBLE MITIGATION ACTIVITIES

The following are activities that are specific for each of the watersheds previously identified. The following is a brief summary for the causes of flooding in each area, along with possible activities that can be implemented to mitigate the problems of flooding.

Sacramento River

The Sacramento River weir protocol is being reviewed by the California Department of Water Resources, the Army Corps of Engineers and the Sacramento Area Flood Control Agency. Currently, it is recommended that the flood victims located on the wet side of the Sacramento River levee elevate above flood risk.

There are several repetitive loss properties that were built low, before the current County of Sacramento floodplain policies (pre-FIRM). There are other newer (post-FIRM) homes that have been built above the base flood elevation but still have repetitive loss claims. Additional investigation may conclude that flood damages are not due to water entering the main living areas.

The following are possible activities for structures located along the Sacramento River:

Flood Control. The US Army Corps of Engineers in conjunction with the Sacramento Area Flood Control Agency have made numerous improvements to the river levees improving flood protection for properties on the dry side of the levees. However, the homes that have been built on the wet side of the levees are still at risk.

Property Protection. For new development, all structures are required to be constructed one foot or higher above the highest 100-year base flood elevation determined by the County. Elevation of existing structures is possible and has been accomplished in this area. All owners of repetitive loss properties have been invited to participate in the elevation program, and some have been elevated.

Emergency Services. In the event that structures in this area have the potential of being flooded, sandbagging or other flood proofing method may be a feasible solution. Property owners will be responsible for these activities.

Floodplain Management. The County's Grading and Erosion Control Ordinance and Stormwater Ordinance apply countywide, including this area. The County has no comprehensive plan or zoning ordinance in place for this area, nor is one planned for the near future. There are existing residential

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and commercial parcels that should enjoy their property rights without causing any negative impacts
to the floodway of the Sacramento River.

**Elevation of Structures.** The County has received grant monies from the Federal Emergency
Management Agency to facilitate elevation of repetitive loss structures

**Dry Creek/NEMDC & Tributaries**

**Dry Creek.** Dry Creek will essentially be treated as a natural stream in that there are existing
flooding problems and overbank storage in extreme flood events. Sacramento and Placer Counties
are jointly studying flooding along Dry Creek and have developed new hydrology for the
watershed. Water Resources has used the results of this study to determine the 100-year flood
elevation and floodplain location. Detention will not be required in this watershed (downstream of
Placer County), per determination of the joint Placer/Sacramento County study.

**Dry Creek Tributaries.** These include Basin "A" and Basin "B" (also known as Sierra Creek),
Magpie Creek, and Robla Creek. Robla Creek should be treated as a natural stream until a master
plan is provided. Only short reaches of Basin "A" and Magpie Creek have not been previously
channelized. More substantial reaches of Sierra Creek have not been channelized to date. New
development within these watersheds will be considered in-fill. Flood control detention will not be
required for these watercourses, consistent with results of the joint Placer/Sacramento County Dry
Creek Study. Further channelization is acceptable since these are in-fill areas. It is recommended
that development in these floodplains be reviewed on a case-by-case basis bearing in mind the
impact on the watershed.

**The NEMDC Tributaries.** These are located in largely undeveloped areas. The downstream, or
westerly end of the watercourses are in the backwater area of the NEMDC. The watercourses are
typically very small, and need to be deepened to gravity drain adjacent lands before substantial
development can occur. Water Resources recommends that master plans be prepared prior to any
large-scale development within this watershed.

From its review of the numerous past studies the following conclusions may be drawn:

- Local and regional flood control detention above Roseville may be beneficial to halt
  increases in, or potentially reduce, peak flood flows.

- The Sacramento Area Flood Control Agency (SAFCA) project to raise existing levees and
  build new levees will improve flood protection for areas adjacent to the confluence of Dry
  Creek and Robla Creek.

- A fee plan has been put in place, a subzone of Zone 11C of the Sacramento County Water
  Agency, to collect funds from developments in the watersheds tributary to the Natomas East
  Main Drainage Canal. This fee may be used for upgrades to the D-15 pump station or other
  mitigation measure as impacts to the floodplain are realized over time due to development
  and channelization of the watersheds.
• Local projects are needed to protect areas that are now threatened, and those projects must be designed or mitigated to prevent any increased risk elsewhere in the watershed.

• Acquisition of properties within the Dry Creek floodway is deemed an appropriate mitigation measure. SAFCA and the County of Sacramento ultimately desire to rezone this floodway area to open space. Some properties have been acquired and the County is currently working with FEMA to obtain additional grant monies for acquisitions.

• Elevation of structures to above the base flood elevation is an effective mitigation measure and has been occurring in this area.

**Floodplain Management Policies Related to New Construction.**

Along with the County's Grading and Erosion Control Ordinance and Stormwater Ordinance (apply county-wide), the following policies are applicable for this area:

**For the Natomas Tributaries:**

1. Development and rezones to increase density may not occur within the 100-year floodplain prior to the establishment of a master drainage plan, except as outlined below. Building permits for single structures on a parcel will be reviewed on a case-by-case basis. Some development and rezones may occur in the floodplain fringe provided:

   (a) the depth of the 100-year flood is less than two feet;
   (b) there is no net loss of storage within the 100-year floodplain;
   (c) there is in-kind replacement of lost floodplain storage;
   (d) substantial grading within the floodplain will not occur less than 75 feet from the centerline of the existing watercourse.

2. Areas outside the 100-year floodplain designated as possible areas of channel realignment, detention sites, or urban runoff treatment sites during preliminary phases of the master plan study will not be allowed to develop until the study is complete.

3. Development and rezones will be allowed in areas outside the 100-year floodplain prior to the establishment of a master drainage study provided a fair share contribution is made toward the cost of future drainage improvements and master drainage plan study cost, with the exceptions listed in policy 2 above.

4. Development within areas adjoining the NEMDC that are designated as floodway shall be limited allowing driveway culverts, and minimal fill for driveways, and residential structures in accordance with existing entitlements.

**For Dry Creek:**

1. Development may not cause an offsite increase in the 100-year flood elevation.
2. Adequate topography with one-foot contours will be required for all land less than two feet above the 100-year flood elevation.

3. A certified grading plan will be required once grading is complete.

4. New development and increased zoning density will be discouraged in the floodway of Dry Creek; however, in the case where an existing parcel has entitlements, this shall not serve to inversely condemn.

For the Dry Creek Tributaries:

1. Floodplain encroachment may be allowed outside the floodway where the depth of the 100-year flood is less than two feet, except for Robla Creek, where development must be reviewed on a case-by-case basis. Floodplain encroachment where the depth of the 100-year flood is greater than two feet may be allowed on a case-by-case basis provided it is consistent with existing development in the watershed.

Natural Stream Group & Tributaries

The majority of the watersheds are approaching full buildout. The drainage corridors have been crowded by development. The effect of new development in the basins on increasing stream flow due to increased impervious area is considered minor for most of these watercourses. Possible activities within the Natural Stream Group area are as follows:

Flood Control. Levees and detention are not feasible due to the minimal open area available adjacent to creeks, and nearly full buildout of the watersheds. Channel improvements are discouraged, however some exceptions may be allowed for the following situations:

   (a) as prescribed in the Natural Streams Plan;
   (b) to provide erosion protection;
   (c) for necessary transitions, crossings, maintenance ramps, etc.;
   (d) as determined in approved master drainage plans; and
   (e) tributary drainage not mapped on Flood Insurance Rate Map (FIRM).

Property Protection. For new development, all structures are required to be constructed one foot or higher than the highest 100-year base flood elevation determined by the County. The most effective protection for existing structures will be elevation of the structures. A total of 9 repetitive loss properties have been elevated in this area. There have also been several flood control projects, including drainage improvements and floodwalls that have reduced the flood risk on at least 11 repetitive loss properties in this area.

Emergency Services. This area is prone to flash flooding. The County DWR provides real time rain gage and stream gage information on the internet. In the event that structures in this area have the potential of being flooded, sandbagging may be a feasible solution. Property owners will be responsible for the sandbagging of their properties.
Floodplain Management Policies Related to New Construction.

Along with the County's Grading and Erosion Control Ordinance and Stormwater Ordinance (apply county-wide), the following policies are applicable for this area:

1. Development shall not cause an offsite increase in the 100-year water surface elevation due to encroachment within the conveyance portion of a watercourse unless a floodplain easement is obtained for all impacted offsite floodplain areas. Exceptions may be considered for watercourse crossings on a case-by-case basis.

2. Provisions of the Natural Streams Plan will be followed.

3. Adequate topography with one-foot contours will be required for all areas where the land is less than two feet above the 100-year water surface elevation. The topography must be based upon an onsite survey and stamped and signed by a licensed land surveyor or registered civil engineer.

4. A certified grading plan will be required once grading is complete.

5. Floodway easements will be required over those portions of the 100-year floodplain determined to be within the conveyance area of a watercourse.

Morrison Creek Stream Group

The Morrison Creek Stream Group watershed will be divided into two groups for floodplain policy, representing in-fill areas and currently undeveloped areas. The in-fill areas consist of watercourses that have previously been channelized and are generally surrounded by existing development, often to the channel banks. The undeveloped areas will include areas where little or no channel improvement has occurred and there is little or no existing development.

In-Fill Areas of the Morrison Creek Stream Group. The in-fill portions of these watercourses have previously been channelized and have significant urbanized area near the channel. Much of the original floodplain has been reclaimed. The existing improved channels often do not represent the ultimate required channel section as they were designed for lesser flows than are currently recognized as the 100-year flows. Channel improvements may still occur in these watercourses as they are not designated natural streams, and these improvements may reclaim land that is currently within the 100-year floodplain.

Undeveloped Areas within the Morrison Creek Stream Group. The watercourses in these areas have not been channelized beyond ditches constructed by private property owners. The floodplains are generally shallow and relatively wide. Some channel improvements will be necessary to provide gravity outfall to drain the adjacent lands. Regional detention may be required to keep the ultimate buildout flows to existing condition flows. Comments for the in-fill areas concerning peak flow apply to the undeveloped areas as well. Possible activities for the Morrison Creek Stream Group are as follows:
**Flood Control.** There are various, however yet unapproved and unfunded, plans for flood control at the Beach Stone Lakes outfall area. These projects are part of the bigger State Delta program and outside of the control of the County. Meanwhile, home elevation is a good idea. Property owners should also look at ways to provide islands for livestock to find dry refuge. Flood warning is available by real-time ALERT system internet site. This area does not typically flash flood, so some warning time is available, assuming accurate weather forecasts. Sandbagging can be an effective emergency measure. Owners of flood prone buildings should consider elevation.

**Property Protection.** For new development, all structures are required to be constructed at least one-foot above the highest 100-year base flood elevation determined by the County. Elevation will be an effective method of protection of existing structures. Two homes are currently being considered for elevation under the FEMA grant program.

**Emergency Services.** In the event that structures in this area have the potential of being flooded, sandbagging is a feasible solution and should work effectively. Property owners will be responsible for the sandbagging of their properties.

**Floodplain Management Policies Related to New Construction.** Along with the County's Grading and Erosion Control Ordinance and Stormwater Ordinance (apply county-wide), the following policies are in place for the in-fill areas of the Morrison Creek Stream Group:

1. Floodplain encroachment may be allowed on a case by case basis for the purpose of protecting homes and agricultural buildings, or for creation of a small area for livestock to take refuge above the floodwaters.

2. Encroachment into the conveyance area of a floodplain will not cause an increase in the peak 100-year flood elevation unless the increase has no adverse impact on existing development.

The following are policies in place for the undeveloped areas of the Morrison Creek Stream Group:

1. Development and rezones to increase density may not occur within the 100-year floodplain prior to the establishment of a master drainage plan, except as outlined below. Building permits for single structures on a single parcel will be reviewed on a case-by-case basis. Some development and rezones may occur in the outer edge of the floodplain provided:

   (a) the depth of the 100-year flood is less than two feet;
   (b) there is no net loss of storage within the 100-year floodplain;
   (c) there is in-kind replacement of lost floodplain storage;
   (d) substantial grading will not occur within the floodplain less than 150 feet from the centerline of the existing channels for Morrison, Elder (downstream of Bradshaw Road), Laguna, and Laguna Tributary #1 (downstream of the CCTRR) creeks; and not less than 75 feet from the centerline of all other watercourses.
2. Areas outside the 100-year floodplain designated as possible areas of channel realignment, detention sites, or urban runoff treatment sites during preliminary phases of the master plan study will not be allowed to develop until the master drainage plan is complete.

RECOMMENDATIONS

Update of Past Local Floodplain Management Plan Recommendations

- Continue to implement and enforce the Countywide policies listed in Section III- Review of Possible Activities. The majority of these policies are enforced by Water Resources. The implementation and enforcement of these policies are ongoing, and funding is provided through the normal budget of Water Resources.

- Provide regular periodic inspections and maintenance on all drainage channels, streams, ditches, and creeks within the County's jurisdiction, and record all work performed. This activity is currently in practice by the Operations and Maintenance section of Water Resources. All creeks shall be inspected and individually evaluated, and any special maintenance needed for each creek will be investigated and undertaken if practical. This activity is ongoing throughout each year, and is funded through the normal budgeting of Storm Water Utility monies.

- Pursue the acquisition of properties within the Dry Creek Parkway Corridor. The Sacramento County Department of Parks and Recreation is currently in the process of attempting to acquire parcels located within the floodplain, some of which are repetitive loss properties. This activity is ongoing and is funded through grants from FEMA.

- Review the Sacramento County repetitive loss properties on an annual basis to identify candidates for mitigation action. The primary mitigation actions are likely to be elevation of structures above the base flood elevation or acquisition of properties, but can also include improvement of local drainage, installation of floodwalls, or flood-proofing of the structures.

- Work with one-time flood victims to mitigate so that they do not become repetitive loss properties.

- Provide technical advice to residents who want to know more about flood protection and flood preparedness. This information is made available to the public by personnel at Water Resources via annual utility bill mailers, the Internet and at the public counter. If any questions should arise that can not be immediately answered, then the inquirer will either be instructed of other sources to call for technical advice, such as FEMA, or will be contacted later after research is performed by Water Resources. This activity is ongoing throughout each year, and is funded through the normal budget of Water Resources.

- Other activities are also being implemented by other agencies that affect Sacramento County. Work is being performed along the Sacramento River levees in the Natomas and
South Sacramento areas. The lead agency for this work is the Army Corps of Engineers (COE), and the local agencies are the State Department of Water Resources (Cal-DWR) and the Sacramento Area Flood Control Agency (SAFCA). This work being performed will bring the levees back to their original design capacity.

- The COE, along with Cal-DWR and SAFCA, are currently strengthening levees and are proposing other improvements at the lower American River; near the Folsom Dam. These activities are still at the feasibility stages, therefore it is uncertain whether the above projects will be undertaken.

**2004 Local Floodplain Management Plan Recommendations:**

**Recommended Action Item #1:** Lower Strong and Chicken Ranch Slough improvements by Cal Expo. Pump Station D-05 Chicken and Strong Ranch Sloughs.

**Category (for CRS purposes):** Structural Protection (540 – capital improvement)

**Issue/Background Statement:** Feb 1986 and twice in Jan 1997 Strong Ranch Slough was overwhelmed causing flooding to an area north and south of Northrop Avenue, and Ethan Way near Cal Expo. Also, in Jan 1995, there was widespread flooding in upper reaches of both sloughs.

The American River will be operated at higher levels more often, once improvements to Folsom Dam are complete. There is concern that this existing problem will be exacerbated as the capacity of the D-05 gravity outlet and pump station is greatly decreased when the river is high.

**Other Alternatives Considered:** No action, Floodwalls, including raising bridge crossings, Elevating structures, Increasing gravity outlet at D-05, Increase pump capacity at D-05, Provide peak flow detention upstream of D-05 (*Source:* Strong and Chicken Ranch Slough Feasibility Study, October 2003, Sacramento County, Sacramento Area Flood Control Agency, US Army Corps of Engineers)

**Responsible Office/Person:** SAC County/SAFCA

**Priority (H, M, L):**

**Cost Estimate/Potential Source of Funding:**

**Briefly Explain why this is cost-effective:** The Study indicates that 4500 properties are at risk of flooding in the 100-year storm.

**Desired Schedule:**
Recommended Action Item #2: Laguna Creek Detention at Aggregate Pit

Category for CRS purposes: Structural Protection

Issue/Background Statement: Laguna Creek peak flows jump to Gerber Creek at the California Central Traction Railroad line. This is due to the fact that the crossing under the railroad embankment is undersized. Areas in and around the floodplain associated with this shed jump are slated for development.

Other Alternatives Considered: Peak flow detention at the Triangle Rock Aggregate Pit (currently being mined) is estimated to be adequate volume to attenuate peak flows in Laguna Creek to such a level that the shed jump will no longer occur in the 100-year flood. Increase conveyance under the railroad grade. Channelize the shed jump flow thereby reclaiming land for development. Leave the shed jump and accommodate the flow in the Gerber Creek proposed detention basins.

Responsible Office/Person: Sacramento County DWR

Priority (H,M,L): Medium, as it is likely that the Triangle pit will not be available for six years.

Cost Estimate/Potential Source of Funding:

Brief Explanation why this may be Cost Effective:

Desired Schedule: 2010

Recommended Action Item #3: ALERT warning systems

Category for CRS purposes: Emergency Services (610 Warning)

Issue/Background Statement: The County ALERT system includes stream gage and rain gage data in real time. See www.floodready.org for real time web information with links to gages of other agencies. We also retained the services of OneRain to overlay Doppler radar information. Problem is that we really don’t have a good way of informing people of impending flood risk. The news media uses our website and reports on what they see, but not everyone at risk of flooding is watching the news, particularly when the flooding occurs in the middle of the night.

It is well documented that, given a little bit of warning, residents and business owners can elevate valuables thereby saving significant property damage. Additionally, evacuation routes are not well defined or well known by the public or by the emergency response personnel.

Alternatives Considered: Storm Ready radios and Reverse 911

Responsible Office/Person: Sacramento County with Sacramento City ALERT teams.
Priority (H,M,L): High

Cost Estimate/Potential Source of Funding:

Brief Explanation why this may be Cost Effective:

Desired Schedule: 2006

Recommended Action Item #4: Elevation and acquisitions project

Category for CRS purposes: Property Protection

Issue / Background Statement: The Sacramento County Department of Water Resources applied for and received Hazard Mitigation Grant Program (HMGP) and Flood Mitigation Grant (FMA) funding for the purpose of elevating homes and acquiring and removing homes. An application has been submitted for Pre-Disaster Mitigation (PDM) Assistance as well.

Since the beginning of the HMGP and FMA programs, many homes have been removed from harm’s way. In the Unincorporated County, to date, 53 home elevations have been performed, 22 structure acquisitions and removals, and 18 other home elevations have been reimbursed. A total of $6,453,109 (federal) has been spent on these mitigation projects.

Other Alternatives Considered (including no action): The flooding problems addressed by these mitigation programs are those that have no other solution. The acquisition program for instance took place in the Dry Creek Parkway.

At the outset of the acquisition activities, there were 43 flood prone homes located on “Cherry Island”, a piece of land located between the two branches of Dry Creek in northern Sacramento County. This area has a history of frequent and dangerous flooding and comprises a federal and state floodway. Because of the progress made through the HMGP and FMA programs, 22 of the 43 structures have been removed.

The home elevations are located Countywide. The homes elevated have all been reviewed to check for other, less expensive or locally funded options. The Sacramento County stormwater utility provides revenue for small to medium engineering projects from increasing drain inlet capacity to installing detention basins to building floodwalls to correct flooding problems. All of the homes elevated were considered for such projects but were ineligible for either cost or physical reasons. The mitigation programs allow the opportunity to mitigate problems for individual homes when a regional project is not feasible.

Responsible Office / Person: SAC County DWR

Priority (H,M,L): High
**Cost Estimate / Potential Source of Funding:** Current grant amounts (November, 2004) are: $1,089,570 in HMGP funds; $979,083 in FMA funds; and $1,400,000 in PDM funds.

**Brief Explanation why this may be Cost Effective:** All mitigation projects have been reviewed for cost effectiveness using procedures outlined by the California State Office of Emergency Services using the Corps of Engineers developed Riverine Benefit Cost Analysis program. This program equates flood depth to a dollar amount of flood damage using the depth-damage function, then compares this to an anticipated cost for the mitigation project using Sacramento County developed project cost estimating analyses.

**Desired Schedule:** It is the desire of Sacramento County to complete all elevation and acquisition work by the end of 2005.

**Recommended Action Item #5:** Dry Creek Peak Flow at Placer County Line  
**Category for CRS purposes:** 440  
**Issue/Background Statement:** It is the intention of the April 1992 study to attenuate peak flows at the Placer/Sacramento County line to the level currently mapped by FEMA’s Flood Insurance Study, dated 7/6/98.

**Other Alternatives Considered:** The Placer County Flood Control and Water Conservation District and Sacramento County, Final Report, Dry Creek Watershed Flood Control Plan, April 1992, Table 4-1 provides a list of 24 proposed regional detention basins.

**Responsible Office/Person:** Placer County  
**Priority (H,M,L):** Medium  
**Cost Estimate/Potential Source of Funding:**  
**Brief Explanation why this may be Cost Effective:** Details included in 1992 Study.

**Desired Schedule:** Review of 1992 Study with Placer County should be a priority. The Study should then be revised and resubmitted publicly to each County Board. This will allow for scheduling of the various components of the plan or determination whether or not an update of the Study is proper.

**Recommended Action Item #6:** Flood Insurance Rate Map Studies (FIS)  
**Category for CRS purposes:** Preventative  
**Issue / Background Statement:** Many of our north county urban streams are in need of updated flood insurance studies. The County of Sacramento Department of Water Resources has been
keeping high water records and has found, over the years that record water surface elevations are higher than the 100-year elevation shown on the current Flood Insurance Rate Maps. The County keeps record of these high water episodes plotted on a profile compared to existing FIS.

Particular Streams of Interest are Arcade and Cripple Creeks and their tributaries.

**Other Alternatives Considered (including no action):** If financial assistance is not available to restudy these streams, the County may like to map known high water elevations on GIS, shown as a ‘local flood hazard.’ This will allow for better public information and better understanding of how to regulate development while saving the exorbitant cost of a map revision.

**Responsible Office/Person:** Sacramento County Dept. of Water Resources

**Priority (H,M,L):** Medium

**Cost Estimate/Potential Source of Funding:** FEMA with cost share from the County existing enterprise funds.

**Brief Explanation why this may be Cost Effective:** It is difficult to put a price on public information, particularly in the case of flood risk. People need to know to construct structures adequately above the 100-year floodplain as well as whether or not they should purchase flood insurance. Furthermore, when there are small projects that require a letter of map revision or map amendment, FEMA needs to be clear what water surface elevation is most appropriate. Recent 2’ contours are available on GIS platform. The work should not be too difficult.

**Desired Schedule:** 2006

**Recommended Action Item #7:** Interior Flooding Due to High Water in the American River. Review necessary improvements to pump stations serving interior drainage.

**Category for CRS purposes:**

**Issue/Background Statement:** Various studies have been done over the years associated with the performance of the interior drainage pump stations along the Lower American River Levees when the American River is high. This issue may become more important as the improvements are made to Folsom Dam allowing 64,000 cfs release on a more regular basis.

These relatively small pump stations, serving local drainage for developed areas, include: D43 Wilhaggin, D02 Kadema, D10 Manlove, D09 Mayhew, D06 North Mayhew, D11 West Coloma, D13 Mills Tower, D08 Citrus Road, D07 Sunriver, and D01 Hagginbottom.

**Other Alternatives Considered:** Prior to improvement, if any, map the floodplain associated with failure or reduced capacity of the pump stations. Ultimately, where needed, capacity of the facility should be improved. Another alternative might be to elevate at risk homes.
**Responsible Office/Person:** Sacramento County with SAFCA

**Priority (H,M,L):** Medium. The Folsom Dam modifications will take six years to complete.

**Cost Estimate/Potential Source of Funding:**

**Brief Explanation why this may be Cost Effective:**

**Desired Schedule:**

**Recommended Action Item #8:** Mayhew Drain – Flood Control Project

**Category for CRS purposes:** Structural Protection

**Issue / Background Statement:** This area was hammered by high intensity storm on January 10, 1995 causing much flooding. Fortunately, the American River was not flowing at a high level on this same date. This concern is further exacerbated by the possibility that higher flows will occur more often in the American River after the Folsom Dam modifications are completed.

**Other Alternatives Considered:** A detailed hydraulic analysis is needed to determine the needed repairs which may include increasing the size of the culvert under the freeway and under Folsom Blvd into the leveed area adjacent to the river. An automated sluice gate may be needed to keep river water from backwatering into the Mayhew Drain.

**Responsible Office/Person:** SAFCA, Army Corps of Engineers, Sacramento County DWR

**Priority (H,M,L):** Medium as the Folsom Dam modifications may be six years away.

**Cost Estimate/Potential Source of Funding:**

**Brief Explanation why this may be Cost Effective:**

**Desired Schedule:**
**Recommended Action Item #9:** Morrison Creek Detention Basin at Aggregate Pit

**Category for CRS purposes:** Structural Protection

**Issue/Background Statement:** There is much development occurring upstream of the large aggregate mining pits located along Morrison Creek southwest of Mather Air Force Base (Jackson Road and Bradshaw Road area) These sites should serve well for attenuation of peak flow, now and in the future. Currently, there is an agreement and a weir that will spill peak flows into the Granite Construction aggregate mine. What some people would look for in the future is an overall beautification and functional facility that includes natural and beneficial functions as part of an overall mining reclamation plan.

The downstream neighbor, the City of Sacramento, will look for the County to attenuate peak flows in order to protect flooding concerns.

**Other Alternatives Considered (including no action):**

**Responsible Office/Person:** Sacramento County DWR with other City of Sacramento Departments, SAFCA, park and open space proponents, and the Mining Companies.

**Priority (H, M, L):** medium, although it is not too early to begin working on a plan.

**Cost Estimate/Potential Source of Funding:**

**Brief Explanation why this may be Cost Effective:**

**Desired Schedule:**

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**Recommended Action Item #10:** Coordinate with SAFCA on Proposed Flood Control projects on Florin Creek in the Morrison Creek Streams Group

**Category (for CRS purposes):** Structural Protection

**Other Alternatives Considered (including No Action):**

**Issue/Background Statement:**

**Responsible Office/Person:** SAFCA

**Priority (H, M, L):**

**Cost Estimate/Potential Source of Funding:**

**Cost-Effectiveness Explanation:**
Desired Schedule: SAFCA estimates this work to begin in 2007-08.

**Recommended Action Item #11:** Channel/Detention Project on South Branch of Arcade Creek upstream of Kenneth Avenue in the Fair Oaks community.

**Category for CRS purposes:** Structural Protection

**Issue/Background Statement:** South Branch Arcade Creek has a tendency to flood, exceeding the capacity of the 45-year-old concrete lined channel. Additionally, there is urban flooding upstream of the headwaters of the open channel due to an inadequate pipe at the point of discharge. There is a desire to remove the existing 33” x 60” corrugated metal pipe, from Illinois Avenue to the headwaters of the open channel, with a 60” concrete pipe. The upstream pipe work has been done. This last segment awaits improvement of the channel.

**Other Alternatives Considered (including no action):** The channel, however, should not be improved until a detention basin is constructed on the north side of the creek, west of Kenneth Avenue. Then the crossing at Kenneth Avenue should be increased, and subject to a hydraulic model, other upstream improvements should be made including another possible basin in a vacant parcel near Turnbull Avenue. Another alternative would be to elevate flood-prone structures.

**Responsible Office/Person:** Sacramento County DWR

**Priority (H,M,L):**

**Cost Estimate/Potential Source of Funding:**

**Brief Explanation why this may be Cost Effective:**

**Desired Schedule:**

**Recommended Action Item #12:** Hire a Consultant to Prepare a Condition Assessment report of the County drainage system. Report must include list and cost of needed repairs, pipe facility life expectancy, financial analysis of costs, evaluation of several alternative methods to fund repairs and maintenance of the drainage system.

**Category for CRS purposes:** Drainage Operations and Maintenance

**Issue/Background Statement:** Due to the substantial size of the underground drainage system, and limited funding for cleaning and repairing system, several reaches of pipes have exceeded their life expectancy. The age of the drainage pipes and the materials used is currently unknown. Making condition assessment and financial planning to pay for repairs impossible. The County has yet to achieve a proactive condition assessment of the entire underground drainage. A
proactive inspection regimen will aid in the assessment of pipeline condition and will help prevent or mitigate future flooding.

**Other Alternatives Considered (including no action):** No action, continue performing repairing pipes based upon constituent complaints and problems identified during storm events. Increased system failures as a result of not identifying potential failures before they occur. Inability to fund future replacement of drainage pipes.

**Responsible Office / Person:** Drainage Operations and Maintenance

**Priority (H,M,L):** H

**Cost Estimate / Potential Source of Funding:** $500,000 / Stormwater Utility –limited funding

**Brief Explanation why this may be Cost Effective:** A thorough understanding of the drainage system age and construction materials is needed to plan and fund replacement of the facilities. Financing needs to initiated now in order to be able to fund future repairs. Repairing and upgrading the underground drainage system prior to failure will help minimize the costs incurred during and after major flood events.

**Desired Schedule:** Immediate

**Recommended Action Item #13:** Purchase Bucket Machine trucks - drainage pipe cleaning equipment.

**Category for CRS purposes:** Drainage Operations and Maintenance

**Issue/Background Statement:** Conventional pipeline cleaning methods and equipment such as Hydro-Vactors are ineffective when removing large quantities of sediment and debris from pipelines. Bucket Machines are designed to remove the large quantity of sediment and debris that can build up in drainage pipes.

**Other Alternatives Considered (including no action):** No action at this time – currently looking for alternative methods of cleaning

**Responsible Office/Person:** Drainage Operations and Maintenance

**Priority (H,M,L):** H

**Cost Estimate/Potential Source of Funding:** 2 trucks - $500,000 / Stormwater Utility –limited funding

**Brief Explanation why this may be Cost Effective:** The accumulation of stormwater throughout the underground drainage is ultimately conveyed through a mainline pipe system. If the mainline pipe system is not functioning it will cause flooding to occur throughout the
upstream drainage systems. A thorough cleaning of the mainline pipe system will greatly reduce the likelihood of upstream flooding. One flooded home in the Sacramento Area will cost between $250,000 to $1,000,000 to replace.

Desired Schedule: Immediate

Recommended Action Item #14: Purchase emergency power generators for the storm drainage pump stations

Category for CRS purposes: Emergency Operations

Issue/Background Statement: Due to the likelihood of a power failure during a large storm event the storm drainage pump stations need to have an alternative source of power so the pumps will run when utility electrical power is not available.

Other Alternatives Considered (including no action): No Action

Responsible Office/Person: Drainage Operations and Maintenance

Priority (H,M,L): H

Cost Estimate/Potential Source of Funding: Average $100,000 per generator for 20 pump stations. Total cost: $2,000,000 / Storm Water Utility – funding limited

Brief Explanation why this may be Cost Effective: This backup power supply system will keep the drainage pump stations up and running during the critical periods of a storm event. Keeping the pumps working at all times will ultimately prevent flooding. One substantially flood damaged home in the Sacramento Area will cost between $250,000 to $1,000,000 to replace.

Desired Schedule: Immediate action

Recommended Action Item #15: Coordinate with the City and State to create defensible space to protect vital infrastructure located in the American River Parkway from wildfires.

Category (for CRS purposes): Emergency Services

Issue/Background Statement: Major power lines traverse the American River Parkway in the vicinity of Bushy Lake. Tree and brush growth amongst the transmission line towers pose a potential wildfire hazard that could lead to major power disruption.

Other Alternatives Considered (including No Action): No Action
**Responsible Office/Person:** Sacramento County, State of California, SMUD, City Utilities Department, Fire Protection Districts, City Fire Department

**Priority (H, M, L):**

**Cost Estimate/Potential Source of Funding:**

**Cost-Effectiveness Explanation:**

**Desired Schedule:**

**Recommended Action Item #16:** Television Inspection Truck for Drainage Pipeline Condition Assessment

**Category for CRS purposes:** Drainage Operations and Maintenance

**Issue/Background Statement:** Due to the substantial size of the underground drainage system, the current television inspection truck is only able to respond reactively to drainage problems. The County has yet to achieve a proactive condition assessment of the entire underground drainage. A proactive inspection regimen will aid in the assessment of pipeline condition and will help prevent or mitigate future flooding.

**Other Alternatives Considered (including no action):** No action, continue performing inspections based upon constituent complaints and problems identified during storm events. Increased system failures as a result of not identifying potential failures before they occur.

**Responsible Office/Person:** Drainage Operations and Maintenance

**Priority (H,M,L):** H

**Cost Estimate / Potential Source of Funding:** $300,000 / Stormwater Utility –limited funding

**Brief Explanation why this may be Cost Effective:** A thorough inspection and assessment of the drainage system will help identify pipelines that need to be repaired or upgraded. Repairing and upgrading the underground drainage system prior to failure will help minimize the costs incurred during and after major flood events. In addition a thorough condition assessment will result in obtaining information that can be used to justify a rate increase to meet the anticipated repair costs of the extensive drainage pipe system.

**Desired Schedule:** Immediate

**Recommended Action Item #17:** Coordinate with SAFCA and the City of Sacramento on Public Education and Outreach regarding the changing Flood Insurance requirements related to the recertification of 100-yr. protection on the American and Sacramento Rivers.
**Category (for CRS purposes):** Property Protection/Public Information

**Other Alternatives Considered (including No Action):** No Action

**Issue/Background Statement:** In May 22, 2000 the AR Zone was re-designated A99 after substantial improvements were made to the levee system that brought the level of protection back to the 100-year flood. This removed the AR development requirements, while maintaining the insurance requirements. Additional levee work and erosion control efforts have been completed that will change the A99 zone to a Shaded X zone by early 2005. This will relieve approximately 40,000 property owners, mostly in the City of Sacramento, of the mandatory Flood Insurance requirement. SAFCA is currently planning an outreach project to the property owners that will be affected by the flood zone change. This outreach will include a direct mailing to the property owners notifying them of the change. The mailing should encourage property owners to maintain Flood Insurance at a reduced rate, as they are still at risk to a levee breach/failure flood.

**Responsible Office/Person:** SAFCA/ City Public Information Program working group/ Department of Utilities/County DWR

**Priority (H, M, L):** H

**Cost Estimate/Potential Source of Funding:** $215,000/SAFCA/FEMA

**Cost-Effectiveness Explanation:** People need to be informed of flood risk when they live behind levees. This program helps inform residents as to the risk and helps them to make informed decisions about maintaining flood insurance.

**Schedule:** Late 2004/Early 2005

**Recommended Action Item #18:** Coordinate with SAFCA, USACE, and Sacramento City on Proposed Flood Control projects on Magpie Creek that may impact the Rio Linda area.

**Category (for CRS purposes):** Structural Protection

**Other Alternatives Considered (including No Action):**

**Issue/Background Statement:** The proposed project would involve raising a portion of the Magpie Creek Diversion Channel (MCDC) levee between Raley Boulevard and Vinci Street, constructing a short section of new levee along Raley Boulevard to prevent outflanking flows, purchasing and preserving 80 acres of lands generally between Magpie and Don Julio Creeks to detain peak flows during major flood events, constructing a new maintenance road between Vinci Avenue and Dry Creek Road adjacent to the left bank (looking downstream) of the MCDC, and constructing a new culvert under the bike trail at Robla Creek. No channel widening is proposed.
Residents in the unincorporated area have voiced concerns about the proposed bike trail culvert size at Robla Creek. The new culvert must be adequate to prevent flows from backing up into Robla Creek. In a SAFCA 13 March 2002 Declaration, SAFCA proposed the addition of a 30 feet wide by five feet high culvert at the Bike Trail. This created an additional 150 square feet of area for the storm water to flow through the Bike Trail. A USACE January 2004 document is proposing culverts of about 75 square feet in area, which is half of SAFCA’s proposal. This could potentially cause flood problems in the unincorporated County, while alleviating problems in the incorporated area.

**Responsible Office/Person:** SAFCA/UASCE/ County DWR/ City Department of Utilities

**Priority (H, M, L):**

**Cost Estimate/Potential Source of Funding:** SAFCA

**Cost-Effectiveness Explanation:**

**Schedule:** SAFCA estimates construction to begin in 2005-2006.

**Recommended Action Item #19:** Coordinate with the CALFED and the State Division of Water Resources to implement flood mitigation projects in the Beach Stone Lakes/Point Pleasant area.

**Category (for CRS purposes):** Structural Protection

**Issue/Background Statement:** Point Pleasant is an area within the 100-year floodplain (BFE 16') and is a recipient of all of the drainage from the south county streams. Problems are exacerbated when the Cosumnes River floods. There has been much debate over the 150 plus year history of the reclamation of the Sacramento River and Delta. The Cal-Fed project is supposed to be a big picture approach to delta levees and water supply issues but has been a very slow and cumbersome process.

**Other Alternatives Considered (including No Action):** No Action

**Responsible Office/Person:** Sacramento County, State of California, CALFED

**Priority (H, M, L):**

**Cost Estimate/Potential Source of Funding:** All of Zone 11A (drainage developer impact fees for the greater Morrison Creek Streams Group) contributes to the Interstate 5/Point Pleasant Flood Protection Project in the amount of $220.00 per acre (in 2003 dollars). Additionally, fees have been collected from Lakeside/Laguna and Elliott Ranch South Developments as compensation for impacts.
Cost-Effectiveness Explanation:

Desired Schedule:

**Recommended Action Item #20:** Initiate a discussion with Sutter County Department of Water Resources regarding their concerns over the AE flood zone immediately to the north of RD 1000, and the potential impact of their concerns on the goal of 200 year protection for the RD 1000 basin.

**Category (for CRS purposes):** Structural Protection

**Issue/Background Statement:** Sutter County has expressed some concerns about the AE flood zone immediately north of the Cross Canal, which is the northern boundary of RD 1000. There may be some need to improve the levees on the south side of the Canal so that they don’t break in the case that the north levees are breached.

**Other Alternatives Considered (including No Action):** No Action

**Responsible Office/Person:** Sacramento County Department of Water Resources, RD 1000

**Priority (H, M, L):** High

**Cost Estimate/Potential Source of Funding:** TBD

**Cost-Effectiveness Explanation:** Life safety, Reduced flood losses

**Desired Schedule:** 2005