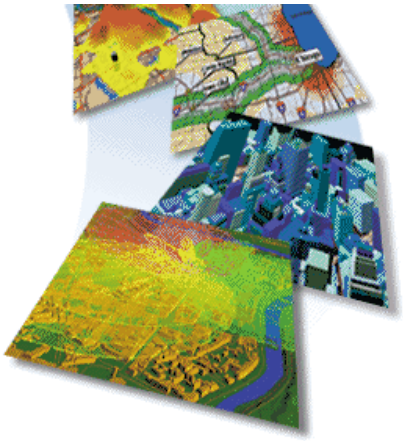
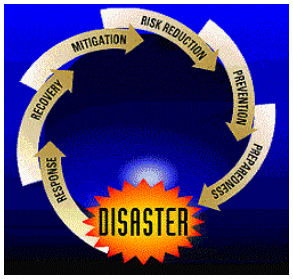
December 2004

Sacramento County, California Multi-Hazard Mitigation Plan





Developed by:
AMEC Earth & Environmental, Inc.
Santa Barbara, CA and Lakewood, CO
with
The Hazard Mitigation Technical Assistance Partnership, Inc.
Folsom, CA and Park Forest, IL

EXECUTIVE SUMMARY

This plan is the product of a yearlong planning process undertaken by Sacramento County. The purpose is to meet the requirements of the Disaster Mitigation Act of 2000 (PL 106-3900) and thereby maintain continued eligibility for certain Hazard Mitigation – or disaster loss reduction – programs from FEMA, the Federal Emergency Management Agency, now a part of the Department of Homeland Security. More importantly, this plan and planning process lays out the strategy that will enable Sacramento County to become less vulnerable to future disaster losses.

The process followed a methodology prescribed by FEMA. It began with the formation of a Hazard Mitigation Planning Committee (HMPC) compromised of key County and Stakeholder representatives. The planning process examined the recorded history of losses resulting from natural hazards, and analyzed the future risks posed to the county by these hazards. The largest disasters, in terms of one-time losses, were floods. The HMPC puts forth several mitigation goals and objectives that are based on the results of the risk assessment. The plan also puts forth specific recommendations for actions that can mitigate future disaster losses.

The purpose of hazard mitigation and this plan is to reduce or eliminate long-term risk to people and property from natural hazards and their effects. This plan has been prepared to meet the Disaster Mitigation Act of 2000 (DMA 2000) requirements in order to maintain Sacramento's eligibility for FEMA Pre-Disaster Mitigation (PDM) and Hazard Mitigation Grant Programs (HMGP). The Plan also functions as the CRS Floodplain Management Plan for the County as well as the City of Sacramento.

The plan is based on a hazard identification and risk assessment of all the potential natural hazards that could impact Sacramento County. The plan also includes a review of the County's current capabilities with regards to reducing hazard impacts. The plan includes recommended additional action items for the County and its jurisdictions to reduce their vulnerability to potential disasters. The multi-jurisdictional plan includes the County, the City of Sacramento, and the incorporated municipalities of Citrus Heights, Elk Grove, Folsom, Galt, Isleton, Rancho Cordova, as well as 69 special districts that include SAFCA, SMUD, as well as school, recreation and park, water, community service, special and other districts.

TABLE OF CONTENTS

	Page Number
Executive Summary	**i**
Table of Contents	**ii**
1.0 Introduction ……..	**1-1**
2.0 Community Profile ……...	**2-5**
3.0 The Planning Process ……..	**3-1**
4.0 Risk Assessment ……..	**4-1**
4.1 Hazard Identification …….	**4-3**
4.2 Vulnerability Assessment ……	**4-35**
4.3 Capability Assessment ……	**4-59**
5.0 Mitigation Strategy …….	**5-1**
6.0 Introduction to the Community Elements ……....	**6-1**
6-1 Sacramento County	**6-1-1**
6-2 Sacramento City	**6-2-1**
6-3 Citrus Heights	**6-3-1**
6-4 Elk Grove	**6-4-1**
6-5 Folsom	**6-5-1**
6-6 Galt	**6-6-1**
6-7 Isleton-Delta	**6-7-1**
6-8 Rancho Cordova	**6-8-1**
6-9 The Districts	**6-9-1**
7.0 Plan Implementation and Maintenance ……	**7-1**

Appendix A – Acronyms
Appendix B – Participants
Appendix C – References
Appendix D - Public Comments on 2nd Draft
Appendix E – Alternatives & Criteria
Appendix F – Community Adoptions
Appendix G – City of Sacramento Resolution for Public Outreach

Multi-Hazard Mitigation Plan

1.0 Introduction

Sacramento County, the City of Sacramento and the City of Folsom funded, coordinated and marshaled the effort necessary to develop this countywide Multi-Hazard Mitigation Plan pursuant to the requirements of the Disaster Mitigation Act of 2000 (PL 106-390), hereafter referred to as DMA (see Appendix A for a list of acronyms used in this document). This section of the Plan describes the purpose and need for the Plan, the scope of this effort, and the Plan organization.

Hazard Mitigation is defined as any sustained action taken to reduce or eliminate long-term risk to human life and property from hazards. Planning is the process of setting goals, developing strategies, and outlining tasks and schedules to accomplish the goals.

Hazard Mitigation Planning is the process through which natural hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies that would lessen the impacts are determined, prioritized, and implemented.

Hazard Mitigation Planning is required for state and local governments to maintain their eligibility for certain federal disaster assistance and hazard mitigation funding programs. Communities at risk from natural disasters can ill afford to jeopardize this funding.

PURPOSE AND NEED

Each year, natural disasters in the United States take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars each year to help communities, organizations, businesses and individuals recover from disasters. These monies only partially reflect the true cost of disasters, because additional expenses to insurance companies and non-government organizations are not reimbursed by tax dollars.

Additionally, many natural disasters are predictable. Many more are repetitive, often with the same results. Many of the damages caused by these events can be alleviated or even eliminated.

FEMA, the Federal Emergency Management Agency, now a part of the Department of Homeland Security, has made reducing losses from natural disasters one of its primary goals. Hazard Mitigation Planning and subsequent implementation of projects, measures, and policies developed through those plans, is the primary mechanism in achieving these goals. Success in reducing disaster damages has taken place as the result of mitigation projects implemented as a result of mitigation planning.

This plan was developed pursuant to the DMA regulations published in the *Federal Register* Volume 67, Number 38, Tuesday, February 26, 2002. Section 104 of DMA revises the Robert T. Stafford Disaster Relief and Emergency Assistance Act by adding Section 322, which provides new and revitalized emphasis on hazard mitigation, including adding a new requirement for local mitigation plans. These new local mitigation-planning regulations are implemented through 44 CFR Part 201.6.

DMA requires local governments to have a FEMA-approved Hazard Mitigation Plan in place. Compliance with these requirements will maintain continued eligibility for certain Hazard Mitigation – or disaster loss reduction – programs from FEMA for each organization that participated in this planning process.

More importantly, proactive mitigation planning at the local level can help reduce the cost of disaster response and recovery to property owners and government by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruption.

SCOPE

The Sacramento County Multi-Hazard Mitigation Plan is a multi-jurisdictional plan that covers the following incorporated communities that participated in the planning process:

- City of Citrus Heights
- City of Elk Grove
- City of Folsom
- City of Galt
- City of Isleton
- City of Ranch Cordova
- City of Sacramento and
- Sacramento County.

This plan also covers 69 additional special districts and organizations within Sacramento County that meet the DMA definition of "local government" and participated in the planning process. The types of districts and organizations include:

- Community service districts (3)
- Conservation districts (2)
- Fire protection districts (6)
- Flood control agency (1)
- Recreation and park districts (9)
- Reclamation districts (11)
- School districts (13)
- Utility districts (2) and
- Water districts (22).

All organizations participating in this planning process are listed in Appendix B.

This plan identifies goals, objectives and measures for hazard mitigation and risk reduction to make communities less vulnerable and more disaster resistant and sustainable. Information in the plan can also be used to help guide and coordinate mitigation activities and local policy decisions for future land use decisions.

This Plan follows DMA planning requirements and associated guidance for developing Local Hazard Mitigation Plans. This guidance sets forth a generalized 4-task process:

1) Organize resources
2) Assess hazards and risks
3) Develop a mitigation plan and
4) Evaluate the work.

This Plan also utilizes the process set forth in FEMA Region IX's Crosswalk Reference Document for Review and Submission of Local Mitigation Plans, and the California Office of Emergency Services (CA-OES) guidance for Local Hazard Mitigation Plans (LHMP).

This plan addresses natural hazards only. Although the participants of the Sacramento Hazard Mitigation Planning Committee (HMPC) recognize that FEMA is both encouraging and promoting communities to integrate human-caused hazards into the mitigation planning process, the scope of this effort did not address these human-caused hazards for two reasons. First, many of the planning activities for the mitigation of human-caused hazards are either underway or complete, and have been developed by a different set of organizations. Secondly, DMA requires extensive public information and input, and this is in direct conflict with the secrecy necessary in planning for the fight against chemical, biological, and radiological terrorism. The HMPC determined it was not in the community's best interest to publicly share specific information about the area's vulnerability to human-caused hazards.

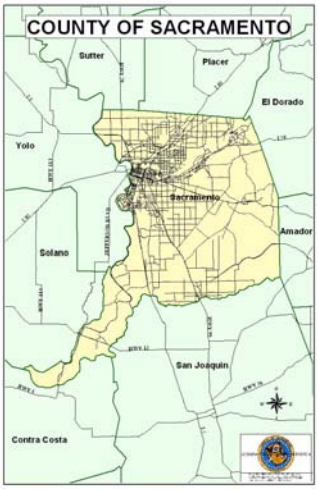
(This page has been left intentionally blank.)

Multi-Hazard Mitigation Plan

2.0 Community Profile

GEOGRAPHY: LOCATION, POPULATION AND SIZE

Sacramento County was incorporated in 1850 as one of the original 27 counties of the State of California. The County's largest city, the City of Sacramento, is the seat of government for the State of California and also serves as the county seat. Sacramento was incorporated in 1849 and became the State Capital in 1854. The County is the major component of the Sacramento Metropolitan Statistical Area ('SMSA') which includes Sacramento, El Dorado, and Placer Counties.



Sacramento County encompasses approximately 955 square miles in the middle of the 400-mile long Central Valley, which is California's prime agricultural region. The County is bordered by Contra Costa and San Joaquin Counties on the south, Amador and El Dorado Counties on the east, Placer and Sutter Counties on the north, and Yolo and Solano Counties on the west. Sacramento County extends from the low delta lands between the Sacramento and San Joaquin rivers north to about ten miles beyond the State Capitol and east to the foothills of the Sierra Nevada Mountains. The southernmost portion of Sacramento County has direct access to the San Francisco Bay.

Sacramento County is the eighth most populous county in California. The following table estimates the population and size of the County and its incorporated communities:

	Population	Size
Sacramento County	1,379,440	955.01 Sq. miles
City of Sacramento	411,200	96.34 Sq. miles
City of Elk Grove	94,850	38.60 Sq. miles
City of Citrus Heights	85,400	14.24 Sq. miles
City of Rancho Cordova	54,000	35.00 Sq. miles
City of Folsom	51,300	24.17 Sq. miles
City of Galt	19,550	2.95 Sq. miles
City of Isleton	840	.46 Sq. miles
Unincorporated Area	662,300	813.25 Sq. miles

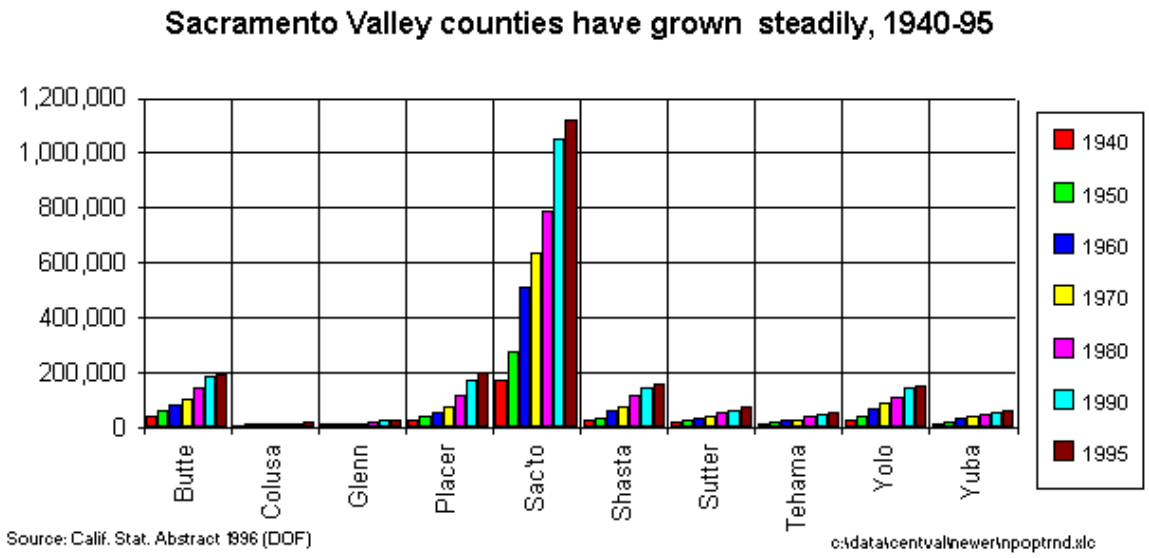
Source: SacCounty.net; Revised to include Rancho Cordova
All maps on this page courtesy SacCounty.net

Over the last decade, the County population has increased rapidly, as the following table depicts for the period 1990 – 2000. Elk Grove and Rancho Cordova are not included as they were not incorporated until 2000 and 2003, respectively. No percent change is shown for Citrus Heights, as it was not incorporated until 1997. The incorporations of Citrus Heights, Elk Grove and Rancho Cordova have shifted a large percentage of the county's population out of the unincorporated county.

	1990 Population	2000 Population	Numeric Change	Percent Change
Sacramento County	1,041,219	1,223,499	182,280	17.5
City of Citrus Heights		85,071		
City of Folsom	29,802	51,884	22,082	74.1
City of Galt	8,889	19,472	10,583	119.1
City of Isleton	833	828	-5	-0.6
City of Sacramento	369,365	407,018	37,653	10.2

Source: California Department of Finance, Demographic Research Unit: http://www.dof.ca.gov/html/demograp/table1.xls

The next table further emphasizes the significant population growth within Sacramento County.



Sacramento County is responsible for providing 'municipal'-type services such as water supply, drainage, sewer and garbage collection to the unincorporated area making it a larger service provider than all the cities combined. (Note, however, that there are 22 water providers within the county). The County also provides some drainage services for Citrus Heights, Elk Grove and Rancho Cordova.

HISTORY

Source: History (edited) and picture are from www.discovergold.org

Sacramento's history began in 1839 when Johann Augustus Sutter settled at the confluence of the American and Sacramento Rivers. When the Mexican government and Governor Alvarado granted 48,000 acres of land to Sutter, they did not realize that they had given away a literal goldmine. Gold was discovered in 1848 just 30 miles east of Sacramento, in Coloma. The rest is history!

The news of the discovery spread like wildfire around the globe and fortune hunters came by the thousands from all corners of the world to California—Sacramento to be precise. In fact, it was recorded as the largest human migration in history. The city has been on the move ever since and is now one of the fastest growing regions in the United States. Sacramento has been called a snapshot of Wild West history in a modern, world-class city. The California Gold Rush era is preserved in Old Sacramento, a 28-acre town of historic buildings, museums and monuments. With strong preservation efforts, the wooden sidewalks, horse-drawn carriages, Pony Express monuments and Mississippi-style riverboats reflect the nostalgic appeal of early American history.

CLIMATE

The climate for Sacramento is Mediterranean with mild winters and dry summers. Annual average temperatures range from 53 to 93 degrees Fahrenheit. The humidity in the area is low, averaging 45 percent. Sacramento average annual rainfall is 17.3 inches per year, with the highest average amounts falling between December and February. It rarely snows. The table below displays the monthly and annual climate statistics for the City of Sacramento.

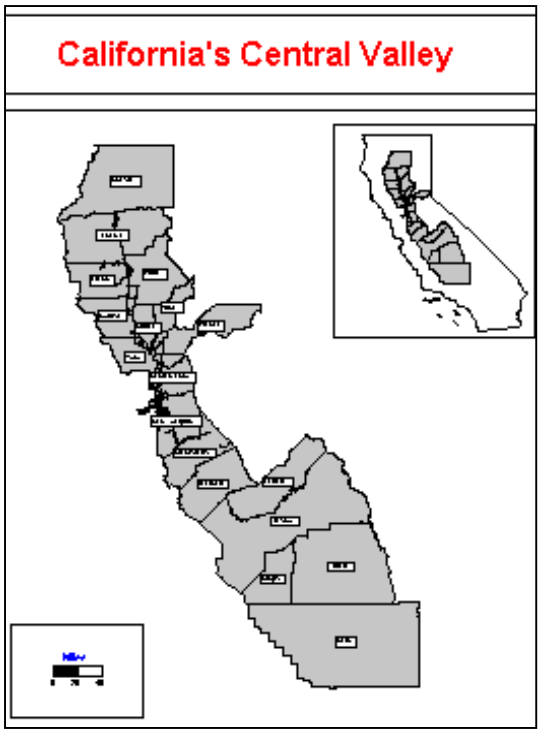
Sacramento (City)	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average High temperature in degrees F	73	53	60	64	71	80	87	93	91	87	78	63	53
Average Low temperature in degrees F	48	38	41	43	46	50	55	58	58	56	50	43	38
Number of days warmer than 90 degrees F	73	0	0	0	Tr	5	12	22	19	12	2	0	0
Number of days colder than 10 degrees F	0	0	0	0	0	0	0	0	0	0	0	0	0
Average Precipitation in inches	17.3	3.6	2.8	2.4	1.3	0.4	0.1	Tr	0.1	0.3	1	2.4	2.8
Average Snow in inches	Tr	Tr	Tr	Tr	Tr	0	0	0	0	0	0	0	Tr
Number of days with some precipitation	58	10	8	9	5	3	1	Tr	Tr	2	3	7	9
Number of days with thunderstorms	2	Tr	Tr	1	1	Tr	Tr	Tr	Tr	Tr	Tr	Tr	Tr
Average percentage of Relative Humidity	45	70	59	51	43	36	31	28	29	31	39	57	70
Average Windspeed in knots	9	8	8	9	9	10	11	9	9	9	9	8	8

Source: www.bestplacesnet./climate/climateus4.asp?wmo=724830 (Sperling's Best Places)

PHYSICAL FEATURES AND LAND USE

Source: *A Statistical Tour of California's Great Central Valley*
By Kenneth W. Umbach, Ph.D. @ www.library.ca.gov/CRB/97/09

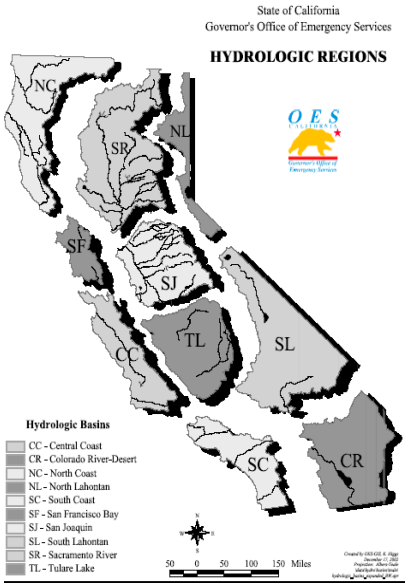
Sacramento County is part of California's great Central Valley, which stretches from Shasta County to Kern County – some 450 miles long and typically 40 to 60 miles wide. The Central Valley encompasses 18 counties with a total of over five million people and over 42,000 square miles – one-sixth of the population and more than two-fifths of the land area of the state. Geographically, the Central Valley may be subdivided into northern and southern portions. The northern part, the Sacramento Valley, encompasses 10 counties, and the southern, or San Joaquin Valley, encompasses eight.



The Central Valley is centered on agriculture and it is the most productive in California. This productivity has not come easily, as it has required the combined efforts of laborers, landowners, agricultural researchers, hydraulic engineers, and many others over generations.

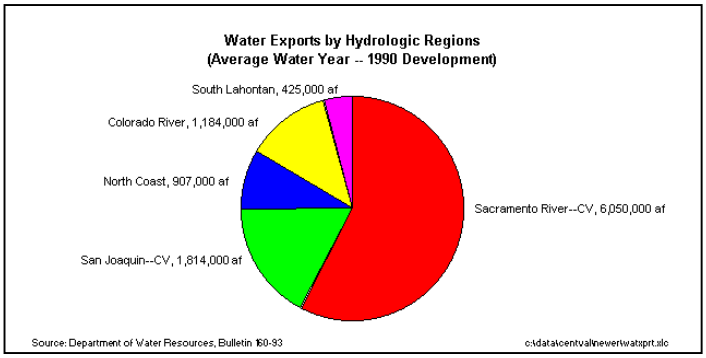
Sacramento County differs from the northern valley in that it is the State Capital, and therefore home to the Legislature, Governor's Office, and many government departments and agencies. The state and local governments employ nearly one-quarter of the county's employed residents (1994 data). The county is also distinctive among Central Valley counties by virtue of its population, which is the largest and most dense in the valley. Even with the county's population density, 61.3 percent of the land is in farms (1992 data), producing milk, wine grapes, pears, field corn, tomatoes, turkeys and other products.

In terms of watersheds, the Central Valley is encompassed by the Sacramento River watershed, the San Joaquin River watershed, and the Tulare Lake watershed. The Sacramento River watershed stretches from roughly the northeast corner of California to Sacramento County. The San Joaquin Valley watershed encompasses the area from the southeast corner of Sacramento County to Madera County.

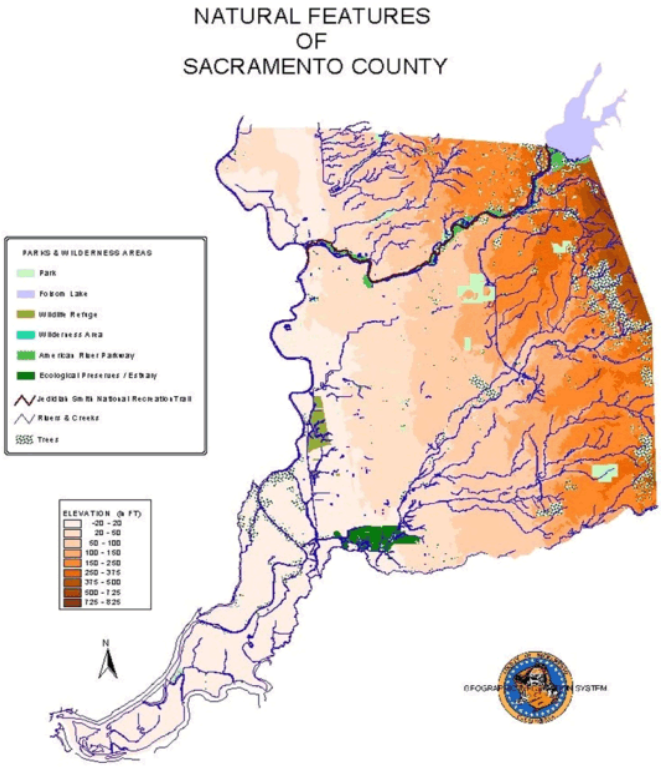


The Sacramento River hydrologic region contains the entire drainage area of the Sacramento River and its tributaries. It begins upstream of Shasta Lake near the Oregon boarder and extends south to the Sacramento-San Joaquin Delta. The San Joaquin River hydrologic region contains the entire drainage area of the San Joaquin and its tributaries. It extends from the Delta and the Cosumnes River in the north to the southern

reaches of the San Joaquin watershed. The northern part of the Central Valley provides much of the State's water. More water is exported from the Sacramento Region than all other regions combined.



The natural features of Sacramento County are displayed below. The colors shaded from peach to brown depict the steady rise in ground elevation from west to east. The City of Isleton, in the southwest tip of the County (the 'Delta,' colored the palest peach) is situated only five feet above sea level. The City of Folsom, just below Folsom Lake in the northeast corner of the county, is situated between 218 and 790 feet above sea level. The gross pool elevation of Folsom Lake is 466 feet above sea level. This eastward gain in elevation portrays how the County rises from the Delta through the Central Valley floor to the foothills of the Sierra Nevada mountains, and highlights how east flowing rain and snowstorms return to the valley as runoff through the rivers and streams of the watersheds.



The downtown urban core of the City of Sacramento is a combination of skyscrapers, neighborhoods and renovated historic buildings.

ECONOMY

Source: California Department of Finance, 2003 Statistical Abstract: www.dof.ca.gov

Sacramento County has a vibrant and diversified economy, including the following attributes:

- The seat of state government
- $300 million in agricultural operations based on milk, fruit, corn, turkey, rice and other products
- Close proximity to large markets
- A transportation system that include two interstate highways, three mainline railroad tracks and an international airport which services 7.4 million passengers annually
- An average unemployment rate of 4.6 percent
- A median income over $30,000 and a
- Superb quality of life supported by temperate climate, affordable housing, six million trees, 14 park districts, 19 major public & private colleges and universities, 16 public school districts, 15 major art and historical museums, 26 public libraries, and 10 hospitals.

In addition, each of the seven incorporated cities, has their own economic engine. These include:

- Citrus Heights
- Elk Grove
- Folsom
- Galt
- Isleton
- Rancho Cordova and
- Sacramento.

Multi-Hazard Mitigation Plan
3.0 Planning Process

44 CFR 201.6(b): "An open public involvement process is essential to the development of an effective plan".

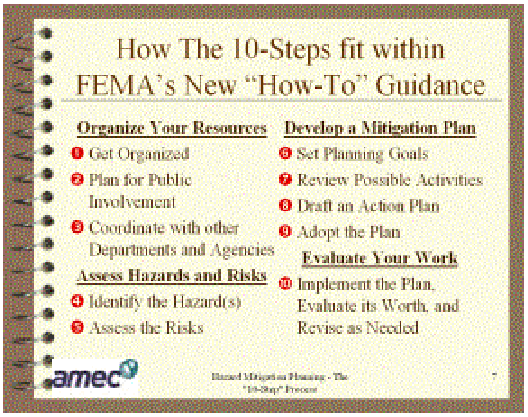
The Sacramento County Department of Water Resources, City of Sacramento Department of Utilities and City of Folsom Public Works Department contracted with AMEC Earth & Environmental (AMEC) to facilitate and develop this countywide, multi-jurisdictional multi-hazard Mitigation Plan through the provision of a professional mitigation planning team. The project was initiated, and project management was provided, by County Department of Water Resources, with administrative assistance by the County Sheriff's Department, Office of Emergency Services (OES). AMEC's role was to:

- Establish a HMPC for Sacramento County, all incorporated communities, and all other "local governments" as defined by the DMA regulations
- Meet all of the DMA requirements as established by federal regulations, following FEMA's planning guidance
- Meet the Community Rating System (CRS) of the National Flood Insurance Program's (NFIP) planning requirements for Repetitive Loss Communities (Sacramento County and Sacramento City only)
- Facilitate the entire planning process
- Identify the data requirements that the HMPC participants could provide, and conduct the research and documentation necessary to augment that data
- Develop and facilitate the public input process
- Produce the draft and final plan documents and
- Coordinate the State OES and FEMA Region IX reviews of this plan, and formal adoption of the plan by the governing board of each participating 'local government'.

Funding for the planning assistance contract was provided to Sacramento County by FEMA through the CA-OES. The required local match was provided with both cash and 'in-kind' matches, through cash disbursements for professional planning services, copying and public notices, and the many hours spent on this effort by each of the HMPC participants attending meetings, collecting data, managing administrative details, as well as through the use of their facilities for meetings.

AMEC established the process for this planning effort utilizing the DMA planning requirements and FEMA's associated guidance. This guidance is structured around a generalized four-phase process. AMEC also integrated an older, more detailed 10-step planning process that was still required at the time this effort was initiated for other FEMA mitigation plans, such as for the NFIP's CRS and Flood Mitigation Assistance (FMA) programs. Thus, AMEC formulated a single planning process that melds these two sets of planning requirements together and meets the requirements of six major programs: DMA, CRS, FMA, Hazard Mitigation Grant Program

(HMGP), FEMA's Pre-Disaster Mitigation Program (PDM), and new flood control projects authorized by the U.S. Army Corps of Engineers (USACE). The graphics below shows how the 10-step process fits within the four-phase process.



Integration of CRS Planning Steps into DMA Planning Process

The following table also serves as a means of cross-referencing the two sets of planning requirements.

DMA AND CRS PLANNING CROSS REFERENCE

Disaster Mitigation Act Planning Regulations (44 *CFR* 201.6)	**CRS Planning Steps**
Planning process	
201.6(c)(1)	1. Organize
201.6(b)(1)	2. Involve the public
201.6(b)(2) & (3)	3. Coordinate
Risk assessment	
201.6(c)(2)(i)	4. Assess the hazard
201.6(c)(2)(ii) & (iii)	5. Assess the problem
Mitigation strategy	
201.6(c)(3)(i)	6. Set goals
201.6(c)(3)(ii)	7. Review possible activities
201.6(c)(3)(iii)	8. Draft an action plan
Plan maintenance	
201.6(c)(5)	9. Adopt the plan
201.6(c)(4)	10. Implement, evaluate, revise

***Source**: CRS Coordinator's Manual, Floodplain Management Planning, Commentary*

LOCAL GOVERNMENT/COMMUNITY PARTICIPATION

The DMA planning regulations and guidance stress that each local government seeking the required FEMA approval of their mitigation plan must:

- Participate in the process
- Detail areas within the planning area where the risk differs from that facing the entire area
- Identify specific projects to be eligible for funding and
- Have the governing board formally adopt the plan.

For Sacramento County HMPC members, 'participation' means the local government representatives will:

- Attend the HMPC meetings
- Provide available data that is requested by the HMPC
- Review and provide/coordinate comments on the draft plans
- Advertise, coordinate and participate in the public input process and
- Coordinate the formal adoption of the plan by the governing boards.

THE PLANNING PROCESS

Step 1: Get Organized – Building the Planning Team

AMEC worked with Sacramento County's Department of Water Resources to establish the framework and organization for the development of this Plan. The Plan was developed by a planning team (the HMPC) led by AMEC, and was comprised of key county, city, and other local government and stakeholder representatives. Sacramento County and the Cities of Folsom and Sacramento formally adopted resolutions that:

1. Established the HMPC and appointed particular departments to participate
2. Identified plan contributions for the participating departments
3. Included representative members of the public and
4. Charged the HMPC with particular responsibilities covering the 10-step planning process.

These resolutions are on file with each community. For Sacramento County and City, these resolutions were adopted to support their CRS programs, and will be included as part of their annual CRS re-certification efforts. Folsom adopted their resolution to demonstrate their leadership and support for this overall planning effort.

The HMPC met 11 times over an 11-month period.

HMPC Meeting	Meeting Topic	2004 Meeting Date
1	Introduction to DMA	January 22
2	Hazard identification	February 27
3	Vulnerability data collection	April 15
4	Existing capability assessment	May 3
5	Formation of planning goals and objectives	May 6
6	Project & early public meetings review	July 22
7	Mitigation categories, alternatives and criteria	August 18
8	Develop mitigation strategy and action items	August 19
9	Review of rough first draft of plan	September 23
10	Review first draft of plan	October 26–November 8
11	Review of 2nd draft comments from public meetings	December 10

As stated in section 1.0, the HMPC included representatives from:

- City of Citrus Heights
- City of Elk Grove
- City of Folsom
- City of Galt
- City of Isleton
- City of Rancho Cordova
- City of Sacramento
- Sacramento County and
- 69 additional special districts and organizations within Sacramento County that meet the DMA definition of "local government"

The list of HMPC representatives is included in Appendix B. Attendees and agendas for each of the HMPC meetings are on file with the County Sheriff's Department OES. The HMPC will stay in existence for the purpose of implementing and updating this plan.

In addition to the HMPC meetings, separate meetings were also conducted with county and city staff to review and evaluate their current CRS program status and the potential impact this plan might have upon their respective class rating.

Step 2: Plan for Public Involvement – Engaging the Public

The HMPC undertook myriad strategies to engage the public in the planning process. Most significantly, 21 citizens participated directly on the HMPC. In addition, two series of formal public meetings were conducted. Three meetings were conducted in July 2004, during the early data collection stages of the planning process. 24 citizens and 21 HMPC members attended these meetings.

Three additional formal public meetings were conducted in December 2004 to hear comments on the second draft of the plan. The draft plan was posted to the websites www.saccounty.net, www.saccodwr.org and www.folsom.ca.us providing the general public 21 days to review the document prior to these public meetings.

Additionally, press releases were developed and distributed by the Public Information Officers (PIO) for the County and City of Sacramento to all the local media outlets and posted to the community websites. Hard copies of the draft plan were also made available for review at libraries, County Municipal Services Agency public counters, and City Hall. Stakeholder and public comments were addressed by the HMPC in Meeting #10 and reflected in the preparation of the final plan. Public comments on the review are included as
Appendix D.

Page 3-The NEWS Thursday, December 2, 2004

County-wide Draft Multi-Hazard Mitigation Plan

The Sacramento County-wide Draft Multi-Hazard Mitigation Plan for public comment is now available on the Internet at: http://www.msa.saccounty.net/waterresources/files/Files.asp?pageID=239

Copies of the Draft Multi Hazard Mitigation Plan can be reviewed at the City of Sacramento Department of Utilities and the County of Sacramento Department of Water Resources. For your convenience, it can also be accessed at: http://www.msa.saccounty.net/waterresources/files/Files.asp?pageID=239

In order to meet the deadlines imposed by FEMA, comments must be submitted in writing and must be received no later than December 10th at 5 p.m. PST. Comments may be presented at any of the public meetings or by email to the project facilitator, Clancy Philipsborn, clancy.philipsborn@amec.com

Meeting dates are as follows:

•Tuesday, Dec. 7, 7 p.m. Citrus Heights Police Services, 6237 Fountain Square Drive, Citrus Hts.

•Wednesday, Dec.8, 7 p.m. Lisbon Elementary School Cafeteria, 7555 South Land Park Drive, Sacto

•Thursday, Dec. 9, 7 p.m. Arden-Dimmick Community Library, 891 Watt Avenue, Sacramento.

Page 5-The NEWS Th

Special Meeting to Review Disaster Mitigation 2000 Plan

The Hazard Mitigation Planning Committee will be hosting a meeting regarding the draft plan for elected officials and any boards that believe that their jurisdiction may ever have a need for FEMA disaster assistance. We cordially invite you to participate. The meeting will be held: Monday, December 6th 7 p.m. at Sacramento Metropolitan Utility District (SMUD) Main Building Auditorium, 1st Floor 6201 S Street Sacramento, CA.

The Hazard Mitigation Planning Committee (HMPC) developed the plan with input from County and City agencies, including each incorporated community in Sacramento County, regional flood control organizations and state and federal agencies.

The plan has been an effort of the County with all of the incorporated cities and special districts to better marshal County resources in addressing potential hazards before they occur and to maintain eligibility for mitigation funding from the Federal Emergency Management Agency (FEMA).

Copies of the Draft Multi Hazard Mitigation Plan can be reviewed at the reference desk of local libraries, the City of Sacramento Department of Utilities and the County of Sacramento Department of Water Resources. For your convenience, it can also be accessed at: www.co.sacramento.ca.us/

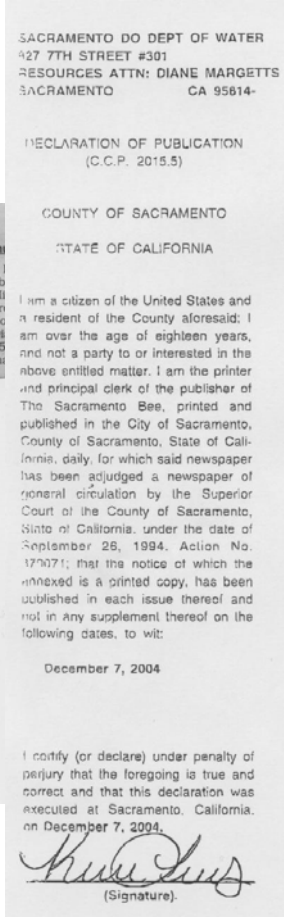
The Hazard Mitigation Planning Committee will also be hosting public meetings regarding the draft plan. These meetings will each be the same and held at different locations and times, as follows:

•Tuesday, December 7th, 7 p.m. Police Services Center 6237 Fountain Square, Drive Citrus Heights.

•Wednesday, December 8th, 7 p.m. Lisbon Elementary School Cafeteria 7555 South Land Park Drive, Sacramento.

•Thursday, December 9th, 7 p.m. Arden-Dimmick Community Library, 891 Watt Avenue.

The NEWS welcomes your comments on local issues



SACRAMENTO DO DEPT OF WATER
427 7TH STREET #301
RESOURCES ATTN: DIANE MARGETTS
SACRAMENTO CA 95814-

DECLARATION OF PUBLICATION
(C.C.P. 2015.5)

COUNTY OF SACRAMENTO

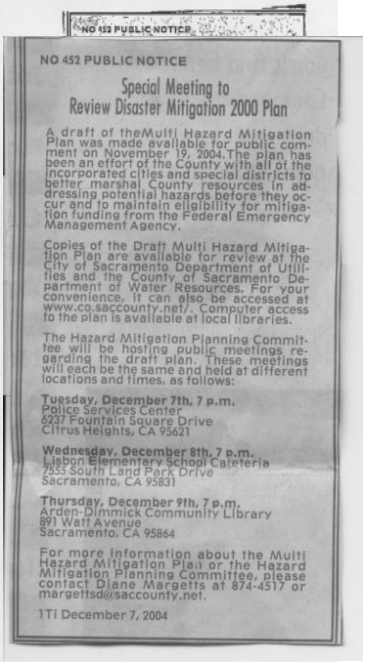
STATE OF CALIFORNIA

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the printer and principal clerk of the publisher of The Sacramento Bee, printed and published in the City of Sacramento, County of Sacramento, State of California, daily, for which said newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Sacramento, State of California, under the date of September 26, 1994, Action No. 379071; that the notice of which the annexed is a printed copy, has been published in each issue thereof and not in any supplement thereof on the following dates, to wit:

December 7, 2004

I certify (or declare) under penalty of perjury that the foregoing is true and correct and that this declaration was executed at Sacramento, California, on December 7, 2004.

(Signature).



NO 452 PUBLIC NOTICE

NO 452 PUBLIC NOTICE

Special Meeting to Review Disaster Mitigation 2000 Plan

A draft of theMulti Hazard Mitigation Plan was made available for public comment on November 19, 2004.The plan has been an effort of the County with all of the incorporated cities and special districts to better marshal County resources in addressing potential hazards before they occur and to maintain eligibility for mitigation funding from the Federal Emergency Management Agency.

Copies of the Draft Multi Hazard Mitigation Plan are available for review at the City of Sacramento Department of Utilities and the County of Sacramento Department of Water Resources. For your convenience, it can also be accessed at www.co.saccounty.net/. Computer access to the plan is available at local libraries.

The Hazard Mitigation Planning Committee will be hosting public meetings regarding the draft plan. These meetings will each be the same and held at different locations and times, as follows:

Tuesday, December 7th, 7 p.m.
Police Services Center
6237 Fountain Square Drive
Citrus Heights, CA 95621

Wednesday, December 8th, 7 p.m.
Lisbon Elementary School Cafeteria
7555 South Land Park Drive
Sacramento, CA 95831

Thursday, December 9th, 7 p.m.
Arden-Dimmick Community Library
891 Watt Avenue
Sacramento, CA 95864

For more information about the Multi Hazard Mitigation Plan or the Hazard Mitigation Planning Committee, please contact Diane Margetts at 874-4517 or margettsd@saccounty.net.

1Ti December 7, 2004

Finally, the County and City of Sacramento formed a subcommittee to the HMPC specifically to develop a Public Information Strategy that would be creditable under the CRS program. The Public Information Strategy Subcommittee is comprised of the following county and city representatives:

- The CRS Coordinators
- The Public Information Officers
- The Webmasters and
- Representatives of the Public.

The subcommittee met twice during the planning process. The county found that the formal Public Information Strategy would not significantly benefit their existing flood hazard management program. However, the City of Sacramento subcommittee members did find

benefit to their existing flood hazard management program. Thus, the city's formal Public Information Strategy is incorporated and explained in detail within the City of Sacramento 'Community Element' portion of this plan.

Step 3: Coordinate with Other Departments and Agencies

Early on in the planning process, the HMPC determined that data collection, mitigation and action strategy development, and plan approval would be greatly enhanced by inviting other state and federal agencies to participate in the planning process. Based on their involvement in hazard mitigation planning, representatives from the following key agencies were offered the opportunity to provide comments to or participate in the process as members of the HMPC:

- Bureau of Reclamation
- California Office of Emergency Services, Hazard Mitigation Program
- California Department of Fish and Game
- California Department of Water Resources, State NFIP Coordinator
- FEMA Region IX
- National Marine Fisheries Service
- National Weather Service
- USACE, Sacramento District, and the
- US Fish and Wildlife Service.

Each of the above agencies were issued invitations both in writing and by e-mail notification. The HMPC provided each agency with an individual copy of the draft plan for their review and written comment. Those comments were incorporated into this document. Additionally, technical data, reports and studies were obtained from these agencies either through web-based resources or directly from the agencies.

The CRS program requires that the neighboring communities also be invited to participate in the planning process, and to review the draft documents. Therefore, on behalf of the County and City of Sacramento, the following neighboring counties were invited to participate, review and comment on our planning activities:

- Yolo County
- Placer County
- El Dorado County, and
- Sutter County.

Copies of the letters seeking coordination with state and federal agencies are on file with the Sacramento County Department of Water Resources. Copies of the letters inviting neighboring communities' review and comments are on file with the county and city CRS annual re-certification documentation.

Step 4: Hazard Identification and Step 5: Risk Assessment

AMEC led the HMPC in an exhaustive research effort to identify and document all the natural hazards that have, or could, impact Sacramento County. This process and the results are included

in this plan as Chapter 4 – Risk Assessment (Section 4-1 – Hazard Identification, Section 4-2 – Vulnerability Assessment, and Section 4-3 – the existing mitigation Capability Assessment).

Step 6: Identifying Goals and Step 7: Review Possible Measures

AMEC led facilitated HMPC brainstorming and discussion sessions that described the purpose and the process of developing planning goals and objectives, a comprehensive range of mitigation alternatives, and a method of selecting and defending recommended mitigation actions utilizing a series of selection criteria. This information is included in this plan as Chapter 5 – Mitigation Goals and Strategy.

Step 8: Draft the Mitigation Action Plan

AMEC developed three drafts of this plan for the HMPC. The first draft was reviewed in-house only by members of the HMPC. AMEC received these comments, made appropriate revisions at the direction of the HMPC, and developed a second draft of this plan, which was extensively advertised and distributed for the purpose of collecting public input and comments through a series of formal Public Meetings. This second draft was also submitted to CA-OES and French & Associates, an AMEC subconsultant, for additional review. The comments and issues from the Public Meetings and the additional reviews were then discussed with the HMPC, appropriate revisions were made, and a third draft of the plan was produced reflecting the public and technical input.

Step 9: Adopt the Plan

The third draft of the plan was submitted to FEMA Region IX for review and tentative approval, pending formal adoption of the plan by each of the participating jurisdictions. This plan is the final, FEMA approved, locally adopted multi-jurisdictional plan for Sacramento County. Each of the Adoption resolutions are included on the CD included with this plan. Of the 77 participating local government jurisdictions listed in Appendix B, _____# have adopted this plan at the time of Sacramento County's formal submission to FEMA Region IX. Additional adoptions will be forwarded to FEMA as they become available.

Planning Step 10: Implement the Plan

The true worth of this, and any mitigation plan, is its final step – implementation. To this point, all of the HMPC efforts have been directed at researching data, coordinating input from participating entities, and developing appropriate mitigation actions. Each recommended action includes key descriptors, such as a lead manager and possible funding sources, to help initiate implementation of the specific action. Beyond that, however, an overall strategy is described in Chapter 7 – Implementation and Plan Maintenance.

RELATING THIS PLAN TO OTHER COMMUNITY AND MITIGATION PLANNING EFFORTS AND ACTIVITIES

Finally, there are numerous organizations within Sacramento County whose goals and interests interface with hazard mitigation. Coordination with these other community planning efforts is paramount to the success of this plan.

Hazard mitigation planning involves identifying existing community policies, tools and actions that will reduce a community's risk and vulnerability from natural hazards. Sacramento County and the incorporated communities and other eligible 'local governments' utilize a variety of comprehensive planning mechanisms, such as land use and master plans, emergency response and mitigation plans, and municipal ordinances and building codes to manage community growth and development.

During the planning process the HMPC gathered and analyzed information from these organizations either directly through email, telephone, and/or meetings, or indirectly through newsletters, brochures, and websites. These organizations include:

- American River Task Force
- American River Parkway Foundation
- Arcade Watershed Group
- California Reclamation Board
- Dry Creek Watershed Council
- Lower American River Task Force
- Natomas Basin Conservancy
- North Area Round Table
- North Fork American River Watershed
- Sacramento Area Council of Governments (SACOG)
- Sacramento Area Flood Control Agency (SAFCA)
- Sacramento River Planning Forum
- Save the American River Association, Inc.
- Sacramento Urban Creeks Council
- Sacramento Water Forum (the successor effort) and
- Valley Vision.

Additionally, the development of this plan utilized information included in the following community plans, studies, reports, and initiatives:

- CALFED Bay-Delta Program, *Seismic Vulnerability of the Sacramento-San Joaquin Delta Levees*, April 2000
- *California Floodplain Management Task Force Final Recommendations Report*, December 2002
- California Reclamation Board's *Sacramento and San Joaquin River Basins S-1 Interim Report Comprehensive Study*, December 20, 2002
- City of Sacramento *Comprehensive Flood Management Plan*, February 1996
- *Safety Elements of the General Plans* for Sacramento County and each incorporated community
- Flood Emergency Operations Manual, DWR, February 2002
- *Governor's Flood Emergency Action Team Report*, May 10, 1977
- Interagency Hazard Mitigation Team Report, FEMA –DR-1044-CA, 1995
- Lower American River Task Force *River Corridor Management Plan*, January 2002
- Natomas Comprehensive Drainage Plan (SAFCA and City of Sacramento, 1995)
- Sacramento County *Local Floodplain Management Plan*, 2001
- Sacramento County *Multi-Hazard Disaster Plan*, July, 1997

- Strong and Chicken Ranch Sloughs Feasibility Study, USACE/SAFCA/SAC-CO, October 2003 and
- Water Forum Agreement, January 2000.

The Sacramento Area Flood Control Agency (SAFCA) provides a good example of how these organizations interface with hazard mitigation**.** SAFCA is a sponsor and participant in three collaborative planning forums that promote coordination, cooperation and mutual assistance among local, state, and federal agencies, neighborhood groups and environmental organizations with an interest in river and stream management issues. These three collaborations are the Lower American River Task Force (Task Force), the North Area Round Table (Round Table) and the Sacramento River Corridor Planning Forum (Planning Forum).

The Lower American River Task Force focuses on flood, environmental and recreational management issues affecting the lower reach of the American River from Folsom Dam to the Sacramento River. In 2002, Task Force participants cooperated in preparing the Lower American River Corridor Management Plan (RCMP) to provide a framework for integrated management of this reach of the river. The RCMP is intended to serve as a catalyst for updating the 1985 American River Parkway Plan.

The North Area Round Table addresses fiscal issues and stream management and recreation access issues associated with Steelhead Creek, Dry Creek, Arcade Creek and Magpie Creek. For the past five years, the Round Table has focused considerable attention on the City of Sacramento's emerging Ueda Parkway, particularly the levee top bike and pedestrian trail that constitutes the Parkway's major recreational feature.

The Sacramento River Corridor Planning Forum addresses riverfront development, public access and flood management issues affecting the reach of the Lower Sacramento River extending from the Fremont Weir to Courtland. The Planning Forum's principal focus has been developing guidelines for implementing the updated Sacramento Riverfront Master Plan along the Lower Sacramento River between the mouth of the American River and the mouth of the Sacramento River Deep Ship Channel.

The Planning Forum’s Master Plan presents a vision of the riverfront as a distinctive feature of an emerging downtown core that spans both sides of the river and includes offices, retail, and restaurants attracting mid and high-density housing developments that help to deter sprawl in the surrounding metropolitan area. The Master Plan embraces the goal that riverfront improvements should be designed to avoid adverse impacts to the flood control system in the area and should collectively improve the functionality and reliability of the system. The Guidelines developed by the Forum are intended to provide a framework for achieving this goal, and are organized around the following general principles:

- Improve the stability of eroding or unstable banks and levee slopes
- Maintain the ability to inspect levees and floodwalls
- Improve access for levee and bank protection maintenance activities
- Maintain or improve flood conveyance capacity and reliability
- Reduce navigation and flood-related safety risks and

- Limit the damage vulnerability of riverfront improvements.

These general principles provide a foundation for developing the following more specific guidelines for the Sacramento River:

Bank and Levee Stabilization – These guidelines are designed to ensure that riverfront improvements incorporate features that will improve bank and levee stability in the project area. The guidelines call for removal of derelict or abandoned structures from the levee and floodway as part of the riverfront development process, limiting structures on the levee and within ten feet of the landside toe of the levee to infrastructure that is maintained and operated by public agencies improving deficient levees and protecting eroding banks as part of the riverfront development process, and avoiding structural designs that increase the risk of levee seepage or otherwise compromise levee stability. The guidelines also clarify the applicability of these design principles to irregular levees in the project area and underscore the importance of protecting the eroding banks in the project area that may provide the only remaining landscape in the project area for achieving the Master Plan's greenbelt and recreation access objectives.

Improved Access for Routine Maintenance and Emergency Response – These guidelines recognize that the continuity and condition of the levee roadway is the most essential component of a viable flood operations and maintenance program. Thus, the guidelines complement the Master Plan's call for a continuous system of multiple-use paved levee top promenades and trails throughout the project area. In order to ensure that these facilities are properly designed and maintained, the guidelines call for elimination of barriers and gaps in the levee roadway system; provision of adequate levee top widths to accommodate the safe passage of levee maintenance vehicles, incorporation of adequate levee access points and vehicle turnouts to permit effective levee maintenance, inspection and emergency response activity, and posting of informational signs to explain the rules for shared use of levee roads.

Assurance of Floodway Hydraulic Capacity – A key goal of the guidelines is to ensure that as the development envisioned in the Master Plan unfolds, the capacity of the floodway to safely convey floodwaters is maintained or improved. This goal extends to improving the predictability of hydraulic conditions during floods, evaluating the potential effects of debris and ensuring the security of floating and fixed structures. Toward this end, SAFCA has evaluated the cumulative effects of the Master Plan on the hydraulic capacity of the floodway using a one-dimensional model developed by the U.S. Army Corps of Engineers. This evaluation indicated that these cumulative effects would be minimal due to the relative magnitude of the planned developments in comparison to the size of the river channel. Nevertheless, the guidelines call for additional, detailed modeling of individual facilities as they are proposed, using two-dimensional model simulations as necessary, to ensure that these facilities will not adversely affect channel bed or bank stability in discreet locations of the floodway.

The guidelines also contain specific provisions regarding the design of Master Plan facilities that will encroach into the floodway, including marinas, new bridges, fishing piers, floating docks and bank vegetation. These guidelines anticipate that the two new marinas called for in the Master Plan will be sited exclusively in off-channel locations. The guidelines on fishing piers are intended to reduce the dependence on or use of submerged piles to support piers, or other

typical designs that will create new flow obstructions or trap floating debris. The guidelines on floating docks are intended to address the potential for these facilities to inappropriately reduce the conveyance area of the channel, increase the risk of debris accumulation, induce sediment deposition in areas of reduced channel velocities, and heighten the risk of breakaway boats or other structures that can be impinged on bridges or other facilities. The guidelines on bank vegetation are intended to allow for the fulfillment of the greenbelt objective of the Master Plan in a manner that does not impair the maintenance of flood project facilities, flood fight activities, or the inspection of the channel and levee banks. The guidelines do not address the appropriateness of developing riverfront restaurants in the project area. Rather, this issue has been deferred for further consideration in the next phase of the Forum process.

Another instance that provides a good example of how other organizations and plans could interface with this hazard mitigation plan is included in Chapter 7, Implementation and Plan maintenance.

Multi-Hazard Mitigation Plan

4.0 Risk Assessment

44 CFR 201.6(c)(2)(ii): "The risk assessment shall include…a description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Risk from natural hazards is a combination of hazard and exposure. The risk assessment process measures the potential loss to a community, including loss of life, personal injury, property damage, and economic injury resulting from a hazard event.

The risk assessment process allows a community to better understand their potential risk and associated vulnerability to natural hazards. This information provides the framework for a community to develop and prioritize mitigation strategies and plans to help reduce both the risk and vulnerability from future hazard events. The risk assessment for this Sacramento Countywide Multi-Hazard Mitigation Plan followed the methodology described in the FEMA publication 386-2 *"Understanding Your Risks – Identifying Hazards and Estimating Losses"* (FEMA, 2002) and was based on a four-step process:

(1) Identify hazards
(2) Profile hazard events
(3) Inventory assets and
(4) Estimate losses.

This risk assessment covers DMA Planning Step 4 – Assess the Hazard and DMA Planning Step 5 – Assess the Problem. It also includes a third component, Existing Mitigation Capabilities, where the risk and vulnerability are analyzed in light of what existing mitigation measures are in place, for example, the adoption and enforcement of building codes, warning systems and floodplain development regulations.

(This page has been left intentionally blank.)

Multi-Hazard Mitigation Plan

4.1 Hazard Identification

The HMPC conducted a Hazard Identification study to determine what hazards threaten the planning area. This section of the plan documents the previous occurrence of natural hazards, those that might occur in the future, and the likelihood of their recurrence.

Utilizing historical data from the National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center (NCDC), CA-OES, and FEMA Region IX, the HMPC developed and confirmed a list of those natural hazards of significance to the participating communities within the planning area. Significance was measured in general terms, focusing on key criteria such as frequency and resulting damage, including, deaths/injuries and property and economic damages to a community.

The natural hazards identified and investigated in Sacramento County include:

- Severe weather
    - Heavy rains/storms
    - Tornadoes
    - Fog
- Flood
- Dam failure
- Earthquakes
- Wildfires
- Drought
- Natural health hazards
    - West Nile Virus
- Landslides and
- Volcanoes

All of the above are identified in the California State Hazard Mitigation Plan with the exception of severe weather and West Nile Virus.

DISASTER DECLARATION HISTORY

One method to identify hazards based upon past occurrence is to look at what events triggered federal and/or state disaster declarations within the planning area. Disaster declarations are granted when the severity and magnitude of the event's impact surpass the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. When the local government's capacity has been surpassed, a state disaster declaration may be issued,

allowing for the provision of state assistance. Should the disaster be so severe that both the local and state government's capacity is exceeded, a federal disaster declaration may be issued allowing for the provision of federal disaster assistance.

Since the passage of the Stafford Act in 1988, FEMA Region IX has experienced 50 Presidential Disaster Declarations, obligating $10.4 billion to date. Within Sacramento County, there have been thirteen federal and five state declarations since 1950. Ten of the federal declarations and four of the state declarations were associated with flood events. Of the three remaining Federal declarations, one was related to drought and two to economic/agricultural losses due to severe weather and freezes. Together, these disasters resulted in over $2.26 billion in damages to the affected jurisdictions.

It is important to note that the federal government may issue a disaster declaration through the U.S. Department of Agriculture and/or the Small Business Administration, as well as through FEMA. The quantity and types of damage are the determining factors. In fact, recent SBA declarations included numerous declarations for Sacramento County, making small, non-farm businesses eligible for Economic Injury Disaster Loans as a result of damages associated with extreme weather events occurring between January 2001 and May 2003. These include the following declarations:

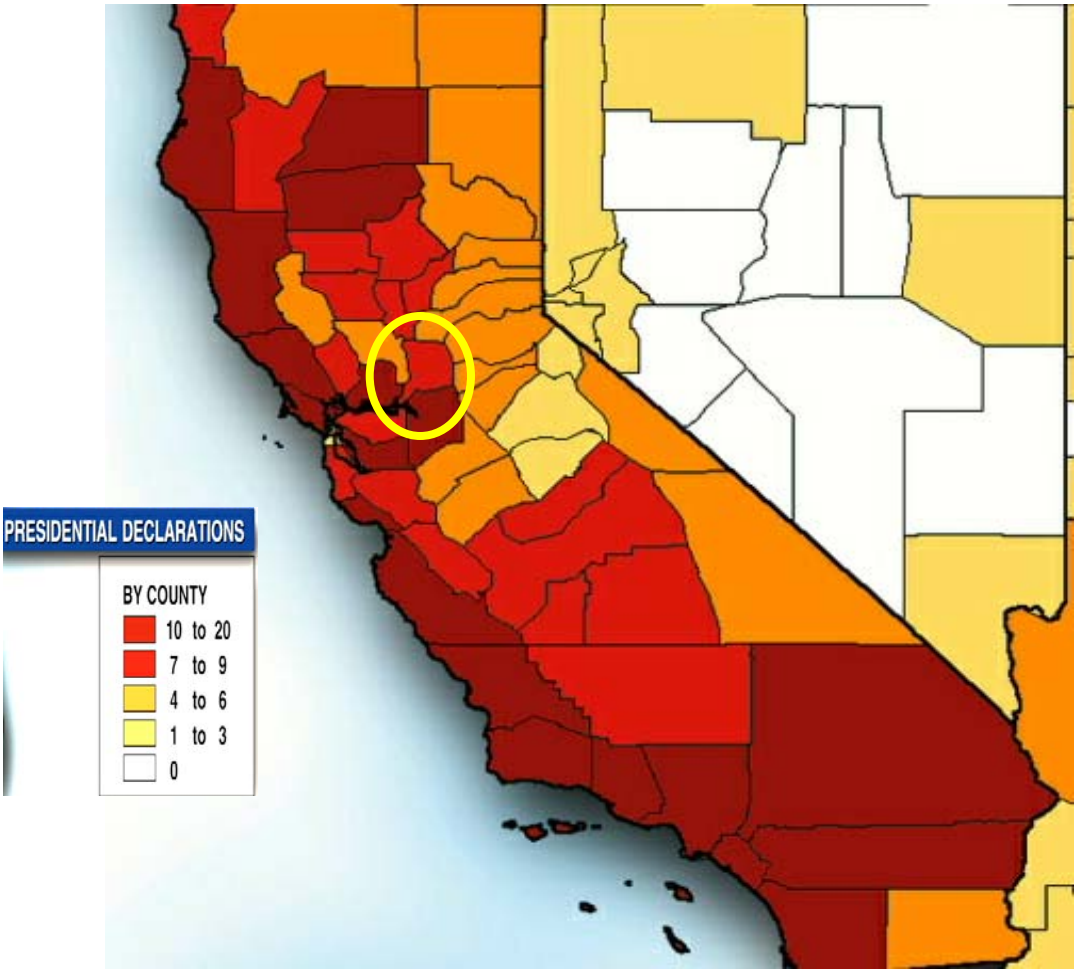
- SBA Declaration #9V57 – Rain & Wind
- SBA #9V54 – Drought
- SBA #9Z00 – Extreme Heat followed by Unseasonable Rainfall
- SBA #9X87 – Excessive Rain, Hail, Freezing Temperatures & Wheat Stripe Rust
- SBA #9X85 – Excessive Rain, Hail, Freezing Temperatures & Wheat Stripe Rust
- SBA #9X60 – Excessive Rain & Wheat Rust and
- SBA Declaration #9W77 – Hailstorm and Rain.

Recent Department of Agriculture disaster declarations include one for Sacramento County in October of 2003 due to damages and losses caused by excessive rain and wheat stripe rust. These designations make all qualified farm operators eligible for low-interest emergency loans as well as eligible for funding from other assistance programs available to farmers and ranchers.

The map on the following page displays the number of Presidential (FEMA) Disaster Declarations within the planning area between 1965 and 2002. Clearly, Sacramento County is susceptible to disaster.

PRESIDENTIAL DISASTER DECLARATIONS MAP

January 1, 1965 to November 1, 2002



Source: www.fema.gov

Other disaster data obtained by the HMPC is provided, in chronological order, in the table below. In general, this data is inconsistent from source to source.

Year	Event	Location	Declaration Type	Damages	Source of Data	Notes
11/21/50	Flood	Sac. County	State	9 deaths $32.2 Million	CAL OES	CA OCD 50-01
12/23/55	Flood	Sac. County	State	74 deaths $300 Million $213K in Sac.Co.	CA OES	CA 47-DR-CA
02/26/58	Flood: Storm and Flood Damage	Sac. County	State	unknown	CA OES	CDO 58-03
04/04/58	Flood	Sac. County	State	13 deaths $24 Million $204K in Sac.Co.	CA OES	CD 82-DR-CA
04/25/59	Hail	Sac. County		unknown	NCDC	.75 in.

Year	Event	Location	Declaration Type*	Damages	Source of Data	Notes
02/07/62	Severe Storm Thunderstorm Wind	Sac. County		Injuries: .26 Fatalities: .35 Property : $86,206.90	Sheldus: USC-Hazards Research Lab (SC HRL)	Fips: 06067
10/--/62	Flood	Sac. County		$65,000	Sac. City FIS	
12/29/64	Flood: 1964 Late Winter Storms	Sac. County	Federal	$213.1 Million	CA OES	OEP 183-DR-CA
09/16/65	Wind	Sac. County		Property : $104K Crop Damage: $1,470.59	Sheldus: USC HRL SacCity FIS	Fips: 06067
01/18/69	Severe Storm/T-Storm	Sac. County		Injuries: .17 Fatalities: .78 Property: $862,068.97 Crop Damage: $8,620.69	Sheldus: USC HRL	Fips: 06067
02/20/69	Severe Storm/Thunderstorm, Wind, Winter Weather	Sac. County (as part of statewide disaster)	Federal	47 deaths, 161 injuries, Property: $300 Million	Sheldus: USC HRL Sac .City FIS	$159K damage in City
06/27/72	Flood: Andrus Island Levee Break	Sac. County	Federal	$23,681,630	CA OES	OEP 342-DR-CA
01/16/73	Flooding, Severe Storm, Thunderstorm	Sac. County		Fatalities: .02 Property Damage: 86,206.90	Sheldus: USC HRL	Fips: 06067
11/17/73	T-storm Wind	Sac. County		unknown	NCDC	54 knots
01/12/77	Drought	Sac. County	Federal	unknown	CA OES	GP-1977
01/16/78	T-storm Wind	Sac. County		unknown	NCDC	51 knots
02/05/78	T-storm Wind	Sac. County		unknown	NCDC	57 knots
02/07/78	Tornado	Sac. County		Property Damage: 250K	NCDC	F2
02/07/78	Tornado	Sac. County		Property Damage: 500,000.00	Sheldus: USC HRL	Fips: 06067
12/23/79	Severe Storm/Thunderstorm, Wind, Winter Weather	Sac. County		Property Damage: 14,285.71	Sheldus: USC HRL	Fips: 06067
01/23/80	Flood: Delta Levee Breaks	Sac. County (+ 2 others)	Federal	$17,388,013	CA OES	FEMA 3078-EM (80-15)
11/13/81	T-storm Wind	Sac. County		unknown	NCDC	52 knots
04/28/82	Flood: Heavy Rains/Flooding 5/82	Sac. County	Federal	unknown	CA OES	DC-82-03 Thru 82-14

Year	Event	Location	Declaration Type*	Damages	Source of Data	Notes
10/26/82	Economic: Agricultural Losses due to Unseasonable Freeze	Sac. County	Federal		CA OES	GP-1982
12/21/82	Flooding	Sac. County		Property Damage: 5M	Sheldus: USC HRL	Fips: 06067
12/22/82	Wind	Sac. County		Injuries: .21 Fatalities: .06 Property Damage: 1,041,666.67 Crop Damage: 104.17	Sheldus: USC HRL	Fips: 06067
01/24/83	T-storm. Wind	Sac. County			NCDC	54 knots
02/09/83	Flood	Sac. County (statewide flooding)	Federal	$523.6 Million	CA OES	FEMA 677-DR-CA
03/22/83	Tornado	Sac. County		Property: $250-500K	NCDC & Sheldus: USC HRL	Fips: 06067 F1
12/03/83	Severe Storm, T-storm, Wind	Sac. County		Injuries: .94 Fatalities: .25 Damage:312,500 Crop Damage: 3,125.00	Sheldus: USC HRL	Fips: 06067
02/17/86	Flooding	Sac. County		Property Damage: 5M	Sheldus: USC HRL	Fips: 06067
02/18/86	Flood: 1986 Spring Storms	Sac. County (statewide)	Federal	13 deaths $407.5 Million	CA OES	FEMA 758-DR-CA
02/28/88	T-storm Wind	Sac. County			NCDC	55 knots
04/19/88	Tornado	Sac. County		Property: 250K	NCDC	F1
04/19/88	Tornado	Sac. County		Property Damage: 500,000.00	Sheldus: USC HRL	Fips: 06067
12/20/90	Winter Weather	Sac. County		Fatalities: .05 Property: $86,206.90 Crop Damage: $8,620,689.65	Sheldus: USC HRL	Fips: 06067
02/05/92	Winter Weather	Sac. County		Property Damage: 862,069.00	Sheldus: USC HRL	Fips: 06067
02/11/92	Flooding, Winter Weather	Sac. County	Federal #935	Property Damage: 11,628.00	Sheldus: USC HRL	FEMA 935-DR
03/26/93	Funnel Cloud	Elverta			NCDC	
05/18/94	Hail	Sac. County		Property: $500,000.00	Sheldus: USC HRL	Fips: 06067

Year	Event	Location	Declaration Type*	Damages	Source of Data	Notes
01/10/95	Flood: 1995 Severe Winter Storms	Sac. County (statewide)	Federal	11 deaths $741.4 Million	CA OES	FEMA 1044-DR
12/22/96	T-storm Wind	Lambert			NCDC	80 knots
01/04/97	Flood: 1996/97 Winter Storms	Sac. County	Federal	1 death Property: $2.4M $5.5 Agriculture	CA OES & NCDC Ag. Comm.	FEMA 1155 DR-CA
01/22/97	Flash Flood	Sacramento		Property: $1.5M	NCDC	
01/26/97	Flash Flood	Sacramento		Property: $500K	NCDC	
01/26/97	Flash Flood	Rio Linda			NCDC	
12/11/97	Fog	Sac. County		Injuries: 5 Deaths: 1 Property: $300K	Sheldus: USC HRL	Fips: 06067
01/12/98	Heavy Rain	Countywide			NCDC	
01/18/98	Heavy Rain	Countywide			NCDC	
02/06/98	Flood: El Nino '98	Sac. County (statewide)	Federal		CA OES	FEMA 1203 DR-CA
04/24/98	Tornado	Arcade		Property Damage: $10K	NCDC	F0
12/18/98	Fog	Sac. County		Property: $83,333.33	Sheldus: USC HRL	Fips: 06067
02/07/99	Urban/small Stream Flooding	Sacramento, Elk Grove			NCDC	
12/20/99	Fog	Sac. County		Injuries: .33 Property Damage: 20,000.00	Sheldus: USC HRL	Fips: 06067
01/22/00	Heavy Rain	Citrus Heights, Elk Grove, Folsom, Sacramento		Injuries: 1 Property Damage: $15K	NCDC	
02/11/00	Heavy Rain	Folsom		Property Damage: 100K	NCDC	
05/15/00	Heavy Rain	Countywide			NCDC	
09/01/00	Heavy Rain	Sacramento Airport			NCDC	
10/09/00	Lightning	Elk Grove		Property Damage: 150K	NCDC	
01/08/01	Heavy Rain	Sacramento			NCDC	
01/17/01	Other: 2001 Energy Emergency	Sac. County (Statewide)	State		CA OES	GP-2001
02/19/01	Funnel Cloud	Sacramento			NCDC	
03/02/01	Funnel Cloud	Sacramento			NCDC	

** A blank in this field indicates that the incident had either a local declaration or possibly no declaration at all.*

Every historical hazard event listed above, except for the Andrus Island Levee failure and the 2001 energy emergency, resulted directly from extreme weather conditions. While the correlation between extreme weather events and state or federal disaster declarations is weak, the data demonstrates that injuries to people and damages to property are a direct result of severe weather conditions. Since 1950, there have been 59 documented severe weather events (including flood and tornado events) resulting in damages to the planning area.

SEVERE WEATHER

Almost all of Sacramento County's disaster declarations are a direct result of extreme weather conditions. For this plan, severe weather is discussed in the following subsections:

- Heavy Rain/Thunderstorms
- Tornadoes
- Fog

HEAVY RAIN/THUNDERSTORMS

Severe storms/thunderstorms in the planning area include heavy rains often accompanied by strong winds, lightning, and hail. Tornadoes may also occur during these storms. Thunderstorms can produce a strong rush of wind known as a downburst, or straight-line winds which may exceed 120 miles per hour. These storms can overturn poorly secured mobile homes, tear roofs off houses and topple trees. Often, downed trees fall across power lines or winds topple the power poles, causing power outages.

Approximately 10 percent of the thunderstorms that occur each year in the United States are classified as severe. A thunderstorm is classified as severe when it contains one or more of the following phenomena: (1) hail, three-quarters inch or greater, (2) winds gusting in excess of 50 knots (57.5 miles per hour), or (3) a tornado.

Lightning is defined as any and all of the various forms of visible electrical discharge caused by thunderstorms. Cloud-to-ground lightning can kill or injure people by direct or indirect means. Objects can be directly struck and this impact may result in an explosion burn, or total destruction. Or, the damage may be indirect when the current passes through or near it.

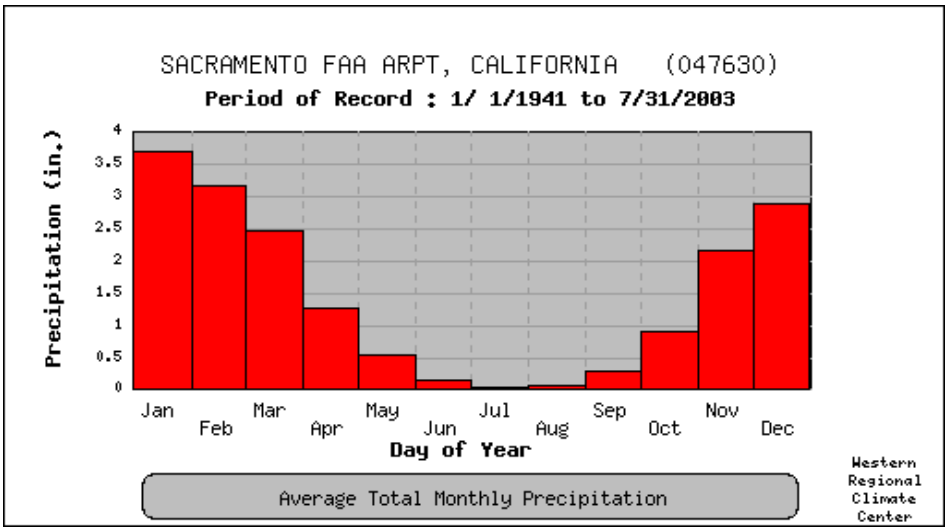
As discussed further in the following sections, heavy rains and severe storms occur in the planning area primarily during the late fall, winter and spring seasons.

Past Occurrences. In Sacramento County, precipitation occurred mostly as rain. Snow was a rare occurrence. The bulk of the rain occurred during the months of November through March. From 1941 through 2003, annual rainfall averaged 17.22 inches, but it can be quite variable. The highest recorded annual rainfall is 33.44 inches in 1983 and the highest recorded rainfall for a given month is 12.64 inches in December 1955. For a 24-hour period, the record high rainfall was 3.77 inches on October 13, 1962. The lowest annual rainfall total was 6.25 inches in 1976.

The temperature generally ranged from an average maximum temperature of low 50's to mid 90's and an average minimum temperature range of high 30's to high 50's. The highest daily extremes included a high of 115 on June 15, 1961 and a low of 18 on December 22, 1990.

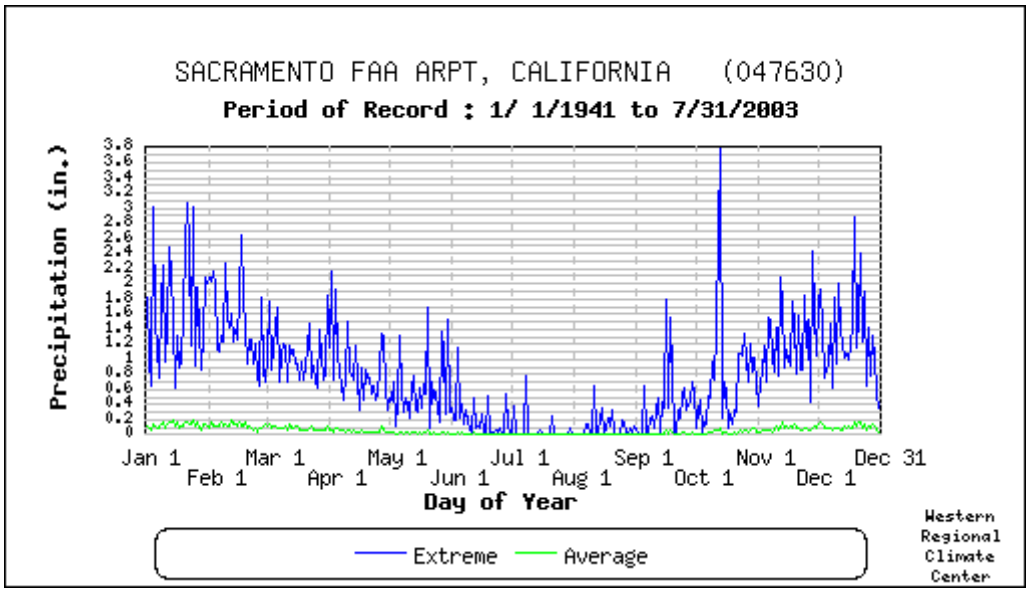
The prevailing winds in Sacramento are Southerly at approximately 5-15 miles per hour. Winds from the North are generally dry. Pre-weather front winds generally come from the Southwest. The following graphs illustrate the weather conditions for Sacramento County.

AVERAGE TOTAL MONTHLY PRECIPITATION



.

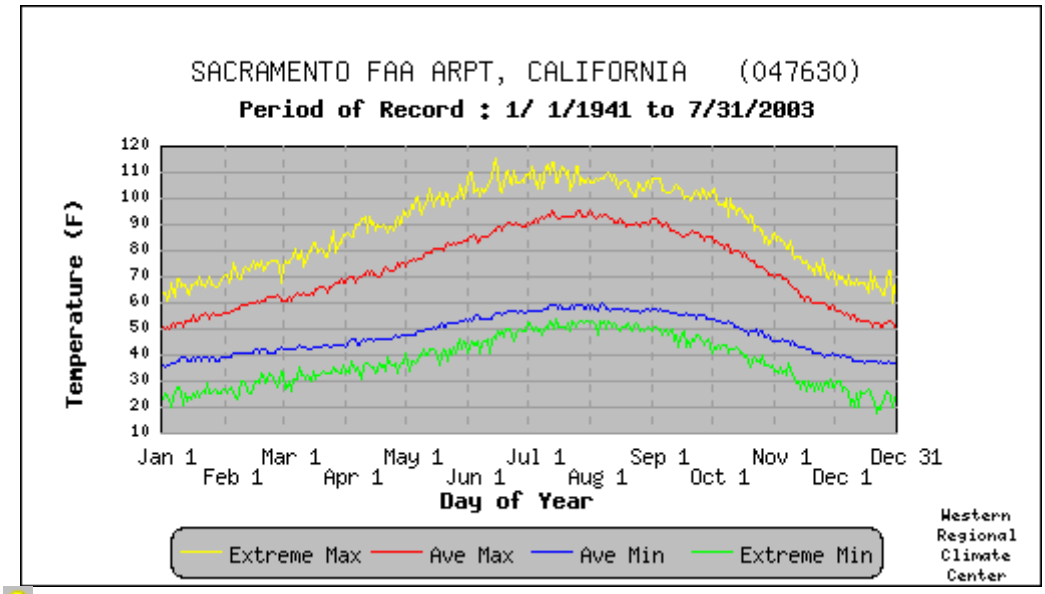
AVERAGE AND EXTREME DAILY PRECIPITATION



– Extreme is the greatest daily precipitation recorded for the day of the year.

– Average is the average of all daily precipitation recorded for the day of the year.

AVERAGE AND EXTREME DAILY TEMPERATURE



– Extreme Max is the maximum of all daily maximum temperatures recorded for the day of the year.

– Ave Max is the average of all daily maximum temperatures recorded for the day of the year.

– Ave Min is the average of all daily minimum temperatures recorded for the day of the year.

– Extreme Min is the minimum of all daily minimum temperatures recorded for the day of the year.

Likelihood of Future Occurrences. Severe weather and thunderstorms are likely to continue to occur annually in the Sacramento County planning area.

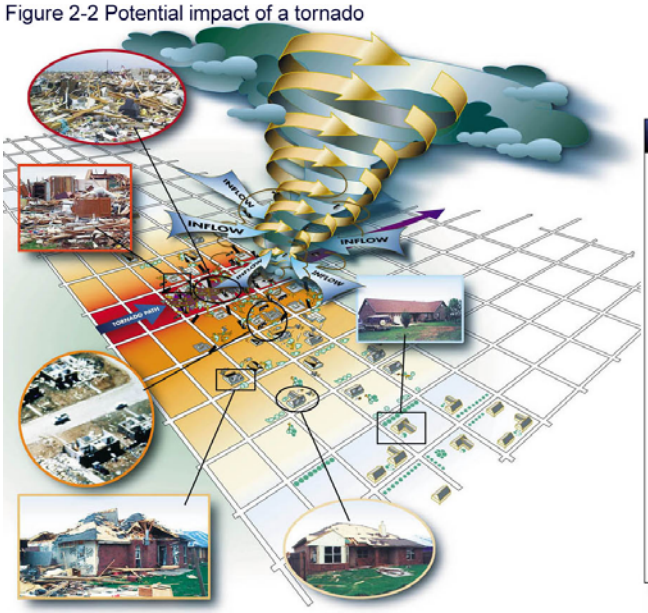
TORNADOES (AND OTHER SEVERE WIND EVENTS)

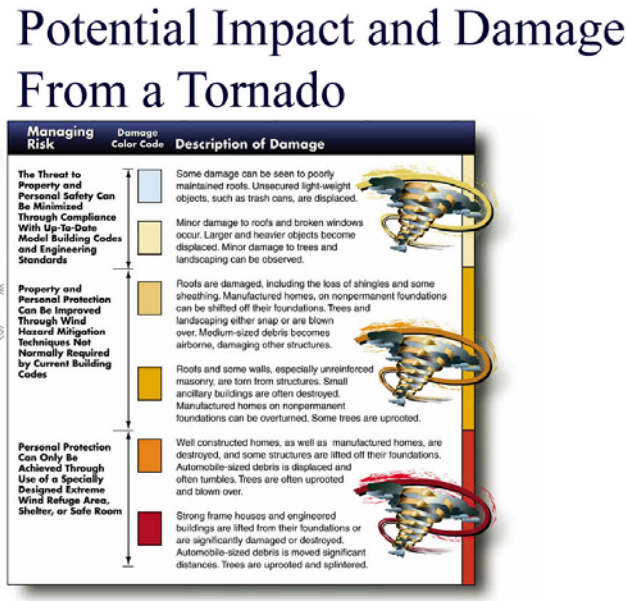
Tornadoes are another weather-related event that affects the planning area. Tornadoes are rotating columns of air marked by a funnel-shaped downward extension of a cumulonimbus cloud whirling at destructive speeds of up to 300 miles per hour. They usually accompany a thunderstorm. Tornadoes are the most powerful storms that exist. They can be comprised of the same pressure differential that fuels 300-mile wide hurricanes across a path only 300 yards wide or less. Tornado magnitude is ranked according to the Fujita scale listed below:

FUJITA TORNADO SCALE

F0: 40-72 mph (35-62 knots)
F1: 73-112 mph (63-97 knots)
F2: 113-157 mph (137-179 knots)
F3: 158-206 mph (137-179 knots)
F4: 207-260 mph (180-226 knots)
F5: 261-318 mph (227-276 knots)

Figure 2-2 Potential impact of a tornado





Potential Impact and Damage From a Tornado

Managing Risk	Damage Color Code	Description of Damage
The Threat to Property and Personal Safety Can Be Minimized Through Compliance With Up-To-Date Model Building Codes and Engineering Standards		Some damage can be seen to poorly maintained roofs. Unsecured light-weight objects, such as trash cans, are displaced.
		Minor damage to roofs and broken windows occur. Larger and heavier objects become displaced. Minor damage to trees and landscaping can be observed.
Property and Personal Protection Can Be Improved Through Wind Hazard Mitigation Techniques Not Normally Required by Current Building Codes		Roofs are damaged, including the loss of shingles and some sheathing. Manufactured homes, on nonpermanent foundations can be shifted off their foundations. Trees and landscaping either snap or are blown over. Medium-sized debris becomes airborne, damaging other structures.
		Roofs and some walls, especially unreinforced masonry, are torn from structures. Small ancillary buildings are often destroyed. Manufactured homes on nonpermanent foundations can be overturned. Some trees are uprooted.
Personal Protection Can Only Be Achieved Through Use of a Specially Designed Extreme Wind Refuge Area, Shelter, or Safe Room		Well constructed homes, as well as manufactured homes, are destroyed, and some structures are lifted off their foundations. Automobile-sized debris is displaced and often tumbles. Trees are often uprooted and blown over.
		Strong frame houses and engineered buildings are lifted from their foundations or are significantly damaged or destroyed. Automobile-sized debris is moved significant distances. Trees are uprooted and splintered.

Figure 2-2 Potential damage table for impact of a tornado

Source: www.fema.gov

Past Occurrences. Sacramento County has experienced four tornadoes:

- ***02/07/1978*** Magnitude F2, Property Damage $250-500K
- ***03/22/1983*** Magnitude F1, Property Damage $250-500K
- ***04/19/1988*** Magnitude F1, Property Damage $250-500K and
- ***04/24/1998*** Magnitude F0, Property Damage $10K

In 1936, a terrific windstorm hit Sacramento, the 'City of Trees', littering the city with fallen trees and causing extensive damage. Another windstorm occurred on February 25, 2004 causing extensive damage to cars and homes. *(Source: Citizen input)* In 1998, a June wind caused $984,000 in losses to the hay, pear and rice crops. *(Source: Sacramento County Agricultural Commissioner memo)*

Likelihood of Future Tornado Occurrence. Based on data from 1950 – 1995, California ranks number 32 (compared to other states) for frequency of tornadoes, number 36 for injuries and number 31 for cost of damages. When compared to other states by the frequency per square mile, California ranks number 44 for the frequency of tornadoes, number 44 for injuries per area and number 40 for costs per area. *(Source: www.disastercenter.com)*

There have been four tornadoes during the 52-year period of record, or one tornado every 13 years on average. This equates to an annual probability of occurrence at 7.69 percent. There are no official recurrence intervals calculated for tornadoes. However, if one assumes a tornado affects only one square mile and there are 965 square miles in Sacramento County, the annual probability of a tornado hitting any particular square mile in the planning area is .07 in 965, or a 0.0001 percent (.000001) chance.

FOG

Fog results from air being cooled to the point where it can no longer hold all of the water vapor it contains. For example, rain can cool and moisten the air near the surface until fog forms. A cloud-free, humid air mass at night can lead to fog formation, where land and water surfaces that have warmed up during the summer are still evaporating a lot of water into the atmosphere – this is called 'radiation fog'. A warm moist air mass blowing over a cold surface can also cause fog to form-this is called 'advection fog'.

The NCDC data shows severe fog incidents in 1997, 1998, and 1999. In these three events there has been one death, 38 injuries, and $403,000 in property damage. Primarily, these incidents have been multi-vehicle pileups on the Interstate Highways. The HMPC has been unable to relate fog incidents with any other data, such as airport, interstate or school closures.

FLOODS

History clearly highlights floods as the most frequent natural hazard impacting Sacramento County. Floods are among the most costly natural disasters in terms of human hardship and economic loss nationwide. There are three different types of flood events in the Sacramento area: flash, riverine and urban stormwater. Regardless of the type of flood, the cause is often the result of severe weather and excessive rainfall, either in the flood area or upstream reach.

The term 'flash flood' describes localized floods of great volume and short duration, generally in less than four hours. In contrast to riverine flooding, this type of flood usually results from a heavy rainfall on a relatively small drainage area. Precipitation of this sort usually occurs in the spring and summer. Dam failures also often result in flash flooding. However, dam failures are addressed separately later on page 4-22.

Riverine flooding occurs when a watercourse exceeds its 'bank-full' capacity and is the most common type of flood event. Riverine flooding occurs as a result of prolonged rainfall that is combined with saturated soils from previous rain events, or combined with snowmelt, and is characterized by high peak flows of moderate duration and by a large volume of runoff. Riverine flooding occurs in river systems whose tributaries drain large geographic areas and can include many watersheds and sub-watersheds. The duration of riverine floods varies from a few hours to many days. Factors that directly affect the amount of flood runoff include precipitation amount, intensity and distribution, soil moisture content, channel capacity, seasonal variation in vegetation, snow depth and water-resistance of the surface due to urbanization. In Sacramento County, riverine flooding can occur anytime during the period from November through April. Flooding is more severe when antecedent rainfall has resulted in saturated ground conditions.

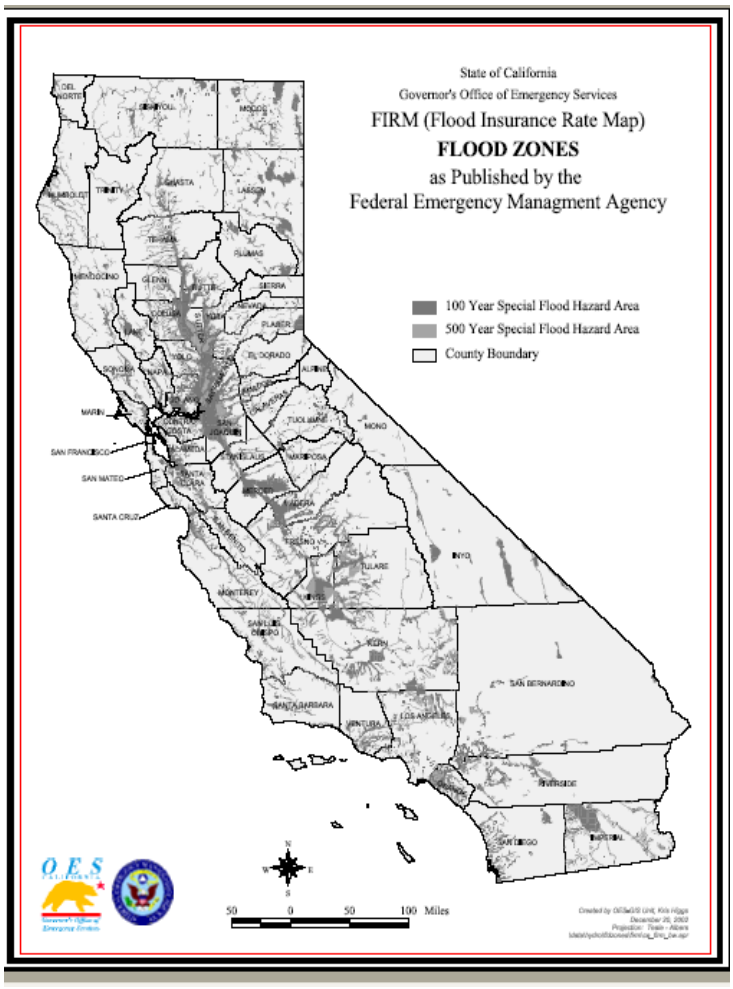
Urbanization may increase peak flow runoff as well as the total volume of stormwater runoff from a site. The increase is dependent upon the type of soil and its topography compared to the proposed development. The Soil Conservation Service (now known as the Natural Resources Conservation Service) has surveyed the soil types in the county. Much of the county is tight soil with low permeability. The City/County Hydrology Manual, Table 5-2, provides infiltration

rates for various land uses on various soil types. Comparison of the peak flow and volume impacts to the watershed should be analyzed whenever development is proposed to assure that any increases are accommodated.

The area adjacent to a channel is the floodplain. A floodplain is the area that is inundated during a flood event. It is often physically discernible as a broad, flat area created by prior floods. The larger the floodplain, the greater the area that is at risk for flooding. Floodplains are illustrated on inundation maps, which show areas of potential flooding and water depths. In its common usage, the floodplain most often refers to that area that is inundated by the 100-year flood, the flood that has a one percent chance in any given year of being equaled or exceeded. The 100-year flood is the national minimum standard to which communities regulate their floodplains through the National Flood Insurance Program (NFIP).

Major Sources of Flooding. In Sacramento County, there are three main rivers, the Sacramento, American and Cosumnes Rivers. The Sacramento and American Rivers and several tributaries to the east, north, and west all flow toward the City of Sacramento. The watersheds of these two main rivers drain most of northern California and part of southern Oregon for a total of some 26,000 square miles. The third, the Cosumnes River, flows southwesterly through the southern portion of the County and into the delta region.

The map to the right, a statewide view of the floodplains in California, highlights the quantity of water in northern California that drains through Sacramento County.



All surface water originating in or passing through Sacramento County discharges to the ocean via the Sacramento and San Joaquin Rivers, which join at the head of Suisun Bay, the easternmost arm of San Francisco Bay. With a combined tributary drainage area of approximately 60,000 square miles, these rivers provide most of the freshwater inflow to San Francisco Bay.

High water levels along the Sacramento and American Rivers are a common occurrence in the winter and early spring months due to increased flow from storm runoff and snowmelt. An extensive system of dams, levees, overflow weirs, drainage pumping plants, and flood control bypass channels strategically located on the Sacramento and American Rivers has been established to protect the area from flooding. These facilities control floodwaters by regulating the amount of water passing through a particular reach of the river. The amount of water flowing through the levee system can be controlled by Folsom Dam on the American River and the reserve overflow area of the Yolo Bypass on the Sacramento River. However, flood zones in Sacramento County are still extensive. Several areas of the county are still subject to flooding by the overtopping of rivers and creeks, levee failures, and the failure of urban drainage systems that cannot accommodate large volumes of water during severe rainstorms.

High flows on the Cosumnes River are less frequent, as the river is essentially dam free and has little in the way of flow regulation. Flooding along the river, such as in 1997, has been due to high water coupled with the failure of non-standard, poorly constructed private levees.

PAST OCCURRENCES: SACRAMENTO COUNTY FLOOD HISTORY

Nineteenth Century: Indian legends and historical records indicated that at least nine major floods have occurred in the Sacramento River Basin during the nineteenth century. A great flood (described in Indian legend as having swamped the entire Sacramento River Basin) occurred in 1805. Indians also described floods that occurred in 1825-26 as widespread in the basin. Extensive flooding in northern California took place in 1839-40, 1847, 1849-50, 1852, 1861-62 (the flood of record), 1881, and 1890. One of the earliest records of flooding in Sacramento was a graphic account which described the floods of January to March 1862 as follows: "The new Capitol is far out in the water – the Governor's house stands as in a lake – churches, public buildings, private building, everything is wet or in water. Not a road leading from the city is passable, business is at a dead standstill,…". *(Source: City of Sacramento FIS, 1998)*

1850 – 1910: Sacramento county raised the streets east of the Sacramento River to about 12th Street by 10 – 12 feet as a result of numerous floods occurring between 1850 and 1910. *(Source: SAFCA. Note: The streets were 'raised' by 'burying' the first floors of the buildings)*

1904 – 1905: In the winter of 1904 the Edwards levee break occurred 1.5 miles south of Y Street, flooding farmlands 35 miles south of Sacramento. As a result, in October 1905, Sacramento approved $165,000 for levee improvements. *(Source: A Sacramento Saga, Myrtle Shaw Lord, 1946)*

1907: "Great floods swept the valley in March, 1907. The highest water ever known in the island district prevailed on the 21st. Fair Oaks Bridge was swept away. With destruction as a

teacher, Sacramento learned an expensive lesson and determined there should be no repetition". *(Source: A Sacramento Saga, Myrtle Shaw Lord, 1946)*

1928: Newspaper account, rainfall and stream gage records indicated that Sacramento experienced significant flooding. In the City of Sacramento, the American River overflowed in 1928, causing extensive flooding in the River Park and Industrial Park areas on the south bank. (*Source:* Sac City FIS, 1998). North Sacramento was flooded for three days in late March. (*Source:* A Sacramento Saga, Myrtle Shaw Lord, 1946)

1950: State Disaster Declaration, CA OCD 50-01, 11/21/50. Newspaper accounts, rainfall and stream gage records indicated that Sacramento experienced significant flooding. In the City of Sacramento, the American River inundated extensive areas on the north bank, including the area in the vicinity of Fulton Avenue and Fair Oaks Boulevard. (Source: Sac City FIS, 1998).

1951 – Record Flood: Just after ground is broken on Folsom Dam, the American River watershed experienced the first of five record storms (*Source:* SAFCA).

1955 – 1956 Record Flood: Federal Disaster Declaration, CD 47-Dr-CA, 12/23/55 (***Source***: CA OES). In the City of Sacramento, Arcade Creek overflowed its banks, inundating portions of Del Paso Park as well as areas upstream along Winding Way and portions of the Hagginwood District downstream. Flooding also occurred on Dry and Robla Creeks near the Natomas East Main Drainage Canal. Large portions of the Morrison Creek Stream Group Basin were flooded during this time. High backwater conditions on the lower reaches of basin streams were caused by overflow from the Cosumnes and Mokelumne Rivers into the Beach-Stone Lakes area. Morrison Creek overflows flooded portions of the Sacramento Army Depot property, areas downstream from the Southern Pacific Railroad tracks and other areas east of Stockton Boulevard between 65th Street and Elder Creek Road, and caused the temporary closure of Meadowview Road west of Franklin Boulevard. Also, widespread flooding occurred along Elder, Florin, Unionhouse, and Laguna Creeks. The 1955 floodwaters covered about 8,300 acres, and flood damages were estimated at approximately $213,000. (*Source*: Sac City FIS, 1998). This record storm filled Folsom Lake in a week just as Folsom Dam was being completed. The Dam and Lake design engineers had predicted it would take a year to fill. As a result, Sacramento is saved from flooding (*Source:* SAFCA).

1958 – Flood: State Disaster Declaration, CD 82-DR-CA, Storm and Flood Damage, 02/26/1958 (*Source*: CA OES). The flooding of 1958 (approximately 10,600) acres covered a larger area than the floods of 1955, however, the flood damage estimate of $204,000 in 1958 was slightly lower. (*Source:* Sac City FIS, 1998)

1958 – Flood: Federal Disaster Declaration, CD 82-Dr-CA, 04/04/1958 (*Source:* CA OES).

1962 – Newspaper accounts, rainfall and stream gage records indicated that Sacramento experienced significant flooding. In the City of Sacramento, floods occurred twice in 1962. The February floods caused inundation along Arcade Creek I, the vicinity of Del Paso Park. The park and the Haggin Golf Course were flooded, and the floodwaters forced the closing of Roseville Road. Dry Creek and Robla Creeks caused flooding in the vicinity of the Natomas East Main Drainage Canal where Rio Linda Boulevard was threatened. In the Morrison Creek

Stream Group, floodwaters escaped from Morrison Creek near the Sacramento Army Depot. This overflow, along with other overflows from Morrison Creek upstream of Stockton Boulevard, caused widespread inundation of a primarily residential area east of Stockton Boulevard from the corporate limits north to Fruitridge Road. The Glen Elder section east of Stockton Boulevard and south of Elder Creek Road was the most severely flooded portion in the Morrison Creek Stream Group area. Laguna, Elder, Florin, and Unionhouse Creeks also overflowed their banks during this flood, adding to the flood problems in the area. A total of $161,000 in flood-related damages was estimated to have occurred in the entire Morrison Creek Stream Group area during this flood. (*Source:* Sac City FIS, 1998).

A severe, early season rainstorm occurred in October 1962, resulting in widespread flooding in Sacramento. Arcade Creek overflowed from Marysville Road to past Del Paso Park. Six families on Verno Street had to evacuate because the flood threat was particularly severe in this area. Damages were estimated at $10,000 along Arcade Creek.

During the October 1962 floods, excess floodwaters from Dry Creek flowed southerly along the eastern side of the Western Pacific Railroad to Robla Creek and the Magpie Creek Diversion. The resultant high water was within two feet of the top of the southern levee of the diversion.

During this event, portions of floodwaters from Magpie Creek bypassed the upper portion of the diversion's levee and flowed into Lower Magpie Creek, causing flooding in the area between Dry Creek Road and Raley Boulevard. Dry Creek and Robla Creek again spread out over their common floodplain near the Natomas East Main Drainage Canal. An estimated $50,000 in flood-related damages were caused by the October 1962 flood on Dry Creek. Many of these damages were caused in areas along Dry Creek upstream of the Sacramento incorporated limits. (*Source:* Sac City FIS, 1998).

1964 – <u>Record Flood</u>: The third record flood occurred in less than 15 years and caused engineers to re-evaluate storm frequency. They concluded that Folsom Dam is designed to handle a 120-year storm, not a 500-year storm (Source: SAFCA). During this flood, Morrison Creek flooded a large region west of the Western Pacific Railroad tracks and south of Meadowview Road. Laguna Creek flooded an area adjacent to the stream that extended for about six miles from near the town of Elk Grove westerly to the Union Pacific Railroad tracks. The 1964 flooding in the basin inundated about 7,700 acres and caused an estimated $156,000 in damages. (*Source:* Sac City FIS, 1998).

1964 – Flood: Federal Disaster Declaration, OEP 183-DR-CA, Late Winter Storms, 12/29/1964. (*Source:* CA OES).

1967 – Newspaper accounts, rainfall and stream gage records indicated that Sacramento experienced significant flooding. Flooding in January 1967 was less severe than flooding in 1962. Arcade Creek overflowed its banks upstream of the Sacramento corporate limits, and flooding in the city was restricted to minor inundation in Del Paso Park. Moderate agricultural damages estimated were estimated at $104,000; an estimated 8,070 acres were flooded. Significant flooding occurred on Laguna Creek, which overflowed into its floodplain. Flooding that occurred in February 1973 on Arcade Creek had a recurrence interval of approximately 10 years. Dry Creek and Robla Creeks, however, overflowed inside the city. A similar extent of

flooding in this area occurred in 1955 and in both the February and October 1962 floods. (*Source:* Sac City FIS, 1998).

1969 – Flooding occurred primarily on agricultural lands, predominantly on lands that lay west of the Union Pacific Railroad tracks in the Beach-Stone Lakes area. Minor flood losses (principally to farmland, crops, and improvements) were incurred east of the UPRR tracks. Floodwaters covered about 10,500 acres, and damages were estimated at $159,000. (*Source:* Sac City FIS, 1998).

1972 – Flood: Federal Disaster Declaration, OEP 342-Dr-Ca, Andrus Island Levee Break, 06/27/72 (*Source*: CA OES). Isleton and the Delta flooded.

1980 – Flood: Federal Disaster Declaration, FEMA 3078-EM (80-15), Delta Levee Breaks, 01/23/80 (*Source:* CA OES).

1983 – Flood: Federal Disaster Declaration, FEMA 677-DR-CA, 02/09/83 (*Source:* CA OES).

1986 – **Record Flood:** A February 1986 storm dumped 10 inches of rain on Sacramento in 11 days. The American River dumped more water into Folsom Dam than it is designed to handle. After 2 days of releases at the design level, (115,000 cubic feet per second), officials boosted releases to 134,000 cubic feet per second. Folsom performance was downgraded to about a 60-year storm. Releases from Folsom exceeded the design capacity of the lower American River levee system for over two days, causing extensive erosion along the toe of the north and south levees of the American River near California State University, Sacramento. Had the rains continued much longer, even higher releases from Folsom would have been required, and a major levee failure could have occurred in one of the heavily urbanized portions of Sacramento, potentially resulting in catastrophic property damage and loss of life. (*Source:* Sac City FIS, 1998). Although this storm caused some flooding in certain areas, the major levee systems that protect the City from disaster withstood record water flows. Some damage did occur in certain sections to the two main levees. These failures were the result of instability, seepage, and boils. This flood resulted in the largest peak flow record on Morrison creek. One of the most significant flooding problems in Sacramento City was the result of overflow along Arcade Creek. During the 1986 flood, successive storms damaged 1,730 private homes and businesses. The storms caused close to $50 million in public and private property damage, excluding damage to roads and other infrastructure. In the northern Delta, 1,600 people were evacuated and $20 million in property damage occurred. Interstate 5, Interstate 80, State Highway 99, and numerous local roads were flooded (*Source:* SAFCA, Sac. County). Only a determined flood fight prevented a collapse of the east levee of the Sacramento River located five miles north of downtown, which protected the residents of the Natoma area. Federal Disaster Declaration, FEMA 758-DR-CA, 1986 Spring Storms, 02/18/1986 (*Source*: CA OES).

1995 – Flood: Federal Disaster Declaration, FEMA 1044-DR-CA, 1995 Severe Winter Storms, 01/10/1995, (***Source:*** CA OES). This storm was a record in terms of localized rainfall intensity and water levels. Record high water was recorded on Arcade Creek, Cripple Creek, Dry Creek, Elk Grove Creek, Linda Creek, Morrison Creek, Natomas East Main Drain and their tributaries. Piped storm drain systems were overwhelmed and there was widespread street flooding. Water ponded in low areas filling to levels that flooded homes. Deep flooding occurred east of the

Natomas East Main Drain Canal (prior to the construction of the D-15 Pump Station). Hundreds of homes reported flooding. (***Source:*** www.sacflood.org/sensdata/strmgrp.htm, by Erwin Hayer, citizen, and Sacramento DWR)

1997 – <u>Record Flood: The fifth record flood in 46 years</u> occurred over the New Year holiday. Federal Disaster Declaration, FEMA 1155-DR-CA, 96/97 Winter Storms, 01/04/97 (Source: CA OES). Sacramento is spared when the fury of the storm hits 40 miles north in the Feather River basin. Unprecedented flows from rain and melted snow surged into the Feather and the San Joaquin Rivers (north and south of Sacramento County, a result of the storm splitting). Levee failures flooded Olivehurst, Arboga, Wilton, Manteca, and Modesto. (*Source:* SAFCA, Sac. County). Reportedly, this relatively short-duration, high intensity storm showed the 24-hour rainfall across northern California with several regions exceeding 8 inches for the period. Several more comparable days, with the addition of significant snowmelt in the Sierras led to widespread flooding in the Sacramento and San Joaquin Valleys. (*Source:* http://ggweather.com)

It was fortunate that Folsom Reservoir, on the American River, was low at the time of the flood warning as the flood storage capacity was much needed. Releases from the dam were at the design capacity of the Lower American River (115,000 cubic feet per second). Record flows in the Cosumnes River were recorded causing widespread failure of the levee system and flooding to dozens of homes. Through traffic was discontinued on Highway 99 as floodwater passed over. There was much loss of dairy and other livestock. The subsequent major levee repair project was funded by Natural Resources Conservation Service and managed by Sacramento County Department of Water Resources.

The 1997 flood was considered to be the perfect storm as 100-year peak flows from multiple major rivers collided and flowed into the Yolo By-Pass and down to the Sacramento River Delta. There was a major, successful, flood fight at Andrus Island, potentially affecting the City of Isleton. Flooding from the Bear and Feather Rivers stressed the levees of the Cross Canal, in Sutter County. This system held back the floodwaters saving the North Natomas Area of Sacramento. The new pump station on the Natomas East Main Drain was also instrumental in protecting properties in Elverta and Rio Linda to the east of the NEMDC levee. Sacramento City and County were saved from major catastrophe by functional flood control features on the Sacramento and American Rivers and storm centering that stressed but did not fail those systems.

1998 – Flood: Federal Disaster Declaration, FEMA 1203-DR-CA, 02/06/1998. (*Source:* CA OES). Later, on April 1, 1998, flooding occurred in Citrus Heights. (*Source*: Citizen input)

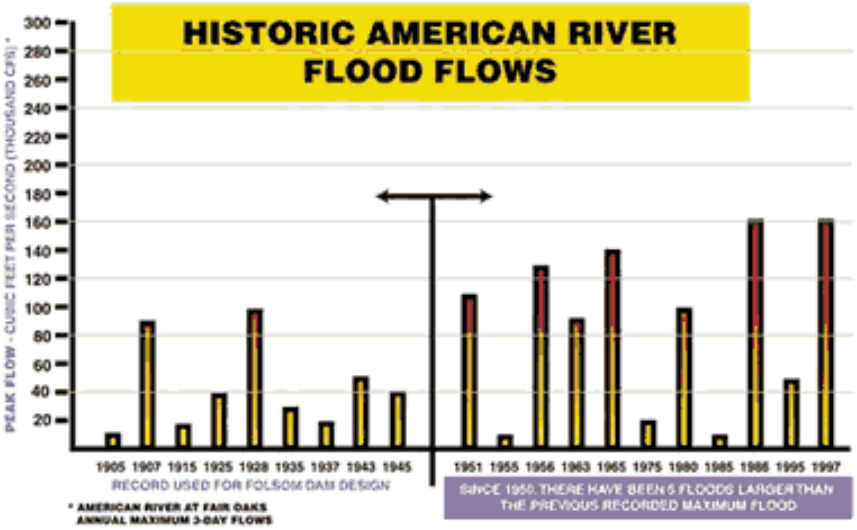
Likelihood of Future Flood Occurrences: According to SAFCA, Sacramento's risk of flooding is the greatest of any major city in the country. Sacramento's flood risk is exceptionally high for two reasons:

1. The cores of today's levees are often the levees built by farmers and settlers as much as 150 years ago. Early levees were not constructed to current engineering standards, and little care was given to the suitability of foundation soils. It was believed prior to 1986 that the levees containing the Sacramento River and the American River were of sufficient height and

stability to protect the county from 100-year or greater storms. The storms that occurred in February 1986 demonstrated that those levees are not sufficient.

2. The quantity of water flowing out of the Sierra Nevada Mountains during large floods appears to be increasing. Folsom Dam was designed, based on historical data, to reduce flood flows in the American River to a flow rate that could be safely contained by the downstream levees. The first storm that occurred after beginning the construction of Folsom Dam was larger than any occurring in the prior 45 years. Since that 1951 storm, Sacramento has experienced four more 'record floods' each somewhat larger than the previous. A comparative analysis run on the two periods (1905 to 1950 and 1950 to 2000) shows that a storm with one chance in 500 of occurring in any year based on the earlier period is approximately the same size as a storm with one chance in 50 of occurring using the entire 95-year period.

The following graph shows the historic flood flows of the American River:



Source: www.safca.org

In order to reduce the risk from floods within the Planning Area, numerous flood protection measures are either in place or planned. Flood Protection Measures include a comprehensive system of dams, levees, overflow weirs, pumping plants, channel improvements, floodway bypasses, and other improvements. Prior to 1986, Folsom Dam and the lower American River levee system were thought to provide a 120-year level of flood protection to the American River floodplain. After the 1986 flood, using data gathered from the storm and hydrologic information, the USACE downgraded the system's flood control capacity to a 63-year level of flood protection (which means that the area is protected against a 63-year flood event). Thus, Sacramento's level of protection against floods has a 1.6 percent chance of being equaled or exceeded every year. (*Source*: Sac City FIS, 1996).

The USACE also concluded that the levees along the Natomas East Main Drainage Canal which protect Natomas and the Dry Creek area to the east, were too low to safely contain the flows produced by the coincidence of peak discharges in Dry and Arcade Creeks and maximum flood releases from Folsom.

As a result of these findings, FEMA reassessed the 100-year floodplain in the Sacramento area and issued new Flood Insurance Rate Maps. These maps, which became effective in November 1989, mandated the purchase of flood insurance by all residents and businesses within the 100-year floodplain and caused the City of Sacramento to impose severe restrictions on new residential development in the Natomas area. (*Source:* City of Sacramento Comprehensive Flood Management Plan, 1996).

As the Planning Area continues to increase their level of flood protection, the risk from floods should continue to decrease.

DAM FAILURES

Dams are man-made structures built for a variety of uses including flood control, power, agriculture, water supply and recreation. When dams are constructed for flood control, they usually are engineered to contain a flood with a computed risk of occurrence. For example, a dam may be designed to contain a flood at a location on a stream that has a certain probability of occurring in any one year. If a larger flood occurs, then that structure will either release water through its spillway or be overtopped. Overtopping is the primary cause of earthen dam failure. Failed dams can create flash floods that are catastrophic to life and property.

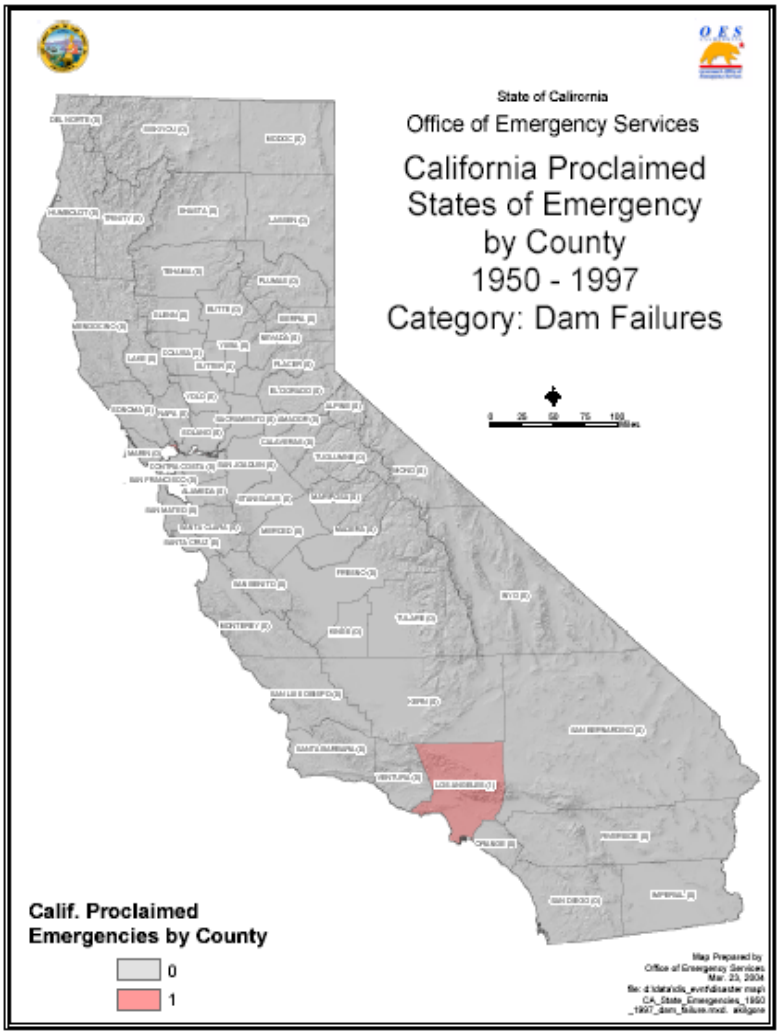
Dams typically are constructed of earth, rock, concrete, or mine tailings. Two factors which influence the potential severity of a full or partial dam failure include:

- The amount of water impounded and
- The density, type, and value of development and infrastructure located downstream.

Dam failures can result from any one or a combination of the following causes:

- Prolonged periods of rainfall and flooding
- Earthquake
- Inadequate spillway capacity, resulting in excess overtopping flows
- Internal erosion caused by embankment or foundation leakage or piping
- Improper design
- Improper maintenance
- Negligent operation and/or
- Failure of upstream dams on the same waterway.

Dams and reservoirs have been built throughout California for water supply, flood control, hydroelectric power and recreational facilities. The storage capacities of these reservoirs range from a few thousand acre-feet to five million acre-feet. The water from these reservoirs eventually makes its way to the Pacific Ocean by way of several river systems. There are five major and numerous minor dams that may impact the people and resources of Sacramento County, if they fail. The major dams include Shasta on the Sacramento River, Oroville on the Feather River, Pardee and Comanche on the Mokelumne River, and Folsom on the American River. The minor dams include Nimbus and Rancho Seco.



Past Occurrences. California has had about 45 failures of non-federal dams. The failures occurred for a variety of reasons, the most common being overtopping. Other reasons include specific shortcomings in the dams themselves or an inadequate assessment of surrounding geomorphologic characteristics. There are 1483 dams in California, 18 of which are in Sacramento County (*Source:* www.ceres.ca.gov). Since 1950 there have been only nine dam failures in California, with none occurring in Sacramento County (*Source:* cee.engr.ucdavis.edu). Overtopping caused two of the failures, and the others were caused by seepage or leaks.

Likelihood of Future Occurrence. *Awaiting official response from California Department of Water Resources, Division of Safety of Dams.*

EARTHQUAKES

Past Occurrences. There has never been a recorded earthquake that occurred in Sacramento County. Faults have been identified that traverse the Sacramento County area however, and historic earthquakes both to the west and the east have been felt in the county and generated damage-producing ground motions. There have been no earthquake disasters declared in Sacramento County though (see map below).

In 1892, an earthquake centered between Vacaville and Winters caused minor structural damage in nearby communities, including Sacramento (and the State Capitol) and Lincoln (in neighboring Placer County.

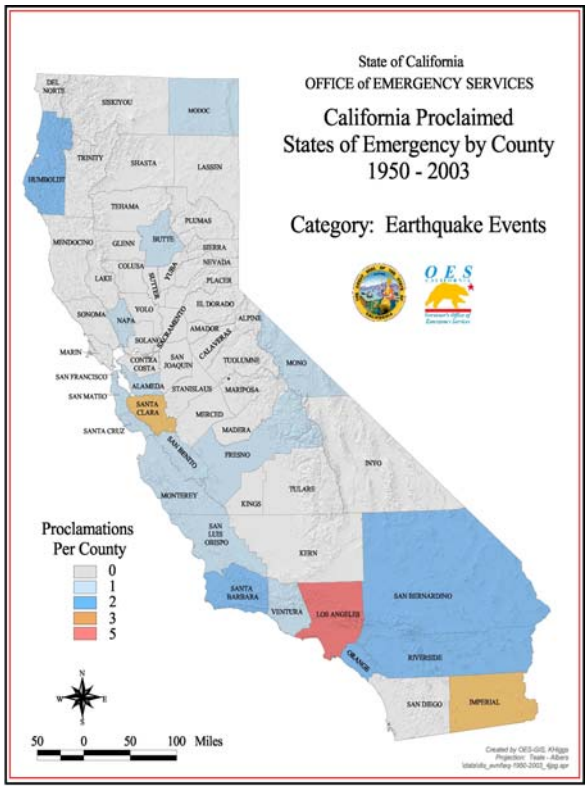
In 1906, the estimated 8.0 plus Richter magnitude San Francisco earthquake, on the northern segment of the San Andreas Fault, damaged the State Capitol, the full extent of which was not discovered until the mid-1970s.

December 16, 1954, a series of earthquakes, particularly the major 7.1 Richter magnitude earthquake at Fairview Peak, Nevada (about 100 miles east of Carson City) caused some damage in Sacramento while virtually no damage occurred in Reno.

August 1, 1975, a moderate magnitude earthquake (5.7) occurred near Oroville on the Cleveland Hills fault and was felt in Sacramento.

Earthquakes have been felt and ground motions recorded in Sacramento from more recent events including:

- **1980,** the Livermore/Green Valley
- **1980,** Mammoth Lakes
- **1983,** Coalinga
- **1989,** Loma Prieta
- **1992,** Petrolia and
- **2004,** San Simeon.



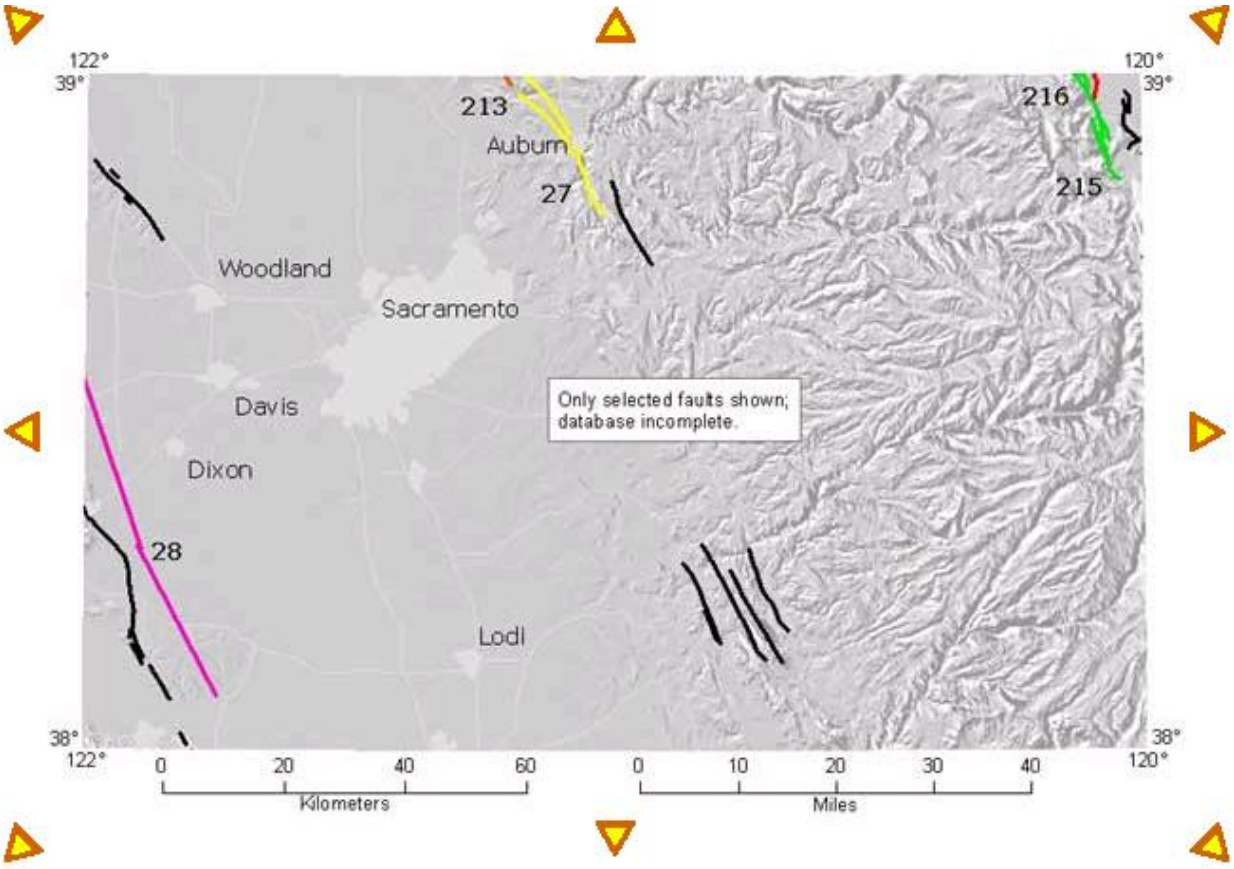
Likelihood of Future Earthquake Occurrences. Both the San Andreas Fault and the closer Hayward Fault have the potential for experiencing major to great events. The US Geological Survey recently (February 2004) estimated that there is a 62 percent probability of at least one 6.7 or greater magnitude earthquake occurring that could cause widespread damage in the greater San Francisco Bay area before 2032.

Another potential earthquake source are the faults associated with western edge of the Central Valley, recently defined as the Coast Range Central Valley (CRCV) boundary thrust fault system. Various documents define portions of this little known system as the Midland Fault Zone or the Dunnigan Hills fault where the 1892 Vacaville-Winters earthquake occurred. A southern part of the CRCV system may have been the source of the 1983 very damaging Coalinga earthquake.

The Foothill Fault Zone, a complex series of northwest trending-faults that are related to the Sierra Nevada uplift, and whose activity also is little understood, runs from about Oroville in the north to east of Fresno in the south. Earthquakes on nearby faults in the zone can be the source of ground shaking in the Sacramento area.

The safety element of the neighboring city of Auburn (Placer County) notes, “there is a high potential that the area will be subject to at least moderate earthquake shaking one or more times over the next century.” It states further, “The closest identified ‘potentially active’ fault are the

Bear Mountain and the Melones Faults," which are situated approximately thirty and forty miles respectively east of downtown Sacramento.



Number	Name
27	Bear Mountain fault zone
28	Great Valley fault zone
213	Spenceville fault
215	Tahoe-Sierra frontal fault zone

Sacramento Area Quaternary Faults
Source: USGS Quaternary Fault and Fold database *http://earthquakes.usgs.gov/qfaults/usmap.html*
Faults displayed are believed to be sources of M>6 earthquakes during the Quaternary (the past 1,600,000 years)

The Petrolia (coastal Humboldt County) earthquake increased concern about how amplified long period motions from much closer major events, such as on the San Andreas Fault or the Hayward Fault, might reach damaging levels and affect Sacramento.

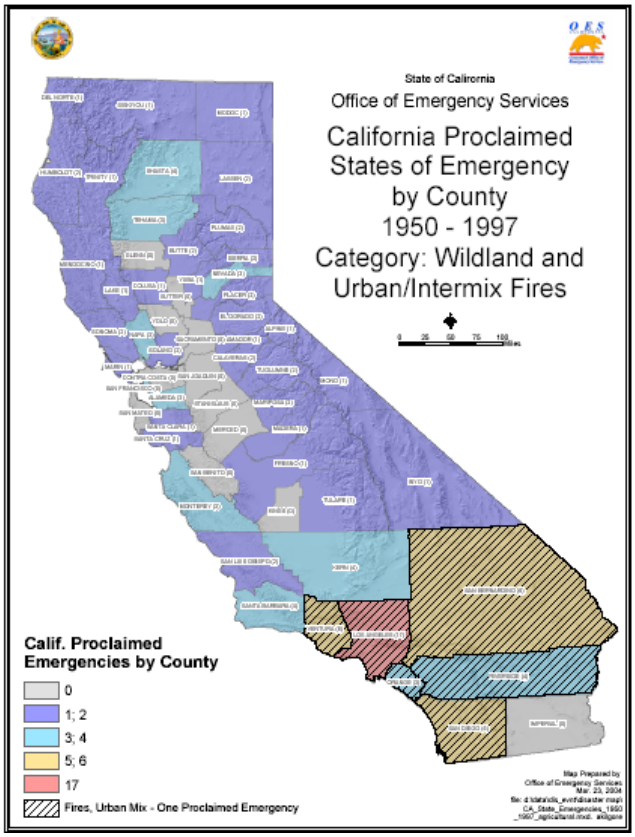
WILDFIRES

Wildfire and Urban Wildfire are an ongoing concern for Sacramento County. Generally, the fire season extends from early spring to late fall. Fire conditions arise from a combination of hot weather, an accumulation of vegetation, and low moisture content in the air. These conditions when combined with high winds and years of drought increase the potential for a wildfire to occur. Urban Wildfires often occur in those areas where development has expanded into the rural areas. A fire along this urban/rural interface can result in major losses of property and structures. Generally, there are three major factors that sustain wildfires and allow for predictions of a given area's potential to burn. These factors include fuel, topography, and weather.

Fuel. Fuel is the material that feeds a fire and is a key factor in wildfire behavior. Fuel is generally classified by type and by volume. Fuel sources are diverse and include everything from dead tree needles and leaves, twigs, and branches to dead standing trees, live trees, brush, and cured grasses. Also to be considered as a fuel source, are man-made structures and other associated combustibles. The type of prevalent fuel directly influences the behavior of wildfire. Light fuels such as grasses burn quickly and serve as a catalyst for fire spread. The volume of available fuel is described in terms of Fuel Loading. Certain areas in and surrounding Sacramento County are extremely vulnerable to fires as a result of dense grassy vegetation combined with a growing number of structures being built near and within rural lands. However, Sacramento County is less susceptible to fire hazards than surrounding counties with hillside development.

Topography. An area's terrain and land slopes affect its susceptibility to wildfire spread. Fire intensities and rates of spread increase as slope increases due to the tendency of heat from a fire to rise via convection. The natural arrangement of vegetation throughout a hillside can also contribute to increased fire activity on slopes.

Weather. Weather components such as temperature, relative humidity, wind, and lightning also affect the potential for wildfire. High temperatures and low relative humidity dry out the fuels that feed the wildfire creating a situation where fuel will more readily ignite and burn more intensely. Wind is the most treacherous weather factor. The greater a wind, the faster a fire will spread, and the more intense it will be. Winds can be significant at times in Sacramento County. However, it should be noted that the winds generally occur during the winter storm season, not during the summer, fire season. In addition to high winds, wind shifts can occur suddenly due to temperature changes or the interaction of wind with topographical features such as slopes or steep hillsides. Related to weather is the issue of recent drought conditions contributing to concerns about wildfire vulnerability. During periods of drought, the threat of wildfire increases.



Past Occurrences. Within the past years alone, there have been numerous urban and wildland fires within Sacramento County and vicinity. The wildland fires are the focus for this plan. In Sacramento County, grass fires and peat fires are the two main types of wildland fires of concern. Grass fires are an annual threat in the unincorporated area of the county, especially within recreational areas such as the American River Parkway. Peat fires are unique to the delta where peat is subject to spontaneous combustion. Once started, these fires become very difficult to control. Peat can still burn some distance underground even when the upper layers of peat are saturated with water over an extended period of time. Once the ground has dried out, a peat fire may return to the surface. However, there have been no disaster declarations for wildfire within Sacramento County between 1955-1997.

Late 1850s: The worst fire in Sacramento history leveled nine-tenths of the city. *(Source: The Sacramento Business Directory)*

1985: Watt Avenue West to Highway 80. This area has been the scene of a number of fires. In 1985, several spot fires burned into one large fire, in the Bushy Lake area behind Cal Expo. The University Avenue section of Sacramento, just to the east of the 1985 fire area, is heavily populated and could be affected by a similar fire along this stretch of the American River Parkway.

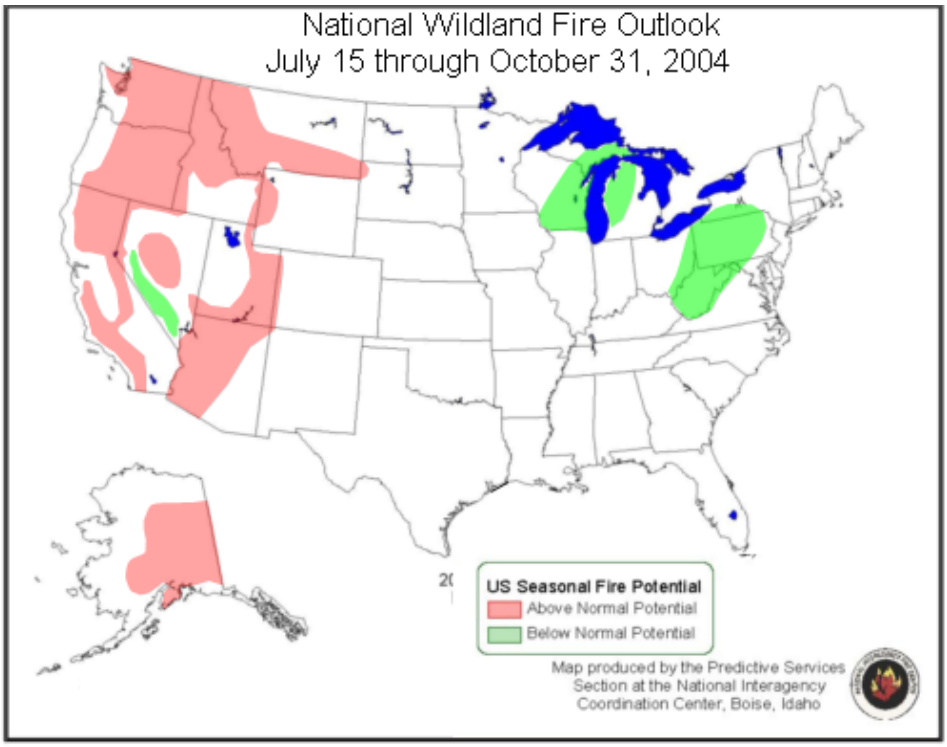
1988: Nearly 35 percent of the total fires in Sacramento County, excluding Sacramento City, were grassland fires (Source: Sacramento County General Plan, 1997).

1992: A Wildland fire occurred by Northgate Boulevard along the American River Parkway and extended into a commercial building.

2002: Sierra Fire - Loomis and Granite Bay. The Sierra fire occurring in September 2002, affected 500 acres in the eastern suburbs of Sacramento. Within the communities of Loomis and Granite Bay (Placer County) the fire destroyed six structures and threatened two schools. One hundred homes were evacuated, and more than 1,000 homes in both communities threatened. FEMA provided federal funds to assist in fighting this wildfire.

Likelihood of Future Fire Occurrences. The current US Forest Service forecasts a low fire danger potential for Sacramento County.

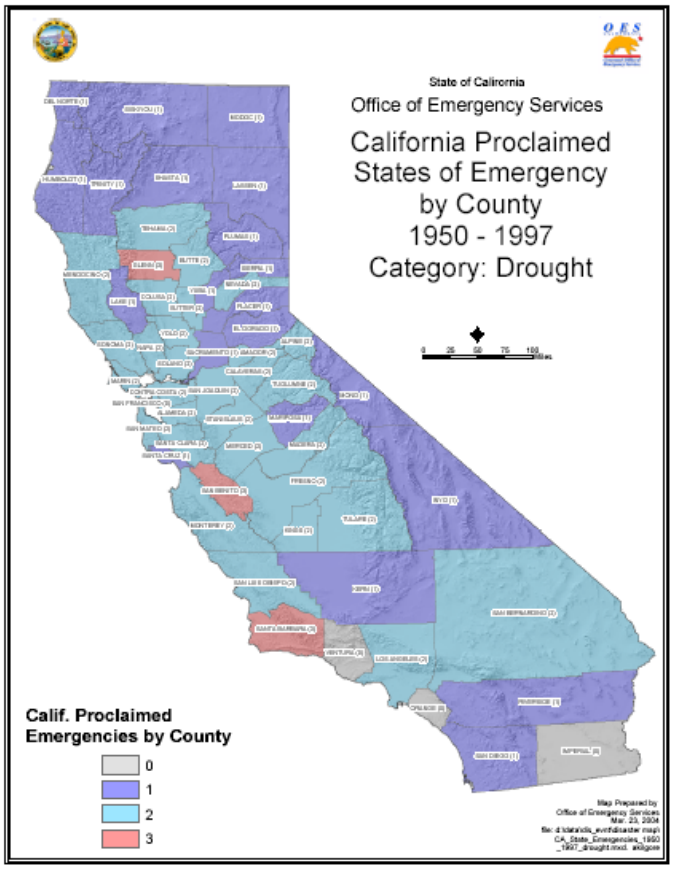
According to the National Wildland Fire Outlook for the Central Valley, large fire potential is expected to be normal (which is minimal) through October 2004.



DROUGHT

Drought is a complex issue involving many factors, with differing conditions and drivers throughout the state making this more of a regional focus. Drought can be defined regionally based on its effects:

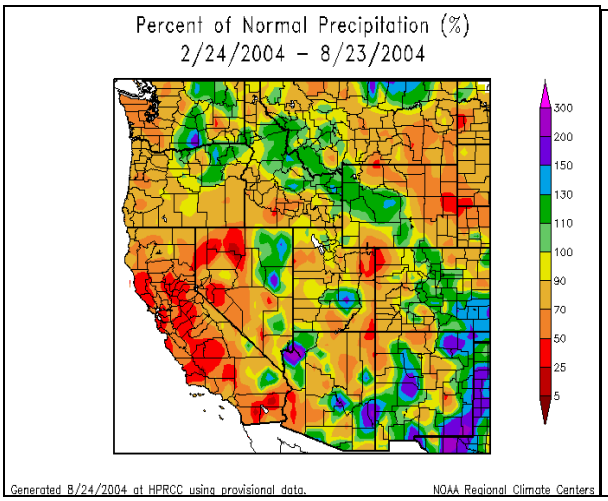
- **Meteorological –** this type of drought is usually defined by a period of below average water supply
- **Agricultural –** this type of drought occurs when there is an inadequate water supply to meet the needs of the state's crops and other agricultural operations such as livestock
- **Hydrological –** a hydrological drought is defined as deficiencies in surface and subsurface water supplies. It is generally measured as stream flow, snowpack, and as lake, reservoir and groundwater levels
- **Socioeconomic –** occurs when the results of drought impacts the health, well being, and quality of life, or when a drought starts to have an adverse economic impact on a region. (*Source: National Drought Mitigation Center, University of Nebraska, Lincoln)*
- **Regulatory –** occurs when mandatory compliance with environmental protection laws (especially those pertaining to protection of endangered species) combined with low precipitation and runoff, produce deficiencies in agricultural and/or urban water supplies.

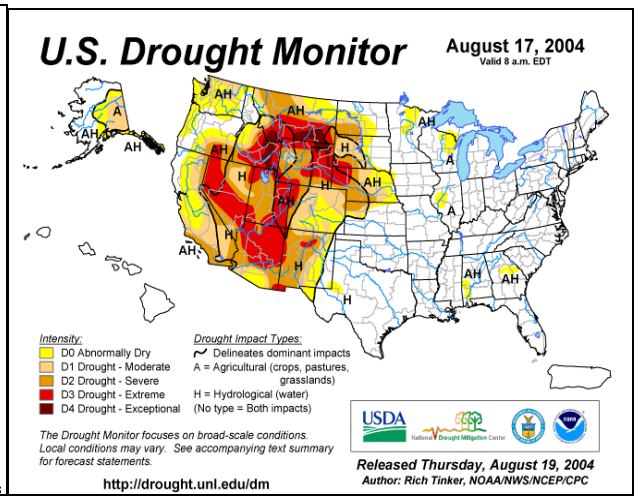


The drought issue is further compounded by water-rights specific to any state or region. Water is a commodity possessed under a variety of legal doctrines. In addition, the prioritization of water rights between farming and federally protected fish habitats in the state is also at issue.

Past Occurrences. Historically, California has experienced severe drought conditions, but Sacramento County has only severely affected once between 1950-1997. In 1977, a Federal Disaster was declared for a drought and Sacramento County was included.

Likelihood of Future Occurrences. Currently, Sacramento County is experiencing a period of abnormally dry conditions, but it is not in a drought, as determined by the U.S. Drought Monitor, NOAA and the USDA. Human caused drought conditions occasionally occur due to the need for flood volume storage in Folsom Reservoir. The operators of Folsom Dam must release water to allow for Spring runoff; however, when precipitation is less than expected (not categorized as drought) the reservoir levels are not fully replaced. Need for continuous flow in the Lower American River depletes the storage volume such that on many occasions the reservoir is too low for recreational boating by late summertime. When this condition is followed by a dry year, a human-caused drought condition may occur, leaving water supply needs unmet.





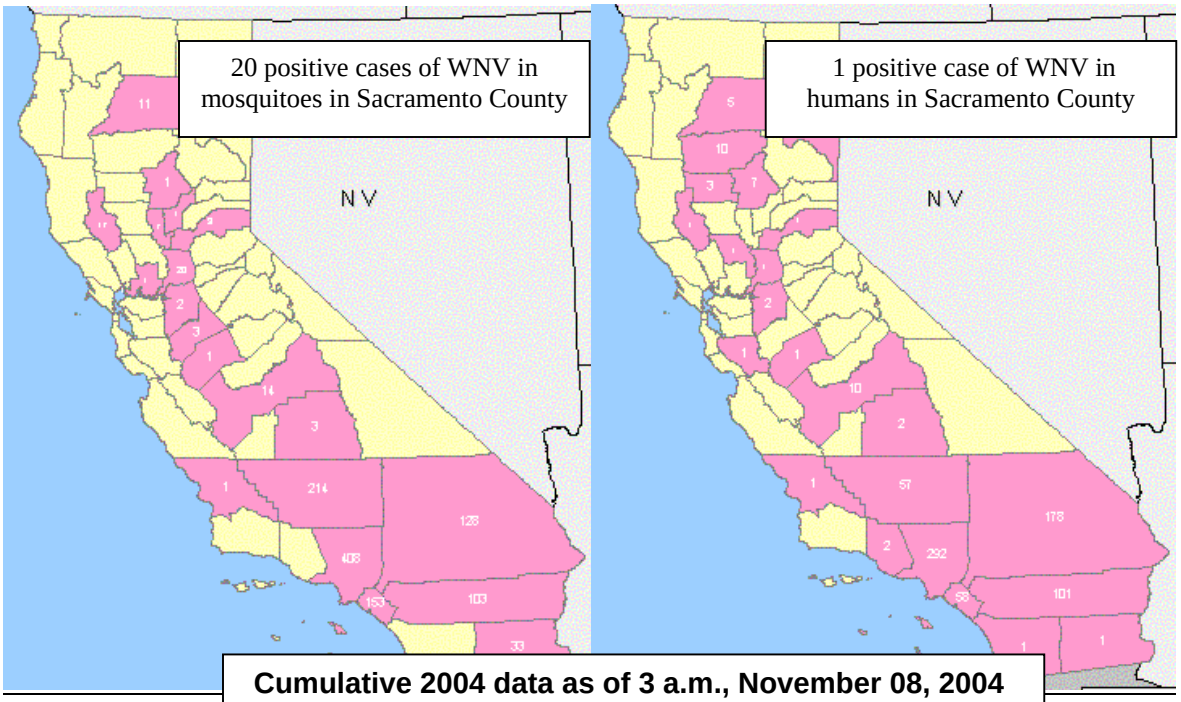
NATURAL HEALTH HAZARDS

West Nile Virus. A recent natural hazard to affect California is the West Nile Virus (WNV). Mosquitoes transmit this potentially deadly disease to livestock and humans alike. WNV first struck the northern hemisphere in Queens, NY, in 1999 and killed four people. In 2003, all 50 states warned of an outbreak from any of the 30 mosquito species known to carry it. From 62 severe cases in 1999, confirmed human cases of the virus spread to 39 states in 2002, and it killed 284 people. Less than one percent of those infected develop severe illness. People over 50 years of age are at higher risk for the severe aspects of the disease.

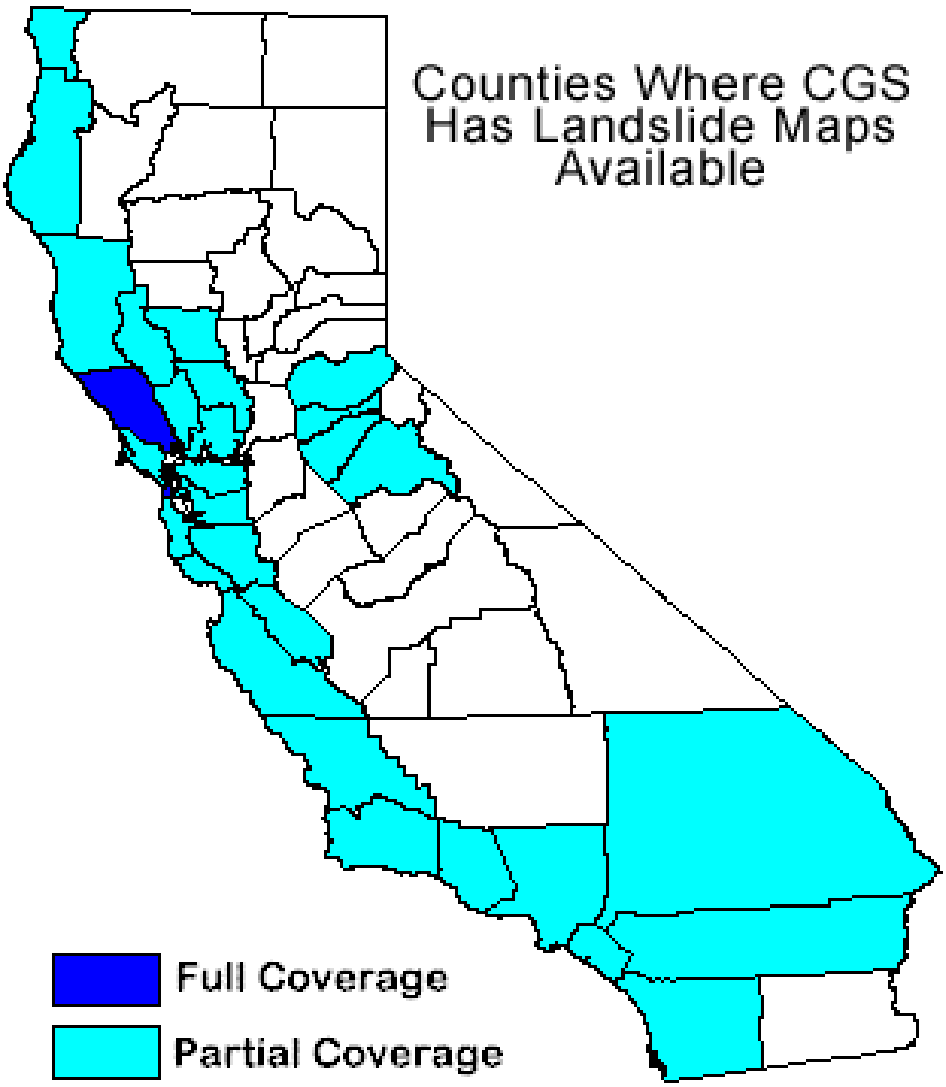
Past Occurrences. WNV was detected on a very limited basis in horses and humans in California in 2003. San Diego County reported one veterinary case; Imperial County and Riverside County each reported one human case. As of November 9, 2004, a total of 801 human West Nile Virus infections have been reported from 23 counties, including one case reported in Sacramento County. Thus far California has had 24 West Nile Virus-related fatalities, in Los Angeles, Kern, Orange, Riverside, San Bernardino, and Tehama counties.
(Source: California Department of Health Services, as reported by AP and www.westnile.ca.gov)

Likelihood of Future Occurrences. To date, across the United States, the incidence rate for WNV has been the worst in its second year with impacts tapering off after that. In California, 2004 was the second year of exposure, and California was hard hit, as described above. If the national pattern holds true, the likelihood of future occurrences will continue to decrease, beginning in 2005.

The WNV maps for California showing number of mosquito and human cases by county are below:



Cumulative 2004 data as of 3 a.m., November 08, 2004
Pink = positive cases, Beige = no reports
Source: http://westnilemaps.usgs.gov/



Landslides. The California State Hazard Mitigation Plan identifies landslides as one of the hazards adversely impacting the state. In general, they refer to land with greater than a 15 percent slope as being susceptible to landslides. The HMPC refers to the California Geological Survey (CGS) for the documentation that landslides do not affect Sacramento County, as CGS has not produced any landslide hazard maps for the County.

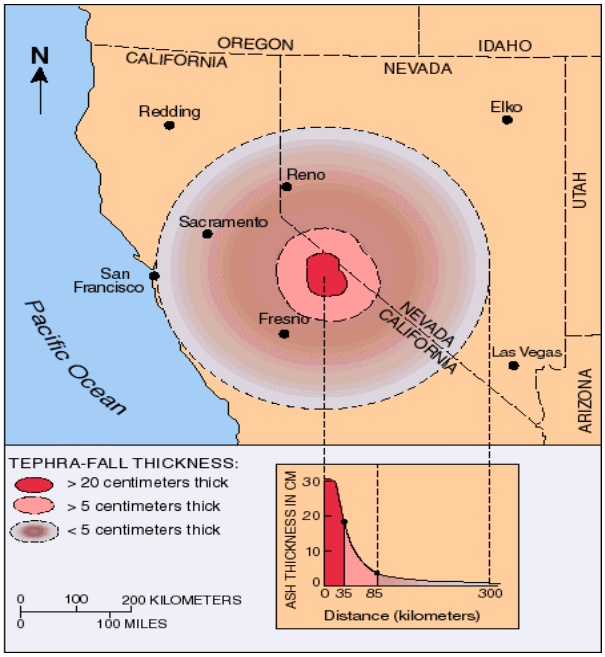
Past Occurrences. The HMPC was unable to find any evidence of major landslides within Sacramento County. However, there were reports of the potential for slope failure along the American River Bluffs, an area along the river between Sacramento and Folsom.

VOLCANOES

Volcanoes. The California State Hazard Mitigation Plan identifies volcanoes as one of the hazards adversely impacting the state. In general, they refer to population centers within 30-60 kilometers as being susceptible to significant volcanic impacts. The HMPC refers to the U.S. Geological Survey (USGS) for the documentation that there are no volcanoes within 85 kilometers of Sacramento County (see map on left, below).

.

Past Occurrences. The HMPC was unable to find any evidence of volcanic activity within Sacramento County.



Source: http://lvo.wr.usgs.gov/zones/TephraFall.html

The map on the right, above, shows the potential thickness of tephra on the ground from future eruptions in the Long Valley area that eject less than one kilometer^3 magma. Downwind deposits of ash produced by an explosive eruption could reach thicknesses of at least 20 centimeters at a distance of 35 kilometers (eight inches at 22 miles), five centimeters at a distance of 85 kilometers (two inches at 53 miles), and about one centimeter at a distance of 300 kilometers (0.5 inches at 185 miles).

These estimates of potential ash thickness are based on deposits of ash from past eruptions at other volcanoes that involved volumes of as much as one kilometer^3. Only a part of an ash-fall hazard zone would probably be affected by any single ash fall, the part affected would be determined by the wind speed and direction or directions during an eruption. (*Source: http://lvo.wr.usgs.gov/zones/TephraFall.html)* An eruption from Long Valley would not likely adversely impact Sacramento County with ash, even if it were downwind.

(This page has been left intentionally blank.)

4.2 Vulnerability Assessment

VULNERABILITY OF THE COUNTY TO CATASTROPHIC DISASTER

Once the hazard identification step was complete, the HMPC conducted a vulnerability assessment to describe the impact that each hazard identified in the preceding section would have upon Sacramento County. As a starting point, the HMPC utilized County Assessor data to define a baseline against which all other disaster impacts could be compared. The baseline is the catastrophic, worst-case scenario, the assessed value of the entire county as a whole, $89.5 Billion.

The value is deceptively low in that state, federal and other exempt facilities are not included in the county's assessment, it only reflects commercial and residential property, and Proposition 13 limits property taxes by freezing a property's assessed value to the value on the date of the most recent sale. The value also does not reflect any infrastructure or other community elements vulnerable to disaster, such as the economic impact to agriculture or business and industry. The figures below represent the value of buildings only. Land values have been purposely excluded because most often land remains following disasters, and subsequent market devaluations are frequently short-term and difficult to quantify. Additionally, state and federal disaster assistance programs generally do not address loss of land or its associated value.

TOTAL VALUE, LESS VACANT LAND, AND LAND VALUES FOR IMPROVED PROPERTY

CITRUS HEIGHTS	4,647,030,160
ELK GROVE	10,410,394,230
FOLSOM	6,895,628,807
GALT	1,138,391,277
ISLETON	30,232,419
RANCHO CORDOVA	3,828,797,291
SACRAMENTO CITY	28,117,810,904
UNINCORPORATED	34,397,919,841
COUNTYWIDE	**89,466,204,929**

(Source: Sacramento County Assessor's Office, 10-SEP-04, modified by the HMPC)

In terms of the impact upon the numbers of people, area affected and individual communities, the following table provides a summary of the county exposure to disaster.

Sacramento County Land Ownership

	Population	Area (Sq. Mi.)
City of Citrus Heights	85,400	14.24
City of Elk Grove	94,850	38.60
City of Folsom	51,300	24.17
City of Galt	19,550	2.95
City of Isleton	840	.46
Rancho Cordova	53,613	33.59
City of Sacramento	411,200	96.34
Unincorporated County	608,687	779.66
County Totals	**1,325,440**	**990.01**

Source: County of Sacramento Website, revised by the HMPC

HOW RISK VARIES BY LOCATION WITHIN THE COUNTY

The DMA regulations require that the HMPC evaluate the risks associated with each of the hazards identified through the planning process. For multi-jurisdictional plans, the regulations also require that the risks be further evaluated where a jurisdiction's risks vary from the risks facing the entire planning area.

The hazards identified in Section 4.1 are:

- Severe weather
- Flood
- Dam failure
- Earthquakes
- Wildfires
- Drought
- Natural health hazards
- Landslides and
- Volcanoes

The HMPC has determined that the risk for the following hazards differs in some jurisdictions within the county:

- Flood (different in every participating community)
- Earthquakes (different in Isleton and the other Delta communities) and
- Wildfires [different along the American River Parkway (including areas of Fair Oaks Bluff, Carmichael and Folsom].

The HMPC has determined that the risk of the following hazards occurring within the county is minimal or non-existent, as described in Section 4.1, and they are no longer addressed in this plan until such time that information becomes available that changes that assessment:

- Landslides and
- Volcanoes.

VULNERABILITY TO HAZARDS AFFECTING THE COUNTY

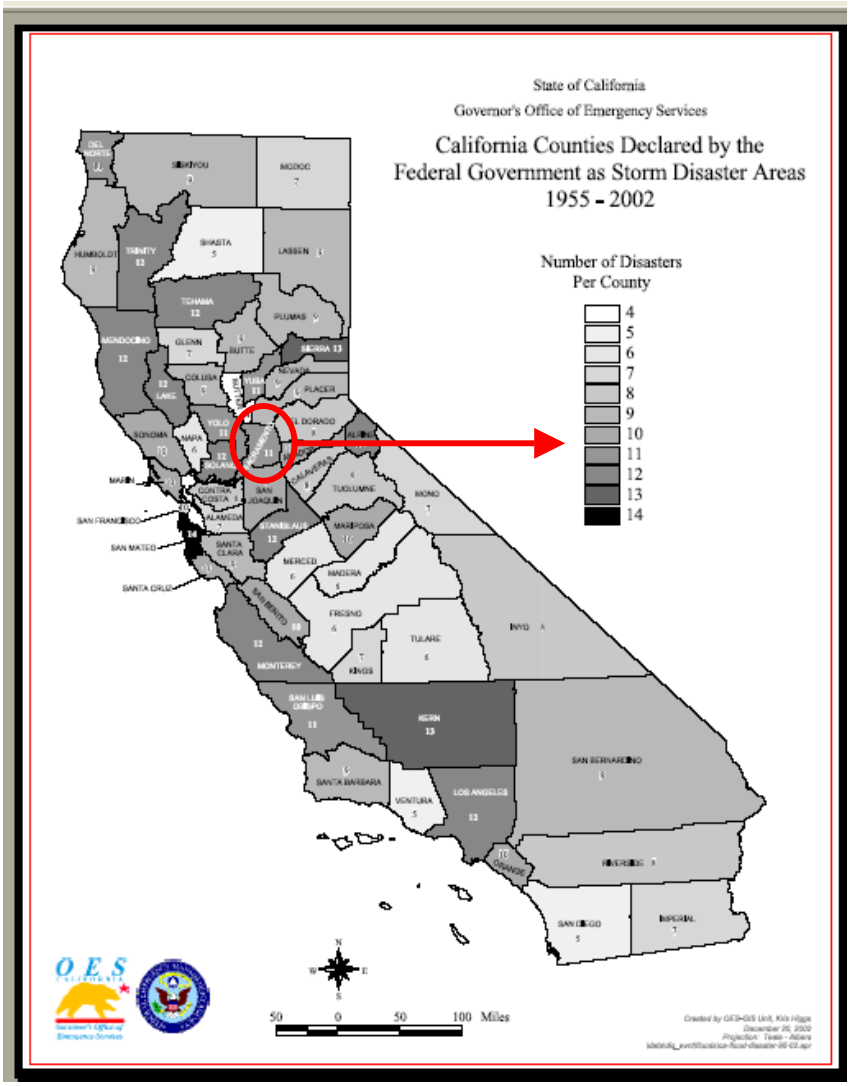
This section of the plan presents an evaluation of the vulnerability to all hazards that are identified in Section 4.1 as presenting a risk to Sacramento County. Where specific hazard risks vary across the county, a detailed evaluation will be presented in Section 6, The Community Elements.

SEVERE WEATHER (HEAVY RAINS/STORMS, TORNADOES, FOG)

The HMPC addressed severe weather hazards for two reasons:

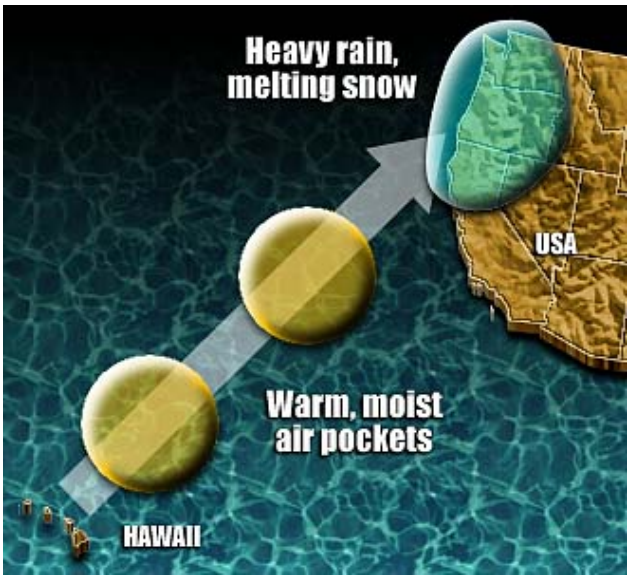
1. Floods, clearly the hazard posing the greatest and most frequent threat throughout Sacramento County, are almost always a direct result of severe weather. The majority of flooding incidents in the county have occurred between October and March, and are often a result of severe weather associated with storms known locally as the 'Pineapple Express'.

2. The HMPC research identified frequent occurrences of 'severe weather'. The HMPC grouped all incidents of hailstorms, thunderstorm winds, tornadoes and fog as severe weather.



The State Hazard Mitigation Plan does not identify severe weather as a hazard to be addressed, but it does include the map to the left displaying the number of federal disaster declarations resulting from 'storms'. The Sacramento County HMPC, having examined the topic, did develop some general recommendations addressing how to reduce the impacts of severe weather.

General Statement of Impact upon Sacramento County. Impacts of severe weather, such as ice, snow and windstorms, are usually upon the availability of electric power, as the distribution systems are disrupted through the breaking of power lines. Hailstorms often damage roofs and motor vehicles. Fog results in serious multi-vehicle crashes on Interstates and other major highways.



'Pineapple express' brings warm air, rain to West. A relatively common weather pattern brings southwest winds to the Pacific Northwest or California, along with warm, moist air. The moisture sometimes produces many days of heavy rain, which can cause extensive flooding. The warm air also can melt the snow pack in the mountains, which further aggravates the flooding potential. In the colder parts of the year, the warm air can be cooled enough to produce heavy, upslope snow as it rises into the higher elevations of the Sierra Nevada or Cascades. Forecasters and others on the West Coast often refer to this warm, moist air as the 'Pineapple express' because it comes from around Hawaii where pineapples are grown. Source: USA TODAY research by Chad Palmer http://www.usatoday.com/weather/wpinappl.htm

FLOODS

River Floods. River flooding is the most significant natural hazard that Sacramento County faces. The Sacramento area has a good working knowledge of the 100-year flood, however, the statistical outlier flood is not as well quantified. Sacramento is not at high risk of flooding but is at low risk of catastrophic flooding. The potential for a flood event is generally between the months of December and March and is exacerbated by heavy snowfall in the mountains and foothills followed by warm rainfall. The Sacramento River extends north to Mount Shasta and the Shasta Reservoir. Many other rivers are tributary to the Sacramento, including (immediately north of Sacramento) the Bear and Feather Rivers. The American River extends to the Sierra Nevada foothills in three branches (South, North and Middle). Folsom Reservoir is at the eastern boundary of Sacramento County and serves to control the American River.

The Cosumnes River is a wild and natural river originating in the Sierra Nevada foothills, flowing into southern Sacramento County. This area is mostly rural farmland. Levees were constructed by agricultural interests, and they are inadequate for containing record storm flows such as those experienced in February 1986 and again in January 1997. These two storms left the levee system sorely damaged. Each time, the levee breaks were repaired, but the overall system sits in wait of another flood event.

The Mokelumne River is the southernmost river in the County and is controlled by a dam in the neighboring county and levees.

All of the watersheds converge at the Sacramento River Delta. The flood issues in the delta are of concern as the agricultural interests continue to farm the land which is subsiding annually, making the levee systems more vulnerable to breaching. More discussion on the Delta is found in the Sacramento County Section of this Plan.

The American and Sacramento River levees were found to be eroded and there were concerns of substrata seepage. Much of the levee system was decertified and large areas were remapped as flood zone AR in July 1998. Subsequently, there has been much work by SAFCA and the US Army Corps of Engineers to improve the levee system on the American and Sacramento Rivers through the County. It is anticipated that many sections of the levee will be recertified to a 100-year level of protection, in 2005.

When the 100-year event is exceeded, the consequences could be catastrophic as flood depths behind levees can range up to many feet deep in some urban areas. It is important that people know that they are protected by these structural flood control systems and purchase flood insurance to protect their financial assets in their homes and businesses. Furthermore, it is important that they are aware of flood warning systems, weather conditions, and river levels and that they have a well rehearsed evacuation plan. There may not be adequate notice to evacuate to higher ground by vehicular travel. Instead, it may be more prudent to find a commercial rooftop or other stable structure to wait out the flood incase the statistically unlikely catastrophic flood event should occur.

Stream Flooding. There are many urban streams, channels, canals, and creeks that serve the drainage needs of the County. There is significant threat of flooding in large areas of the county from several of these streams. These watersheds do not know political boundaries. It is important that each community work together to create watershed master plans. There is more discussion about these stream groups in the section for each city and the unincorporated county. Many of these streams are prone to rapid flooding with little notice.

Flood Mapping. FEMA is working with the County, who in turn has a cooperating technical partner agreement with each city, to create a countywide digital flood insurance rate map. This map will convert the existing paper maps (100-year floodplain maps) to a digital format posted on a Geographic Information Systems platform. There has also been a concerted effort to develop two-foot contours for much of the County, in GIS format. This will help manage the watersheds and floodplains on a regional basis and to improve the accuracy of the floodplain map.

Local Flood Hazards. Urban storm drainpipes and pump stations have a finite capacity. When rainfall exceeds this capacity, or the system is clogged, water accumulates in the street until it reaches a level of overland release. This type of flooding may occur when intense storms occur over a development.

Severe Flooding. Sacramento faces a risk of severe flooding for two primary reasons:

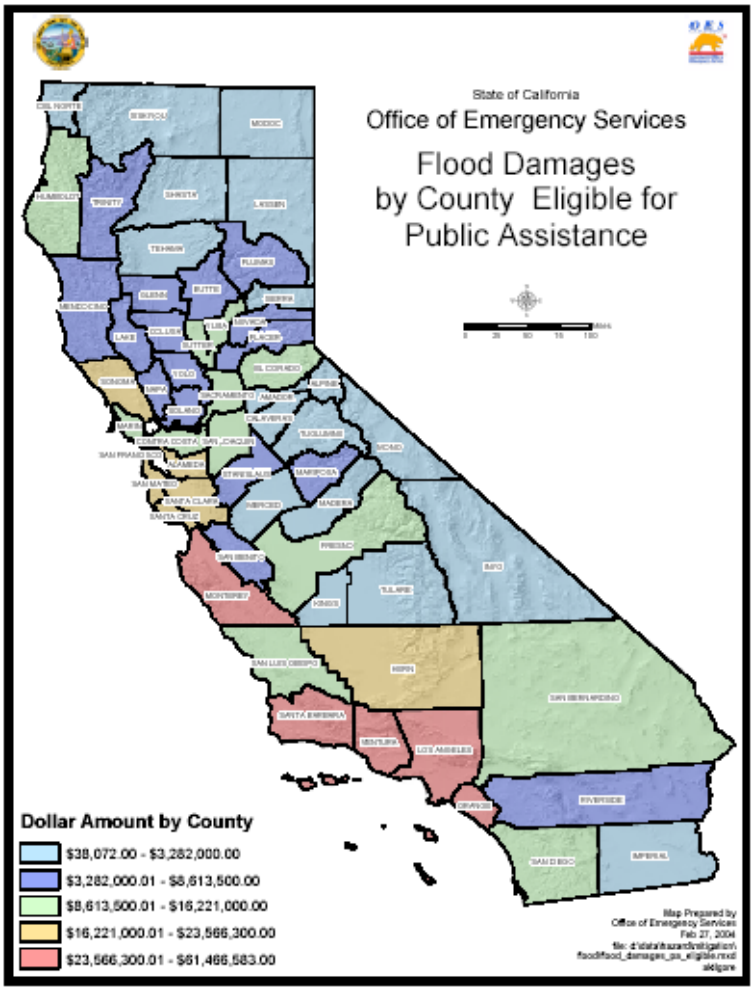
1. The cores of today's levees are often the levees built by farmers and settlers as much as 150 years ago. Early levees were not constructed to current engineering standards, and little care was given to the suitability of foundation soils. These remnants of the past make today's levee reliability uncertain.

2. The quantity of water flowing out of the Sierra Nevada Mountains during large floods appears to be increasing. Folsom Dam was designed to reduce flood flows in the

American River to a flow rate that could be safely carried by the downstream levees. Construction on Folsom Dam began in 1950. In designing the Dam, engineers used historic flow records and statistical analysis to predict the size and frequency of occurrence of large floods. From those predictions they determined how much space must be available in Folsom Dam to store excess flow from a flood with one chance in five hundred of occurring in any given year. Combined with the decreasing flood storage capacity created by increased flood flows, Folsom Dam does not currently have the capacity to release water fast enough to be able to create the storage needed to attenuate the low probability high impact floods flowing from the Sierras.

To address the first issue, levee improvements to strengthen levees and to make them less susceptible to seepage induced failures are a major portion of SAFCA's efforts to reduce the risk of flooding in Sacramento. When the levee improvements are completed, they will remain subject to overtopping by floods larger than their design capacity.

To address the second issue, work is planned to enlarge the Dam's outlets, creating larger and faster releases that will increase storage in Folsom Lake. Additional plans to add seven more feet in height to the Dam will also increase storage even further. The larger releases will still be contained within the downstream levee system, up to the 100-year flood level.



Flooding has been frequent in Sacramento County, and the vulnerability to flood damages is high. While the map at the right shows that the potential flood damages for Sacramento County are the lowest compared to other California counties, the table that follows details that nearly 30 percent of the County population lives within the 100-year floodplain, over 5,000 residences have received damage previously, and that the federal share of past damage to public facilities exposed to the flood hazard has cost $15 million.

This large population in Zone A will be significantly reduced when the A-99 floodplain is remapped in early 2005 and will be further reduced as the Army Corps of Engineers completes

the balance of the work, including the Pocket Area of Sacramento and the area near the Mayhew Drain on the southern side of the American River.

VULNERABILITY TO FLOOD DAMAGES IN SACRAMENTO COUNTY

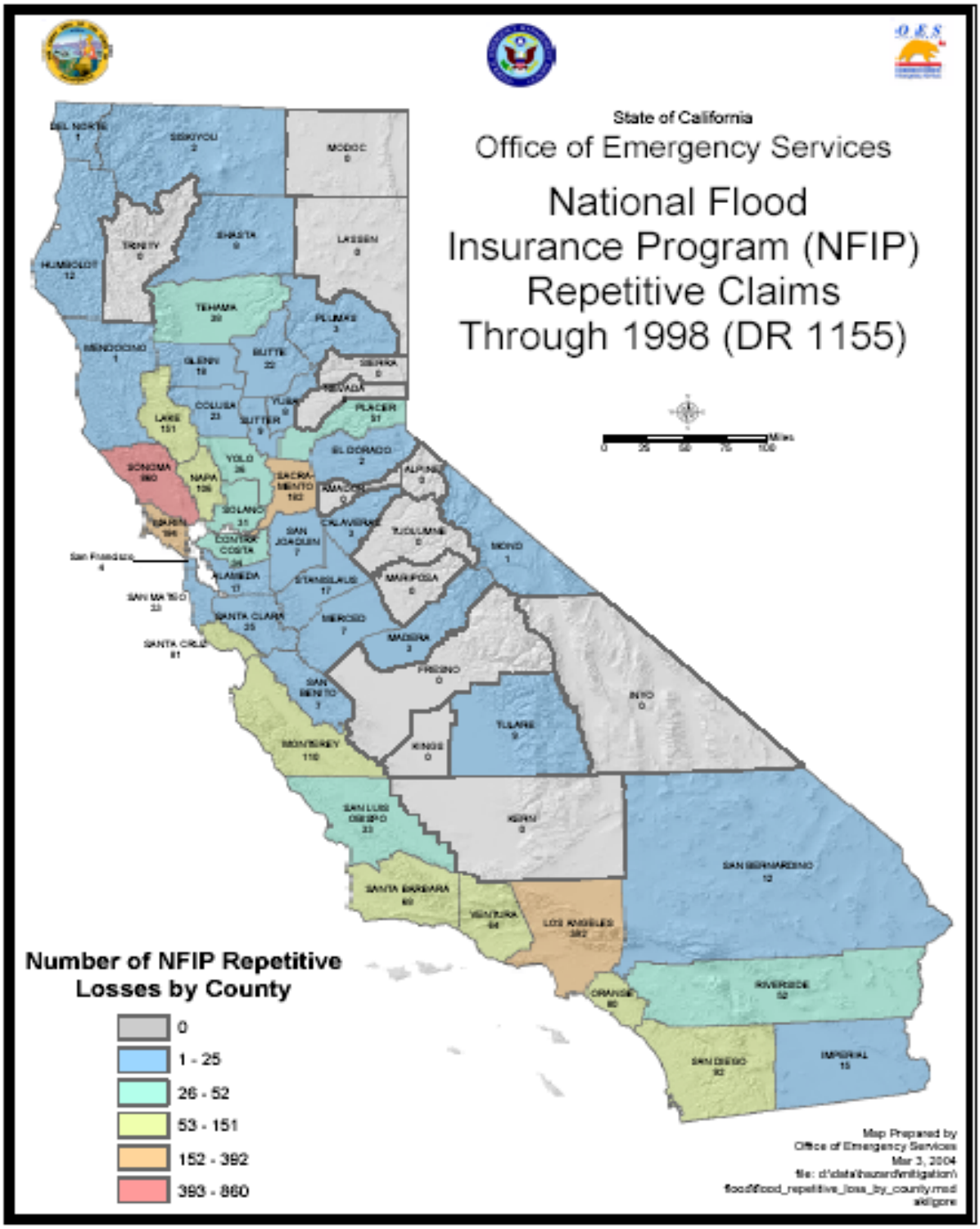
Population of Sacramento County	Total Pop in FIRM Zone	Pop in Zone A – 100YR	Pct County Pop Zone A	IA Damage Locations	# IA Locations In Zone A	Repetitive Losses in Unincorporated County	Total Repetitive Losses in County	Potential # PA Applicants	PA Amt Eligible
1,223,499	490,014	359,792	29.4%	5,279	2,029	114	182	990	$14,989,505

Source: CA-OES State Hazard Mitigation Plan

In the above table, IA refers to FEMA's 'Individual Assistance' disaster program, their program designed to assist people. The numbers above refer to the numbers of eligible 'IA' applicants from past federally declared flood disasters. The actual numbers of individuals affected could be higher due to people who did not apply for assistance, or those that were determined to be ineligible. The 'PA' refers to FEMA's 'Public Assistance' disaster program, their program designed to assist local governments, certain private non-profit institutions, and eligible districts.

In addition, Sacramento County's vulnerability to flooding is highlighted by it's number of Repetitive Losses, defined under the NFIP as insured structures that have generated claims payments greater than $1,000 twice in any 10-year period. Sacramento County ranks third among all California communities participating in the NFIP in terms of the number of repetitive losses. The City of Sacramento ranks number 16 and the City of Citrus Heights ranks number 22. The County has been addressing these repetitive losses through a variety of mitigation techniques over the past few years, and continues to do so.

In response to historic flooding, the communities within Sacramento County continue to undertake major reconstructive efforts to reduce the potential for flood damage. These efforts are described more fully in Section 4.3 – Existing Capabilities.


State of California
Office of Emergency Services
National Flood Insurance Program (NFIP) Repetitive Claims Through 1998 (DR 1155)
Number of NFIP Repetitive Losses by County
0
1 - 25
26 - 52
53 - 151
152 - 392
393 - 860
Map Prepared by
Office of Emergency Services
Mar 3, 2004

TOP 36 REPETITIVE LOSS COMMUNITIES BY NUMBER OF CLAIMS AS OF 6/30/02

Rank	Losses	Properties	Community	Building Payment	Contents Payment	Total Payments
1	2,280	801	Sonoma County	37,377,757.82	10,302,156.07	47,679,913.89
2	464	169	City of Malibu	7,228,124.92	1,190,328.89	8,418,453.81
3	305	114	Sacramento County	4,638,815.17	1,264,770.48	5,903,585.65
4	284	120	City of Los Angeles	2,779,104.58	494,007.21	3,273,111.79
5	238	92	Lake County	4,140,236.06	413,606.48	4,553,842.54
6	231	108	Monterey County	6,202,530.40	758,595.09	6,961,125.49
7	188	72	Santa Cruz County	2,394,553.47	476,769.33	2,871,322.80
8	178	68	Marin County	1,891,163.24	641,438.55	2,532,601.79
9	147	60	City of Napa	2,434,498.85	1,269,014.77	3,703,513.62
10	142	45	Los Angeles County	1,461,070.07	543,404.07	2,004,474.14
11	122	48	Ventura County	1,448,265.70	633,856.75	2,082,122.45
12	115	45	City of Lakeport	1,614,244.22	106,007.55	1,720,251.77
13	99	38	Napa County	1,630,402.40	344,283.04	1,974,685.44
14	92	32	City of Peteluma	1,272,076.37	548,351.96	1,820,428.33
15	91	31	City of San Rafael	786,240.42	649,654.42	1,435,894.84
16	90	40	City of Sacramento	779,495.01	158,248.31	937,743.32
17	76	33	Santa Barbara County	1,485,919.02	292,659.06	1,778,578.08
18	73	32	Yolo County	844,916.23	171,854.21	1,016,770.44
19	73	30	City of Novato	709,576.29	164,572.55	874,148.84
20	68	32	City of Santa Barbara	1,422,043.07	45,972.59	1,468,015.66
21	67	24	City of Roseville	1,597,023.96	454,953.91	2,051,977.87
22	65	25	City of Citrus Heights	1,052,548.53	248,774.15	1,301,322.68

The Impact of Flood Control Upon Flood Vulnerability. Continued reliance upon flood control structures in Sacramento County and the Central Valley will be without reprieve. The history of the area, beginning with hydraulic mining techniques of the gold miners, through the ongoing conversion of agricultural lands to commercial and residential developments, makes it impossible to reverse the dependence upon structural flood control protection. Levee maintenance is a continuous effort, due to erosion and scour brought on by the channelization itself.

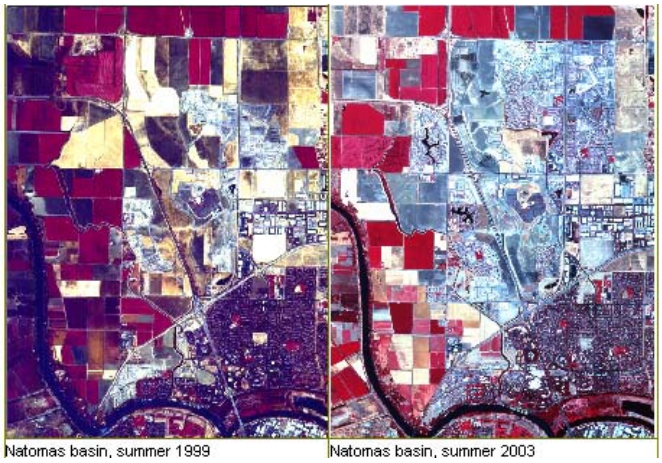
The Impact of Development Trends on Flood Vulnerability. The development trend in Sacramento County is steady, significant growth. The Sacramento Area Council of Governments (SACOG), which includes Sacramento and five neighboring counties, expects an additional one million people to live in the area by 2030, and 1.7 million by 2050. Such growth will consume thousands of acres of farm and woodlands lands and the impacts may overwhelm existing transportation and flood control facilities. (*Source:* Sacramento Bee, April 25, 2004).

Indeed the trend, for the past sixty plus years, has been noteworthy immigration to the area. These people need homes, businesses, industry, government, schools and etceteras. Increased development causes both an increase in peak flow and volume of storm water runoff. The four major rivers flowing through the county are not noticeably influenced by land development trends within the county. However, increased development in areas protected from deep

flooding by levees and the Folsom Dam simply increases the potential damage assessment should a statistically unlikely, yet catastrophic flood occur.

Tributary Streams. Master planning will be necessary to assure that open channel flood flow conveyances serving the smaller internal watersheds are adequately prepared to accommodate the flows. These developments can bring the revenue needed to solve existing flooding problems by constructing ecologically sensitive water conveyance areas with peak flow detention.

The potential for flooding may increase as storm water is channelized due to land development. Such changes can create localized flooding problems in and outside of natural floodplains by altering or confining natural drainage channels. Floodplain modeling and master planning should be based on the ultimate built-out land use in order to assure that all new development remains safe from future hydrologic conditions. While local floodplain management, stormwater management, and water quality regulations and policies address these changes on a site-by-site basis, their cumulative affects can result in floodplain impacts regardless.



Conversion of Agricultural Lands to Urbanized Development

(*Source: California Department of Conservation and The Sacramento Bee)*

This amount of growth will strain the limits of the entire water management system – which includes water supply in addition to water control. The Central Valley provides 2/3 of the water supply for southern California – so when flood control structures are overwhelmed, the result is not only severe flooding, but a significant loss to the state's water supply may occur.

Much of the community favors preservation of open space, smart growth, and protection of endangered species.

"Two-thirds of Sacramento County voters would support a $40-per-parcel annual tax to maintain and improve regional parks and river parkways, according to a new poll conducted for the county… A coalition of American River Parkway supporters paid for the poll, which will help local officials decide on a ballot measure for regional parks… Forty-nine percent of respondents said they visit county parks at least a few times per month, and 70 percent said the county's regional parks are very important or extremely important to their quality of life… Voters ranked

maintaining water quality and preserving natural resources in county parks and preserving land threatened by development as the highest priorities for the additional funds." (***Source:*** Sacramento Bee 9/16/04)

The Impact of Liability upon Flood Vulnerability. As a final statement describing the vulnerability of Sacramento County to future flood losses, it would be remiss to ignore a recent court decision that places the financial liability for flood losses resulting from levee failures on the State of California.

A 2004 State Supreme Court decision found California responsible for a 1986 flood caused by a break on a state controlled portion of the Feather River Levee, flooding the Town of Linda. The Supreme Court decided not to hear an appeal of a lower court decision that found the state should have fixed the levee before it broke. A similar case concerning a levee failure in 1997 is expected to be heard by the Yuba County Superior Court in October of 2004. *(Source:* Sacramento Bee, April, 2004)

At the root of the problem is the lack of a consistent, sufficient source of funding for flood control maintenance. Under the current system, the majority of flood control works are designed, constructed and funded by the USACE, with local input and cost-shares. After construction, in the case of a levee, the State Reclamation Board takes ownership, and maintenance responsibility is transferred to a local agency, generally a reclamation district.

Yet, in the past five years, state General Fund spending for maintenance of flood control structures has decreased from $101.6 million to $13.6 million, one-eighth of what it was. While the court has determined that the state is responsible, the state's legislative analyst currently argues that the state should not participate in funding a portion of projects that the state endorses through the Reclamation Board. An outcome of these conflicting positions is that the functioning of the Fremont Weir, an open weir that allows floodwaters to flow from the Sacramento River into the Yolo Bypass, is in question because the river has deposited a million cubic feet of sediment at its entrance. *(Source:* Sacramento Bee, March 30, 2004)

Regardless of where liability for levee failures finally rests, the concern should be that there will be future levee failures. A wise man once said, "There are only two types of levees, those that have failed and those that will fail." By increasing the density of development, in areas that are protected from deep flooding by levees, the potential damage losses due to exceptional flood events are proportionately increased.

General Statement of Planning Area Impact. Floods present a threat to life and property, including buildings, their contents, and their use. Floods can affect crops and livestock. Floods can also affect lifeline utilities (e.g., water, sewerage, and power), transportation, jobs, tourism, the environment, and the local and regional economies.

- An exceptional flood on the American or Sacramento Rivers could breach levees, leaving tens of thousands of homes and businesses damaged;
- An exceptional flood event would have a significant impact on the overall economic health of the community; and

- A failure of the levee system in an exceptional flood event could have significant damage potential including loss of critical facilities, such as, hospitals, fire/law enforcement facilities, jails, bridges, roadways, pump stations, electricity distribution and water and sewage treatment plants.

Vulnerability of Critical Facilities to Flood Hazards. Critical facilities are those community components that are most needed to withstand the impacts of disaster. Included in this classification are police and fire stations, hospitals, schools that serve as emergency shelters, and lifeline utilities; power, water and sewer system components. Within the county, and particularly the City of Sacramento, many critical facilities are protected by the extensive flood control system. To additionally protect them individually from the potential failure of the structural flood control systems would be very difficult to justify on a benefit/cost ratio analysis. Still, the impact to the community, should the statistically unlikely catastrophic flood event occur, would be astonishing if also these critical facilities are damaged or destroyed.

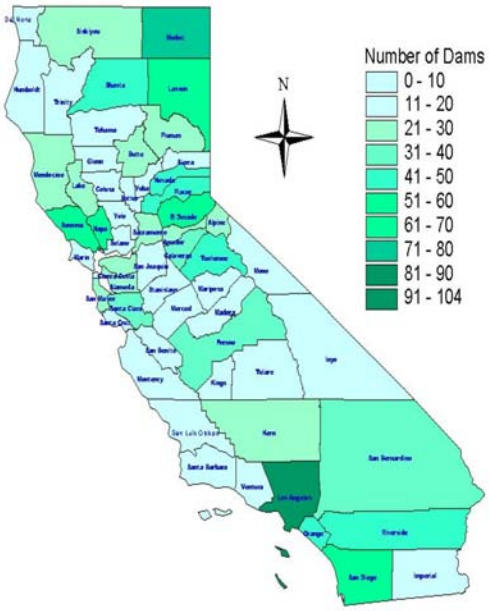
In past flood events, major motor vehicle routes have been closed, even Interstate Freeways and California Highways. Railroad lines have been damaged and closed. Boating on the rovers is curtailed. Even access to the airports has been limited. The Sacramento International Airport lies within a levee protected area, and s subject to flooding in a statistically low probability high impact flood event.

DAM FAILURES

Vulnerability to dam failures is confined to the areas subject to inundation downstream of the facility. Secondary losses would include loss of the multi-use functions of the facility, and associated revenues that accompany those functions. According to the Sacramento General Plan, Folsom Dam would have the greatest impact on the population of Sacramento County should it fail. The floodwaters from this system would affect the cities of Folsom and Sacramento and the surrounding unincorporated area. The failure of the earthen dikes to the north of Folsom Dam would impact those people in the relatively low areas of Sacramento County leading to Roseville. The water would then flow into the Natomas Area of the City of Sacramento and then, depending on if the levees held, this water could fill the old Lake Natomas bed and possibly flood the North Highlands and Rio Linda areas. Failure of the earthen dikes to the south of Folsom Dam would impact the City of Folsom immediately. It would then flow into the American River basin, possibly breaching lower American River levees. Failure of the Mormon Island dike would send a significant flow through parts of Folsom and southwestwardly toward Elk Grove. The superstructures of Folsom and Nimbus Dams are designed to release very large flows without catastrophic failure. However, these flows may cause damage to the downstream levees and erosion to the bluffs.

Nimbus Dam, below Folsom dam, has a capacity of 8,760 acre-feet. The Flood Operations Branch, Department of Water Resources, State of California, believes that the American River Channel will not flood unless the levees fail or there is a catastrophic release. The Sacramento Municipal Utility District (SMUD) inundation map indicates that a failure of the Rancho Seco Dam would flow down to and stop approximately at Highway 99, north of Twin Cities. Failure of Shasta Dam would affect populations south along the Sacramento River basin to about

Knights Landing where it would lose momentum. An Oroville Dam failure would impact populations southwest along the Feather River basis to about the Yolo Bypass. Sacramento County may experience flood consequences greater than those mapped on the FIRM should any of these dams catastrophically fail. A failure at Camanche Dam would affect the Delta and possibly slow the flow of other rivers through the Delta. The Bureau of Reclamation indicated the water would stop short of the Sacramento-San Joaquin County line at Interstate 5 (Source: Sacramento County General Plan). Inundation maps prepared by Dam Owners are on file with the county and, for national security purposes, can only be accessed by those that can demonstrate a need-to-know to the Office of Emergency Management within the County Sheriff's Department.



As discussed in Section 4-1, there are 29 dams whose failure would impact Sacramento, including 11 of which are located outside the county. Since 1950 there have been only nine dam failures, none in Sacramento County. Only one dam failure warranted disaster assistance. *(Source: CA-OES State Hazard Mitigation Plan)*

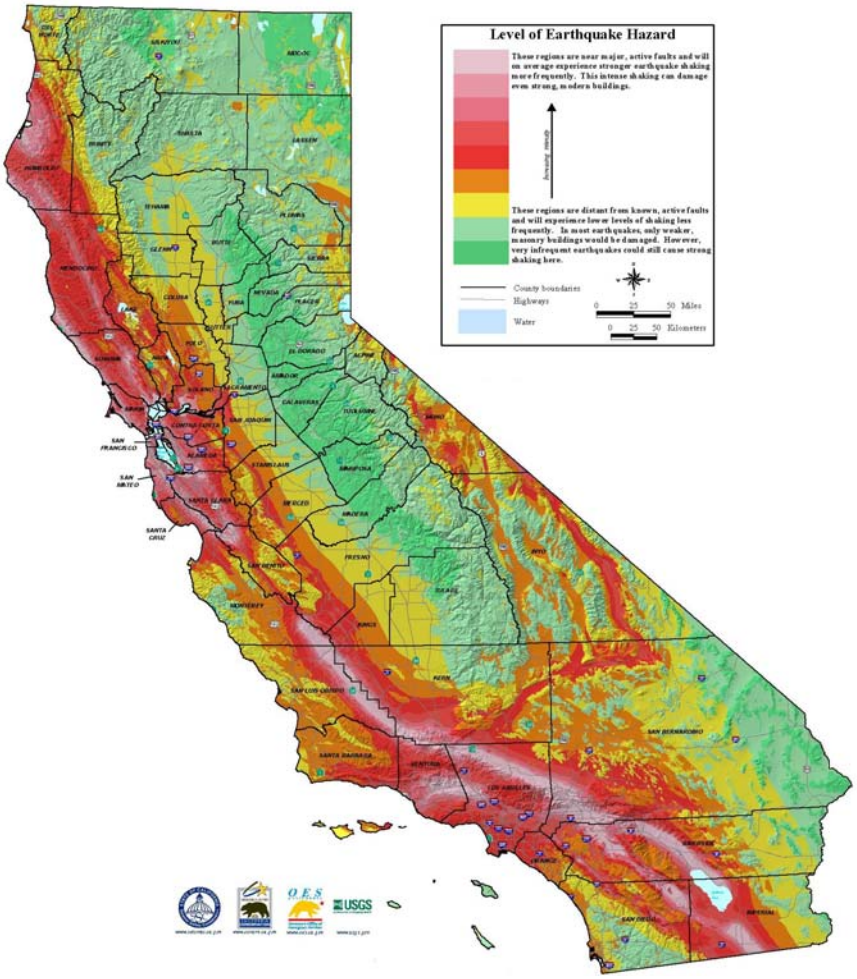
EARTHQUAKES

Based on historic and scientific information, both the risk and vulnerability to Sacramento County from earthquakes is moderate. Several nearby potentially active faults have been identified that could generate locally strong ground motions in Sacramento County and vicinity. Ground shaking, the principal cause of damage, is the major earthquake hazard because most of the County is located on alluvial materials that tend to amplify ground motions. Soil surveys for Sacramento County detail a mixture of sands, silts and clays; materials which are sediment eroded from the Sierra Nevada Mountains and transported by the Sacramento and American Rivers. (***Source***: www.soildatamart.nrcs.usda.gov).

The Delta Plain, between the lower courses of the Sacramento and San Joaquin Rivers, is at a higher risk to ground shaking due to its higher water table and proximity to the Hayward Fault. A key factor in the susceptibility to shaking is the water content of the soils; wet soils with shallow water tables are more likely to amplify the ground motion than dry soils with deep water tables. Thus, the Delta Plain is also at a higher risk due to its very nature of being an area of channels and sloughs, protected by natural and manmade levees. The soils of the delta, once a freshwater marsh, are largely organic deposits from the previous plants. Since that time, floods have deposited silt and the streams have built up alluvial banks. The adjacent land has been reclaimed by additional levees, and cultivated extensively, lowering the water table, drying up the land, and leading to subsidence. Now, the rivers are situated as much as 20 plus feet above the surrounding landscape, contained by saturated earthen embankments.
(Source: http://www.ccta.net/GM/GMdata/DEIRdocs/04deir22.pdf)

The CALFED Bay Delta Program's Levee System Integrity Program is aimed at "reducing the risk to land-use and associated economic activities, water supply, infrastructure and the ecosystem from catastrophic damage associated with the breaching of Delta levees. Levee failures in the Delta could flood farmland and wildlife habitat and also interrupt water supply deliveries to urban and agricultural users and disrupt highway and rail use. Although there has never been a documented levee failure from a seismic event, the Delta has not experienced a significant seismic event since the levees have been at their current size. One goal of the CALFED's Levee Program is to identify the risk of failure to Delta levees due to seismic events…" "The final overall estimate of potential levee failures during a single seismic event is … that an earthquake with a 100-year return period is predicted to cause three to 20 levee failures in the Delta, on one or more islands." (***Source:*** CALFED Bay-Delta Program, "Seismic Vulnerability of the Sacramento-San Joaquin Delta Levees," April 2000).

Most of the non-Delta portion of Sacramento County is located on firmer materials that tend to dampen ground motions, resulting in less damage, with the exception of the floodplains, where the risk is slightly higher. The recently published (Spring 2003) California Geological Survey map that follows describes the ground shaking risk to most of Sacramento County (excluding the Delta) as "distant from active faults and will experience lower levels of shaking less frequently. In most earthquakes, only weaker, masonry buildings would be damaged. However, very infrequent earthquakes could still cause strong shaking here."

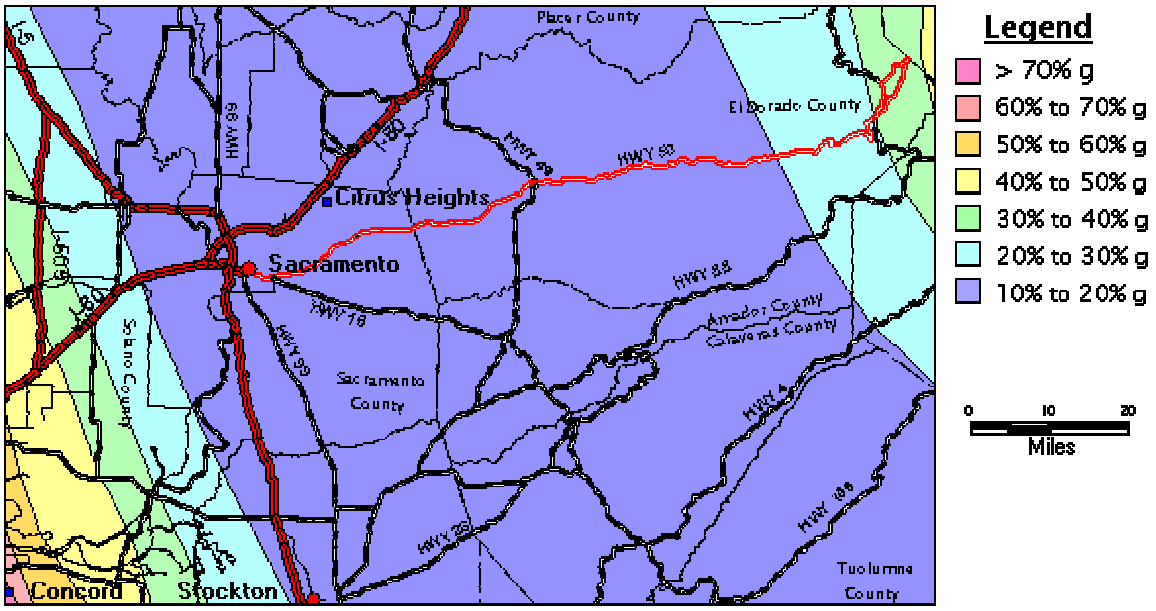


Earthquakes can trigger secondary effects, such as dam failures, explosions, and fires that become disasters themselves. In addition to the potential levee failures along the rivers and sloughs in the Delta area, there is an extremely low probability of a seismic generated failure of Folsom Dam. The resulting flood is described in the preceding Dam Failure section of this plan.

Many factors affect the potential damageability of structures and systems from earthquake-caused ground motions. Some of these factors include proximity to the fault and the direction of rupture, epicenter location and depth, magnitude, local geologic and soils conditions, types and quality of construction, building configurations and heights, and comparable factors that relate to utility, transportation, and other network systems. However, ground motions become structurally damaging when average peak accelerations reach 10% to 15% of gravity, average peak velocities reach 8 to 12 centimeters per second, and when the Modified Mercalli Intensity (MMI) Scale is about VII. The MMI Scale is based on expected human behavior and damage. MMI VII is described as:

> *Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving cars.*

The California Geological Survey, in the Sacramento portion of the Survey's Probabilistic Seismic Hazard maps, estimates that ground motion could be within the damaging range of 10 percent to 20 percent of gravity. That map segment is shown below.



Fault rupture itself contributes very little to damage unless the structure or system element crosses the active fault. In general, newer construction is more earthquake resistant than older construction because of improved building codes and their enforcement. Manufactured housing is very susceptible to damage because rarely are their foundation systems braced for earthquake

motions. Locally generated earthquake motions, even from very moderate events, tend to be more damaging to smaller buildings, especially those constructed of unreinforced masonry, such as was seen in Oroville, Coalinga, Santa Cruz, and Paso Robles.

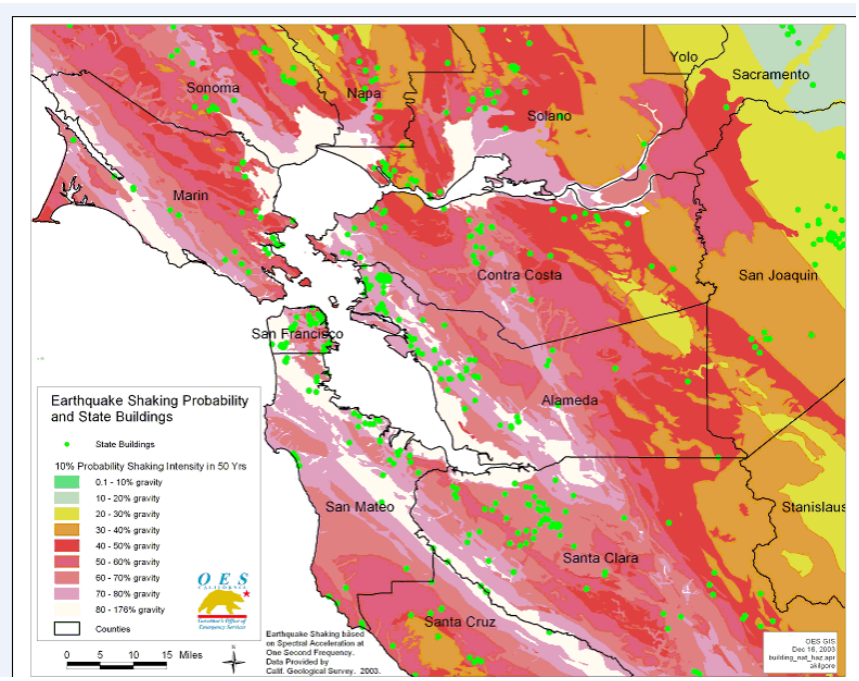
Earthquake motions generated from distant earthquakes tend to more seriously effect taller buildings because the oscillations that are generated can exceed tolerable interstory drift. Naturally or artificially filled areas, such as the Marina District in San Francisco, tend to experience amplified motions and associated ground failures that can cause extensive damage.

Lifeline systems, such as water and natural gas pipelines, highways, overpasses and bridges, rail lines, electrical and other utility services, can experience substantial damage from shaking, ground deformations, and high velocities generated below ground by earthquakes.

Common impacts from earthquakes include damages to infrastructure and buildings (e.g. unreinforced masonry [brick] crumbling; architectural facades falling; underground utilities breaking, gas-fed fires; landslides and rock falls; and road closures). Less common, but possible damages would include dam failures and subsequent flash floods.

In earthquakes, certain soils are more susceptible to shaking than others, and certain types of building construction are more likely to sustain damage than others. Thus, in areas with higher concentrations of these types of soils or these types of buildings, greater damages can be expected. Any area that included *both* risky soils and vulnerable construction would be most likely to incur the greatest level of damage and disruption. The HMPC, however, does not have digital soils data available that would allow us to "overlay" a map of building construction type.

As part of CA-OES's effort to identify state owned buildings at risk from earthquakes, the map below was produced. As indicated in the CGS/USGS shake map, it indicates that the Delta is the area within Sacramento County most vulnerable to earthquake impacts.



California has an Unreinforced Masonry (URM) program where seismic retrofits, or building removal, are required in Zone 4, a designation used in the Uniform Building Code (UBC) to denote the areas of highest risk to earthquake ground motion. Sacramento County is not in Zone 4.

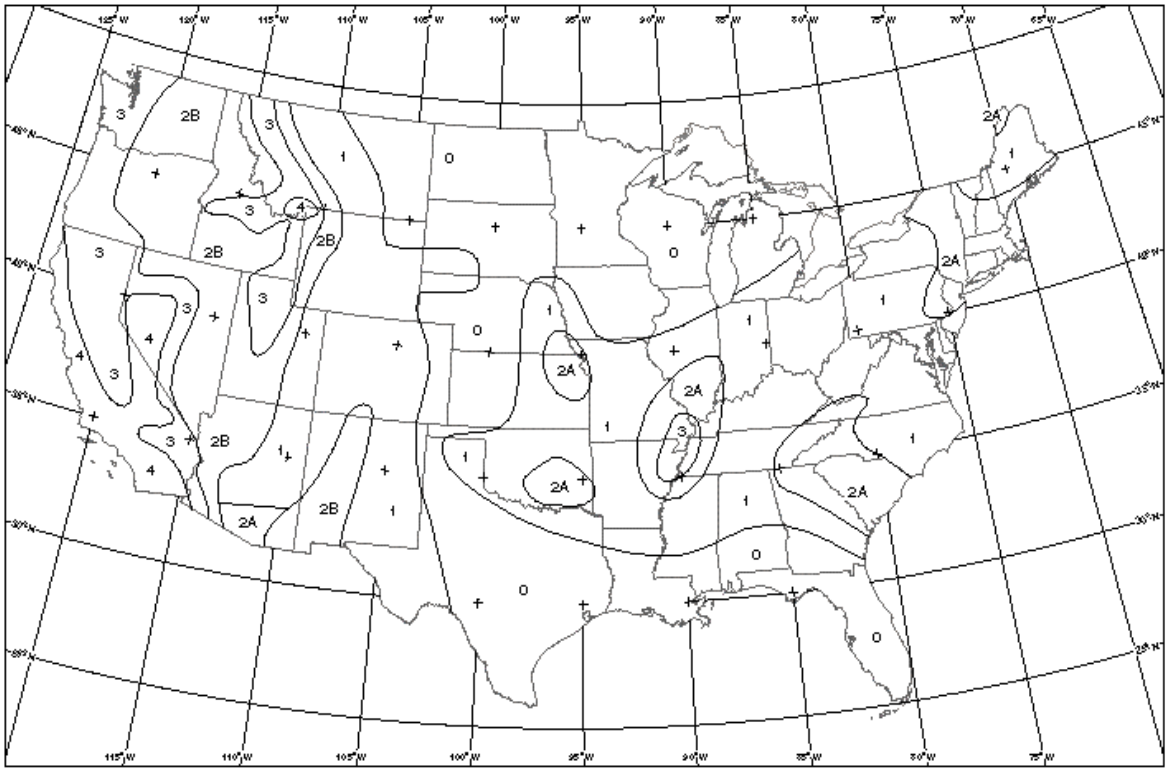
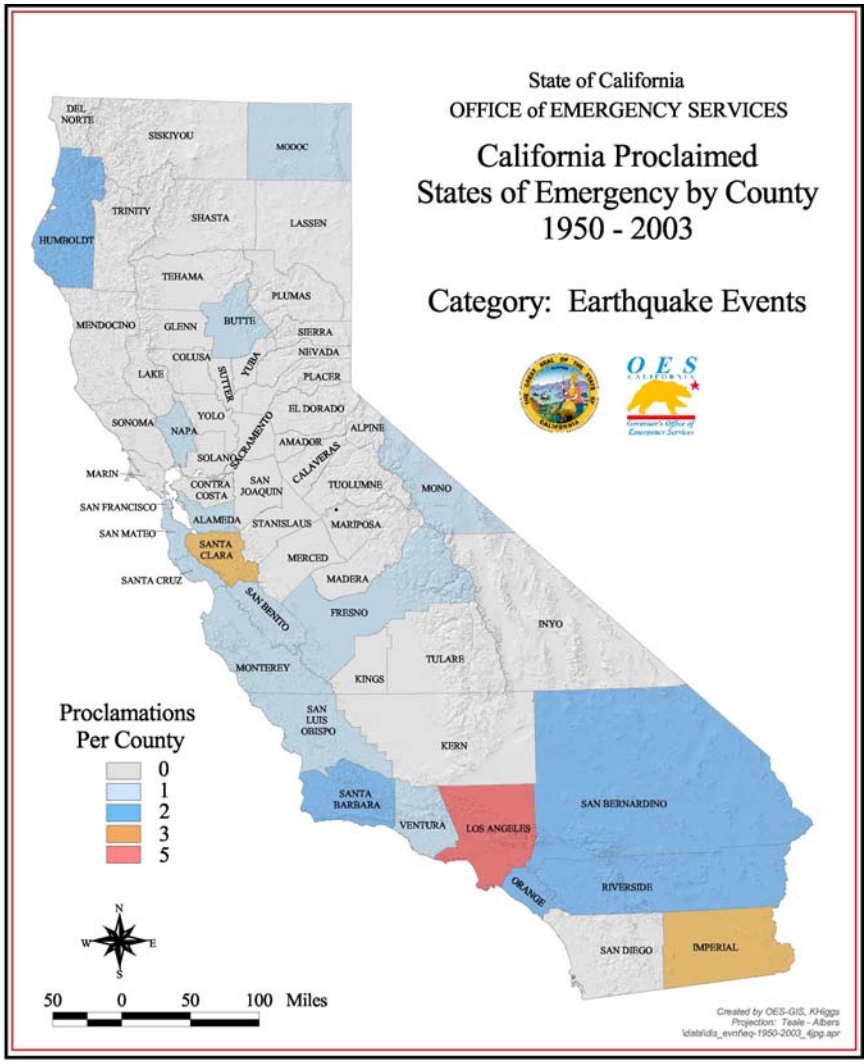


Figure A7. 1994 Uniform Building Code zone map. Zones are identified by the numbers from 0 to 4. Seismic zone factors are assigned to each zone; Zone 0 = 0, Zone1 = 0.075, Zone 2A = 0.15, Zone 2B = 0.20, Zone 3 = 0.3, and Zone 4 = 0.4. Each zone also has specific structural detailing requirements. After ICBO, 1994 (This map was redrawn from the original source, if differences occur, the original source should be used).



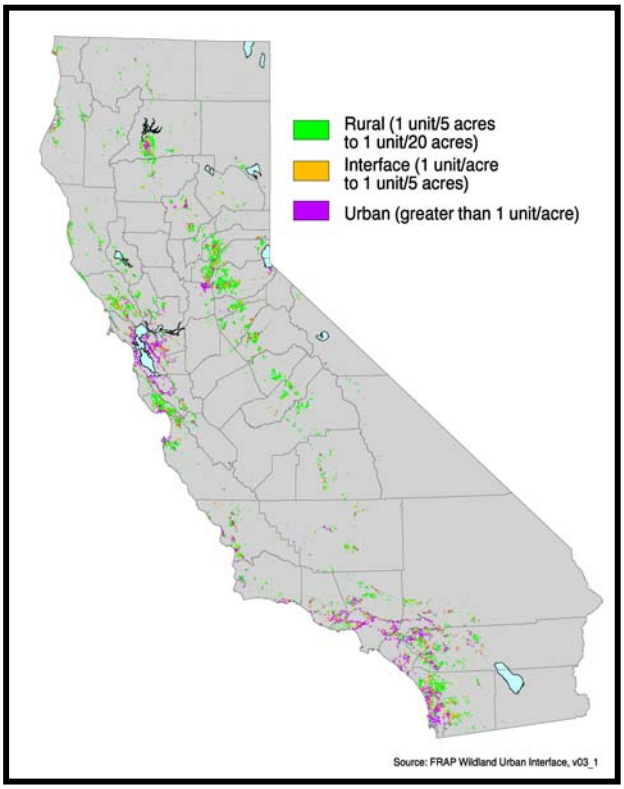
To date, Sacramento County has not been included in any disaster declarations resulting from earthquakes. CA-OES, using FEMA's HAZUS-MH loss estimation modeling tool, determined that approximately 22 million people live in the 40 percent gravity or higher seismic hazard zone statewide. Their analysis found only one one-hundredth of one percent of Sacramento County's population within the high seismic hazard zone. Based on the previous seismic zone maps this population resides in the Delta region of the County.

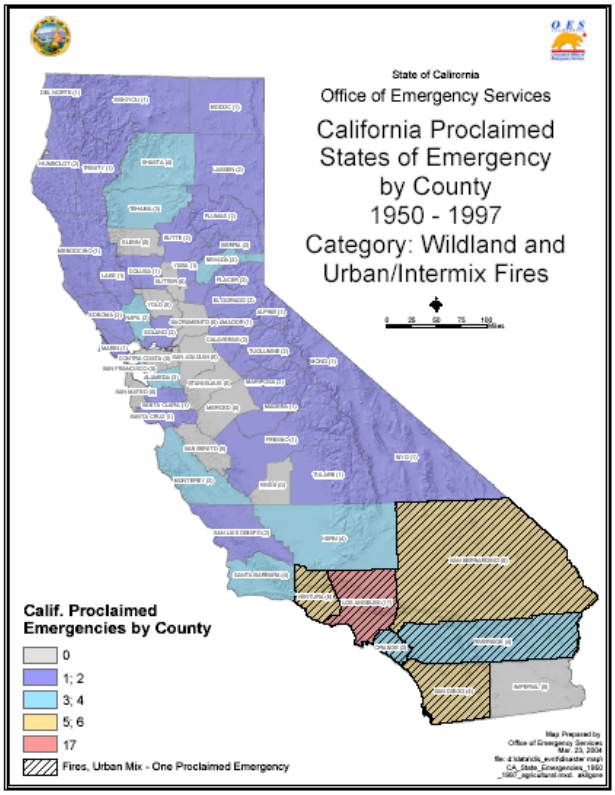
County	Total Population	Pop in EQ Prob > 40%	EQ Rank Total POP	EQ Rank % of POP
SACRAMENTO CO Total	1,338,543	170		0.01%

Source: The State of California Multi-Hazard Mitigation Plan 2004

WILDFIRES

Sacramento County's vulnerability to wildfire is low, though there exists limited exposure in the grassy and forested areas adjacent to the county's eastern boundaries. As with most wildfire vulnerability, it is the result of increased development encroaching into forested and dry grassland areas. This area is referred to as the Wildland Urban Interface (WUI). Lives, infrastructure and property within the WUI 5are vulnerable to wildfire. In Sacramento County, grass and peat fires are the two main types of wildland fires; grass in the eastern foothills of the county and peat in the Delta.





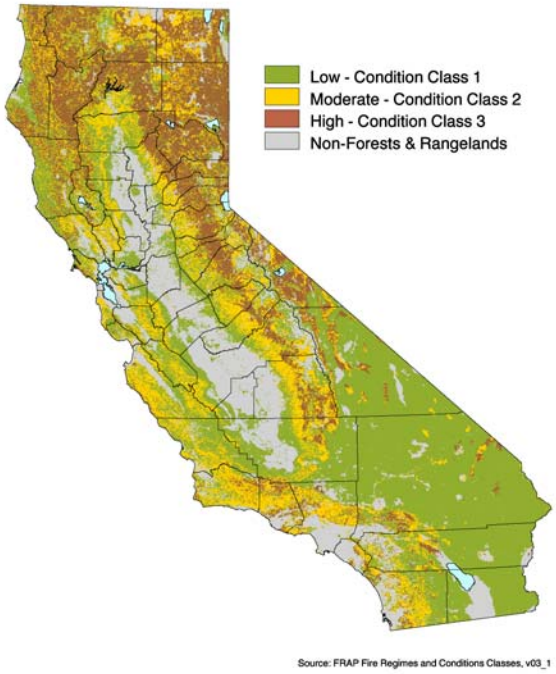
The map, above left, shows the Folsom area as that with the greatest density of housing subject to wildfire in Sacramento County. The map, above right, displays that Sacramento County has not been included in any wildfire disaster declarations.

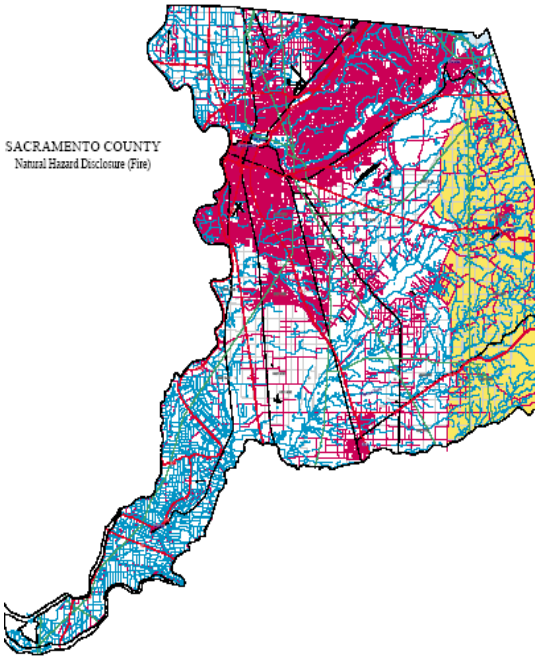
The CA-OES State Hazard Mitigation Plan also presents data that indicates the threat of erosion and the loss of agricultural income due to fire is very low in Sacramento County.

The maps below illustrate the low vulnerability of Sacramento County to wildfires.

FIRE-RELATED RISKS TO ECOSYSTEM HEALTH AS MEASURED BY CONDITION CLASS

(*Source: CDF Fire and Resource Assessment Program – 2003 Assessment)*





The map, above left, shows there is little risk to ecosystem heath in Sacramento County from wildfires, primarily because there is no forest or rangeland to burn. The map, above right, shows that the portion of Sacramento County that is subject to maintenance and hazards disclosure requirements border the eastern boundary of the County. More detail on wildfire vulnerability is provided in the appropriate "Community Element" in Section 6 of this plan.

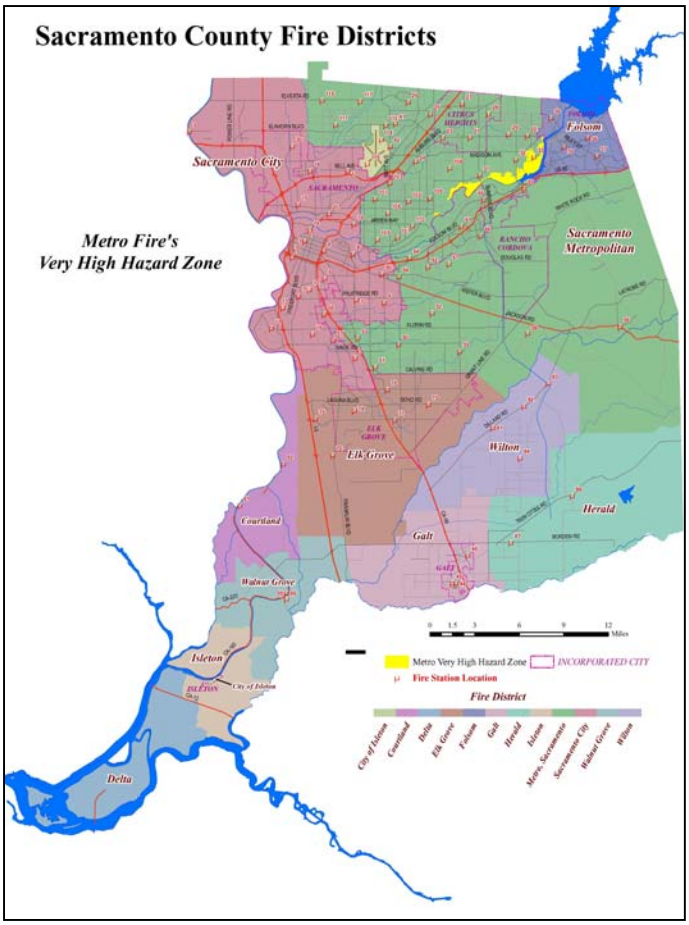
LEGEND

WILDLAND AREA THAT MAY CONTAIN SUBSTANTIAL FOREST FIRE RISKS AND HAZARDS

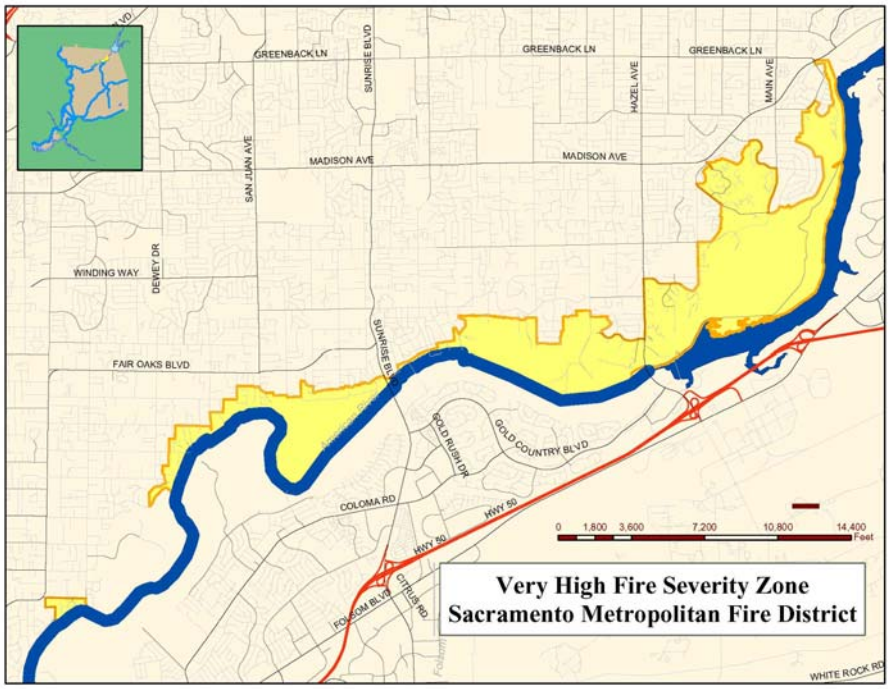
Pursuant to Section 4125 of the Public Resources Code. The owner of this property is subject to the maintenance requirements of Section 4291 of the Public Resources Code. Additionally, it is not the state's responsibility to provide fire protection services to any building or structure located within the wildlands unless the Department of Forestry and Fire Protection has entered into a cooperative agreement with a local agency for those purposes pursuant to Section 4142 of the Public Resources Code.

VERY HIGH FIRE HAZARD SEVERITY ZONE - AB 337

Pursuant to Section 51179 of the Government Code. The owner of this property is subject to the maintenance requirements of Section 51182 of the Government Code.

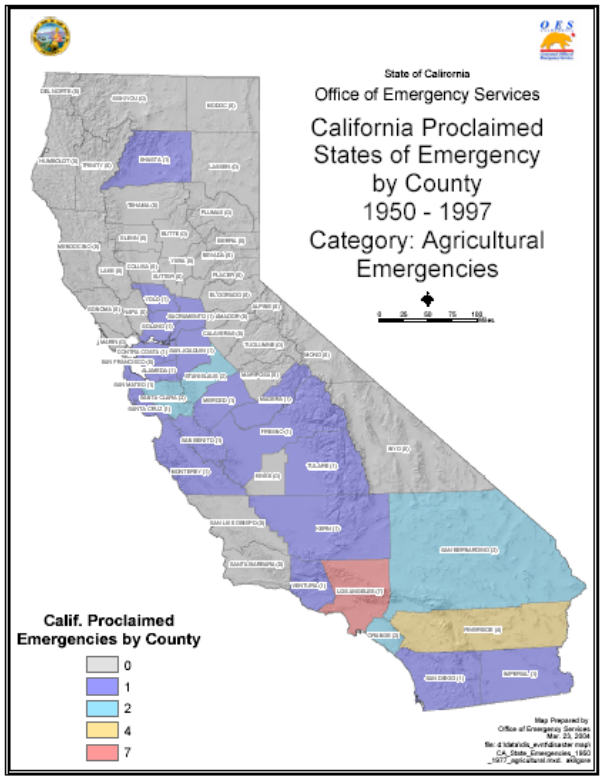


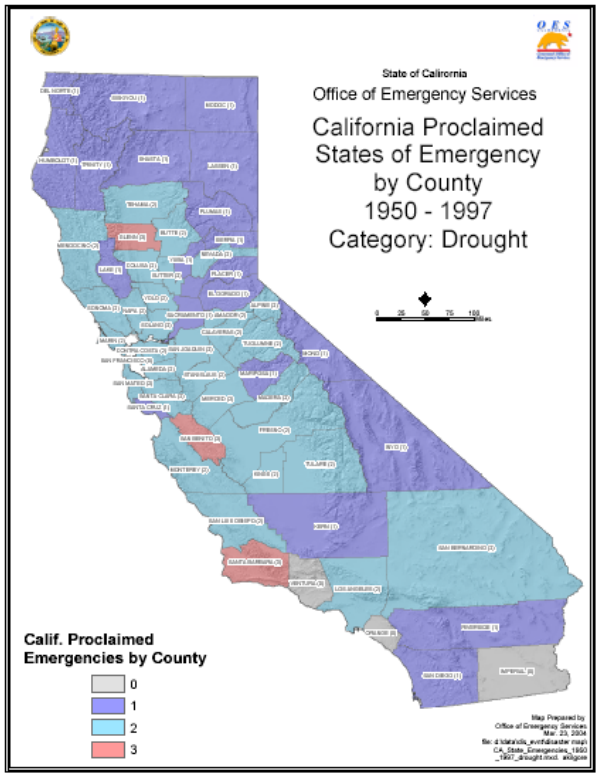
The Sacramento Metropolitan Fire District map above highlights in yellow an area along the American River Parkway which they have designated as a 'Very High Hazard Zone'. The map below shows the same area in much greater detail. This area has significant vegetative growth along the river and up the localized bluffs, upon which homes are situated. As depicted, the hazard area varies in 'width' along different portions of the Parkway, and is a function of the localized vegetation. While this is a high-risk area, the overall countywide vulnerability still remains low.



DROUGHT AND AGRICULTURAL EMERGENCIES

Drought is different than many of the other natural hazards in that it is not a distinct event, and has an unusually slow onset. Drought can severely impact a region both physically and economically. Adequate water is the most critical issue: agricultural, manufacturing, tourism and commercial and domestic use all require a constant, reliable supply of water. As the population in the area continues to grow, so will the demand for water. Water supply is affected both by decreased storage in reservoirs and dry wells resulting from a lowering of the water table. Reservoir storage and ground-water supply are related, in that when reservoirs run dry users rely more on wells to pump groundwater, which in turn lowers the water table and also increases pumping charges due to increased use of electricity.





Sacramento County has only been affected by drought and agricultural emergencies (pests, hail, freeze) once each. The county's vulnerability to such hazards is low.

The potential for drought condition is exacerbated by the need for Folsom Dam to serve as a primary flood control feature while balancing the needs for water supply and aquatic habitat downstream. Miscues in spring precipitation predictions may necessitate excessive releases from Folsom leaving lower than desired volumes in the reservoir in the summer months.

WEST NILE VIRUS - HEALTH HAZARDS

West Nile Virus is spread through mosquito bites. Thus, people and livestock frequenting areas with the greatest concentration of mosquitoes, and during the times of greatest concentration, are most likely to become infected. Areas with standing water are where mosquitoes breed, and therefore are an area of higher risk. Standing water can be found along the river and creek areas of the County as well as in swimming pools, ponds, birdbaths, ditches, and old spare tires – so the risk areas could be in many locations and in differing concentrations

West Nile Virus. Both the risk and vulnerability to California from West Nile Virus (WNV) is increasing, though low overall, based on the percentage of total population that actually comes down with the disease. The first appearance of WNV in North America occurred in 1999. As of August 2003, WNV has been documented in 46 states and the District of Columbia. In California, WNV was detected on a very limited basis in both horses and humans in 2003.

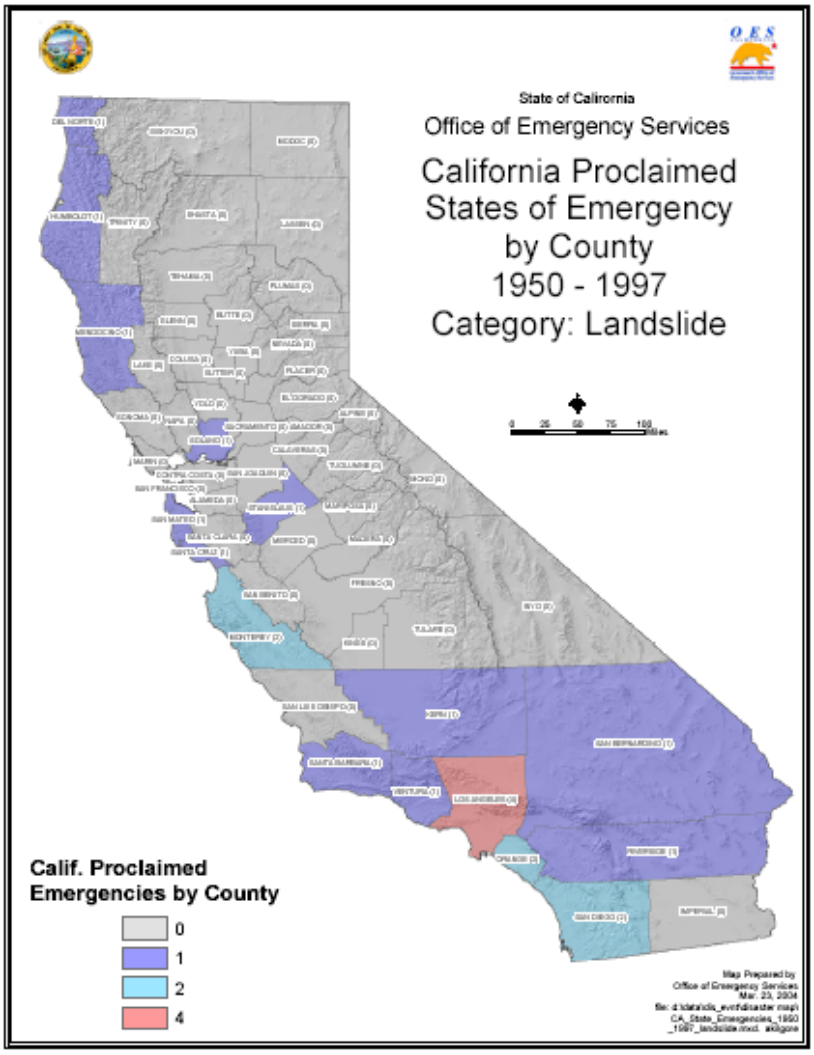
According to the CDC, even though last years outbreak was the largest in the country, fewer people died or had serious brain damage from it compared to 2002. The 9006 cases of the virus last year were more than double the 4,156 cases in 2002, however, there were only 220 deaths and 2,695 cases of severe brain damage in 2003, compared to 228 deaths and 2,944 cases of severe neurological disease in 2003. Researchers think that the larger number of confirmed cases in 2003, could be due to an increase in testing and reporting compared to 2002.

There is very real potential for West Nile Virus to become a health issue in Sacramento County in coming years. One human case in Sacramento County has already been reported as of October 2004. The County already has an active vector control program for mosquitoes due to the past concern with equine encephalitis. Also, protective measures to prevent exposure, such as wearing long sleeved clothing and using insect repelling spray, are relatively simple and cost effective. Thus, the responsibility for protection is considered an individual responsibility. The County Health Department has undertaken a public education program that provides the community with the knowledge to effectively counter the risk and impact from WNV.

LANDSLIDES

As discussed in Section 4.1, there is little or no known risk to landslides in Sacramento County. There have been no declared emergencies due to landsides in the county.

Erosion on the American River Bluffs should continue to be a concern as people desire to develop along the edge.



VOLCANOES

Also, as discussed in Section 4.1, there is little or no known risk due to volcanoes in Sacramento County. There have been no declared emergencies due to volcanoes in the county. There is some minor risk of ash dispersing upon the county from volcanic eruptions, though the amount is anticipated to be minimal, no more than a few centimeters.

DEVELOPMENT TRENDS

While there is significant growth within the Sacramento County, the County is managing growth so as not to increase vulnerability to hazards. The County's floodplain management program is one example of how the County is regulating floodplain development. More details on the County's mitigation capabilities are discussed in the following section and within the County's 'Community Element' in Section 6.1.

(This page has been left intentionally blank.)

4.3 Mitigation Capability Assessment

Thus far, the planning process has identified the natural hazards posing a threat to Sacramento County and described, in general, the vulnerability of the county and communities to these risks. The next step, prior to forming goals and objectives for improving each jurisdiction's ability to reduce the impacts of these risks, is to assess what loss prevention mechanisms are already in place. Doing so provides the county's 'net vulnerability' to natural disasters and more accurately focuses the goals, objectives and proposed actions of this plan. This part of the planning process is referred to as 'The Mitigation Capability Assessment'.

The HMPC took two approaches in conducting this assessment for the County and each of the incorporated communities. 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. 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 'mitigation capabilities' of each community are individually identified and included as part of each 'community element'. This section presents those mitigation capabilities that are common to all communities within Sacramento County.

SAFCA

The Sacramento Area Flood Control Agency (SAFCA) was formed in 1989 to address the Sacramento area's vulnerability to catastrophic flooding. This vulnerability was exposed during the record flood of 1986 when Folsom Dam exceeded its normal flood control storage capacity and several area levees nearly collapsed under the strain of the storm. In response, the City of Sacramento, the County of Sacramento, the County of Sutter, the American River Flood Control District and Reclamation District 1000 created SAFCA through a Joint Exercise of Powers Agreement to provide the Sacramento region with increased flood protection along the American and Sacramento Rivers.

SAFCA's mission is to provide the region with at least a 100-year level of flood protection as quickly as possible while seeking a 200-year or greater level of protection over time. Under the Sacramento Area Flood Control Agency Act of 1990, the California Legislature has given SAFCA broad authority to finance flood control projects

and has directed the Agency to carry out its flood control responsibilities in ways that provide optimum protection to the natural environment.

SAFCA's program has three elements:

- Ensure the structural integrity of the existing levee system
- Provide at least a 100-year level of flood protection as quickly as possible to the areas within the FEMA 100-year floodplain by, among other actions, increasing the space available for flood control at Folsom Dam and Reservoir (Folsom) and
- Achieve the SAFCA adopted standard of providing a minimum of 200-year level of flood protection for the Sacramento area.

SAFCA's activities are funded from development fees and annual assessments imposed on benefiting properties in three separate districts in Sacramento and Sutter Counties. District 1 provides funding for annual operation and maintenance expenses and covers all of the properties in the Natomas Basin, including those lying within Sutter County, and all the properties in Sacramento County lying within the drainage basin of the American River. District 2 provides funding for capital improvements to the levees protecting Natomas and North Sacramento and covers all of the properties directly benefiting from these improvements. District 3 provides funding for capital improvements to Folsom Dam, the levees along the American River, and the levees and related flood control facilities along Morrison Creek and its tributaries in South Sacramento County and covers all the properties benefiting from these improvements.

The magnitude of the flood problem in Sacramento has helped SAFCA obtain federal funding as well. Pending further improvements to the existing flood control system, over 80,000 flood zone parcels remain at a relatively high risk of flooding and 20,000 more are in a moderate-risk status. The 1997 flood underscored the urgency of pursuing additional measures to protect these properties. Congress responded in August 1999 by authorizing the most significant package of improvements to Sacramento's flood control system since the construction of Folsom Dam in 1956. This package is contained in the Water Resources Development Act (WRDA) of 1999.

SAFCA provides a tremendous flood protection capacity throughout Sacramento County. The Agency has succeeded in moving flood zone properties in Natomas and North Sacramento (North Area) from a high-risk status (less than 100-year protection) to a moderate-risk status (greater than 100-year but less than 200-year protection) by raising and strengthening levees around the Natomas basin and along lower Dry and Arcade Creeks. When this work is completed, these properties will have greater than a 200-year level of protection and a relatively low risk of flooding. Outside the North Area, steps have been taken to ensure the integrity of the levee system along the Sacramento and American Rivers and to secure additional flood storage space at Folsom on an interim basis. The fruits of this effort were highlighted during the flood of 1997, when these measures helped prevent catastrophic flooding in Sacramento.

The following highlights other SAFCA accomplishments, work in progress, and future plans.

Completed Flood Protection Projects

- North Area Local Project
  - Garden Highway through levee seepage
  - East/West Levee improvements along Steelhead Creek (also known as NEMDC, Natomas East Main Drainage Canal)
  - Cross Canal Levee Improvements Phase 1
  - Dry Creek North Levee
  - Robla Creek - Phase 1, 2, 3
  - Arcade Creek Phase 1
  - NEMDC Pump Station
- American River Common Features - Slurry Wall Construction
- Installation of American River Basin Telemetry Gages
- Bank Protection along the American River Sites 1 through 5
- American River Revegetation Sites
- Sacramento Regional Water Treatment Plant Perimeter Levees
- Folsom Reservoir Reoperation
- Pocket Area through levee seepage
- American River Common Features Jet Grout Contract 1
- American River Erosion Protection RM 1.8
- American River Erosions Sites 7.0R, 10.2L, 6.4L and 6.9L CEQA Documents - Draft Mitigated Negative Declaration - NOC Draft Environmental Assessment/Initial Study - FINAL Environmental Assessment/Initial Study
- American River 10.0 Bank Stabilization
- Sacramento River East Bank-Pocket/Little Pocket Underseepage
- Sacramento River RM 60.0 - Jibbom Street Park Levee Widening

Flood Protection Projects Under Construction

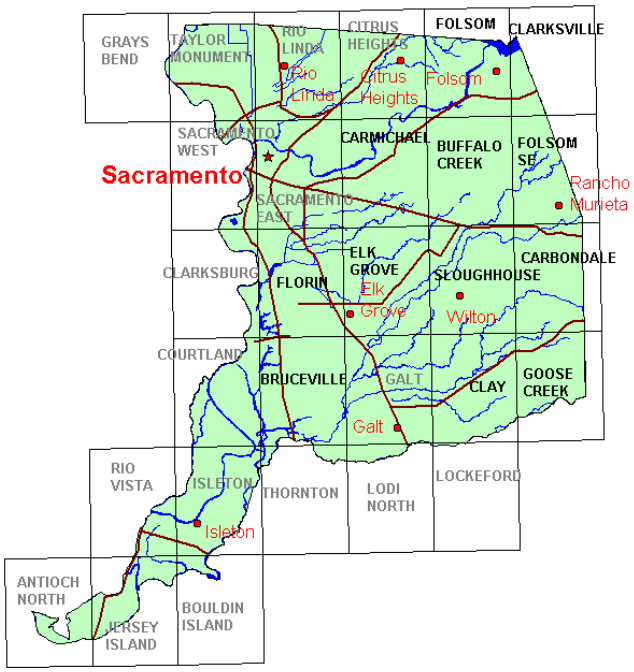
- Dry Creek Floodway acquisitions south of Elkhorn Boulevard
- Robla Creek Floodproofing
- American River Erosion Control
- Sacramento River RM 56.7 - Erosion Protection
- Hayer Dam Renovation and Dry Creek Debris Removal Project - Initial Study and Mitigated Negative Declaration - Notice of Intent to Adopt a Mitigated Negative Declaration

Flood Protection Projects In Planning

- North Area Local Project
- Natomas Levee underseepage
- Natomas Cross Canal Phase 2
- Sankey Gap
- Arcade Creek Phase 2
- Magpie Creek Improvements - http://www.spk.usace.army.mil/civ/magpiecreek/
- South Sacramento Streams Group Levee Project

- Pocket Levee Erosion
- Pocket Area Levee Underseepage
- Folsom Dam Outlet Modifications
- Folsom Dam Mini-Raise
- Folsom Dam Road Bridge
- Folsom Dam Temperature Shutters
- American River Common Features
- Mayhew Drain Closure Structure - Negative Declaration/Initial Study
- Mayhew Drain Levee
- American River Levee Parity
- Cal Expo Woodlake Habitat Restoration efforts
- North Delta Flood Control Studies
- Lower Sacramento Regional Project
- Consumnes/Mokelumne River
- Natomas Setback Levee Land Acquisition Project - Letter - Request for Qualifications - Natomas Setback Levee Alignment (Sacramento River Bank Protection Project)
- East Bank Levee Widening Project at RM 78.1 - Proposed Mitigated Negative Declaration (*Source:*www.safca.org).

CALIFORNIA STATE FLOODPLAIN MAPPING AWARENESS PROGRAM



The California Floodplain Mapping Awareness Program is currently limited to available floodplain mapping data; but by 2012, all areas expected to develop over the next 25 years will have their floodplains mapped. Initial Floodplain Mapping will be for "Awareness Floodplains" identifying flood hazard areas using approximate assessment procedures. These floodplains will be shown simply as flood prone areas without specific depth and other flood hazard data.

The community maps labeled in **black** on the map to the left are those with completed Awareness Floodplain Maps. The existing maps include FEMA/NFIP Q3 data, plus the additional approximate assessments. *(Source:* www.fpm.water.ca.gov/mapping/awareness_mapping)

The maps available for Sacramento County have been included in the appropriate Community Element section.

CALIFORNIA STATE RECLAMATION BOARD

The State Reclamation Board acts as a liaison between the State of California and the United States and residents, property owners, and agencies in the Central Valley and provides an open public forum where all interests may express their views to help resolve issues regarding flood management. The Reclamation Board was born from the history of the Central Valley, when early settlers recognized that lack of a reliable water supply made it difficult for farmers to grow crops. By the turn of the 20th century, it was evident California not only needed a special system for water storage and delivery, but also for protection from periodic floods.

California created the State Reclamation Board in 1911, and authorized it to spend $33 million on a flood control project in the Central Valley. In a 1919 letter to California Governor William Stephens, Colonel Robert Bradford Marshall, Chief Geographer for the U.S. Geological Survey (USGS), proposed a plan to build storage reservoirs along the Sacramento River system, and transfer water from the Sacramento Valley to the San Joaquin Valley via two large canals lying on both sides of the Sacramento River. The plan earned Marshall the nickname, 'The Father of the Central Valley Project'.

California's government became interested in a comprehensive water plan for the state in 1921. The state legislature directed the State Engineer to come up with such a plan. They wanted it to accomplish conservation, flood control, storage, distribution, and uses for all California water. Between 1920 and 1932, approximately fourteen reports detailed water flow, drought conditions, flood control, and irrigation issues in California. State Engineer Edward Hyatt used the reports to create the California State Water Plan.

Salinity control, especially in the Sacramento-San Joaquin River Delta, became a major concern for northern California water users, and a major component of the California State Water Project. The Delta frequently experienced salinity intrusion, which caused problems for Antioch and Pittsburg. Unless water flowed past Antioch at a minimum of 3,300 second-feet, salt water from San Francisco Bay moved into Suisun Bay and the Delta during high tide, making the water unusable for crops and industry. In 1930, the state water plan called for construction of a 420-foot dam at Kennett to maintain a regular flow to Antioch, keeping salt water out of Suisun Bay. The California Legislature authorized the future Central Valley Project (CVP) as a state project in 1933.

The Central Valley Project. In 1935, the federal Emergency Relief Appropriations Act authorized expenditures of funds for various types of public works projects, including water conservation and irrigation. The CVP was first established under this authority. The federal Flood Control Act of 1936 formally authorized funds for the CVP by name.

Over the years, the CVP has been reauthorized numerous times and its purpose expanded through various federal statutes. A 1940 law broadened the project's purpose to include navigation improvements, flood control, and energy development purposes. In 1949, Folsom Dam and Folsom Reservoir were added to the CVP. A 1950 law declared that the purpose of the project is to improve navigation, regulate the flow of the San Joaquin and Sacramento Rivers,

flood control, irrigation, and electric power. A 1954 law declared the use of water for fish and wildlife as an additional purpose of the project. It also provided authority and conditions for delivery of water to the grasslands areas of the San Joaquin Valley for waterfowl conservation purposes.

A 1978 statute amended the 1954 law to guarantee the delivery of 3000 acre-feet of water each fall and 4000 acre-feet of water each summer, when available, and authorized construction of a water delivery system to deliver water to federal waterfowl refuges in the San Joaquin Valley. Finally, a 1992 law included provisions to protect, restore, and enhance fish and wildlife and their habitats in the Central Valley and the Trinity River Basin. Objectives include addressing the effects of the CVP on fish and wildlife resources and achieving a "reasonable balance among competing" water uses.

Today, the Mission Statement of the State Reclamation Board is to:

- Control flooding along the Sacramento and San Joaquin Rivers and their tributaries in cooperation with the United States Army Corps of Engineers
- To cooperate with various agencies of the federal, State and local governments in establishing, planning, constructing, operating, and maintaining flood control works and
- To maintain the integrity of the existing flood control system and designated floodways through the Board's regulatory authority by issuing permits for encroachments.

State and Federal legislation authorized the development of comprehensive plans for flood damage reduction and ecosystem restoration along the Sacramento and San Joaquin rivers following the disastrous floods that occurred in January 1997. The authorizing legislation for this study recognized that a durable flood management system that can be effectively maintained on a long-term basis requires a design to accommodate and respect natural processes and the current benefits and uses offered by the river systems.

The Reclamation Board then developed a Strategic Plan, and its Mission Statement is:

- To reduce the devastating impacts of flooding along the Sacramento and San Joaquin Rivers and tributaries through a comprehensive system-wide approach.

It was recognized that this comprehensive system-wide approach requires evaluating how the complete system functions, how its performance could be improved, and how changes to parts of the system affect its overall performance, and that it would have to apply to both flood damage reduction and ecosystem restoration objectives. This led to the Sacramento and San Joaquin River Basins S-1 Interim Report Comprehensive Study, California December 20, 2002**.** The study identifies the need to:

- Provide for sediment continuity
- Use an ecosystem approach to restore and sustain the health, productivity, and diversity of the floodplain corridors
- Optimize use of existing facilities
- Promote multi-purpose projects to improve flood management and ecosystem restoration

- Integrate with the CALFED Bay-Delta Program and other programs and
- Protect infrastructure. (*Source:* www.recbd.ca.gov and www.usbr.gov/history/cvpintro.htm)

In September 2004, Governor Schwarzenegger signed legislation that gives flood-control districts more power to stop homeowners from building gardens, fences and other 'encroachments' on levees that protect Sacramento and other Central Valley cities. Some homeowners in Sacramento have been extending their back yards by building staircases, terraced gardens and fences on levees. Flood officials say these structures make it harder to maintain the levees and check them for dangerous leaks, and say state standards are inadequate to deal with the problem. The bill was expanded it so it now applies to all flood districts under the jurisdiction of the Reclamation Board. (*Source:* Sacramento Bee 9/16/04)

CALFED

CALFED refers to the state and federal government program agreement to preserve and protect the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta). The Bay-Delta region is of critical importance to California, as the hub of the State's water supply system, and an area of ecological importance for salmon, migratory waterfowl, and a host of other plants and animals. The State-Federal cooperation was formalized in June 1994 with the signing of a Framework Agreement by the state and federal agencies with management and regulatory responsibility in the Bay-Delta Estuary. The third element of the Framework Agreement called for a joint state-federal process to develop long-term solutions to problems in the Bay-Delta Estuary related to fish and wildlife, water supply reliability, natural disasters, and water quality.

The CALFED agencies undertook a comprehensive analysis of potential solutions to the ecosystem restoration, water quality, water supply reliability, and levee system integrity problems of the Bay-Delta and in August 2000, issued a Programmatic Record of Decision for the CALFED Program, reflecting the final selection of the long-term Plan for the Bay-Delta.

The California Bay-Delta Act of 2003 established the Authority as the new governance structure and charged it with providing accountability, ensuring balanced implementation, tracking and assessing Program progress, using sound science, assuring public involvement and outreach, and coordinating and integrating related government programs. The California Bay-Delta Authority oversees 23 state and federal agencies working cooperatively through the CALFED Bay-Delta Program to improve the quality and reliability of California's water supplies while restoring the Bay-Delta ecosystem. The California Bay-Delta Authority is focused upon improving Bay-Delta levees, by acting to protect water supplies needed for the environment, agriculture and urban uses by reducing the threat of levee failure and seawater intrusion. Delta levees also protect major interstates, roadways, cities, towns, agricultural lands, and environmental and aquatic habitat. This effort calls for:

- Improve levees to a higher standard for greater flood protection
- Improve emergency response capabilities
- Ensure levee maintenance and habitat needs are met
- Improve coordination of permit processes and

- Develop adequate and reliable funding for levee maintenance. *(Source: www.*calfed.ca.gov)

In September 2004, the Sacramento Bee reported "Congressional leaders are close to authorizing $90 million to fix some of the worst levees in the Sacramento-San Joaquin Delta - one of the few times the federal government has delved into a flooding problem that threatens farms, roads, railroads and the state's water supply. The Senate included the funds in a reauthorization bill for the Cal-Fed water program on Wednesday [Sept 15, 2004]. The House included that same levee work in its version of the $395-million bill, meaning that Delta flood protection stands to receive a funding jolt if the two arms of Congress can reconcile other Cal-Fed issues." (*Source:* Sacramento Bee 9/18/04).

CALIFORNIA STATE DAM SAFETY PROGRAM

The California Water Code entrusts the regulatory Dam Safety Program to the Department of Water Resources through the Division of Safety of Dams. The principal goal of this program is to avoid dam failure and thus prevent loss of life and destruction of property. Dams under State jurisdiction are an essential element of the California infrastructure that provides constant water supply integrity.

On March 12, 1928, the sudden failure of St. Francis Dam in Southern California resulted in a major disaster. Because of this failure and because of the exposure to potential risk to the general populace from a number of water storage dams in California, the Legislature in 1929 enacted legislation providing for supervision over non-federal dams in the State. Before the enactment of this legislation, State supervision over dams was exercised by either the State Engineer or the State Railroad Commission. This supervision was limited in scope and extended to less than half of the dams in the State. The statute enacted in 1929 provided for:

1. Examination and approval or repair of dams completed prior to the effective date of the statute, August 14, 1929
2. Approval of plans and specifications, and supervision of construction of new dams, and of the enlargement, alteration, repair, or removal of existing dams and
3. Supervision over maintenance and operation of all dams of jurisdictional size.

In 1963, the failure of the Baldwin Hills Dam, in Southern California, caused the Legislature to amend the Water Code to include within State jurisdiction, both new and existing off-stream storage facilities.

In 1972, the Legislature mandated that all state-regulated dams develop inundation maps and provide copies of them to the state and local jurisdictions. Federal agencies complied with this requirement. (Federal Dam Safety regulations require inundation maps for all High-Hazard federal dams).

Dams under State jurisdiction are artificial barriers, together with appurtenant works, which are 25 feet or more in height or have an impounding capacity of 50 acre-feet or more. Any artificial barrier not in excess of six feet in height, regardless of storage capacity, or that has a storage capacity not in excess of 15 acre-feet, regardless of height, is not considered jurisdictional.

The statutes governing dam safety in California (Division 3 of the Water Code), place the supervision of the safety of non-federal dams and reservoirs under the jurisdiction of the Department of Water Resources' Division of Safety of Dams. The Division reviews plans and specifications for the construction of new dams or for the enlargement, alteration, repair, or removal of existing dams, under application, and must grant written approval before the owner can proceed with construction. Professional engineers and geologists from the Division evaluate each project, investigate proposed sites, and check available construction materials. During construction, they identify conditions disclosed during site development that may require design changes; they check for compliance with approved plans and specifications; and they approve foundations before material is placed.

The Department of Water Resources must have issued a certificate of approval before water can be impounded behind a new dam or behind an existing dam that has been enlarged, altered, or repaired. These certificates may contain restrictive conditions and may be amended or revoked by the Department of Water Resources. Operating dams are periodically inspected to assure that they are adequately maintained and to direct the owner to correct any deficiencies found.

Inasmuch as the approval of an application to construct a dam does not grant the right to appropriate water, the applicant must apply for a water right permit through the State Water Resources Control Board prior to filing an application to construct a dam. An application filed with the Division will initiate action for conformance with the requirements of the California Environmental Quality Act of 1970. (*Source:* damsafety.water.ca.gov)

CALIFORNIA STATE BUILDING CODE

The California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code, is the UBC 1997 Building Code, as amended. The California Building Standards Code is a compilation of three types of building standards from three different origins:

- Building standards that have been adopted by state agencies without change from building standards contained in national model codes
- Building standards that have been adopted and adapted from the national model code standards to meet California conditions and
- Building standards, authorized by the California legislature, that constitute extensive additions not covered by the model codes that have been adopted to address particular California concerns.

The national model code standards adopted into Title 24 apply to all occupancies in California except for modifications adopted by state agencies and local governing bodies. Included in the code are provisions for:

- Flood Resistant Construction
- Life-Safety Requirements for Existing Buildings Other than High-rise Buildings
- Life-Safety Requirements for Existing High-rise Buildings and

- Repair to Building and Structures Damaged by the Occurrence of a Natural Disaster.

Standard building codes provide new construction with protection against known or expected forces and include wind, seismic, fire and snow-load/ice considerations. As a practice, standard building codes include a factor of safety of up to 1.3, meaning that structures constructed in a professional manner should be able to withstand forces up to 30 percent greater than what is suggested.
(Source: **www.bsc.ca.gov**)

CALIFORNIA UNREINFORCED MASONRY PROGRAM

Unreinforced masonry buildings (URMs), are generally brick buildings constructed prior to 1933, predating modern earthquake-resistant design. The brick is not strengthened with embedded steel bars and is therefore called unreinforced.

The State Building Code includes a map that identifies areas subject to seismic risk through Zones of increasing risk, from Zone I to Zone IV, with IV having the highest risk. This URM Program results from a law requiring that URM buildings in UBC Seismic Zone 4 be inventoried and retrofitted in every jurisdiction in Seismic Zone 4. The communities are to adopt a loss reduction program, and to report progress to the Seismic Safety Commission (SSC). The 2003 SSC report discusses the relative effectiveness of mandatory, voluntary, and 'notification only' programs. (*Source:* www.quake06.org/quake06/best_practices). No area within Sacramento County is identified as being within Zone 4.

CALIFORNIA FIRE ALLIANCE

The California Fire Alliance is a cooperative membership dedicated to the support of pre-fire principles and activities ensuring that pre-fire management provides for public and community safety, minimizes costs and loses, and maintains and improves the quality of the environment. The Alliance constitutes an interagency forum for coordinating member agencies' efforts in an integrated fashion.

Fire Alliance members are involved in a number of fuel reduction projects, throughout California. These projects are designed to reduce the likelihood of large and damaging wildfires, while maintaining a healthy ecological system. Suppression forces are regularly used to accomplish such projects during non-emergency response time.

During the 2000 fire season, wildfires burned millions of acres throughout the United States. These fires dramatically illustrated the threat to human lives and development. Under Executive Order, the National Fire Plan was created as a cooperative, long-term effort of the US Department of Agriculture's Forest Service, the Department of the Interior, and the National Association of State Foresters to protect communities and restore ecological health on Federal lands.

A major component of the National Fire Plan was funding for projects designed to reduce fire risks to people and their property. A fundamental step in realizing this goal was the identification

of areas that are at high risk of damage from wildfire. Federal fire managers authorized State Foresters to determine which communities were under significant risk from wildland fire on Federal lands.

The California Department of Forestry and Fire Protection undertook the task of generating the state's list of communities at risk. With California's extensive urban Wildland-Urban Interface situation, the list of communities extends beyond just those on Federal lands.

Three main factors were used to determine wildland fire threat to Wildland-Urban Interface areas of California.

1. **Ranking Fuel Hazards:** ranking vegetation types by their potential fire behavior during a wildfire
2. **Assessing the Probability of Fire:** the annual likelihood that a large damaging wildfire would occur in a particular vegetation type and
3. **Defining Areas of Suitable Housing Density that Would Create Wildland-Urban Interface Fire Protection Strategy Situations:** areas of intermingled wildland fuels and urban environments that are in the vicinity of fire threats.

The fire-threatened communities in California list include a total of 1,283. Of those, three are within Sacramento County: Galt (2), Isleton (2) and Rancho Cordova (3). Where threat level 3 is the highest risk. (*Source:* www.cafirealliance.org)

In addition, the California State Hazard Mitigation Plan identifies two dozen pieces of state legislation that have been adopted over the past quarter century establishing requirements ranging from roofing materials to disclosure legislation. (Appendix 5.1.A in state Hazard Mitigation Plan).

SACRAMENTO COUNTY MULTI-HAZARD DISASTER PLAN

The County's planned response to both natural disasters and technological incidents focuses on operational concepts relative to large-scale disasters. The plan also institutionalizes Sacramento County as part of the California Standardized Emergency Management System (SEMS), which serves as a subset of the National Incident Management System (NIMS).

(This page has been left intentionally blank.)

Multi-Hazard Mitigation Plan

5.0 Mitigation Goals and Strategy

Up to this point in the planning process, the HMPC had been involved in talking to agencies and organizations, and collecting and recording hazard-related data. From these discussions and efforts, the HMPC produced three documents. The first two: the Hazard Identification (Section 4.1) and the Vulnerability Assessment (Section 4.2), 'painted a picture' of the vulnerability of Sacramento County to natural hazards. From these documents, the HMPC established that:

1. Floods, and particularly floods that exceed the 100-year flood or existing level of structural protection, will continue to be a threat to the County;

2. When the identified levee improvements and re-certification of the levee system are completed, the County will remain susceptible to floods exceeding the 100-year flood, floods due to levee failures, and "internal" floods occurring within protected areas;

3. Vulnerability to flooding from the 100-year (or less) event will decrease significantly when the levees are recertified to withstand the 100-year event. However, vulnerability to uninsured economic loss during flooding from events greater than the 100-year event will increase significantly since property owners with federally backed mortgages will no longer be required to purchase and maintain flood insurance policies;

4. Most critical public facilities within the City of Sacramento are subject to flooding in an event where the levee system is overtopped or fails, but site-by-site floodproofing is considered redundant and generally not cost-effective;

5. Severe weather, such as thunderstorms, rain and hail occur annually, but only constitute a significant on-going threat to the extent they cause a secondary hazard event such as flooding. The piped and pumped storm drainage systems have a finite capacity. When thunderstorms occur, the capacity of the system may be overwhelmed, filling the street and flooding low floors;

6. There has never been an earthquake epicenter in Sacramento County, though ground shaking from nearby events poses a moderate risk in most of the County. The risk in the Delta Plains is significantly higher due to a combination of alluvial sediments, subsidence and aging levees.

7. Sacramento County's vulnerability to wildfire is low, but increasing as development towards the eastern foothill boundaries increases. Grass and peat fires are currently the two main types of wildland fires that threaten the County. There is a high fire risk along portions of the American River Parkway.

The third document, the Mitigation Capability Assessment (Section 4.3), describes the current ability of Sacramento County to counter these threats through existing policies, regulations, programs and procedures. Sacramento County is comprised of hundreds of formal Districts providing like government services, creating myriad coordination issues in creating an effective comprehensive coordinated mitigation program. The HMPC learned that:

1. The County's structural flood protection system of levees, dams, weirs and by-passes is a subset of a larger, more complex water management system that combines flood protection with urban water supply, agricultural uses and natural and beneficial functions;

2. Sacramento County is at the convergence of multiple watersheds that funnel approximately 2/3 of northern California's water through the County. The mere size of the ultimate drainage area makes coordinated watershed and land-use planning extremely difficult;

3. Progress is being made towards recertifying the levee system as providing 100-year level of flood protection; increasing the Folsom Dam outlets in order to create additional short-term flood storage available in Folsom Lake; and raising the height of Folsom Dam by seven feet to increase storage capacity;

4. Sacramento County and the City of Sacramento both participate in the NFIP's Community Rating System, and are among the top five percent of participating communities nationwide in terms of the effectiveness of their individual programs. Their efforts, including this plan, result in significant discounts to the standard cost of flood insurance for anyone in those two communities that wish to purchase it;

5. Sacramento County maintains several websites that include emergency information and links to organizations to contact if power goes out, flood occurs, etc. (SMUD, PG&E, fire and police department links, sand bag locations, etc.). Among the websites, is the real-time flood warning and information site, www.floodready.org;

6. A variety of flood mitigation techniques have been and continue to be implemented to address repetitive losses in the County and the City (e.g., home elevation, flood proofing, drainage system improvements and floodwalls;

7. There are existing, but dated, Floodplain Management Plans for both Sacramento County and the City of Sacramento. This plan updates and replaces those plans.

8. The SAFCA Board adopted a standard of "a minimum of 200-year level of protection" for areas where development is protected by levees. In other areas, the 100-year standard, with proper freeboard, is applied;

9. The County and Cities have an extensive drainage master planning program to manage and improve storm water conveyance and to mitigate for peak flow and volume impacts;

10. Many progressive State, County and other local programs, policies, ordinances and codes are in place that reduce the vulnerability of the communities to natural hazard impacts;

11. Dam failure inundation maps and Emergency Action Plans are on file with the County Office of Emergency Services in the event of a dam failure;

12. Public information is available that notifies residents and businesses about the risks from hazards and appropriate risk reduction actions that they can undertake. Additional opportunities are continuously being explored with an emphasis on flood insurance, flood protection, storm drain maintenance and protecting stormwater quality;

13. Sacramento County is in Seismic Risk Zone 3, as defined by the Uniform Building Code. This is a lower risk than UBC Seismic Zone 4, which, in California, requires that URM buildings be retrofitted for seismic safety considerations; and

14. Sacramento County only has a few areas currently subject to wildland fire hazard, but population growth will also translate into growth of this hazard. Currently, the wildland fire hazard is adequately addressed through numerous policies that have been adopted by the State over the past 25 years.

5.1 Mitigation Goal Setting

Sections 4-1 and 4-2 document the risks from and vulnerabilities to the natural hazards that threaten Sacramento County. With the additional information provided through the assessment of existing mitigation capabilities (Section 4-3), the HMPC could now begin to formulate mitigation planning goals. The intent of the Goal Setting process is to identify areas where improvements to existing capabilities can be made so that community vulnerability is reduced.

Before formulating the goals for this plan, the HMPC first reviewed planning goals in general. Each HMPC member was provided with a written and graphic explanation of Goals and Objectives, the purpose they serve and how they are developed and written. Following this activity, each HMPC member was provided with an alphabetized list of 14 sample goal statements. Some of these goals were from existing plans within the County and/or the communities themselves, some were developed as a result of analyzing the Risk Assessment, and some were generic community planning goals, such as "Improve Public Safety Services."

The HMPC participated in a discussion of the sample goal statements, and developed an understanding of the relationship of plan goals and objectives to the recommended actions that they would later be tasked to formulate. Following this discussion, each HMPC member received three index cards and was asked to write what they felt would be the most appropriate goals for this plan --- one on each card --- using the possible goal statements as a guide.

HMPC members were instructed that they could use, combine or revise the sample statements or develop entirely new goals. Team members then posted their cards to the meeting room wall, and the goal statements were placed into similar groups, combined, rewritten and agreed upon. Upon group review, some of the proposed goal statements were determined to be better suited as objectives or actual mitigation projects – and were set aside for later use.

Based upon the planning data review and the process described above, the HMPC developed the final goal statements listed below. None of the final goal statements are the same as those provided on the alphabetized list. These goals and objectives (and occasional action item) provide direction for reducing future hazard-related losses within Sacramento County.

PLAN GOALS

GOAL #1: Reduce exposure to hazard related losses.

Objective 1.1: Strengthen the existing flood hazard mitigation program.

- Achieve the SAFCA adopted standard of providing a minimum of 200-year level of flood protection for developing urban areas that are protected from deep flooding by levees

- Develop, sponsor and undertake programs to protect developed property
  - Repair/maintain/improve the levee/pump/drainage system

- Ensure environmental conservation is incorporated into protection plans
  - Provide protection for fish passage
  - Employ renewable technologies (wind, solar) where feasible
  - Develop wetland and vernal pool preservation policies
  - Create habitat friendly greenbelts in urbanizing areas

- Improve coordination between agencies, environmental groups, developers, etc., to improve working together toward common goals

- Seek additional structural protection on the major river systems

- Develop/Impose User/Impact Fees for new development to continue to allow for improvements to drainage, flood control and stormwater quality

- Develop multi-county growth management ordinance(s) that minimize/mitigate development impacts in a meaningful, long-term manner

Objective 1.2: Protect critical facilities, utilities, and infrastructure

- Determine need for protecting those already behind levees
  - Identify site-specific critical infrastructure that need redundant protection and cause that protection to occur (e.g., water supply and sewage pump stations, telephone, electric power substations)
- Critical Services
  - Identify site-specific critical facilities that need redundant protection and cause that protection to occur (e.g., law enforcement and fire stations, hospitals, critical and elderly care facilities)

Objective 1.3: Reduce losses caused by fog

- Hi-tech warning systems
    - Lane-marker lighting
    - Fog-sensitive changing speed limits

GOAL #2: Promote awareness of hazards and vulnerability among citizens, business, industry and government.

Objective 2.1: Develop a seasonal multi-hazard public education campaign to be implemented *annually.*

- Floods
    - Flood insurance-Preferred Risk policies
    - Warning system
    - Evacuation plans/possibilities (response to warning)
    - Natural & Beneficial value of floodplains
    - Place Flood-Depth signs county-wide
    - Investigate the "Living with Levees" program
- Severe Weather
    - Tree-limb trimming
    - Fog – driving tips
    - Warning (NOAA Weather [All-Hazards] Radio)
- Earthquakes
- Wildfire
- Health Hazards
- Develop/enhance Business Continuity Planning
- Conduct disaster exercises
- Train consumers/volunteers to be read to help when disasters strike

GOAL #3: Maximize use of available funding.

Objective 3.1: Identify multiple objective opportunities that can be used to support mitigation activities. – including coordination of plans

Objective 3.2: Identify and analyze project cost share options.

Objective 3.3: Submit mitigation project applications periodically, recognizing that unused funds may come available to those who are in queue

5.2 Review of Mitigation Alternatives

In a separate HMPC meeting, the Planning Team undertook a brainstorming session to generate a set of viable mitigation alternatives that would support the above goals. To begin his process, each HMPC member was provided with the following list of categories of mitigation measures:

- Prevention
- Property Protection
- Structural Projects
- Natural Resource Protection
- Emergency Services, and
- Public Information.

The HMPC members were also provided with lists of alternative multi-hazard mitigation actions for each of the above categories. Below is an example of the list the HMPC examined category of Property Protection. A facilitated discussion then took place to examine, understand and analyze the alternatives. The complete listing of alternatives reviewed and discussed is included in Appendix E.

PROPERTY PROTECTION: Property protection measures are used to modify buildings subject to damage rather than to keep the hazard away. A community may find these to be inexpensive measures because often they are implemented by or cost-shared with property owners. Many of the measures do not affect the appearance or use of a building, which makes them particularly appropriate for historical sites and landmarks.

- ***Retrofitting/disaster proofing***
  - ***Floods***
    - Wet/Dry floodproofing (barriers, shields, backflow valves)
    - Relocation/Elevation
    - Acquisition
    - Retrofitting
  - ***High Winds/Tornadoes***
    - Safe Rooms
    - Securing roofs and foundations with fasteners and tie-downs
    - Strengthening garage doors and other large openings
  - ***Winter Storms***
    - Immediate snow/ice removal from roofs, tree limbs
    - "Living" snow fences
  - ***Geologic Hazards (landslides and earthquakes)***
    - Anchoring, bracing, shear walls
    - Dewatering sites, agricultural practices
  - ***Drought***
    - Improve water supply (transport/storage/conservation)
    - Remove moisture competitive plants (Tamarisk/Salt Cedar)
    - Water Restrictions/Water Saver Sprinklers/Appliances
    - Grazing on CRP lands (no overgrazing-see Noxious Weeds)
    - Create incentives to consolidate/connect water services
    - Recycled wastewater on golf courses
  - ***Wildfire, Grassfires***
    - Replacing building components with fireproof materials
      - Roofing, screening
    - Create "Defensible Space"
    - Installing spark arrestors
    - Fuels Modification
  - ***Noxious Weeds/Insects***
    - Mowing
    - Spraying
    - Replacement planting
    - Stop overgrazing
    - Introduce natural predators
- *Insurance*

USING CRITERIA TO ANALYZE AND SELECT MITIGATION MEASURES

A second facilitated discussion took place to examine and analyze the alternatives, using FEMA's recommended STAPLE/E decision-making criteria, in addition to others. This was done to determine why one recommended action might be more important, more effective, or more likely to be implemented than another (a complete list of criteria examine is included in Appendix E).

STAPLE/E Criteria Set

Social:	Does the measure treat people fairly? (different groups, different generations)
Technical:	Will it work? (Does it solve the problem? Is it feasible?)
Administrative:	Do you have the capacity to implement & manage project?
Political:	Who are the stakeholders? Did they get to participate? Is there public support? Is political leadership willing to support?
Legal:	Does your organization have the authority to implement? Is it legal? Are there liability implications?
Economic:	Is it cost-beneficial? Is there funding? Does it contribute to the local economy or economic development?
Environmental:	Does it comply with Environmental regulations?

The HMPC listed all of the hazards posing a threat to the community and then generated their preferred set of mitigation measures per hazard, using the criteria to determine the most suitable proposals. The proposed actions were recorded on easel pads and then posted to the wall for review, comment, and fuller development of the recommendation.

After some discussion, the HMPC decided not to address the issue of prioritizing the recommended actions. The HMPC felt that the actions were too diverse in nature, cost, and feasibility to assign an implementation priority that would only be divisive. Rather, recognizing the DMA regulatory requirement to prioritize by Benefit-Cost and the need for any publicly funded project to be cost-effective, the HMPC decided to pursue implementation according to when and where damages occur, available funding, individual community priority, and priorities identified in the State Mitigation Plan.

5.3 The Mitigation Strategy

Within the Sacramento County Planning Area, there are eight communities and 69 districts that participated on the HMPC and provided valuable data and insight into this plan. While different in their boundaries, form and function, each recognizes their role to prepare for disaster, respond to natural hazards and undertake mitigation initiatives. Each, however, is part of the larger community fabric that is Sacramento County. There is a "mosaic" of partners and these relationships define the overall hazard mitigation planning strategy.

Any effective mitigation strategy must encompass the participation of the communities forming the partnership. A prime example of the critical nature of this partnership and patchwork quilt is the roles of each community and district in Flood Protection. While either the County or SAFCA, with an even larger border, can achieve great flood mitigation on their own, the Cities and Districts could compromise the total effectiveness of the work without similar, coordinated efforts within their respective jurisdictions. Only together, through coordinated efforts, will the vulnerability of the Sacramento community to future floods be effectively reduced.

Similar to collaboration among local communities and agencies for hazard mitigation, the Local Hazard Mitigation Plan Program (LHMP) is a priority program of California OES to meet one of their primary goals: ***Promote Hazard Mitigation as an Integrated Policy***. The LHMP provides a mechanism for the state to provide technical assistance, and to track the progress and effectiveness of local government mitigation planning programs. As part of this program, the state established the following criteria for prioritizing local mitigation activities for funding:

- Percent of population at risk
- Frequency and likelihood of hazard
- Repetitive loss areas
- Small/impoverished communities
- Planning resources available
- Types/percent of land areas at risk
- Development pressure rating
- Project urgency and C/B analysis
- Cost effectiveness of measure

Taking all into consideration, the HMPC has developed the following four mitigation strategies:

- **ENFORCE** existing rules, regulations, policies and procedures already in existence. Communities can reduce future losses not only by pursuing new programs and projects, but also by more stringent attention to what's already "on the books;"

- **EDUCATE** the hazard information that the HMPC has collected and analyzed through this planning process so that the community better understands what can happen where, and what they can do themselves to be better prepared. Also, publicize the "success stories" that are achieved through the HMPC's ongoing efforts;

- **IMPLEMENT** the Action Plan below; and

- **MOM** - monitor Multi-Objective Management opportunities, so that funding opportunities may be shared and "packaged" and broad constituent support is gained.

5.4 Countywide Mitigation Recommendations

In this section, the HMPC offers proposed mitigation actions in the form of recommendations. The recommendations that follow are those that would have a beneficial impact upon the entire county, communities and districts included. These recommendations are made with the knowledge and consent of the entire County community by virtue of the formal adoptions of this plan (Appendix F). Thus, each participating community has identifiable "projects" in this plan. Most communities have additional "projects" identified through their site-specific recommendations included in their respective Community Elements sections of this plan.

Recommended Action Item #1: *Seek improved site-specific, short-term (48 – 72 hours) weather forecasts through NOAA by lending support and sponsorship as appropriate for the American River Watershed.*

Mitigation Alternative Category: Emergency Services, Warning

Issue/Background Statement: New storms can develop in the Pacific Ocean and arrive at Sacramento County without much warning. NOAA has developed radar technology that can determine the moisture content of incoming storms. This data combined with Doppler Radar can help forecasters to better warn the flood control facility operators, such as Folsom Dam. Much potential damage can be averted by increasing out-flow from the dam, while much water can be conserved by holding the volume in the dam if the storm will not cause significant precipitation.

Rain on snow events are the most potentially catastrophic. When heavy snowfall in the Sierra Nevadas occurs followed by significant volumes of warm rainfall (known as the Pineapple Express), huge volumes of water pour from the mountains and foothills into the rivers. Conversely, fear of these potentially catastrophic storm events has prompted dam operators to release volume from the reservoirs only to later find that there is a water shortage during subsequent months. If excessive releases are followed by draught years, the impact to northern California can lead to a lack of water supply and electricity generating capacity.

Other Alternatives Considered: The status quo is the no action alternative. In exceptional storms, there may not be adequate forecast warnings to allow for discharge of the necessary volume from the Folsom Reservoir for control of the forthcoming flood flows. Weather forecasts are reasonably accurate for one or two days, but the low level discharge capacity only allows for 65,000 acre feet per day. This volume may be quickly exceeded by a low probability, high impact, rain on snow event. Conversely, it is critically important to the other functions of Folsom Dam (water supply, electricity generation, aquatic habitat and recreation) to retain volumes through the dry months.

Responsible Office/Person: CA-DWR, SAFCA, NOAA/NWS, USACE, and BOR. SAFCA should lead the coordination and solicit/include participation by the affected communities.

Cost: To be Determined. It is expected, however, that there would be a local match requirement.

Benefits: Early warning of these episodes will allow dam operators to make educated decisions.

Recommended Action Item #2: *Achieve "Storm-Ready" Certification*

Mitigation Alternative Category: Emergency Services, Warning

Issue/Background Statement: Storm-Ready certification is a program of the National Weather Service (NWS). A community must apply, and meet the program criteria. The major components are redundant methods of communicating warnings (Emergency Alert System, Flood Alert, www.floodready.org, outdoor siren, cable television-override, etc.), NOAA "Weather Radio" reception in all portions of the County, NOAA Weather Radios in all government buildings (e.g., schools); and an understanding of NWS capabilities and procedures. This could include NWS training, formation of "Weather Spotter" groups, and coordination between the County Office of Emergency Services and the NWS. The certification is relatively "easy" and inexpensive to achieve when compared to other mitigation measures, such as structural flood control. In addition, NOAA Weather Radio is becoming a standard in the nation's all-hazard warning infrastructure, and is planned for use in conjunction with Homeland Security as well as Amber Alerts.

Other Alternatives Considered: Do nothing.

Responsible Office/Person: Sacramento County Sheriff's Department, Office of Emergency Services in conjunction with the local National Weather Service office.

Cost: Staff time only to begin. Additional costs will depending upon a countywide assessment of the existing warning capability. For example, funding would be required for additional NOAA Weather Radios or a NOAA Weather Radio repeater antenna, if needed.

Benefits: Improved warning and Life Safety.

Recommended Action Item #3: *Implement the Water Forum Agreement.*

Mitigation Alternative Category: Natural Resource Protection

Issue/Background Statement: The Water Forum Agreement is a regional solution to water shortages, environmental degradation, groundwater contamination, groundwater reliability, and economic prosperity. The Agreement was developed by a diverse group of water managers and users, plus representatives of business and environmental interests from Sacramento, Placer and El Dorado Counties who negotiated this Agreement which is a comprehensive package of linked actions that will achieve two co-equal objectives; provide a reliable and safe water supply for the region's economic health and planed development to the year 2030, and preserve the fishery, wildlife, recreational, and aesthetic values of the Lower American River. The Water Forum Agreement contains seven elements, each of which is necessary for a solution to work. The seven elements are interwoven with water diversions, and urban and agricultural water uses, and

are thus equally intertwined with the County flood control system. In many, many ways, the flood control system of Sacramento County is a critical element of the state's water supply system. Implementation of the Water Forum Agreement preserves both water supply and water related habitat, and by its very nature, the flood control system. Additionally, the Agreement represents thousands of hours of work between hundreds of parties and organizations, and cannot be ignored.

Other Alternatives Considered: No action.

Responsible Office/Person: Executive Director, Water Forum Successor Effort, and all signatories to the Agreement (e.g., the Regional Water Authority and each of their 22 members).

Cost: Incremental, with some elements having little cost, and others with extensive costs. Funding can be sought through existing budgets, grant programs, and self-financing strategies where appropriate (bonds, tax incentives, taxes, fees, etc.)

Benefit: Continued and better managed water supply, water quality, flood protection, natural and ecological habitat

Recommended Action Item #4: *Develop a seasonal multi-hazard public education campaign to be implemented annually.*

Mitigation Alternative Category: Public Information

Issue/Background Statement: The HMPC gathered important and interesting information regarding the hazards that pose a threat to the health and safety of Sacramento County, the likely impacts of such hazards, and reasonable measures that can be undertaken by individuals and organizations to reduce the impact of such inevitable events. This information needs to be made public in a multifaceted approach that addresses the hazards when they occur and where they occur. Public Education is one of the primary mechanisms in reducing future hazard related losses, and one that is inexpensive in comparison to other mitigation projects. This effort should be coordinated between the many organizations that already have extensive and/or limited programs in place.

The following topics need to be addressed through this effort.

- Floods
    - Flood insurance availability and Preferred Risk policies behind levees
    - Currently planned City/County/SAFCA Program
    - Warning system components
    - Regional Evacuation plans/procedures (response to warning)
    - The dangers associated with manhole covers during floods, e.g., popping off from pressure. Include information explaining what they are, what they are for, and why people should not remove the covers
    - Natural & Beneficial value of floodplains
    - Placing Flood-Depth signs county-wide

    - Investigate the "Living with Levees" program

- Severe Weather
    - Tree-limb trimming
    - Fog – driving tips
    - Warning (NOAA Weather [All-Hazards] Radio)
- Earthquakes
- Wildfire (defensible space, subdivision regulations, ingress/egress, severe fire hazard mapping)
- Health Hazards (West Nile Virus)
- Water Conservation (In conjunction with existing San Juan WD program effort)
- Business Continuity Planning

In addition, the following activities should be incorporated into the countywide program:

- Conduct disaster exercises
- Train consumers/volunteers to be ready to help when disasters strike (CERT teams)
- Provide all-hazard curriculum for teachers
- Coordinate with the existing outreach and hazard awareness program of the American Red Cross (ARC).

Other Alternatives Considered: Continue with the minimum requirements for the Community Rating System program, or proceed with the additional items a few at a time. Utilize other innovative outreach methods to get the public's attention.

Responsible Offices/Persons: City & County Emergency Management offices, City & County Floodplain Management Offices, SAFCA, the America Red Cross, Sacramento County Health Department, San Juan Water District, the California Fire Alliance, the Institute of Building and Home Safety, CA-OES, CA-DWR, CA-Reclamation Board and FEMA Region IX.

Cost: Incremental, yet expensive. A single countywide mailing to 500,000 residential units (1.3 million population divided by 2.6 people per residential unit at $.37 per mailing) would cost $185,000 without including design and printing costs. This program should build on existing programs and agencies that are already incurring these costs, and explore other avenues of public outreach.

Benefit: Life Safety, reduced losses, increased insurance coverage

Recommended Action Item #5: *Promote GIS-based information sharing between agencies*

Mitigation Alternative Category: Public Information

Issue/Background Statement: There exists several GIS "centers" and Users Groups within Sacramento County. This recommendation is aimed at broadening the coordination between these groups, including the development of compatible systems and the sharing of baseline data.

Other Alternatives Considered: Do nothing

Responsible Offices/Persons: SACOG already has an existing regional cooperative GIS sharing network between some counties and cities, with plans to expand this effort across the entire six-county membership. This should be a regionally supported network that could take advantage of the work already initiated by SACOG. The County Assessor's office should develop a countywide platform for each community, utility and district to post pertinent data on the World Wide Web.

Cost: To be Determined. Primarily staff time to start.

Benefit: Improved coordination and efficiency, less duplication of effort, reduced costs in acquiring data.

Recommended Action Item #6: *Continue to work to reconcile environmental concerns between flood protection, water supply, natural resource and recreational needs*.

Mitigation Alternative Category: Natural Resource Protection

Issue/Background Statement: SAFCA estimates costs for the mitigation of erosion sites on the Sacramento River system within SAFCA's boundaries alone to exceed $750 Million when acceptable environmental standards are met. Re-establishment of original carrying capacity and rehabilitation of the structural integrity of Delta levees is stymied by similar costs and concerns over impacts upon natural habitats. Middle ground needs to be identified, funding identified, and actions taken. An example under consideration is the establishment of setback levees, established through agreements with willing sellers, and without the use of eminent domain or condemnation. The feasibility of additional techniques to support setbacks need to be identified and examined, including leasebacks and flood easements. Conflicting issues and priorities often result in administrative gridlock and financial paralysis, to the benefit of no one interest group while a detriment to many.

Other Alternatives Considered: Do nothing (which allows problem to become greater over time).

Responsible Offices/Persons: SAFCA, CAL-FED, the Water Forum Successor effort, USACE, BOR, FWS, State Reclamation Board, CA-DWR, CA-DF&G, National Marine Fishery Service and local/regional environmental interest groups.

Cost: To be Determined

Benefit: Common ground between flood control, water supply, water users, and natural resources, where work can progress to the mutual benefit of each constituency

Recommended Action Item #7: *Pursue the installation of new warning systems and devices that are available to minimize fog impacts upon transportation flows and accidents.*

- Lane-marker lighting
- Fog-sensitive changing speed limits

Mitigation Alternative Category: Preparedness

Issue/Background Statement: Fog is common in the Sacramento area. Fog can severely reduce visibility, and leads to numerous, multi-vehicle collisions, often on the Interstate highways where speeds often "over-drive" one's visibility.

Other Alternatives Considered: Do nothing, close the interstate during fog conditions, and lower the speed limits during fog conditions (which this recommendation accomplishes)

Responsible Offices/Persons: Federal Highway Administration, Highway Patrol, and Caltrans

Recommended Action Item #8: *Maximize use of available funding (Goal #3)*

Objective 3.1: Identify multiple objective opportunities that can be used to support mitigation activities. – including coordination of plans

Objective 3.2: Identify and analyze project cost share options.

Objective 3.3: Submit mitigation project applications periodically in order to wait in queue for future funding

Issue/Background Statement: Mitigation often costs money, and most communities, nationwide, strive to use someone else's money to pay for mitigation activities. First, this creates competition for limited dollars. Second, most programs that fund mitigation activities have a required match to be provided by the recipient. The first objective recognizes that there are always more mitigation needs than there are mitigation funds, and so communities must examine their mitigation project from multiple perspectives. For example, a flood protection project can also be construed as a housing improvement, transportation, or economic development project. This, in turn, would make the project eligible under a variety of funding programs rather than just flood programs. An additional benefit is a broader constituent base, because people who might not support a flood protection project (because they are not being impacted by flooding) might support a flood project that improved their neighborhood, relieved a local transportation problem, or improved their business.

The second objective recognizes that communities must identify their own funding sources as their match for most grant programs. The intent here is to identify available cost-share options now, rather than waiting to resolve this issue on a project-by-project basis. Options can include in-kind or "soft" matches, such as employee labor and/or use of community facilities and equipment; cash from bonds, taxes, loans, special assessments, utility fees, reprioritizing existing budgets, eliminating community services, or targeted and discretionary funding (e.g., lottery funds). In some cases, other program funds, such as HUD-CDBG funds can be utilized as a community's match.

The third objective recognizes that funding will not be provided unless it is asked for. Therefore, a constant monitoring of funding sources, application timelines, year-end funding sources and success stories from other communities will better position communities to seek funding as it becomes available.

Other Alternatives Considered: Do nothing (which would be to pass up opportunities to fund important community projects).

Responsible Offices/Persons: The 'Responsible Office or Person' for each individual Recommended Action Items in this plan.

Cost: Staff time only

Benefit: Attracting the funding necessary to implement Recommended Action Items in this plan

Multi-Hazard Mitigation Plan
6.0 The Community Specific Elements

INTRODUCTION

Sacramento County and the City of Sacramento both participate in the Community Rating System (CRS) of the National Flood Insurance Program (NFIP). Both communities have earned substantial discounts to the standard cost of flood insurance as a result of the more stringent standards, flood mitigation activities, and public outreach activities they have undertaken as part of their overall floodplain management programs. Both communities however, still have more than 10 'Repetitive Losses' - those structures that have received flood insurance claims payments greater than $1,000 twice in any given 10-year period since the community joined the National Flood Insurance Program (NFIP) - and thus are categorized within CRS as "Category C Repetitive Loss Communities." A Category C repetitive loss community must prepare a floodplain management plan that covers at least all of its repetitive loss areas. The floodplain management plan must follow the same ten steps that this DMA planning process followed. However, a Category C repetitive loss community must also receive some points for each of the ten planning steps, including some required actions not otherwise required by DMA, or they receive zero points for the entire plan - and any Category C repetitive loss community that does not receive credit for a floodplain management plan loses all their previously earned CRS discounts! These discounts are worth several million dollars each year in this community.

Thus, the primary purpose of the Community Specific Elements in this plan is to be able to separate the particular flood and repetitive loss problems and solutions for both the City and the County for CRS purposes.

A secondary purpose of the Community Specific Elements is to address the DMA regulatory requirement that hazards that present different degrees of risk across the entire planning area be evaluated separately. Since flood vulnerability is different in each community, due to the variations in each floodplain, the number of structures at risk, the amount of insurance coverage, and the values of the structures, the Community Specific Elements allow the vulnerability to floods in each community to also be examined separately.

This also affords the opportunity to examine certain common parameters for each community, such as development trends, while creating a planning document that can be customized, or even separated, by each community in the future. The Community Specific Elements also allows each community to have their own specific recommended mitigation actions listed along with their community attributes. Finally, where possible, the HMPC used the Community Specific Elements to address and other hazard related issues that were distinct to a particular community.

Each Community Specific Element is structured in a similar form and format, with the exception that the County's and City's Elements are much more detailed for CRS purposes. Thereafter, the similarities are more common and more noticeable. The following is an explanation of the template and what each data set represents.

Each Community Element begins with a general location map, and where available, a USGS aerial photograph.

FLOODPLAIN INVENTORY

To address this issue of varying risk to floods, each incorporated community within the County that participates in the NFIP was asked to conduct a flood hazard area inventory. The HMPC inventoried the following, to the extent feasible, as a means of quantifying the vulnerability within the floodplains:

- Total values at risk
- Structure types, numbers and values
- NFIP Insurance coverage, claims paid, and Repetitive Losses
- Identification of Critical Facilities at risk
- Identification of designated historical sites and natural resources
- Overall Community Impact and
- Development trends.

As is required for participation in the NFIP, each participating community has an official map designating the Special Flood Hazard Areas. The County and the City Elements have maps that display their floodplains, in the aggregate, included in this plan. Where other flood maps are readily available, and displayed in the aggregate on one page, such as the CA-DWR Flood Awareness Maps, they have been included in the appropriate Community Specific Element. However, the general approach of the HMPC within the Community Specific Elements was simply to list the official flood hazard map panel #'s due to their total number and volume. These maps, however, are available through each community's Public Works, Building or Planning Department, posted at public libraries and on the WorldWide Web at www.fema.gov. Since these maps change over time, the most current floodplain information is always found at each community's floodplain management office.

Historic and Natural Resources are important to identify pre-disaster for four reasons:

- First, the community may decide that these sites are worthy of a greater degree of protection than currently exists, due to their unique and irreplaceable nature.

- Second, should these resources be impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.

- Third, the rules for repair, reconstruction, restoration, rehabilitation, and or replacement usually differ from the norm, and

- Fourth, Natural Resources, such as wetlands and riparian habitat, can have beneficial functions that contribute to the reduction of flood levels and damage.

CAPABILITY ASSESSMENT

The purpose of the Capability Assessment is to determine what policies, programs, regulations, and other mechanisms each Community already has in place that either contributes to, or hinders the ability to mitigate the effects of natural hazards. Additionally, the analysis of the existing capabilities allows the identification of those practices which may actually increase the impacts of hazards upon the communities.

The true value of a Mitigation Capability Assessment is in its analysis. For this plan, each community presents a good first effort, as exemplified by the inventory they have completed. This is an ongoing process that will continue with the implementation and maintenance of this plan. On the following page is the "key" to the Capability Assessment Matrix utilized and presented by each county.

EXPLANATION OF CAPABILITY ASSESSMENT MATRIX: *Does the Community have:*

Comp Plan: A Comprehensive Long-Term Community Growth Plan?
Land Use Plan: A plan that designates type of Land Use desired/required; uses Zoning
Subdivision Ordinance: A regulation that dictates lot sizes, density, setbacks and construction type
Zoning Ordinance: An ordinance that dictates type of Use and Occupancy, Implements Land Use Plan
NFIP/FPM Ord: A Floodplain Management Ordinance: Directs development in identified Flood Hazard Areas. Required for Participation in NFIP and Availability of Flood Insurance
Sub. Damage: Does your FPM Ordinance contain language on Substantial Damage/Improvements?
Administrator: Do you have a Floodplain Management Administrator (someone with the responsibility of enforcing the ordinance and providing ancillary services (e.g., map reading, public education)
# of FP Bldgs: How many buildings are in the mapped Floodplain?
# of policies? How many buildings are insured against flood through the NFIP?
# of RL's: # of Repetitive Losses: (Paid more than $1,000, twice in 10 years)
CRS Rating: A Community Rating System rating from the NFIP, and if so, what is it?
BCEGS: A Building Code Effectiveness Grading System Rating
LEOP: A Local Emergency Operations Plan – a disaster RESPONSE plan
HM Plan: A Hazard Mitigation Plan
Warning: Any type of system, such as "Storm Ready" Certification from NWS, NOAA Weather Radio reception, outdoor sirens, Cable (TV) Override, or an Emergency Warning Notification System?
GIS: A Geographic Information System
Structural Protection Projects: (levees, drainage facilities, detention/retention basins)
Property Protection Projects: (buy-outs, elevation of structures, floodproofing, small "residential" levees or berms/floodwalls)
Critical Facility Protection: (for example, protection of power substations, sewage lift stations, water-supply sources, the EOC, police/fire stations or medical facilities that are at risk)
Natural And Cultural Inventory: Do you have an inventory of resources, maps, or special regulations within the community? (wetlands and historic structures/districts, etc.)
Erosion Or Sediment Control: Do you have any projects or regulations in place?
Public Information And/Or Environmental Education Program: Do you have an ongoing program even if its primary focus is not hazards? Examples would be "regular" flyers included in city utility billings, a website, or an environmental education program for kids in conjunction with Parks & Recreation?)

Note: In the Capability Assessment matrix, a "C" means the County provides the service, and an "IP" means In Progress. Blank boxes or N/A means the information was either unknown or unavailable.

DEVELOPMENT TRENDS

Mitigation is most effective in protecting development that doesn't yet exist. Knowing a community's development trends, when juxtaposed with the hazard analysis, is a valuable information tool that can provide direction, incentive and alternatives to placing new development at risk from natural hazards. This section describes the development trends within each community, where discernable.

COMMUNITY-SPECIFIC RECOMMENDATIONS

The final section of each County Planning Element puts forth the Recommended Actions of the County Planning Team. Each recommendation is presented in a similar format:

Action Item: A brief statement of what is needed

Issue Statement: An explanation of why the Recommended Action is important

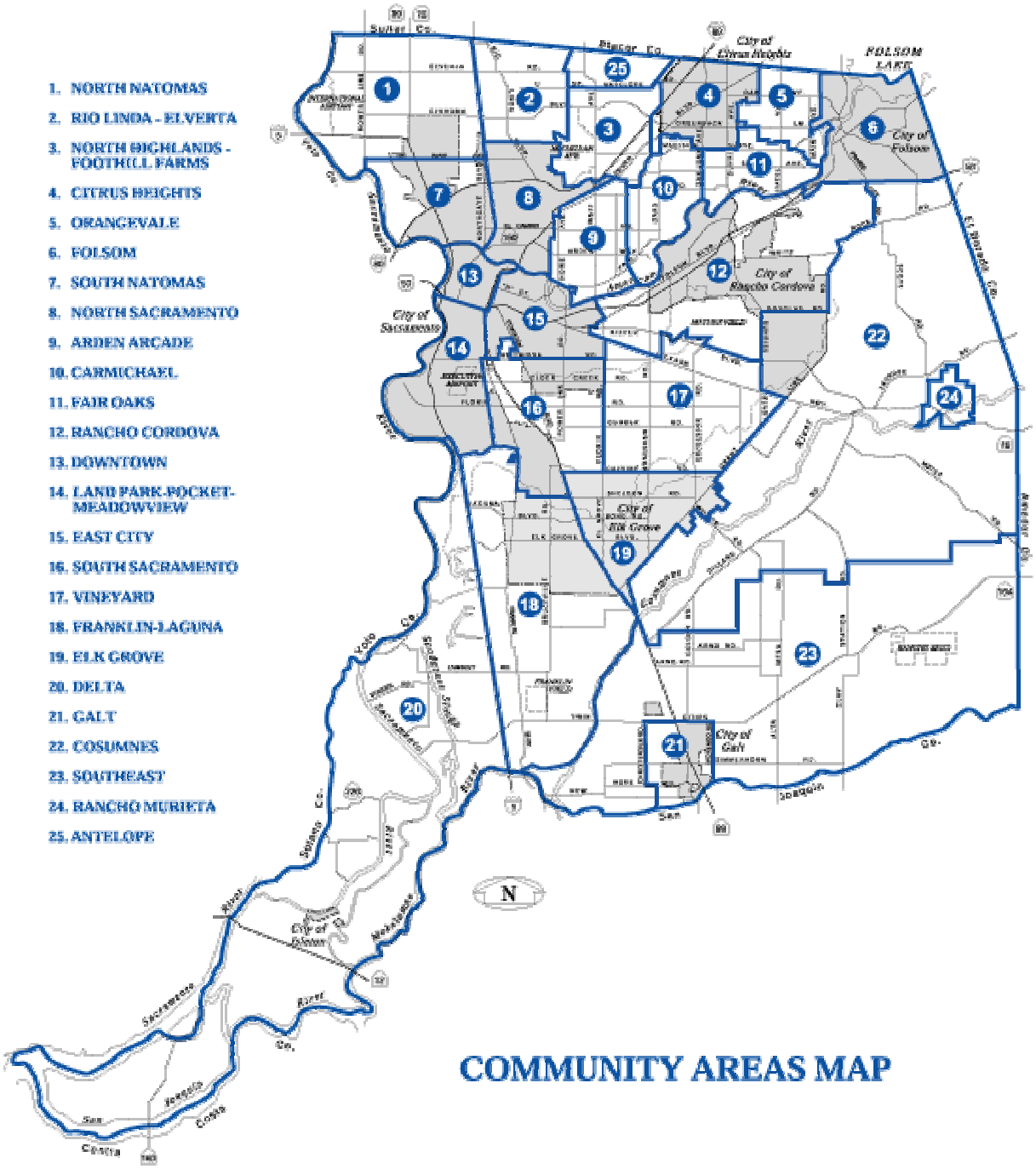
Implementation Manager and Strategy: Identifies what person, position, department or agency has the initial lead responsibility for implementation. This could include a range of activities from identifying and applying for appropriate grants, to gathering the technical data needed for project development, or simply extending an invitation for Technical Assistance.

Cost Estimate: Where costs are known, they are presented. Potential sources of funding and/or local matches are also identified when known or considered.

Cost-Effectiveness Explanation: A statement of why the Planning Team believes these Recommended Actions would be cost-effective to pursue. In most cases, this is a generic description, as it is fully expected that any project being seriously considered for implementation will need to detail project costs and benefits, and due to the scope of this plan, and the constant fluctuation in project costs and values that help determine benefits, a detailed analysis is not worthwhile at this point in the planning process.

Multi-Hazard Mitigation Plan

6.1 Sacramento County Community Element



SACRAMENTO COUNTY COMMUNITY PROFILE

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.

SACRAMENTO COUNTY ASSESSED VALUATIONS (UNINCORPORATED AREAS ONLY)		
Type	**Total Value**	**Land Value**
2/3/4PLEX	$1,043,804,983	$ 311,074,014
COMMERCIAL/INDUSTRIAL	$6,314,076,111	$ 1,889,731,402
MULTI-FAMILY	$2,190,395,227	$ 391,349,321
SINGLE FAMILY	$24,849,643,520	$6,862,602,682
VACANT LAND/AG	$1,443,304,668	$1,263,908,429
TOTAL	**$35,841,224,509**	**$10,718,665,848**

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.

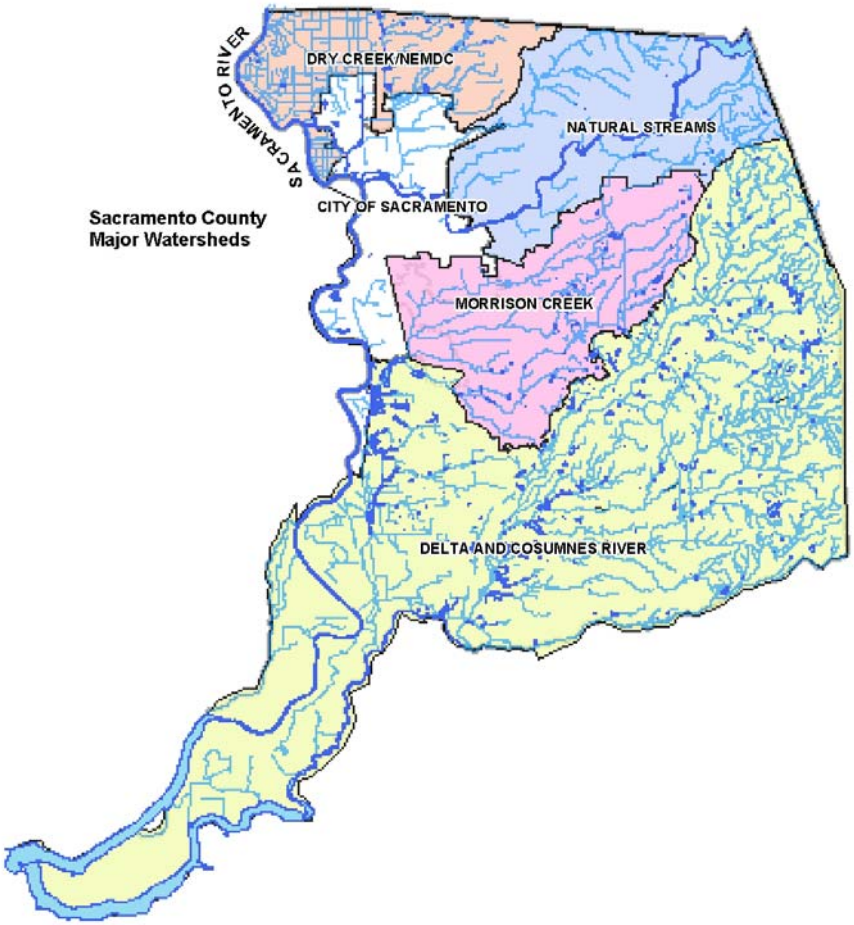
Levee Failure/Overtopping. Generally, levees fail due to overtopping or collapse due to seepage, subsidence, erosion, or any combination thereof. A catastrophic failure resulting from collapse can occur very quickly with relatively little warning. Levee failure usually occurs when the levee is saturated 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/Natomas 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 northeasterly 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
- Arcade Creek
- Arcade Creek South Branch
- Brooktree Creek
- Mariposa Creek
- Carmichael Creek
- Chicken Ranch Slough
- Cripple Creek
- Diablo Creek
- Fair Oaks Stream Group
- Alder Creek
- Manlove Creek
- Kohler Creek
- Linda Creek
- Buffalo Creek
- Mayhew Slough
- Minnesota Creek
- Strong Ranch Slough
- Sunrise Creek
- Verde Cruz Creek
- Boyd Station Channel
- 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.

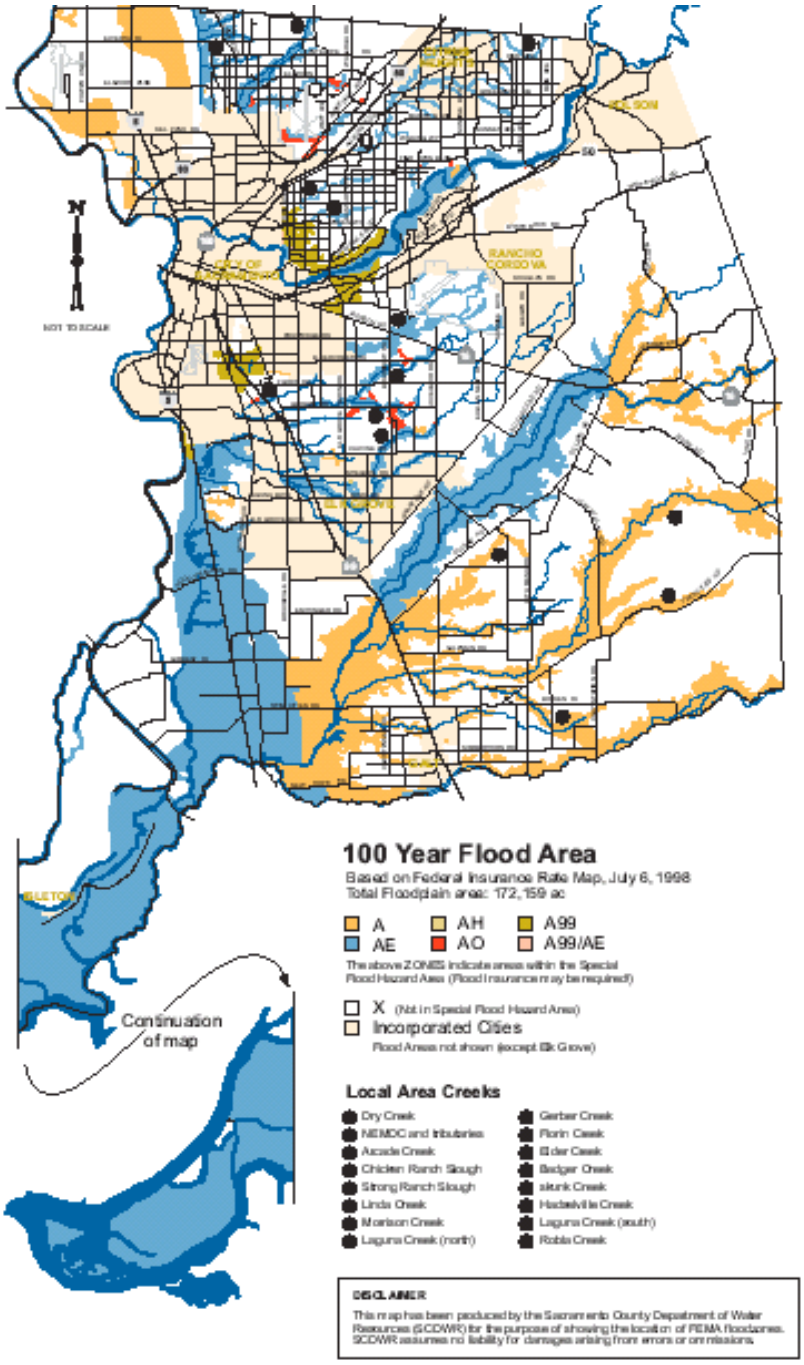
The Cosumnes River originates in the Sierra Nevada foothills and flows through the southern part of Sacramento County. Major flooding has occurred due to levee breaches on the Cosumnes River with the latest occurring in January1997. Although predominantly zoned AG-80, this area also comprises many smaller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

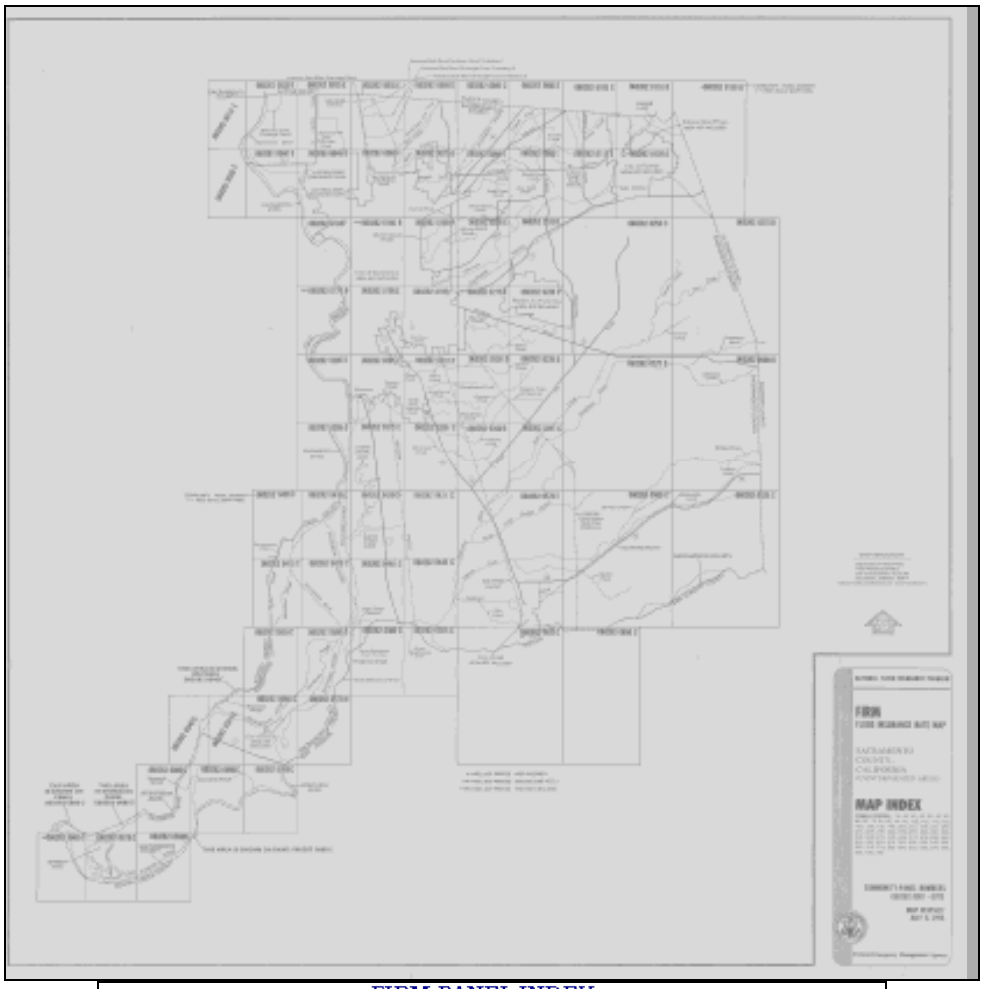
FLOODPLAIN INVENTORY

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



FIRM PANEL INDEX

Effective Date		
7/6/98	9/30/88	2/4/98

10E	20E	30E	35E	40E	45E	55E	60D	65F
70D	80C	85E	90E	95E	105C	110D	115E	120D
160F	185F	190E	195F	205E	210E	215E	220C	250C
275D	285E	295D	305F	310F	315D	320E	330D	335D
340D	345C	375C	400D	405C	410D	415C	420D	430D
435D	440D	445D	475E	500C	525C	540C	545C	555C
560C	565C	570C	580D	585C	625D	650C	670C	680C
685C	690C	705C				665C all zone AE		

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.

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

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

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

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

ZONE	DESCRIPTION
A	No base flood elevations determined.
AE	Base flood elevations determined.
AH	Flood depths of 1 to 3 feet. (usually areas of ponding); base flood elevations determined.
AO	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.
A99	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.
A99/AE	This area subject to flooding from two sources.

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 spit 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)

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

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.

FLOODPLAIN VALUES AND DAMAGE ESTIMATION – UNINCORPORATED AREA

Structure Type by Flood Zone	Number of Structures	Structure and Contents Total Value	20% of Total Value
Residential			
A (various)	6,487	$1,464,610,000	$292,922,000
A99	10,609	$3,424,160,000	$684,832,000
Residential Total	**17,095**	**$4,888,771,000**	**$977,754,200**
Commercial			
A (various)	60	$234,402,000	$46,880,400
A99	211	$845,353,000	$169,070,600
Commercial Total	**271**	**$1,079,756,000**	**$215,951,200**
Industrial			
A (various)	10	$94,358,000	$18,871,600
A99	8	$72,612,000	$14,522,400
Industrial Total	**18**	**$166,970,000**	**$33,394,000**
Public			
A (various)	5	$31,990,000	$6,398,000
A99	16	$86,848,000	$17,369,600
Public Total	**21**	**$118,837,000**	**$23,767,400**
Total of each Total	**17,369**	**$6,254,334,000**	**$1,250,866,800**

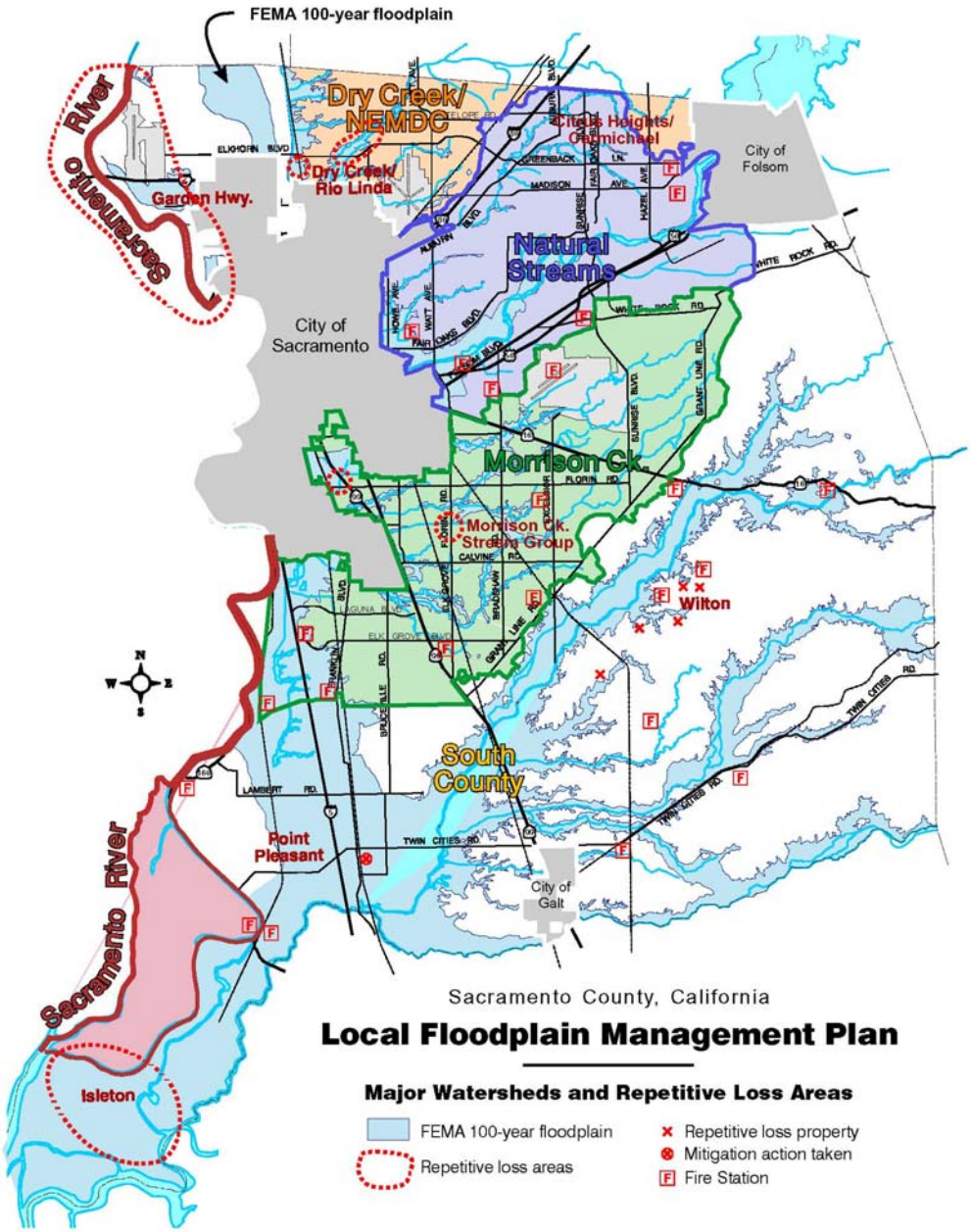
Data Source HAZUS-MH Census Block level, Floodplains - County of Sacramento

Vulnerabilities and Repetitive Losses by Stream Group

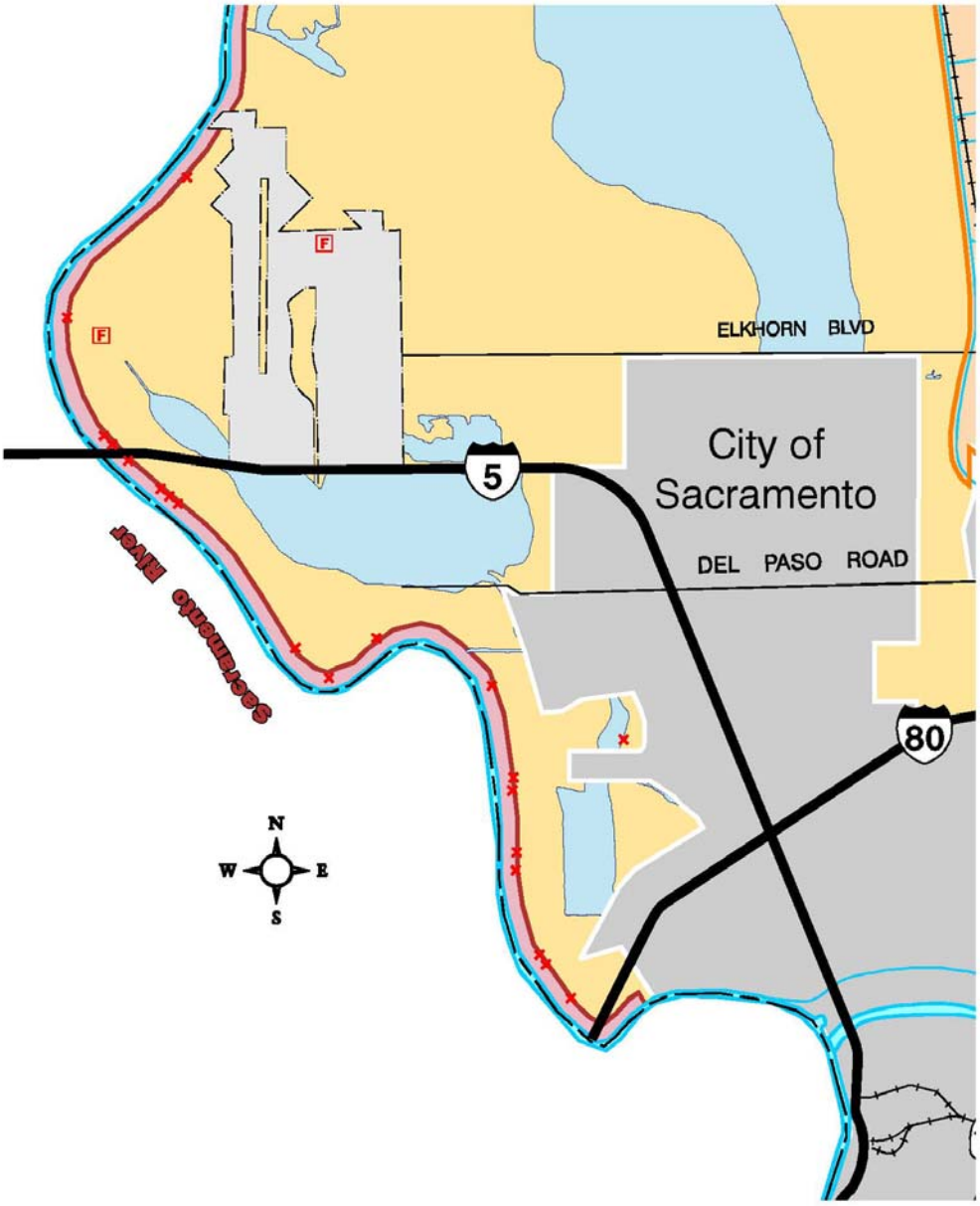
The following table shows the number of repetitive losses by the five major watersheds located within Sacramento County. Sacramento County maintains a database of these repetitive loss locations.

Watershed	# of Repetitive Losses
Sacramento River	23 Structures
Dry Creek/NEMDC & Tributaries	22 Structures
Natural Stream Group & Tributaries	42 Structures
Morrison Creek Stream Group	6 Structures
Southern Portion of the County (Cosumnes River)	10 Structures

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.



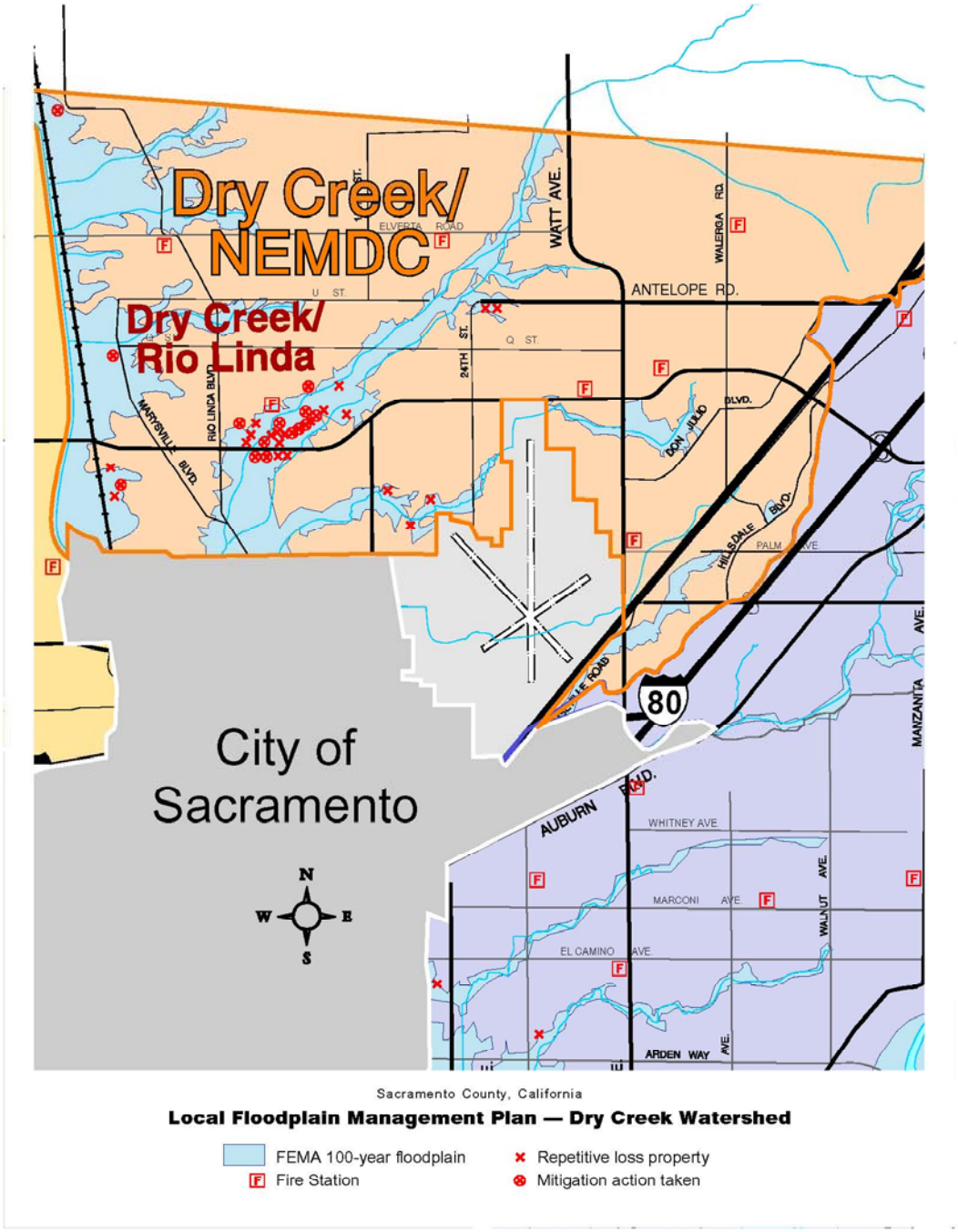
Sacramento County, California

Local Floodplain Management Plan - Sacramento River

FEMA 100-year floodplain
Fire Station
Repetitive loss property
Mitigation action taken

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.

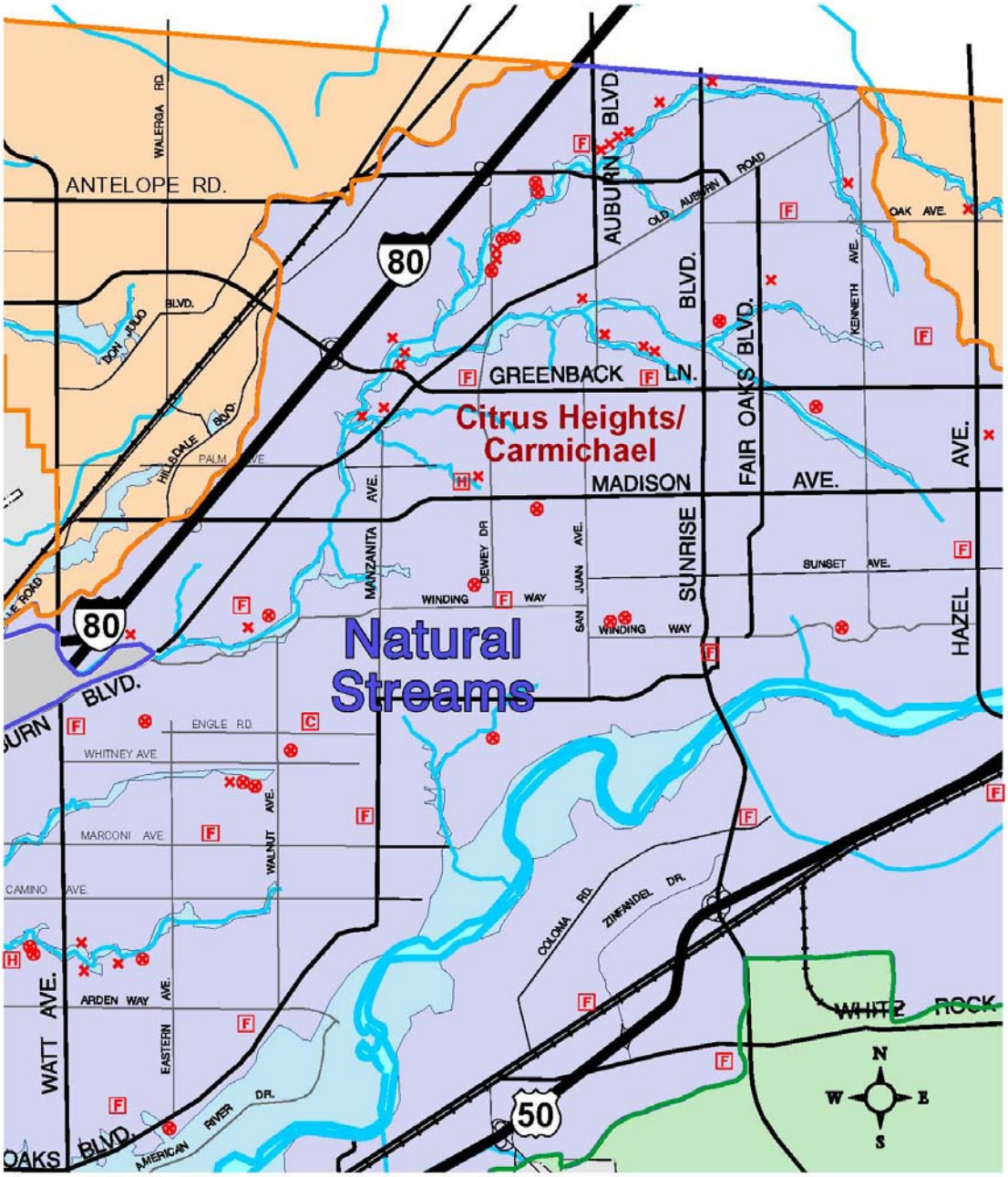
FLOODPLAIN VALUES AND DAMAGE ESTIMATION – DRY CREEK/NEMDC GROUP

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

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.



Sacramento County, California

Local Floodplain Management Plan - Natural Streams Group

FEMA 100-year floodplain
F Fire Station
H Hospital
× Repetitive loss property
⊗ Mitigation action taken
C City/County Emergency Operations Center

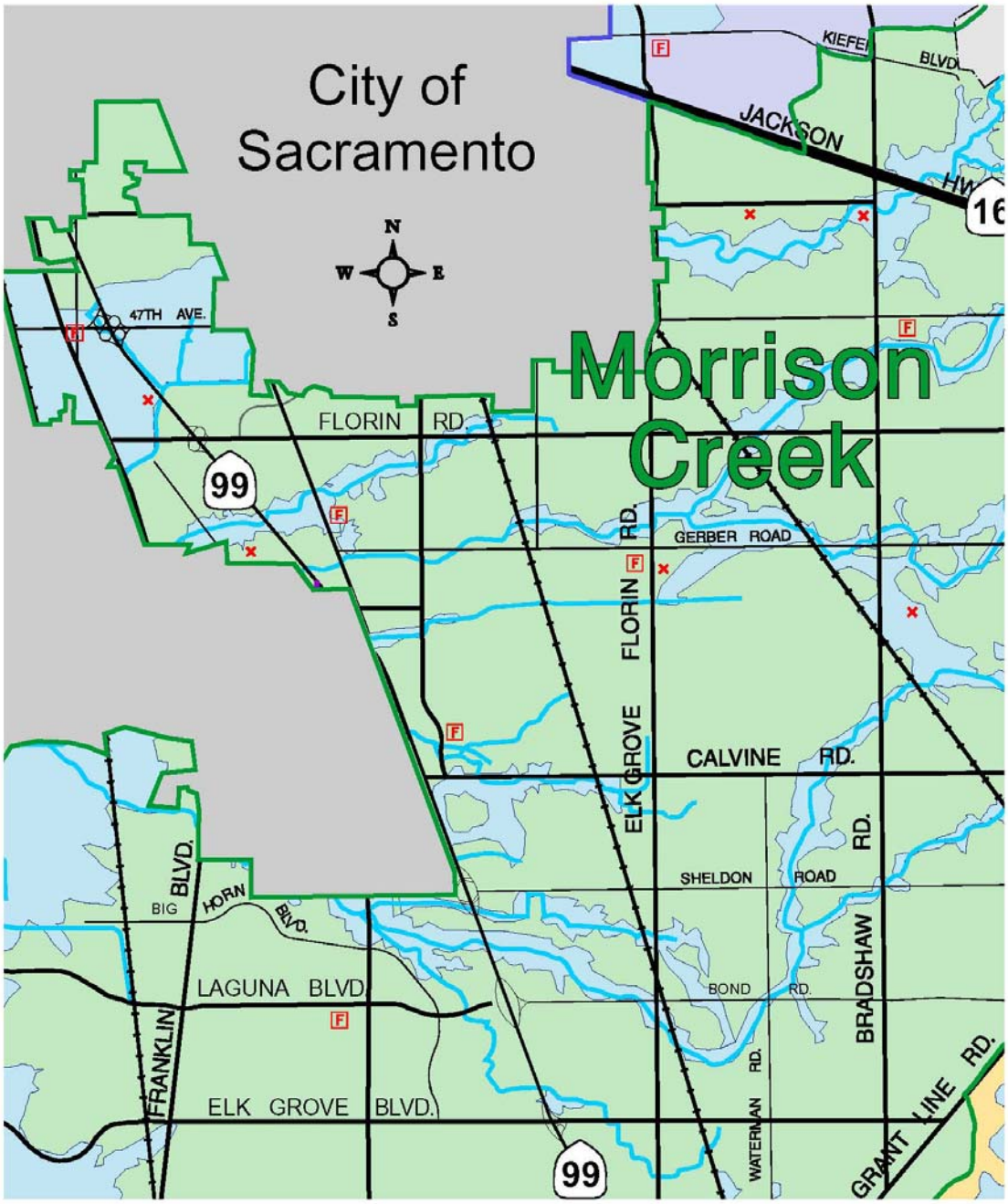
FLOODPLAIN VALUES AND DAMAGE ESTIMATION – NATURAL STREAMS GROUP

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

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.



Sacramento County, California

Local Floodplain Management Plan - Morrison Creek Watershed

FEMA 100-year floodplain
Fire Station
Repetitive loss property
Mitigation action taken

FLOODPLAIN VALUES AND DAMAGE ESTIMATION – MORRISON CREEK GROUP

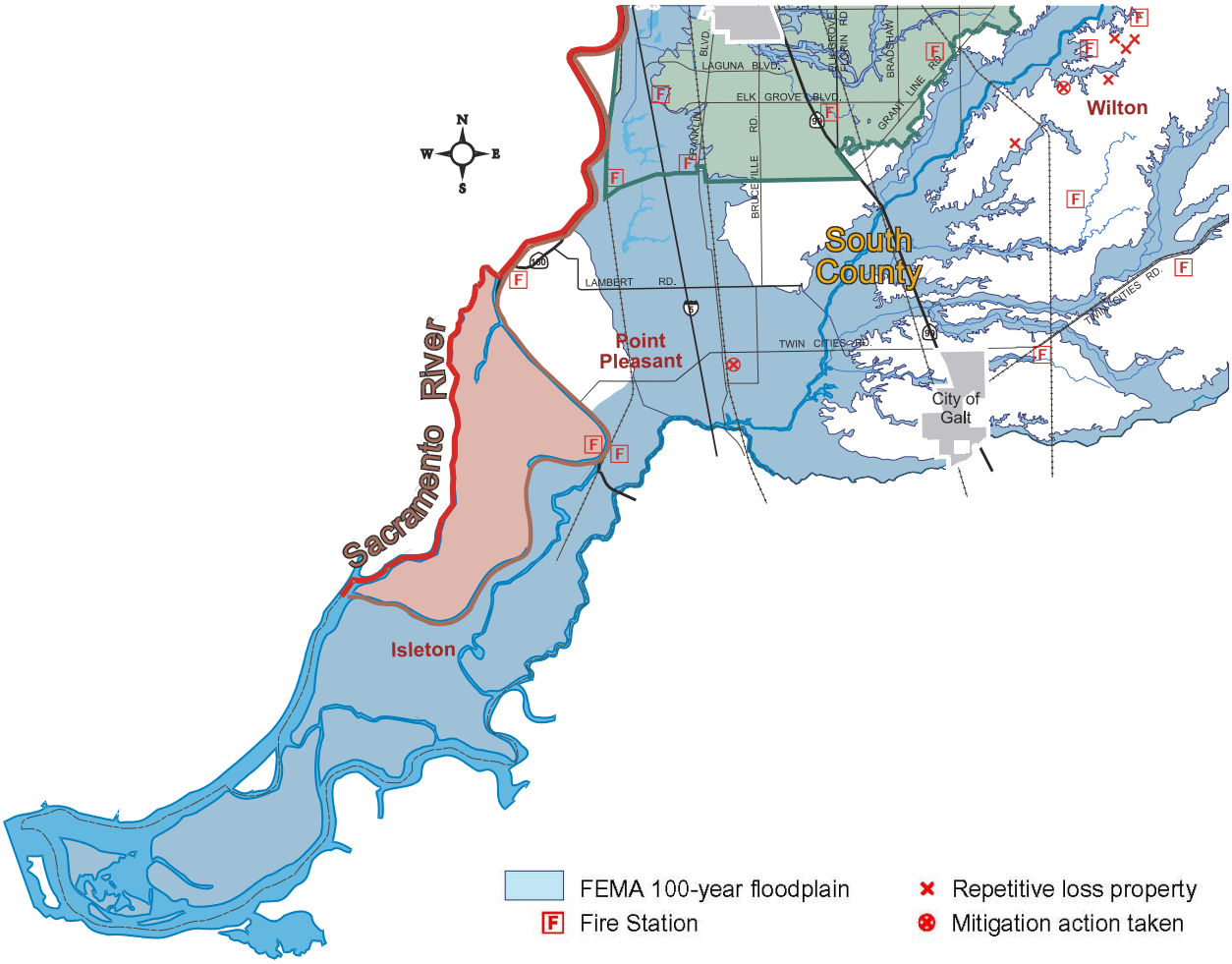
Structure Type by Flood Zone	Number of Structures	Structure and Contents Total Value	20% of Total Value
Residential			
A (various)	892	$196,653,000	$39,330,600
A99	2,385	$659,815,000	$131,963,000
Residential Total	**3,277**	$856,468,000	**$171,293,600**
Commercial			
A (various)	7	$23,053,000	$4,610,600
A99	45	$162,969,000	$32,593,800
Commercial Total	**52**	$186,022,000	**$37,204,400**
Industrial			
A (various)	2	$19,278,000	$3,855,600
A99	6	$31,883,000	$6,376,600
Industrial Total	**8**	$51,162,000	**$10,232,400**
Public			
A (various)	1	$5,458,000	$1,091,600
A99	6	$25,252,000	$5,050,400
Public Total	**7**	$30,710,000	**$6,142,000**
Total of each Total	**3,344**	**$1,124,362,000**	**$224,872,400**

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

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.

SOUTH COUNTY AND DELTA FLOODPLAINS – SACRAMENTO AND COSUMNES RIVERS



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

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

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

FACILITY TYPE	A99	AE	AO	A	TOTAL
Fire Department	1		1	1	3
Police Department	1	1			2
Hospitals					0
Schools	17	2	2	1	22
Sewer Pump Stations	8	11	2	2	23

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

Slocum House (added 1979 - **Building** - #79000520)
7992 California Ave., Fair Oaks

Walnut Grove Gakuen Hall (added 1980 - **Building** - #80000837)
Also known as **Walnut Grove Japanese Community Center; Senior Citizen's Cent**
Pine and C Sts., Walnut Grove

Historic Districts
Locke Historic District (added 1971 - **District** - #71000174)
Bounded on the W by the Sacramento River, on the N by Locke Rd., on the E by Alley St., and on the S by Levee St., Locke

Sacramento Air Depot Historic District (added 1992 - **District** - #91001969)
Also known as **McClellan Air Force Base; Sacramento Air Logistics Center**
McClellan Air Force Base, North Highlands

Walnut Grove Chinese-American Historic District (added 1990 - **District** - #90000484)
Also known as **Walnut Grove Chinatown**
Bounded by C, Tyler, and Bridge Sts., and River Rd., Walnut Grove

Walnut Grove Commercial/Residential Historic District (added 1990 - **District** - #90000551)
Also known as **Alex Brown Business District**
Browns Alley and River Rd., Walnut Grove

Walnut Grove Japanese-American Historic District (added 1990 - **District** - #90000483)
Also known as **Walnut Grove Japantown**
Bounded by Winnie St., Tyler St., C St., and River Rd., Walnut Grove

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

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

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.

Sacramento County Capability Assessment Matrix

Capability	Notes
Comp Plan/General Plan	Y
Land Use Plan	Y
Subdivision Ord	Y
Zoning Ordinance	Y
NFIP/FPM Ordinance	Y
- Map Date	Sept 30, 1988, Feb 4, 1998, July 7, 1998
- Substantial Damage language?	Y
- Certified Floodplain Manager?	Y
- # of Floodprone Buildings?	17,369
- # of NFIP policies	17,228
- Maintain Elevation Certificates?	Y
- # of Repetitive Losses?	128
CRS Rating, if applicable	5
Stormwater Program?	Y
Building Code Version	UBC 1997
Full-time Building Official	Y
- Conduct "as-built" Inspections?	Y
BCEGS Rating	?
Local Emergency Operations Plan	Y
Hazard Mitigation Plan	Y
Warning System in Place?	
- Storm Ready Certified?	N
- Weather Radio reception?	Y
- Outdoor Warning Sirens?	?
- Emergency Notification (R-911)?	N
- Other? (e.g., cable over-ride)	Y
GIS System?	Y
- Hazard Data?	Y
- Building footprints?	N
- Tied to Assessor data?	Y
- Land-Use designations?	Y
Structural Protection Projects	Y-Levees/Dams
Property Owner Protection Projects	Y-Acq/El.
Critical Facilities Protected?	Y-Levees
Natural Resources Inventory?	Y-aggregates, mining, soil, prime farmlands
Cultural Resources Inventory?	Inventories for specific planning areas
Erosion Control procedures?	Y
Sediment Control procedures?	Y
Public Information Program/Outlet	Y
Environmental Education Program?	Y

FLOODPLAIN MANAGEMENT RELATED POLICIES

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.

- 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.
- 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.
- 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.
- 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 erosions 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 recordation. 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

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.

For the residents of the County of Sacramento

CUBS #1500

Be Flood Ready!

Protect your family and property from flood hazards

A History of Flooding

In 1995, heavy rains hit the Sacramento region causing widespread localized flooding, in particular in the Arcade, Morrison, Florin, Unionhouse, and Dry Creeks areas. Two years later, a series of tropical storms hit northern California, causing the Cosumnes River to crash through its levees in 24 places.

Sacramento County has 276 square miles within the 100-year floodplain. The 100-year floodplain is shown on the Flood Insurance Rate Map (FIRM) and these areas are known as Special Flood Hazard Areas (SFHAs). In addition, Sacramento County has many local flood hazard areas. Normal rainfall years can bring high-intensity thunderstorms with localized flooding, resulting in devastating losses of property and possessions.

Flood Insurance

If you live in a floodplain, you should have flood insurance. Your homeowner's insurance policy will not cover losses due to flooding.

The National Flood Insurance Program (NFIP) makes flood insurance available to everyone in the county. The county's unincorporated flood prevention program improved its CRS (Community Rating System) rating in 2002 to 5, thereby earning a 25% discount in flood insurance premiums for those who live within a SFHA and up to 10% for those who do not—an annual savings of about $2,000,000 countywide.

If you are located within a SFHA, we urge you to buy flood insurance to protect yourself from flood losses. Information about flood insurance can be obtained from your insurance agent. Property owners can insure buildings and contents and renters can insure their possessions.

Elevation certificates may be on file at the Sacramento County Department of Water Resources (SCDWR).

Remember, you do not have to live in a floodplain to qualify for flood insurance.

Flood Warning

When high-intensity storms move through Sacramento County, flood-response officials need accurate rainfall information quickly. The Department of Water Resources' staff developed an Automated Local Evaluation in Real Time (ALERT) system that, through a network of 52 gauging stations, collects rainfall and stream-level data and provides Web site updates every 15 minutes. Local meteorologists, who keep Sacramento County residents informed through television and radio broadcasts, monitor the ALERT Web site. Creeks can flash flood without warning. To the extent possible, the communication and media officer issues news releases to all local media channels to identify waterways that are nearing flood stage and, as appropriate, evacuation procedures and locations.

KNOW YOUR FLOOD HAZARD!

For more information, visit our Web site at: www.FloodReady.org

Protecting Property

"Over 80 percent of the flood victims could have avoided flood damage by taking proactive actions to divert water from their property."

— George Booth, Senior Engineer for Drainage Development and Hydrology, on his investigation of flood damage after the 1995 flood.

Proactive steps taken before a flood can help protect your property.

Purchase sandbags, plywood, plastic sheeting and other products deemed necessary for the protection of your property and belongings before the rainy season begins. To be effective, sandbags must be properly stacked. See our Web site: www.FloodReady.org for sandbagging tips.

There are other steps that can be taken to protect your property from flood damage.

- You could consider elevating your house above the flood hazard. Approximately 100 homes have been elevated in our county in the last six years.
- Consider diverting floodwater around your structures.

Property owners are responsible for maintenance activities for their own property. However, if you think the maintenance requirement is within the countywide drainage system, call (916) 875-RAIN (7246) and we'll send a crew to evaluate the problem.

Floodplain Development Requirements

All construction, or fill, within a floodplain requires a floodplain management permit. If you plan to build or grade within a federal or local floodplain, please contact Sacramento County Department of Water Resources (SCDWR) staff at (916) 874-6851.

If you know of any non-permitted floodplain construction or fill, please contact SCDWR at (916) 874-6851. All new structures built within a flood hazard area are required to be constructed such that the lowest floor of the structure is at least one foot above the flood hazard. Substantially damaged or improved structures have the same elevation requirement as new construction. A substantially improved/damaged structure is where the cost of the improvements/damage is equal to or greater than 50 percent of the fair market value of the structure before the improvements are made or the damage occurred.

Surviving a Flood

Preparing for a flood before it occurs can prevent loss of property, possessions and, in the worst situation, lives. Here are tips to prepare you before a storm becomes an emergency:

- Know the safest route from your home or business to high, safe ground.
- Put insurance policies and lists of personal property in a safe place, such as a safe deposit box.
- Prepare a family disaster supply kit. The kit should contain items such as: flashlight, portable, battery operated radio, extra batteries, first aid kit and manual, emergency food and water, non-electric can opener, essential medications, cash and credit cards, sturdy shoes, warm outer wear and blankets.
- Monitor local weather forecasts. For example, you can call the Weatherline Forecast System at (916) 646-2000 for weather updates or tune your radio to either KFBK 1530AM or KSTE 650AM.

Floodwaters can rise rapidly. Be prepared to evacuate before the water level reaches your property.

- If evacuation is required and you can safely do so, turn off all utilities at the main power switch and close the main gas valve.
- Move to higher ground if you can do so safely—DO NOT attempt to walk through moving water.
- Do not drive in flooded areas.
- Do not remove manhole covers or drain grates.
- If you are caught at home by rising water, move to the second floor or the roof. Take your disaster supplies kit with you. Wait for help—don't try to swim to safety.
- Watch for fallen power lines.
- If you come in contact with floodwaters, wash hands with soap and clean water.
- Stay out of disaster areas unless authorities give you permission to enter.

Are You in a Flood Zone?

To find out if you are located within a SFHA, call the Sacramento County Department of Water Resources (SCDWR) at (916) 874-7517. Be prepared to give your name, address and parcel number. You may also come to our public counter to view the floodplain map (FIRM). We are located in downtown Sacramento at 827 7th Street, Room 301. Public hours are 9 a.m. – 4:45 p.m., Monday through Friday. No appointment is necessary.

Drainage System Maintenance

In 1996, the Stormwater Utility was formed in order to fund new programs for preventive maintenance, drainage repair and improvement projects. Entire storm drain systems in large areas of the county are systematically cleaned on a periodic basis. The creation of the Stormwater Utility also allows for more repair and construction projects that directly target local flooding problems. Typical sources of problems that may require cleaning or replacement of storm drains include blockage by tree roots, physical damage from other construction or landscape conditions altering over time.

Keep it Clear! Drainage problems are most frequently caused by debris not passing through drain inlets and blocking the flow of water. Keeping gutters and drain inlets clear of leaves and debris is one of the best things homeowners can do to prevent localized flooding. If your inlets are clear, but water is still not draining properly, call (916) 875-RAIN (7246). We'll send out a field crew to evaluate the problem.

Do not dump or throw anything into drainage ditches or streams. Dumping into our ditches or streams is a violation of Sacramento County Code Title 15, Chapter 15.12. Even grass clippings and branches can accumulate and restrict the flow of stormwater. Every piece of trash can contribute to flooding. If you see dumping or debris in our drainage ditches or streams, call (916) 875-RAIN (7246).

Drainage easements allow field crews to maintain public drainage systems that are on private property. Property owners who have creeks, ditches or pipes that carry storm runoff across their parcel can grant a maintenance easement to the county. Without an easement the responsibility for maintaining the ditch, pipe, or channel rests with the property owner. If you would like more information on drainage easements, call (916) 874-6851.

Sacramento Stormwater Management

The county of Sacramento has teamed with the cities of Sacramento, Citrus Heights, Elk Grove, Folsom, Galt, and Rancho Cordova to protect our creeks and rivers by keeping urban stormwater runoff clean and natural. Program goals include educating the public about urban runoff pollution, encouraging stormwater-friendly daily routines and organizing public involvement in community and clean-up events.

Rinsing toxic substances into storm drain inlets pollutes our creeks and streams because storm drains are direct paths to our waterways.

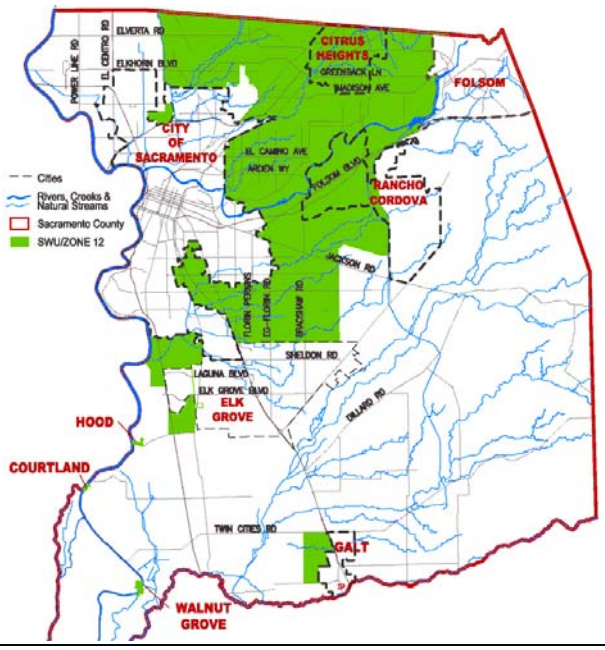
If you wouldn't drink it, **please** don't feed it to our fish and other wildlife that make the creeks and streams their homes.

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.



DEVELOPMENT TRENDS

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

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, 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:

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 Turnbill 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 expectance. 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. In ability 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

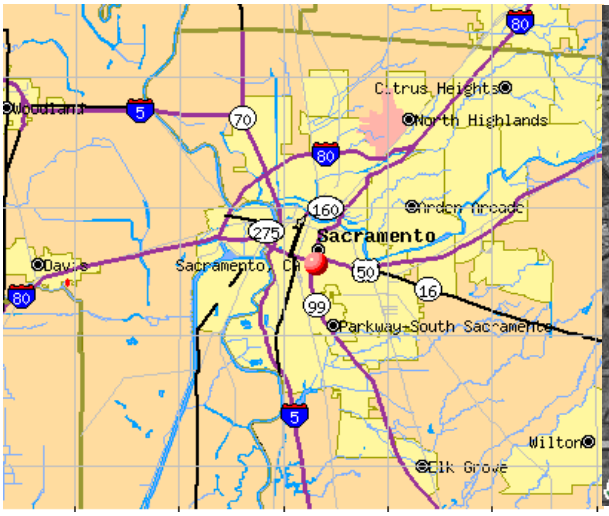
Cost-Effectiveness Explanation: Life safety, Reduced flood losses

Desired Schedule: 2005

(This page has been intentionally left blank)

Multi-Hazard Mitigation Plan

6.2 City of Sacramento Community Element



CITY OF SACRAMENTO COMMUNITY PROFILE

The City of Sacramento was founded in 1849 and was the first incorporated city in the State of California. The City was founded at the confluence of the American and Sacramento rivers, two of the largest rivers in the state. As California's capitol city, Sacramento is the center of governmental policy for the entire state, as well as the cultural, educational and business center of a four-county metropolitan region. The City is run by a City Council-City Manager form of government under guidance of a City Charter that was adopted by voters in 1920. Sacramento is known as the "City of Trees" and includes about 165,000 trees in its urban forest, second only to Paris for the most number of street trees. *Source: www.cityofsacramento.org*

The City of Sacramento covers 96.34 square miles and has a population of 411,200. This equates to a population density of 4,268 persons per square mile.

TOTAL VALUES AT RISK FROM HAZARDS

The total values at risk from all hazards are presented as a worst-case baseline. Like other values presented in this plan, these are deceptively low because they do not include the values of infrastructure, government and church facilities, or the local economy. 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.

	Total Value	Land Value
2/3/4PLEX	926,778,525	253,294,764
COMMERCIAL/INDUSTRIAL	8,599,735,443	2,132,299,447
MULTI-FAMILY	2,052,977,028	373,574,460
SINGLE FAMILY	16,538,319,908	4,425,014,244
VACANT LAND/AG	486,909,435	483,635,996
SACRAMENTO CITY	28,604,720,339	7,667,818,911

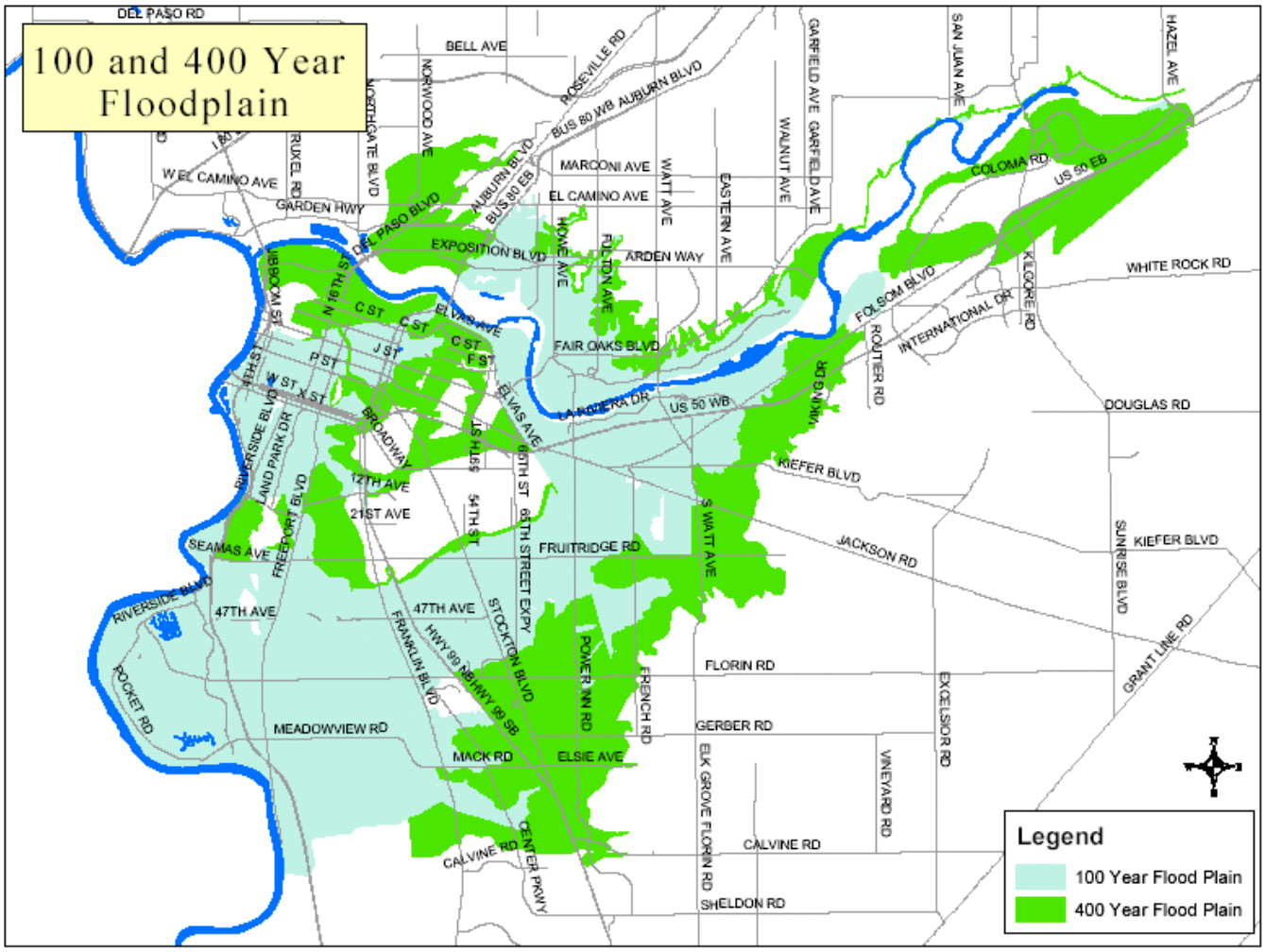
Source: *Sacramento County Assessor's Office, Assessments by Land Use; 9-10-04*

The Risk Assessment portion of this plan indicates that the City of Sacramento does not face a catastrophic natural disaster, so damage during any given disaster event would be less than the $28.6 Billion displayed. However, the risk for the City varies from the rest of the County within the mapped floodplain due its different size, and the varying numbers of structures and varying values of those structures. Therefore, the following section takes a closer look at the City of Sacramento's vulnerability to flooding.

FLOOD PROBLEM IDENTIFICATION

In the City of Sacramento, the overlapping American and Sacramento River floodplains encompass a landmass of more than 100,000 acres. According to SAFCA, Sacramento's risk of flooding is the greatest of any major city in the country. A major flood could result in significant loss of life, property damage, and economic disruption. 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 flood hazards and risks within the City of Sacramento.

SACRAMENTO FLOOD HAZARD MAP-AMERICAN/SACRAMENTO FLOODPLAIN



Four types of floods can impact the City of Sacramento: 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.

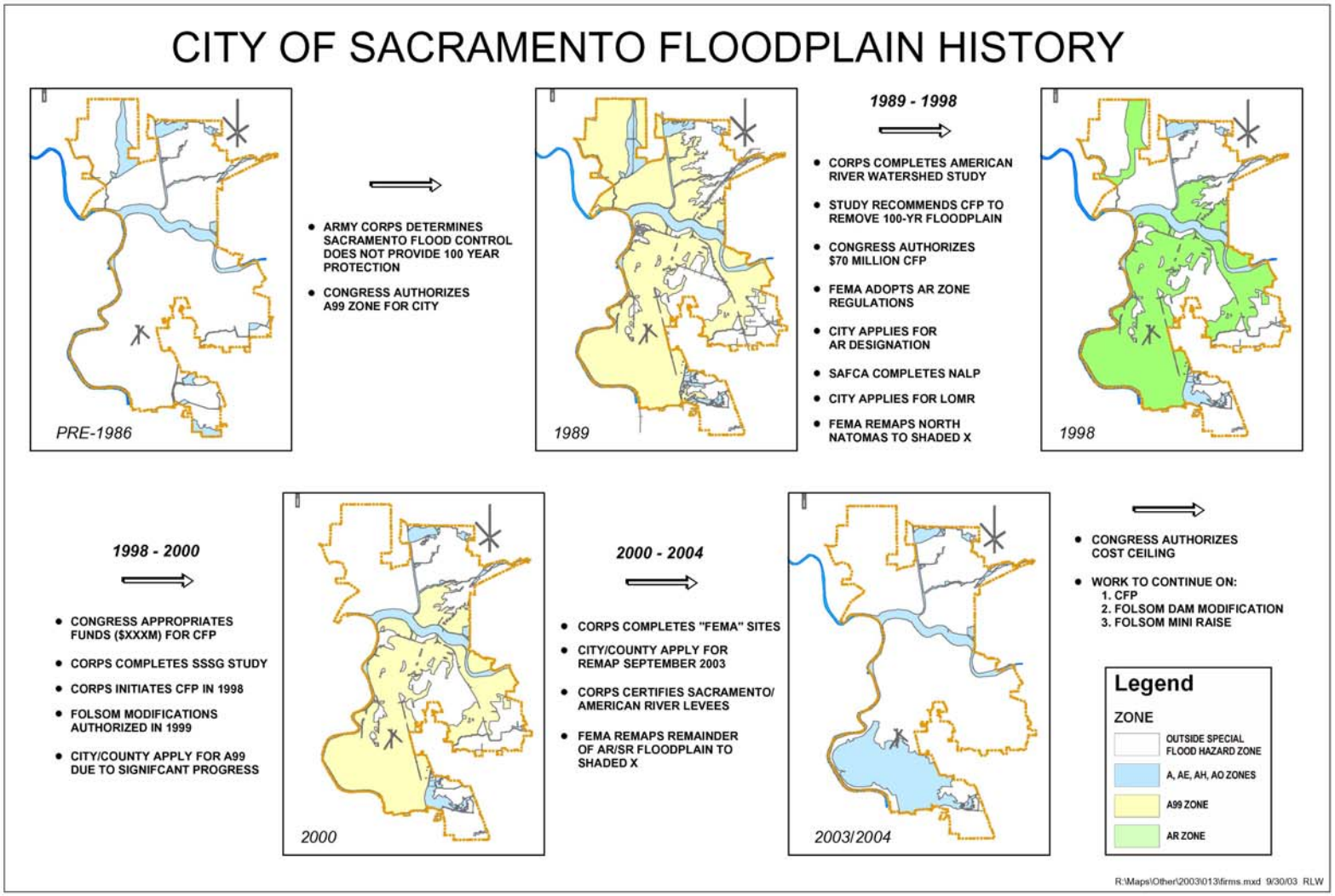
Localized Street Flooding. The City's local drainage system services 100 square miles and is handled by 123 storm drainage basins. Since the City is typically lower than the elevated rivers, the majority of local drainage must be collected and pumped into the rivers. The City operates 102 storm water-pumping plants to keep the drainage pumped down. A major power outage during a rain event could contribute to significant flooding.

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.

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. The maximum flood pool could exceed 15 feet in depth, which could result in serious life and safety impacts. Levee failure scenario maps have been developed as part of the 1996 City of Sacramento Comprehensive Flood Management Plan. The 21 maps show where the water would go, how long it would take to get there, and how deep it would be in various parts of the City.

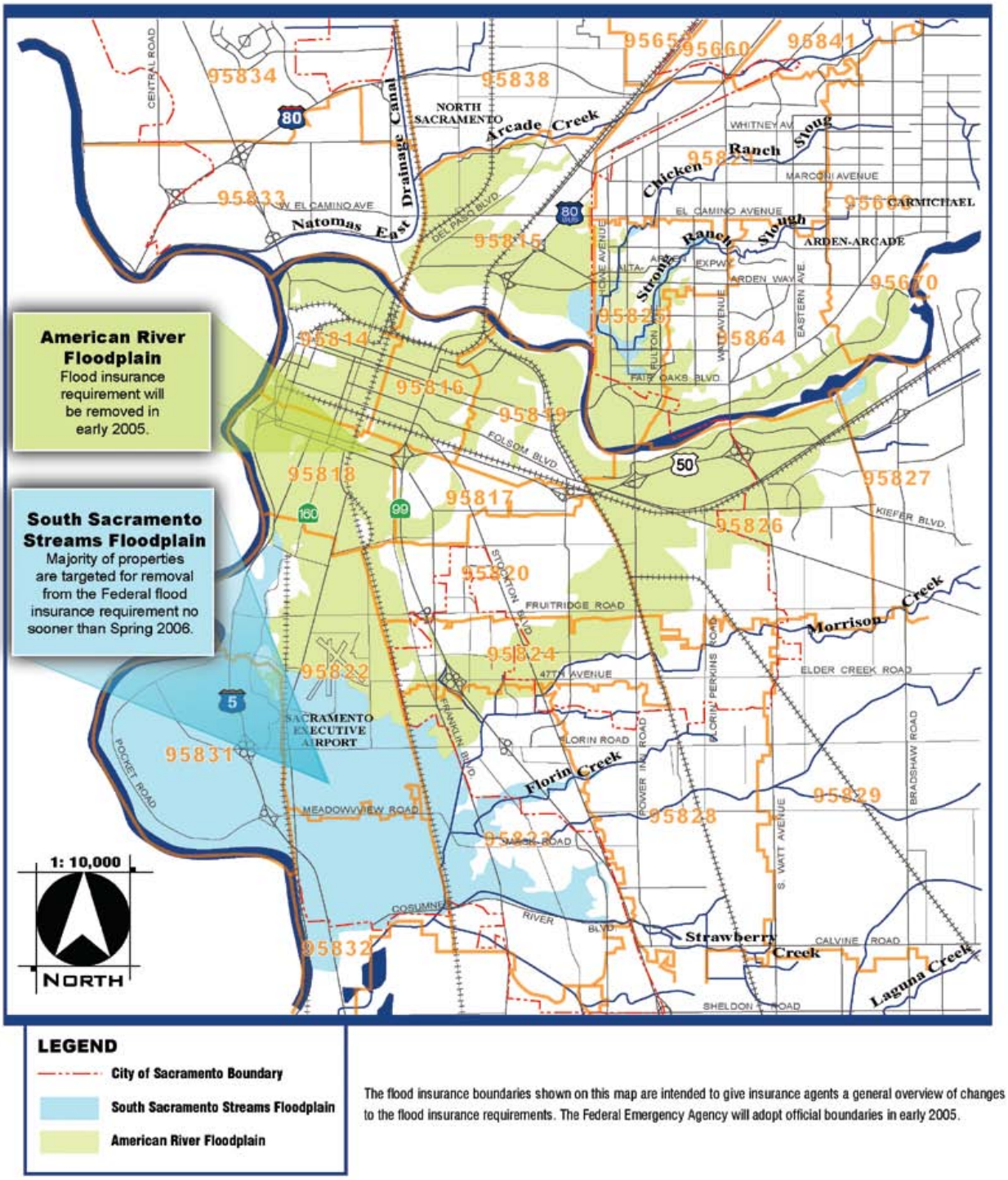
Historically, levees have been the answer to flood control as the City grew and developed over the years. The cores of today's levees are often the levees built by farmers and settlers as much as 150 years ago. Early levees were not constructed to current engineering standards, and little care was given to the suitability of foundation soils. It was believed prior to 1986 that the levees containing the Sacramento River and the American River were of sufficient height and stability to protect the county from 100-year or greater storms. The storms that occurred in February 1986 demonstrated that the levees were not sufficient. The USACE also concluded that the levees along the Natomas East Main Drainage Canal which protect Natomas and the Dry Creek area to the east, were too low to safely contain the flows produced by the coincidence of peak discharges in Dry and Arcade Creeks and maximum flood releases from Folsom. As a result of these findings, FEMA reassessed the 100-year floodplain in the Sacramento area and issued new Flood Insurance Rate Maps. These maps, which became effective in November 1989, mandated the purchase of flood insurance by all residents and businesses within the 100-year floodplain and caused the City of Sacramento to impose severe restrictions on new residential development in the Natomas area. *Source: City of Sacramento Comprehensive Flood Management Plan (CFM), 1996*.

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 were completed in 2004 that will change the A99 zone to X zone. The City submitted a Letter of Map Revision to FEMA in October 2004 requesting the change in flood zone and was awaiting response during the final draft of this plan. The change of the City's floodplain zones over time is displayed in the series of maps below, followed by a larger version of the recent proposed changes.


CITY OF SACRAMENTO FLOODPLAIN HISTORY
PRE-1986
ARMY CORPS DETERMINES SACRAMENTO FLOOD CONTROL DOES NOT PROVIDE 100 YEAR PROTECTION
CONGRESS AUTHORIZES A99 ZONE FOR CITY
1989
1989 - 1998
CORPS COMPLETES AMERICAN RIVER WATERSHED STUDY
STUDY RECOMMENDS CFP TO REMOVE 100-YR FLOODPLAIN
CONGRESS AUTHORIZES $70 MILLION CFP
FEMA ADOPTS AR ZONE REGULATIONS
CITY APPLIES FOR AR DESIGNATION
SAFCA COMPLETES NALP
CITY APPLIES FOR LOMR
FEMA REMAPS NORTH NATOMAS TO SHADED X
1998
1998 - 2000
CONGRESS APPROPRIATES FUNDS ($XXXM) FOR CFP
CORPS COMPLETES SSSG STUDY
CORPS INITIATES CFP IN 1998
FOLSOM MODIFICATIONS AUTHORIZED IN 1999
CITY/COUNTY APPLY FOR A99 DUE TO SIGNIFCANT PROGRESS
2000
2000 - 2004
CORPS COMPLETES "FEMA" SITES
CITY/COUNTY APPLY FOR REMAP SEPTEMBER 2003
CORPS CERTIFIES SACRAMENTO/ AMERICAN RIVER LEVEES
FEMA REMAPS REMAINDER OF AR/SR FLOODPLAIN TO SHADED X
2003/2004
CONGRESS AUTHORIZES COST CEILING
WORK TO CONTINUE ON:
1. CFP
2. FOLSOM DAM MODIFICATION
3. FOLSOM MINI RAISE
Legend
ZONE
OUTSIDE SPECIAL FLOOD HAZARD ZONE
A, AE, AH, AO ZONES
A99 ZONE
AR ZONE
R:\Maps\Other\2003\013\firms.mxd 9/30/03 RLW

Revised Flood Insurance Requirement Boundaries for the City and County of Sacramento

(effective early 2005)



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.

City of Sacramento Drainage Areas

This section documents the stream groups and drainage areas that pose flood problems to the City of Sacramento. The drainage patterns affecting the City of Sacramento can be divided into the following groups and geographic areas:

- Natomas Area Stream Group (Northwest Sacramento)
- American River Stream Group (Downtown and Northeast Sacramento)
- Morrison Creek Stream Group (South Sacramento)
- Sacramento River (Western edge of Sacramento)

Slopes of the main drainage ways in these areas increase from west to east, thereby reflecting the general topographic pattern of the surrounding region. Stream gradients vary from 0.5 foot per mile to 10 feet per mile and average approximately two feet per mile.

Natomas Area Stream Group. 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. This stream group is situated in the northwestern portion of Sacramento, in the area between the Sacramento River and the Natomas East Main Drainage Canal. This reclaimed floodplain, protected from external flooding by a levee system, has an internal drainage system that depends on pumping into the Sacramento River.

American River Stream Group. This stream group is composed of the American River and its tributaries: the Chicken Ranch and Strong Ranch Sloughs; and the Natomas East Main Drainage Canal and its tributaries: Arcade, Lower Magpie, Robla, and Dry Creeks. Two tributaries of Robla Creek, Magpie Diversion, and Magpie Creek, are also a part of the group. The American River, a major tributary to the Sacramento River, flows westerly through Sacramento. Arcade Creek, Dry Creek, and the Natomas East Main Drainage Canal drain the northeastern sector of the city.

In the City of Sacramento, the American River is confined by major levees, and the floodplain between the levees is currently developed as a park compatible with flood stages. To the north, it covers about 6,000 acres, including the state fairgrounds at Cal Expo, the Campus Commons subdivision, and a portion of North Sacramento near McClellan Air Force Base. South of the American River, the floodplain covers about 45,000 acres, encompassing much of downtown

Sacramento, the State Capitol, CSUS, the City's water treatment facilities, the River Park neighborhood (adjacent to the river northeast of the downtown core), and a number of large residential areas to the south.

Although the Corps has estimated that this section of the floodplain outside Natomas and Dry Creek contains over 300,000 residents and $30 billion worth of damageable property, grade elevations for most of this area are significantly lower than water surface elevations in the river channels during major floods. Thus, the potential exists for extensive deep flooding in the event the levees are overtopped, or if they otherwise fail due to prolonged high flows. As a result, the Corps estimates that a levee failure along the American River could cause as much a $9 billion worth of damage in Sacramento. *Source: City of Sacramento Comprehensive Flood Management Plan (CFM), 1996*.

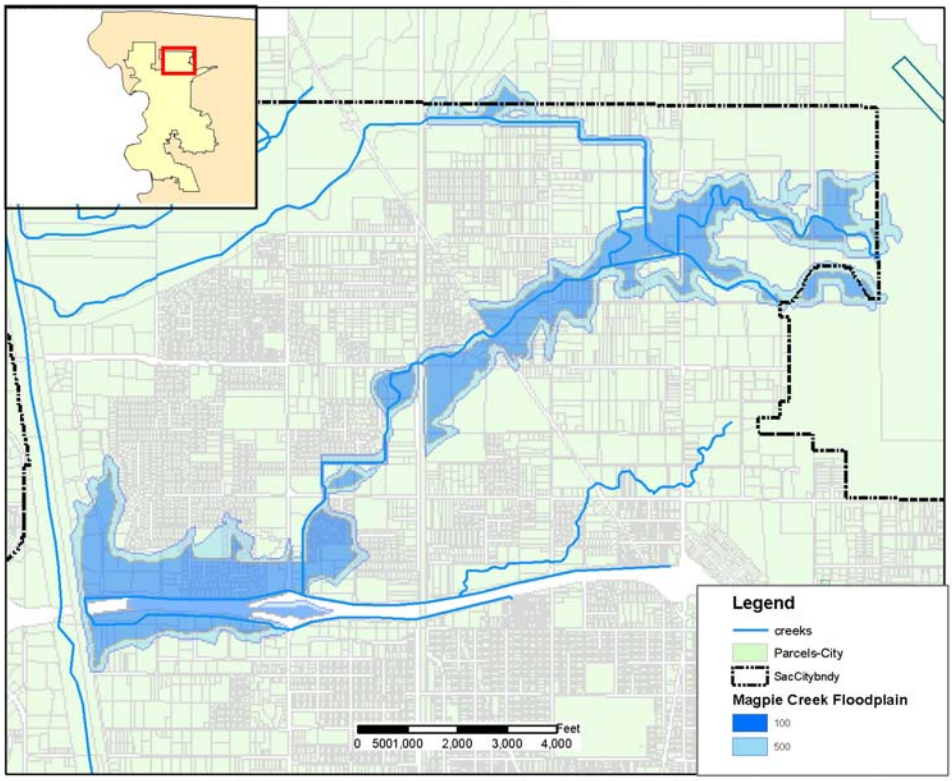
Magpie Creek. Located near the northeast City limits, Magpie Creek and its diversion channel is a source of flood problems for residential properties within the City and unincorporated Rio Linda. Around 1955, the USACE constructed a new channel for Magpie Creek from Raley Boulevard to Rio Linda Creek called the Magpie Creek Diversion Channel (MCDC). The channel is located within the City limits, but diversions into the Rio Linda has increased flood problems in the Rio Linda unincorporated area of Sacramento County. When the MCDC was constructed around 1955, the Railroad Bridge just down stream of the confluence of the MCDC and Robla Creek was not enlarged. When more than twice the storm water was trying to flow through the Robla Creek Bridge, it could not. This caused major increases in up stream flooding and more than the south half of the Rio Linda Airport was under water during a major storm. The south end of the Rio Linda Airport runway was then raised from about 36 feet mean sea level (msl) to about 42 feet msl to get the runway above the increased flood levels caused by the USACE construction of the MCDC.

Morrison Creek Stream Group. This stream group encompasses the following streams, Morrison Creek, Elder Creek, Florin Creek, Gerber Creek, Unionhouse Creek, Strawberry Creek, Laguna Creek, Whitehouse Creek, Elk Grove Creek, Laguna Creek Tributary No. 1, and North Laguna Creek. The terrain in the Morrison Creek Basin, which slopes gently from northeast to southwest, is relatively flat with a drop in elevation of only about 300 feet over a length of approximately 20 miles. All stream flow in the basin drains to the San Joaquin River via Beach and Stone Lakes, Snodgrass Slough, and the Mokelumne River. Originally, runoff from the Morrison Creek Stream Group Basin drained into the Sacramento River. However, when levees were constructed along the Sacramento River, the flows were diverted into Beach Lake.

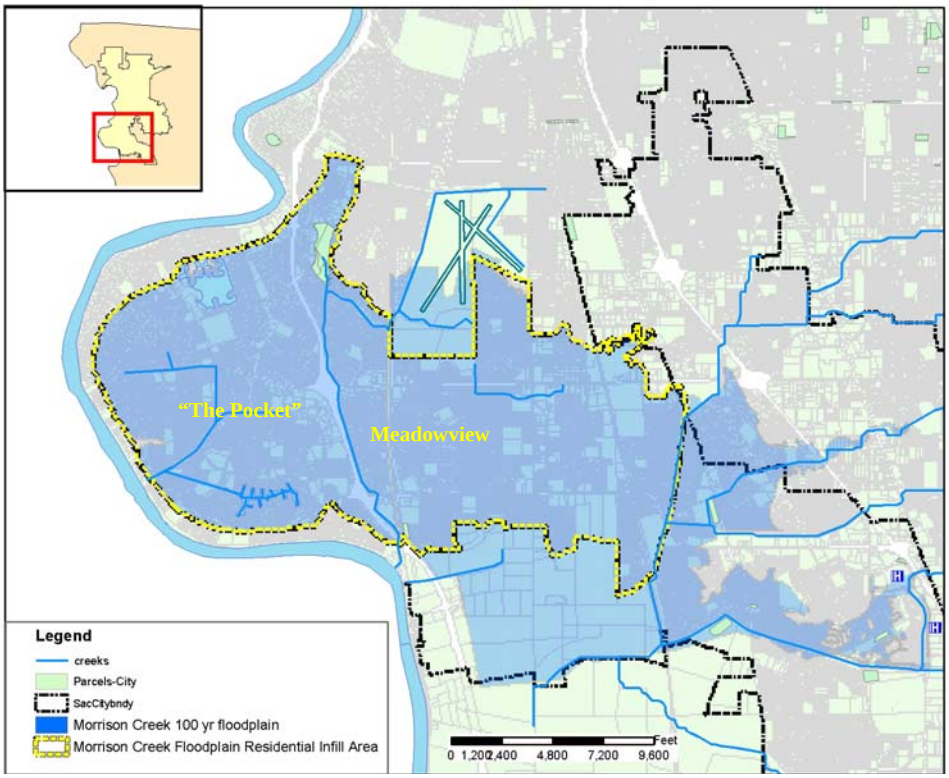
Sacramento River. The City of Sacramento lies along the southern reach of the Sacramento River. Within the City of Sacramento, this river is confined by a system of levees and floodwalls along the east bank of the river.

Mapped Floodplains. Within the City of Sacramento there are three mapped floodplains. The various zones of the aggregate American/Sacramento River floodplain FIRM cover 63,959 acres and the entire incorporated area of the City. The Magpie Creek Floodplain is a 363-acre subset of the American/Sacramento River floodplain located in the northeastern corner of the city limits. The Morrison Creek floodplain covers 9,976 acres in an area of southwestern Sacramento.

Magpie Creek 100 and 500 year Floodplain



Morrison Creek 100 year Floodplain



County-City stream group crosswalk. Sacramento is affected by large drainage basins with catchment areas located outside the city limits. The majority of the stream groups discussed in the County section of this plan drain into or through the City of Sacramento, with the exception of the Southern Portion (Cosumnes River). For the purpose of multi-objective, multi-jurisdictional floodplain management the table below correlates the County stream group definitions with the City's stream groups and mapped floodplains.

COUNTY/CITY STREAM GROUP CROSSWALK

Upstream County Stream Group	Downstream City Stream Group	Associated City Floodplain Map
Sacramento River	Natomas and Sacramento River	Aggregate FIRM
Dry Creek/Natomas East Main Drainage Canal	American River	Aggregate FIRM
Natural Streams	American River	Aggregate FIRM, Magpie Creek
Morrison Creek	Morrison Creek (AKA South Sacramento Streams Group)	Morrison Creek 100 year, Aggregate FIRM

FLOODPLAIN INVENTORY

Structure Types and Values Exposed to Flood Hazards

The following methodology was used to model the exposure of values at risk to floods in the City of Sacramento. 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 city, 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

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

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 city 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 has several different flood zones including some that attempt to account for the existence of levees, such as the A99 and X-Shaded zones. These zones and descriptions are listed in below. Exposure was aggregated by these zones to refine the analysis.

FEMA FLOOD ZONES WITHIN THE CITY OF SACRAMENTO

ZONE	DESCRIPTION
A	No base flood elevations determined.
AE	Base flood elevations determined.
AH	Flood depths of 1 to 3 feet. (usually areas of ponding); base flood elevations determined.
AO	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.
A99	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.
A99/AE	This area subject to flooding from two sources.
X-Shaded	Areas of 500-year flood; areas of 100-year flood with average depths of less than one foot or with drainage areas less than 1 square mile; and areas protected by levees from the 100-year flood.
X	Areas determined to be outside 500-year floodplain.

The aggregate FIRM map is called the American/Sacramento Floodplain map and represents overlapping American and Sacramento, as well as tributary stream, floodplains. Subset digital flood maps developed by the City were available for the Morrison Creek and Magpie Creek floodplain. Because this data was available the assets in those floodplains were analyzed as well.

The analysis performed for this planning process makes no further attempt to divide exposure into stream groups, but this is recommended for future re visions of this plan.

Tables that summarized the number, structure and content values for each occupancy class (Residential, Commercial, Industrial, Public) categories were developed and linked to the Census Blocks layer in the GIS. 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 in the case where a Census Block was split by the floodplain and 50 percent 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, this method is reasonably 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. 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. Data from this analysis are summarized in the tables that follow in the Estimating Potential Losses section and display a total structure value by occupancy type for each floodplain.

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. Only the Morrison Creek Floodplain had this information available. Within this area the average 100-year flood depth is estimated to be about five feet based on the subtracting the average ground elevation from the average BFE for the area. According to FEMA FIA Depth-Damage Data damage to a 1 story structure with no basement will be at least 30 percent to the structure and 33 percent to the contents. Assuming a value of 30 percent damage for both structure and contents a table below summarizes potential losses from a 100-year flood on Morrison Creek --- without the additional impacts of damage to infrastructure and economic disruption.

Without BFE's for the aggregate American/Sacramento River and Magpie Creek floodplains an assumption of a two-foot flood depth was used. 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 are depicted for the three mapped floodplains in the following table.

FLOODPLAIN AREA AND POPULATION TABLE

Flood Plain	Residential Count	Population	Area Sq Mi	Area Acres
Aggregate				
A	277	789	3.44	2,199.57
AE	3,521	13,866	7.71	4,932.33
AH	777	3,157	0.45	286.03
AO	731	3,128	0.42	270.72
A99	63,818	212,485	41.50	26,558.56
A99/AE	1	3	0.20	125.36
Indeterminate*	579	1,855	1.53	982.12
TOTALS	69,704	**235,283**	55.25	35,354.69
Morrison Creek 100 year	25,301	**89,456**	15.58	9,976.30
Magpie Creek 100 year	314	**1,336**	0.57	362.79

Data Source HAZUS-MH Census Block level, Floodplains - City of Sacramento
** Indeterminate includes Census Block sliver polygons that do not match city boundaries*

MORRISON CREEK FLOODPLAIN VALUES AND DAMAGE ESTIMATION

Structure Type	Number of Structures	Structure and Contents Total Value	30% of Total Value
Residential	25,301	$6,211,662,000	$1,863,499,000
Commercial	69	$289,099,000	$86,730,000
Industrial	1	$16,188,000	$4,856,000
Public	4	$41,044,000	$12,313,000
ALL TYPES	**25,375**	**$6,557,993,000**	**$1,967,398,000**

MAGPIE CREEK FLOODPLAIN VALUES AND DAMAGE ESTIMATION

Structure Type	Number of Structures	Structure and Contents Total Value	20% of Total Value
Residential	314	$86,031,000	$17,206,200
Commercial	6	$27,801,000	$5,560,200
Industrial	7	$40,011,000	$8,002,200
Public	1	$41,044,000	$8,208,800
ALL TYPES	**328**	**$194,887,000**	**$38,977,400**

AGGREGATE FLOODPLAIN VALUES AND DAMAGE ESTIMATION

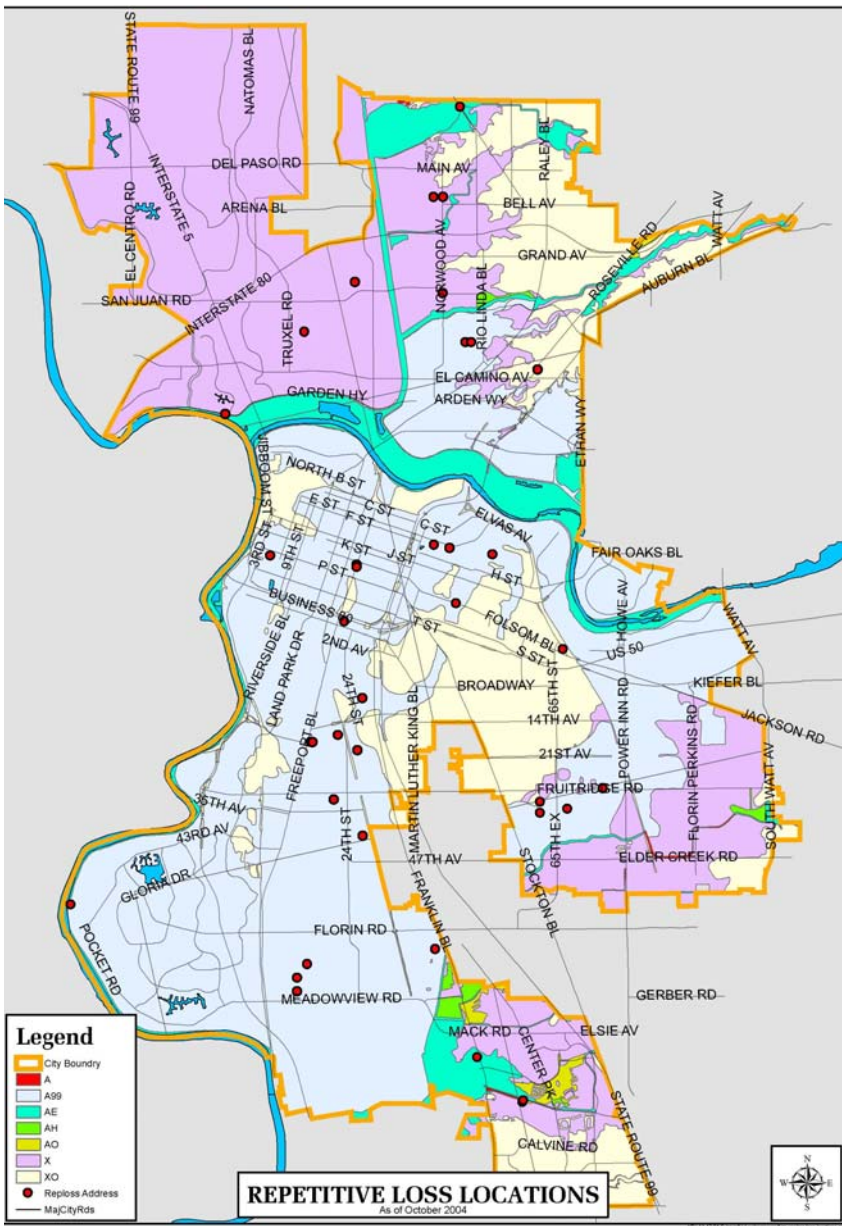
Structure Type by Flood Zone	Number of Structures	Structure and Contents Total Value	20% of Total Value
Residential by Zone			
A (various)	5,306	$1,302,530,000	$260,506,000
A99	63,819	$17,350,285,000	$3,470,057,000
Residential Total	**69,125**	**$18,652,815,000**	**$3,730,563,000**
Commercial by Zone			
A (various)	29	$111,084,000	$22,216,800
A99	927	$3,566,331,000	$713,266,200
Commercial Total	**956**	**$3,677,415,000**	**$735,483,000**
Industrial by Zone			
A (various)	6	$59,368,000	$11,873,600
A99	55	$410,974,000	$82,194,800
Industrial Total	**61**	**$470,342,000**	**$94,068,400**
Public by Zone			
A (various)	2	$16,072,000	$3,214,400
A99	198	$688,202,000	$137,640,400
Public Total	**200**	**$704,274,000**	**$140,854,800**
Total of Each Total	**70,342**	**$23,504,846,000**	**$4,700,969,200**

NFIP Policies

NFIP Insurance data indicates that as of February 29, 2004 there are 50,467 flood insurance policies in the City of Sacramento, representing roughly $8.5 billion in coverage. Thus, 71.75 percent of the buildings in the floodplain are insured for 36.17 percent of the value of the structures and their contents. There have been 1,591 claims and a total of $8,108,531 paid since the inception of the program, an average of $5,097 per claim. *Source: FEMA Region IX* When the American River levees are re-certified and the City A-99 zone remapped, the number of policies in force could drop by as many as 40,000 --- though the City, the County and SAFCA will continue to promote the purchase of flood insurance in all floodprone areas, including those where the mandatory purchase requirement expires.

Repetitive Losses

The City of Sacramento Utilities Department maintains a GIS database and map of repetitive loss locations. Within city limits there are 40 repetitive loss properties. These properties are randomly scattered across the city such that the problem areas are not easily defined. During September 2004 the City revisited repetitive loss properties in an attempt to better define the problem areas. GIS was used to overlay repetitive loss locations on highly detailed topography derived from a LIDAR survey flown in March 2004. The city was not able to delineate any topographic depressions that using this method, nor did site visits reveal extraordinary drainage problems. The City did produce 24 separate Repetitive Loss maps, available from the Utilities Department, and intends to further study appropriate mitigation measures to reduce repetitive losses, possibly with FEMA grant funding (see recommendations).



The numbers of properties are listed by floodplain and flood zone below.

Aggregate American/Sacramento River Floodplain

Repetitive loss properties by flood zone:

AE	1
AO	2
A99*	26
X-Shaded	8
X**	3

***** *When levees become recertified this Zone will become X-Shaded, which indicates 100-year floodplain protected by a levee*

****** *X = outside of 500 yr floodplain*

Morrison Creek Floodplain

Repetitive loss properties: **7** (included in American/Sacramento River floodplain count)

Magpie Creek Floodplain

Repetitive loss properties: **0**

By Stream Group

Natomas Area Stream Group:	3
American River Stream Group:	29
Morrison Creek Stream Group:	7
Sacramento River:	1

Critical Facility 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, city buildings, 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 County GIS provided sewage pump station locations. The Sacramento Municipal Utilities District provided a list of power substations but not in a GIS compatible format; therefore we could not determine substations at risk. Facilities at risk were analyzed by intersecting the combination of existing GIS data sources with city-supplied floodplain data.

The following is a summary list of critical facilities at risk to flooding by flood zone for the Aggregate American/Sacramento River floodplain. 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 City staff through their GIS capabilities for further details and analysis.

CITY OF SACRAMENTO CRITICAL FACILITY SUMMARY BY AGGREGATE FLOOD ZONE

Facility Type	A99	AE	AO	A	X (X-SHADED)	Total
Fire Department	18				3	21
Police Department	9				4	13
City Utilities	5	2			2	9
City Office Facility	6					6
Hospitals	6					6
Schools	52	2	1	4	40	99
Sewer Sumps	32	3			4	39
Sewer Pump Stations*	12	7				19
Waste Water Facility **	2					2
Water Treatment Facility	2					2

**County data source **HAZUS data source City source for all others*

Previous efforts to identify, inventory, and protect Critical Facilities. Critical facilities have been identified in both the 1996 Comprehensive Flood Management Plan (CFMP) and the City of Sacramento Multi-Hazard Emergency Plan (revised 1993). The CFMP identified six categories of critical public facilities that should be considered for floodproofing:

- Drainage pump stations
- Sewage pump stations
- Unit substations
- Water treatment plants
- Wastewater treatment plants
- Reservoirs/booster pump stations

The analysis of these facilities revealed that due to their placement within respective systems the facilities cannot be relocated. The City has implemented auxiliary power generators for some of these facilities that are discussed below. The CFMP identified six SMUD bulk substations located in the floodplain. Floodproofing is not practical for some utilities such as the SMUD substations. As most of these substations are protected by levees it would be redundant and not cost effective to floodproof them again. If a levee breach occurred SMUD's perspective is that a flooded area can be without power until floodwaters begin to recede. SMUD has a system where power service will be rerouted through other substations in the event of losing a bulk substation. The City Department of Utilities Multi-Hazard Emergency Management Plan outlines procedures to establish a staff liaison with SMUD during a flood emergency to coordinate power re-routing. The City has inventories of auxiliary generators as part of the City's emergency planning efforts.

Levees. Levees protect the majority of critical facilities from flooding in the City of Sacramento, as well as most of the population and infrastructure. In this context, levees may be considered not only a flood protection measure, but also one of the most critical facilities that exist in the City. Levee inadequacies identified after the 1986 flood helped the city join forces with Sacramento and Sutter Counties, the American River Flood Control District, and Reclamation District 1000 to form the Sacramento Area Flood Control Agency (SAFCA). Its mandate was to collaborate with state and federal authorities in identifying and constructing levee improvements and additional facilities to provide Sacramento with a 200-year (or greater) level of flood protection. Many of these improvements are included in the Sacramento Urban Area Levee Reconstruction Project (SUALRP) and are anticipated to be completed in the fall of 2004.

Other. The City Department of Utilities has taken certain floodproofing actions to water, sewer and wastewater facilities that will minimize downtime in the event that a levee failure or overtopping leads to a flood. Water pumping stations and sumps, along with water and sewer treatment plants, tend to lose primary power to main facilities and distribution systems during floods. The City has installed backup diesel generators on drainage pumping stations in the event that flooding creates a power outage. These generators are exercised on a routine basis by the City Utilities Department. Four of the Department of Utilities Plant Services Division facilities have auxiliary power sources as identified in the Department's Business Recovery Plan (2002)

HISTORIC PRESERVATION

There are 23 areas within the City of Sacramento that are considered historic preservation areas in the City's GIS. All of these areas are located in downtown Sacramento within the American River Stream Group. The table below lists the area name and the size of the area by flood zone. All of these areas lie within the levee-protected A99 zone will effectively be removed from the 100-year floodplain with levee re-certification expected in 2005.

HISTORIC PRESERVATION AREAS BY FLOOD ZONE

Preservation Area Name	Acres	Flood ZONE
1200-1300 Q Street	4.9	A99
12th Street Commercial	4.7	A99
20th and N Street	4.6	A99
Boulevard Park	89.7	A99
C Street Commercial	2.3	A99
C Street Industrial	11.8	A99
Capitol	50.4	A99
Capitol Avenue	28.7	A99
Cathedral Square	6.9	A99/X
Fremont Park	5.9	A99
Marshall Park	7.5	A99
Memorial Auditorium	8.8	A99
Merchant Street	2.9	X
North Alkali flat	4.0	A99
Old Sacramento	35.3	X
Plaza Park	19.2	X
Poverty Ridge	28.0	A99/X
R Street	6.2	A99
Sacramento City College	45.8	A99
South Side	114.8	A99
Sutter's Fort	112.9	A99
Washington	47.3	A99
Washington School	28.0	A99

670.6 acres total (1.04% of total floodplain area within the city)

Source: Sacramento City GIS

The following buildings are listed on State and Federal Historic Preservation Registers. No determinations have been done as to what flood zone they may lie within, if any.

Alhambra Theatre
1101 Alhambra Boulevard, Sacramento
The theatre has been removed, but a plaque remains

Blue Anchor Building
aka **California Fruit Exchange**
1400 10th Street, Sacramento

Brighton School
aka **Edward Kelly School**
3312 Bradshaw Road, Sacramento

California Governor's Mansion
16th and H Streets, Sacramento

California State Capitol
aka **California's State Capitol**
Between 10th and 16th and L and N Streets, Sacramento

Calpak Plant No. 11
aka **Del Monte Corporation, Plant No. 11**
1721 C Street, Sacramento

Coolot Company Building
aka **Comstock Building**
812 J Street, Sacramento

Cranston--Geary House
2101 G Street, Sacramento

Crocker, E. B., Art
216 O Street, Sacramento

Dunlap's Dining Room
aka **Dunlap House**
4322 Fourth Ave., Sacramento

Eastern Star Hall
2719 K Street, Sacramento

Fire Station No. 6
3414 4th Ave., Sacramento

Firehouse No. 3
aka **Engine Co. #3 Firehouse**
1215 19th Street, Sacramento

Galarneaux, Mary Haley, House
922-924 T. Street, Sacramento

Goethe House
aka **Goethe, C. M., House**
3731 T Street, Sacramento

Greene, John T., House
aka **Maria Nicholas Residence**
3200 H Street, Sacramento

Heilbron House
704 O Street, Sacramento

Hotel Regis
1024-1030 K St, Sacramento

Hotel Senator
1121 L Street, Sacramento

Howe, Edward P., Jr., House
aka **Connerly & Associates, Inc.**
2215 21st Street, Sacramento

Hubbard-Upson House
1010 F Street, Sacramento

I Street Bridge
CA 16, Sacramento

J Street Wreck
At the foot of J Street, in the Sacramento River, Sacramento

Johnson, J. Neely, House
1029 F Street, Sacramento

Judah, Theodore, School
aka **Lubin, David, Annex**
3919 McKinley Boulevard, Sacramento

Kuchler Row
aka **Wheeler Row**
608--614 10th Street, Sacramento

Lais, Charles, House
aka **Berglund House**
1301 H Street, Sacramento

Libby McNeil and Libby Fruit and Vegetable Cannery
1724 Stockton Boulevard, Sacramento

McClatchy, C.K., Senior High School
3066 Freeport Boulevard, Sacramento

Meister, A. G., and Sons Carriage Factory
910--914 Ninth Street, Sacramento

Merchants National Bank of Sacramento
aka **Merchants National Bank**
1015 7th Street, Sacramento

Merrium Apartments
1017 14th Street, Sacramento

Mesick House
aka **Pendergast House**
517 8th Street, Sacramento

Old Tavern
aka **Sacramento Brewery**
2801 Capitol Ave., Sacramento

Pony Express Terminal
aka **B.F. Hastings Building**
1006 2nd Street, Sacramento

Ruhstaller Building
900 J Street, Sacramento

Sacramento Bank Building
3418 Broadway, Sacramento

Sacramento City Library
aka **Central Library**
828 I Street, Sacramento

Sacramento Junior College Annex and Extensions
aka **Sacramento City College Historic District**
3835 Freeport Boulevard, Sacramento

Sacramento Masonic Temple
1131 J Street, Sacramento

Sacramento Memorial Auditorium
16th and J Streets, Sacramento

Sacramento Hall of Justice
813 6th Street, Sacramento

Southern Pacific Railroad Company's Sacramento Depot
5th and I Streets, Sacramento

Stanford-Lathrop House
aka **Leland Stanford House**
800 N Street, Sacramento

Sutter's Fort
aka **Sutter's Fort State Historic Monument**
2701 L Street, Sacramento

Tower Bridge
aka **Tower Bridge; M Street Bridge; Capitol Avenue Bridge**
CA 275 across Sacramento River, Sacramento

Travelers' Hotel
428 J Street, Sacramento

U.S. Post Office, Courthouse and Federal Building
aka **Federal Building**
801 I Street, Sacramento

Van Voorhies House
925 G Street, Sacramento

Wagner, Anton, Duplex
aka **Property at 701 E Street**
701 E Street, Sacramento

Westminster Presbyterian Church
1300 N Street, Sacramento

Wetzlar, Julius, House
1021 H Street, Sacramento

Winters House
2324 and 2326 H Street, Sacramento

Alkali Flat Central Historic District
Roughly E and F Streets between 9th and 12th Streets, Sacramento

Alkali Flat West Historic District
E, F, and 8th Streets, Sacramento

Capitol Extension District
aka **Library and Courts Building; Office Building No. 1; Fountain Plaza**
Capitol Mall, Sacramento

Old Sacramento Historic District
Junctions of U.S. 40, 50, 99, and CA 16 and 24, Sacramento

Witter, Edwin, Ranch 3480 Witter Way, Sacramento

NATURAL RESOURCES IDENTIFIED IN SACRAMENTO

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 twenty-four ecologically sensitive plant or animal communities within the city limits of Sacramento.

CITY OF SACRAMENTO

Bank swallow
Burrowing owl
California linderiella
Cooper's hawk
Elderberry Savanna
Giant garter snake
Great blue heron
Great egret
Legenere
Northern California black walnut
Northern Claypan Vernal Pool
Northern Hardpan Vernal Pool
Purple martin
Rose-mallow
Sacramento perch
Sacramento splittail
Sanford's arrowhead
Swainson's hawk
Tri-colored blackbird
Valley elderberry longhorn beetle
Vernal pool fairy shrimp
Vernal pool tadpole shrimp
Western pond turtle
White-tailed kite

Natural and Beneficial Functions

The areas in the following table are within the City of Sacramento floodplain which are in an undeveloped state, have been restored to a natural state, or protect natural and beneficial floodplain functions. The areas area protected in its natural sate by the City Council adoption of various Park Master Plans, Community Plans, and City General Plan. The western end of the 23 mile-long American River Parkway lies along the American River within the City Limits to confluence of the Sacramento and American Rivers. 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. This Parkway is a multi-jurisdictional resource. The tables below list the named natural and beneficial areas and other park types.

NAMED NATURAL AND BENEFICIAL AREAS

Area	Acreage
American River Parkway	585
Del Paso Park	20
Bannon Creek Parkway	21
Chorley Park	20
Laguna Creek	73
Magpie Creek	16
Marconi Station Park	4
Reichmuth Park	33
TOTAL	772

Source: City of Sacramento Department of Planning and Development 1995 Memo

AGGREGATE FLOODPLAIN PARKS (ALL TYPES) SUMMARY

Park Type	Acreage
Existing	1,220.5
Existing Undeveloped	499.0
Partially Developed	662.6
Proposed	339.62
Golf Course	700.1
Inactive	6.1
Non- City Park	1,495.0
Open Space	145.1
Parkway	770.4
School Park	971.8

6,810.4 Acres total, 10.6% of total floodplain area

Summary of Impacts on the City of Sacramento

See statement of general impact in vulnerability section of this plan.

CAPABILITY ASSESSMENT

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 the City of Sacramento. This is the next step prior to forming Goals and Objectives for improving the City'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 City. 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 the City of Sacramento has made efforts above and beyond the standard floodplain management requirements of the NFIP.

EXPLANATION OF CAPABILITY ASSESSMENT MATRIX

Does the Community have:

Comp Plan: A Comprehensive Long-Term Community Growth Plan?
Land Use Plan: A plan that designates type of Land Use desired/required; uses Zoning
Subdivision Ordinance: A regulation that dictates lot sizes, density, setbacks and construction type
Zoning Ordinance: An ordinance that dictates type of Use and Occupancy, Implements Land Use Plan
NFIP/FPM Ord: A Floodplain Management Ordinance: Directs development in identified Flood Hazard Areas. Required for Participation in NFIP and Availability of Flood Insurance
Sub. Damage: Does your FPM Ordinance contain language on Substantial Damage/Improvements?
Administrator: Do you have a Floodplain Management Administrator (someone with the responsibility of enforcing the ordinance and providing ancillary services (e.g., map reading, public education)
# of FP Bldgs: How many buildings are in the mapped Floodplain?
# of policies? How many buildings are insured against flood through the NFIP?
# of RL's: # of Repetitive Losses: (Paid more than $1,000, twice in 10 years)
CRS Rating: A Community Rating System rating from the NFIP, and if so, what is it?
BCEGS: A Building Code Effectiveness Grading System Rating
LEOP: A Local Emergency Operations Plan – a disaster RESPONSE plan
HM Plan: A Hazard Mitigation Plan
Warning: Any type of system, such as "Storm Ready" Certification from NWS, NOAA Weather Radio reception, outdoor sirens, Cable (TV) Override, or an Emergency Warning Notification System?
GIS: A Geographic Information System
Structural Protection Projects: (levees, drainage facilities, detention/retention basins)
Property Protection Projects: (buy-outs, elevation of structures, floodproofing, small "residential" levees or berms/floodwalls)
Critical Facility Protection: (for example, protection of power substations, sewage lift stations, water-supply sources, the EOC, police/fire stations or medical facilities that are at risk)
Natural And Cultural Inventory: Do you have an inventory of resources, maps, or special regulations within the community? (wetlands and historic structures/districts, etc.)
Erosion Or Sediment Control: Do you have any projects or regulations in place?
Public Information And/Or Environmental Education Program: Do you have an ongoing program even if its primary focus is not hazards? Examples would be "regular" flyers included in city utility billings, a website, or an environmental education program for kids in conjunction with Parks & Recreation?)

Sacramento Capability Assessment Matrix

Capability	Notes
Comp Plan/General Plan	Y
Land Use Plan	Y
Subdivision Ord	Y
Zoning Ordinance	Y
NFIP/FPM Ordinance	Y
- Map Date	Jul-98
- Substantial Damage language?	Y
- Certified Floodplain Manager?	N
- # of Floodprone Buildings?	70,342
- # of NFIP policies	50,467
- Maintain Elevation Certificates?	Y
- # of Repetitive Losses?	40
CRS Rating, if applicable	6
Stormwater Program?	Y
Building Code Version	UBC 1997
Full-time Building Official	Y
- Conduct "as-built" Inspections?	Y
BCEGS Rating	Y
Local Emergency Operations Plan	Y
Hazard Mitigation Plan	Y
Warning System in Place?	Y
- Storm Ready Certified?	N
- Weather Radio reception?	Y
- Outdoor Warning Sirens?	Y
- Emergency Notification (R-911)?	N
- Other? (e.g., cable over-ride)	Y
GIS System?	Y
- Hazard Data?	Y
- Building footprints?	Y
- Tied to Assessor data?	Y
- Land-Use designations?	Y
Structural Protection Projects	Y-Levees/Dams
Property Owner Protection Projects	Y-Acq/El.
Critical Facilities Protected?	N
Natural Resources Inventory?	Y
Cultural Resources Inventory?	Y
Erosion Control procedures?	Y
Sediment Control procedures?	Y
Public Information Program/Outlet	Y
Environmental Education Program?	N

FLOODPLAIN MANAGEMENT RELATED POLICIES

Excerpts from the City of Sacramento General Plan, 1988

- The City's Conservation and Open Space Element recognizes the importance of conservation and open space needs for public health and safety (e.g., the preservation of river levees). A related goal is to continue to work toward providing a levee system, which protects the community from related hazards with the supporting policy to support levee reconstruction with appropriate crown widths for recreational use to the extent feasible. One of the policies is to protect the modified floodplain along Laguna Creek and another is to conserve and protect planned open space areas along the American and Sacramento Rovers, floodways and un-developable floodplains. Another policy is to design new floodways to be built in North Natomas and South Sacramento to be aesthetically pleasing and offer passive recreation and wildlife sanctuaries.

- California State law requires that each local government update the housing element of its General Plan every five years. The 2002 Housing Element was adopted by City Council on June 10, 2003. It describes how South Natomas, South Sacramento and North Sacramento had the highest population growth rate from 1980 to 2000 and that dwelling unit growth correlated closely with population growth. North Natomas remains largely undeveloped and has the most amount of residentially zoned vacant land. A map showing residentially zoned vacant land greater than two acres. Areas identified as "new growth areas" include North Natomas, Airport Meadowview and South Sacramento.

- Goal 4 of the Housing Element is to mitigate governmental and nongovernmental constraints in the development and assistance of housing. Policy 4.C of this goal states that the City shall continue to require adequate flood protection when approving new development. Associated with Goal 4, Program 4.4 with states:

- "Work with SAFCA and other responsible agencies to resolve floodplain restrictions that affect major portions of the City. Actions include: 1) Complete the Sacramento River levee stabilization project. 2) Begin construction of needed improvements along the perimeter levee system protecting Natomas. 3) Implement permanent protection plan along the main stream of the American River as authorized by Congress and, 4) Modify operation of Folsom Dam and Reservoir to provide a minimum 100-year level of flood protection on an interim basis until such time as permanent protection is available."

- The Health and Safety Element includes goals and policies for seismic safety, flood hazards, hazardous materials, and code enforcement (i.e., fires. One seismic safety policy is to continue to require soils reports and geological investigations for determining liquefaction, expansive soils and subsidence problems on proposed subdivision sites. Another is to continue to implement Uniform Building Code requirements. Other polices call for initiating a comprehensive survey of all older buildings and public places and rehabilitate or remove structures deemed structurally unsafe, and to support a jointly sponsored City/County/State soils investigation in the downtown area to determine if

there is a liquefaction problem in the area. There is only one goal and one policy under the flood hazard section. The goals is to protect against flood related hazards wherever possible, and the policy is to prohibit development of areas subject to unreasonable risk of flooding unless measures can be implemented to eliminate or reduce the risk of flooding. The hazardous materials section states that the City has established a Toxic Substances Commission to develop long range plans for issues related to hazardous materials, however, no polices relate directly to minimizing safety risks during natural disasters. Polices included in the fire hazard section include efforts to continue Fire Department inspection of all public and private buildings and review all future developments for fire safety; require existing and proposed buildings have adequate fire protection measures to reduce the potential loss of lives and property; and continue the City's Weed Abatement Program to reduce risk of grass fires.

The City of Sacramento City Code (Revised 02/04). The City Code contains floodplain management regulations under three sections: Buildings and Construction, Subdivisions, and Zoning. The following excerpts are from relevant City Code.

Title 15 Buildings and Construction

- **Chapter 15.104 Floodplain Management Regulations.** This chapter contains standard regulations to ensure compliance with the NFIP but also details that new construction is required to have the lowest floor, including basement, elevated one foot above the base flood elevation.

- **Chapter 15.108 Floodplain Risk Notification.** This chapter states that no building permit shall be issued for new construction within the 100-year floodplain unless the property owners make a contractual agreement with the City, stating the City is not liable for flood-related property damage. Further this statute requires that any person sold property within the floodplain must be notified that their property is in risk of flood danger.

- **Chapter 15.124 Historic Preservation.** This chapter recognizes the importance of the City's historic resources and contains policies for maintaining and preserving them. The chapter includes provisions for minimum maintenance standards of historic structures, as well as a requirement for the building official to notify the preservation director upon designation of a historical resource as a substandard, dangerous, or immediately dangerous building, structure or resource.

Title 16 Subdivision Regulations

- **Chapter 16.40.350 Flood Plain Management** requires that subdivisions include adequate drainage implemented in project design to reduce potential for flood damage. Further, plans must show the elevation of a proposed site; if it is above the base flood, the final pad elevation must be certified by a qualified registered professional engineer. All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize flood damage.

- **Chapter 16.40.300 Lot Drainage** requires that all lots shall be graded to provide adequate, positive drainage. Provision shall be made for proper erosion control, including the prevention of sedimentation or damage to off-site property.

- **Chapter 16.24.060 Tentative Subdivision Maps** must show the location of all "potentially dangerous areas" including geological hazards and flood hazards. Final maps for subdivisions must show base flood elevation or depth of flow and floodway boundary or a separate document shall be recorded with the final map indicating floodway boundary and base flood elevation or depth of flow.

Title 17 Zoning

Division II Zoning Districts and Land Use Regulations

- **Chapter 17.48 Open Space Zones (A), (AOS), (F)** The Flood (F) zone is a designated open space zone, which prohibits construction of any building within the zone unless it either floats or is constructed in such a manner that no usable portion of the building is located below the 100-year flood line. *This F zone is mostly in the drainage canals and portions of the American and Sacramento rivers near the confluence. It applies to commercial properties such as the floating restaurants on the Sacramento riverfront.*

- **Chapter 17.52 Zoning Districts and Land Use Regulations**. The American River Park Floodplain (ARP-F) zone is adopted as an open space zone pursuant to the general plan of the city. Property within the ARP-F zone constitutes a designated floodway likely to be inundated by a flood having a one percent per annum chance of occurrence or greater. The only uses permitted within this zone are agriculture (no swine) for which no buildings or structures are constructed upon the premises.

Division V Special District

- **Chapter 17.160 The Parkway Corridor (PC) overlay zone** is a special district established to reduce impacts of development along the American River and its adjacent floodplain. This chapter recognizes environmental impacts that occur as a result of development within this special district and is intended to implement the City's General Plan and American River Parkway Plan.

- **Special Districts Chapter 17.156**. **Floodway (FW) and Floodway Fringe (FF) Overlay Zones** have been established to identify all FEMA designated 100-year floodplains within the City and to identify regulations to help reduce the risk of injury or loss of property due to flooding. This chapter describes compliance with the City's Comprehensive Flood Management Plan for development within the 100-year floodplain.

Details from section 17.156.050 Compliance with the CFMP

A. **Rescue Zones.** In addition to FEMA development standards, the following safety measures shall be required for new construction in areas defined as rescue zones in the 1996 flood management plan:

1. **Special Needs Facilities.** Special needs facilities located in rescue zones must register with the utilities department prior to occupancy of the structure. Electrical equipment and heating, ventilating, air conditioning, emergency generators, and phone banks for these facilities must be either located one foot above flood rescue elevation or constructed in a manner satisfactory to the chief building official such that water cannot enter or accumulate in the system components.

2. **Refuge and Evacuation.**

   a. New public facilities and new commercial buildings (excluding industrial occupancies) with an enclosed building area greater than forty thousand (40,000) square feet shall have an accessible roof or floor level at least one foot above the rescue flood elevation.
   b. New residential subdivisions greater than two acres shall either identify public refuge locations, have a minimum of fifty (50) percent of the residential units with the entire roof (4:12 maximum pitch) or have a floor level at least one foot above the rescue flood elevation.

B. **Rescue Zones and Evacuation Zones.** In addition to FEMA development standards, the following safety measures will be required in development within areas that are both rescue zones and evacuation zones in the 1996 flood management plan.

1. New subdivisions shall have two or more vehicular ingress and egress points designed to facilitate evacuation and other emergency services where geographically feasible. Knox boxes shall be provided in gated communities to facilitate emergency vehicle access.

2. Approved lever handle gas valves shall be used for all residential and nonresidential gas appliances as per Title 15 of this code.

3. Above ground fuel tanks shall be securely anchored to a foundation to prevent movement or floatation during a flood per Title 15 of this code.

C. **Alternative compliance methods with or variances from any portion of this section shall be subject to the review and approval of the local administrator. Appeals shall be administered per Section 15.104.070 of this code. (Ord. 99-015 § 5-3.5-E)**

Title 18 Additional Development Requirements

- **Chapter 18.52** contains a North Natomas supplemental refundable drainage fee and refundable buy-in fee. Each landowner within the North Natomas community plan area issued a building permit on or after March 1, 2003, must pay a supplemental refundable North Natomas drainage fee and buy in fee.

Other

Morrison Infill Regulations

Although the American River floodplain zone in the Morrison Creek area changed from AR to A99 in May 2000 due to flood control improvements, The City has elected to maintain the more stringent AR Zone regulations within the Morrison Creek floodplain due to the underlying flood risk from Morrison Creek. Within the Morrison Creek floodplain all new commercial properties and new subdivisions must be either elevate or floodproof three feet above the highest adjacent grade or at the BFE, whichever is lower. Single-family residential infill is exempt from these requirements. These requirements may change over time with the completion of the South Sacramento Streams Group flood control projects.

STRUCTURAL PROJECTS

Flood Control in Sacramento relies on a combination levees, parkways and open space, and Folsom Dam. The majority of the American/Sacramento River 100 year floodplain is protected by extensive levee systems. Extensive pumping systems are required to alleviate flooding in Magpie and Morrison Creeks, where the natural drainage of these tributaries to the American and Sacramento Rivers can pond behind the levees.

Levees

SAFCA, CA-DWR and the USACE are currently working on erosion control efforts that will stabilize existing levees along the Sacramento and American Rivers. The anticipated completion in early 2005 and levee re-certification will provide 100-year flood protection for approximately 40,000 property owners currently in the A99 flood zone. This will subsequently relieve them of the NFIP insurance requirement.

American River Levee near I-80 and the confluence of the Sacramento River

Folsom Dam

Modification of Outlet Gates. $150 million has been appropriated for the BOR to modify outlet gates at Folsom Dam to allow more water to be released during high flows. This project is based on the USACE recertifying the levees to 100-year protection, and will take six to eight years to complete.

Forecast Based Operations. Another option that is being studied is the use of pinpoint weather forecasting to do releases from Folsom Dam in advance of weather systems capable of producing large amounts of rain.

Dam Raising. Congress has authorized a 257 million dollar project for the BoR to raise Folsom Dam by seven feet. This would provide at least 200-year event flood protection, but it will likely not be complete until 2020.

Drainage Improvements

Drainage facilities within the City include gutters, swales, ditches, culverts, storm drain inlets, catch basins, storm drainage pipes, major canals, detention basins and pump stations. Since the majority of the City is in low lying areas with flood control levees, most of the storm runoff must be pumped from the collection system into rivers and urban creeks. Runoff from the central area of the City is collected by a combined storm and sanitary sewer system and conveyed to the Sacramento County Regional Sanitation District for treatment.

Sacramento River Projects

Sacramento lies along the southern reach of the Sacramento River and thus reaps the benefits, directly or indirectly, of every flood control project in the northern portion of the Central Valley. These include six major dams and reservoirs on the main stem and tributary streams extending from the upper Sacramento River in Shasta County to the north. Each flood control storage

project affording protection to Sacramento is a unit of a comprehensive integrated system that includes levees, channel improvements, and floodway bypasses.

The Sacramento riverwall, recommended in the 1996 CFMP, has been constructed to protect Old Sacramento Historic District from the 100-year flood. The wall separates Old Sacramento from the adjacent Sacramento River. Gaps in the wall for pedestrian and bicycle access can be sealed with timbers that are located in holders next to the gaps. Bolts secure the timbers in place when not in use for flood control purposes.

The Yolo Bypass. The Yolo Bypass conveys flood flows generated by runoff from the entire Sacramento River watershed. This project was completed in 1948 by state and federal agencies and local reclamation districts and can siphon 500,000 cfs from the Sacramento River just north of the City. Floodwaters are diverted into Cache Slough, which carries the water through Yolo County west of Sacramento into the North Delta.

Morrison Creek Streams Group Projects

Flood control on Morrison Creek and its tributaries is being address by SAFCA through the implementation of the South Sacramento Streams Group project. The following discussion details levee networks within this area.

Morrison Creek. Flooding on Morrison Creek is contained by existing levees on the north and south. The north levee is approximately five miles long and begins near the town of Freeport and continues north easterly to the terminus near Franklin Boulevard. About 2.2 miles of levee exists on the southwest side from the confluence of Morrison Creek and Union House Creek to Franklin Boulevard.

Union House Creek. Flooding is contained with approximately 0.9 miles of levees on both the north and south side of this tributary to Morrison Creek.

Elder Creek. Elder Creek is a tributary of Morrison Creek that runs westerly through South Sacramento. The creek is contained by levees on both the north and south side, beginning at the

confluence with Morrison Creek and continues approximately to Franklin Boulevard, for a total of 0.5 miles.

American River Streams Group Projects

Magpie Creek Floodplain and Diversion Channel. SAFCA and the USACE is involved with a project that will involve land acquisition and levee raising in the Magpie Creek Floodplain that will preserve floodplain and wildlife habitat. As the lead Federal Agency, the U.S. Army Corps of Engineers (Corps) has prepared a draft EA and FONSI to comply with the National Environmental Policy Act (NEPA) and address the environmental effects of the proposed project. The draft EA evaluated all environmental resources as required by NEPA. 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. Construction on this project is anticipated to begin in 2005-2006.

Natomas Area Stream Group

Existing Flood Control. The Natomas Basin in northern Sacramento is very flat and crossed by numerous canals that are essential for drainage in the Basin. The City has been addressing drainage problems in the Basin since 1984. Drainage canals and improvements in this area are detailed in the North Natomas Comprehensive Drainage Plan (1992). The canals that drain the basin include the Natomas East Main Drainage Canal (NEMDC), the Natomas Cross Canal, the East Drainage Canal and the West Drainage Canal. The Natomas Basin is protected from flows in the Sacramento River by a series of levees and pumping systems. Levees exist along the west bank of the Sacramento River, the south side of the Natomas Cross Canal, and the east side of the Natomas basin. The latter section holds back flows from the NEMDC in Sacramento County and the Pleasant Grove Creek Canal in Sutter County. Currently, seven pumping sites remove the storm water from the Natomas Basin. Four sites pump into the Sacramento River, one-site pumps into the cross canal and two sites pump into the NEMDC (Steelhead Creek). The two pump sites on the NEMDC add storm water from the lower Natomas Basin to higher property to the east. This has actually made storm water flow uphill and reverses the natural downhill flow of the storm water.

Natomas development along the East Drainage Canal, looking north

EMERGENCY SERVICES ACTIVITIES

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

Emergency Management Program. The City of Sacramento has an aggressive emergency management program in place that includes comprehensive hazards planning and an ongoing commitment to staff training. The City's Office of Emergency Services is part of the City Fire Department and is responsible for disaster planning. The office provides intra and interagency coordination for disaster planning, presentations on preparedness to public service organizations, and coordination in the preparation and execution of disaster exercises. The City's Emergency Operations Center (EOC) functions as the coordination hub during floods and other emergencies.

Flood ALERT system. ALERT, developed by National Weather Service (NWS), stands for Automated Local Evaluation in Real Time and signals the City Department of Utilities of possible flooding. It provides continuous and automatic reports from river levels and rainfall gauges. The City also monitors County of Sacramento alert stations on streams and creeks that flow into the City. These monitoring stations provide data to determine when to initiate evacuation procedures.

Evacuation and Warning. The City has the ability to warn the public through a Citywide siren system, loud speakers, and/or roving police patrols. The City's emergency broadcast station is KFBK Radio 1530-AM.

Existing Emergency Response Plans

City of Sacramento Comprehensive Flood Management Plan, February 1996 Includes flood emergency evacuation plans for levee failure scenarios in 17 evacuation areas.

City of Sacramento Department of Utilities Water Distribution Emergency Management Plan

City of Sacramento Multi-Hazard Emergency Plan revised 1993.

City of Sacramento Department of Utilities Multi-Hazard Emergency Management Plan, January 2002

City of Sacramento Department of Utilities Water Sewer Overflow Emergency Response Plan, July 31, 2001

City of Sacramento Department of Utilities Water Production Emergency Management Plan, June 2001

City of Sacramento Department of Utilities Business Recovery Plan, January 2002

City of Sacramento 1986-2006 General Plan Health and Safety Element. The Health and Safety Element includes goals and policies for seismic safety, flood hazards, hazardous materials, and code enforcement

PUBLIC INFORMATION ACTIVITIES

Map Determinations. The City has flood maps available for review at all branches of the Sacramento Public Library and the Planning and Building Department. The city has a floodplain information line (916) 808-5061 for citizen inquiries.

Outreach Projects. The City Department of Utilities annually mails a letter of notice on property protection to repetitive loss properties and floodplain residents.

"Are You Flood Ready?" Brochure. City of Sacramento Department of Utilities developed and distributes this brochure on how to protect yourself, your family, and your property from floods. It includes a map of the 100-year floodplain, describes the flood hazard areas and the flood ALERT system, flood insurance, and includes contact information. This brochure is distributed to all property owners in the City with their November utility bill.

"Living Next to Levees" brochure. SAFCA is working with State Department of Water Resources on a mailing of a brochure called "Living Next to Levees". The brochure will be mailed to owners of property that are adjacent to levees and advocates property management activities that will not reduce the integrity of the levee system.

"You are the Solution to Stormwater Pollution" brochure. Developed by the Sacramento Stormwater Management Program

which is a cooperative effort of Sacramento County and the Cities of Sacramento, Folsom, Galt, and Citrus Heights to protect the health of the local waterways. The brochure is published by the City of Sacramento Department of Utilities.

"Ten Steps to Disaster Preparedness". This is a public information pamphlet developed jointly with the City of Sacramento Office of Emergency Services and the Sacramento Area Red Cross Chapter. It details family preparedness strategies applicable for several hazards and explains emergency river stage definitions.

Public Information Program Strategy

As explained during the description of Planning Step 2, *Plan for Public Involvement – Engaging the Public* (page 3-5) the City of Sacramento and the County formed a subcommittee to the HMPC specifically to develop a Public Information Strategy that would be creditable under the CRS program. The Public Information Strategy Subcommittee is comprised of the following county and city representatives:

- The CRS Coordinators
- The Public Information Officers
- The Webmasters and
- Representatives of the Public.

The subcommittee met twice during the planning process, July 14 and August 17, 2004. The county found that the formal Public Information Strategy would not significantly benefit their existing flood hazard management program. However, the City of Sacramento subcommittee members did find benefit to their existing flood hazard management program. Thus, the city's formal Public Information Strategy is incorporated in this plan here. The City subcommittee met one additional time, December 9, 2004, in the process of reviewing and revising this plan.

CRS Credit for a public information program strategy under Activity 330, requires a document that includes a description of the following:

1. Local flood hazard
2. Safety and protection measures
3. Current public information activities
4. Goals for community's program
5. Projects to be done each year
6. Monitoring and evaluation procedures

Items 1, 2, 3 are already included in this document. The local flood hazard, including vulnerability to the hazard, is described between pages 6.2-2 and 6.2-23. Safety and protection measures are described within the description of the City's existing capability, between pages 6.2-23 and 6.2-34, which also includes information on existing structural protection and emergency services measures. The current public information activities are described on the preceding page. The remainder of this sub-section will address items 4, 5, and 6.

Goals for the City Public Information Program Strategy

Goal 1: Provide the citizens of the City of Sacramento with detailed information regarding floodplain regulations and insurance requirements as they relate to the City's mapped flood hazard areas.

Goal 2: Promote the value of purchasing a NFIP flood insurance policy, even when and where it is not required.

Goal 3: Coordinate with the City Office of Emergency Services (within the Sacramento Fire Department) to develop and disseminate practical information describing evacuation areas, procedures and directions.

Goal 4: Support and participate in the countywide dissemination of the multi-hazard risk and vulnerability information developed in this plan to the citizens of and visitors to the City of Sacramento, by providing the technical information and assistance regarding flooding within the City.

Goal 5: Continue the ongoing public information activities undertaken annually that describe the flood hazard, risk and protective measures and actions beneficial to the citizens of the City of Sacramento.

Projects to be Done Each Year

Year 1, 2005: Adopt and implement the proposed Community Outreach Plan to inform Sacramento area property owners and residents about pending levee certification and flood insurance relief actions. *(This is City Recommended Action Item #10 in this section of this plan. Also see SAFCA Recommended Action Item #2, Section 6-9, and County Recommended Action Item #18, Section 6-1).*

The City Department of Utilities will request City Council approval of a formal Resolution (See Appendix G) authorizing coordination with SAFCA and the County of Sacramento to implement a community outreach plan to inform Sacramento area property owners and residents about pending levee certification and flood insurance relief actions.

The plan has two goals: 1) to educate property owners and residents occupying a large portion of the American River floodplain about their flood insurance options once the levees protecting this floodplain are certified and floodplain remapping is approved by the Federal Emergency Management Agency (FEMA); and 2) to inform property owners and residents occupying the South Sacramento Streams Group floodplain, a small portion of the American River floodplain, and the Chicken/Strong Ranch Slough floodplain, about the status of the flood control projects needed to secure insurance relief.

The target audience is identified in the above program description. The need is critical because it is estimated that 40,000 of the 50,467 NFIP policyholders within the City will no longer be required to maintain an NFIP policy. The effort is aimed at explaining the residual risk of

flooding even when protected by a USACE certified levee and the benefits of obtaining a NFIP "Preferred Risk" flood insurance policy.

The proposed community outreach plan anticipates two separate mailings to this group. The first will let them know about the pending change in insurance requirements, outline their insurance options once the change occurs, and encourage them to seriously consider maintaining their coverage at a reduced rate. The second mailing will identify the steps they need to take to modify their insurance coverage and encourage them to attend a series of informational community meetings to get assistance in moving forward.

The outreach plan also anticipates separate mailings to property owners in three areas that will not receive flood insurance relief in 2004/2005: the South Sacramento Streams Group floodplain, the floodplain along the north side of the American River upstream of the Mayhew Drain, and the Chicken/Strong Ranch Slough floodplain. These mailings will provide information on the status of the projects needed in these areas to provide insurance relief and invite residents to attend informational community about local floodplain management issues.

The estimated cost of the plan to be funded by SAFCA is not expected to exceed $225,000.

Year 2, 2006: The City Department of Utilities will coordinate with the City Office of Emergency Services, and other departments as appropriate, such as the Police Department, to solidify evacuation procedures for areas behind levees subject to swift and severe flooding, should the levees fail or be overtopped. This information will then form the basis for a comprehensive education program targeting those citizens subject to evacuation. *(This is City Recommended Action Item #11 in this section of this plan.)*

Evacuation areas are currently being identified and verified, and mapping and procedures are being reviewed and revised. Part of this work is being accomplished as part of the preparations for a full-scale flood exercise scheduled for January 2005. Part of this work is being undertaken in response to the concerns voiced by residents of "The Pocket" through public input into this planning process. At issue are people who want to know where to go and how to get there. Even though most of this information has been already been developed, residents of both of these areas stated on several occasions that they were unaware of any formalized evacuation procedures.

Year 3, 2007: The City of Sacramento Office of Emergency Services will work with the Sacramento Sierra Chapter of American Red Cross, and other local organizations active in disseminating the multi-hazard risk and vulnerability information developed in this plan to the citizens of and visitors to the City of Sacramento *(This is City Recommended Action Item #11 in this section of this plan.).* The City of Sacramento Department of Utilities will help provide information regarding flooding to these organizations.

Currently the Sacramento Sierra Chapter of the American Red Cross is actively working in the community to teach people how to prepare for disasters. ARC provides direct outreach to the community in three ways. First, ARC attends community events (such as health fairs) and distributes information and has the chance to talk with people one on one. Second, ARC works with various business and community groups making presentations. Presentations can be general and talk about the five basic steps to preparedness (make a plan, build a kit, get trained,

volunteer, and donate blood) or they can be hazard specific. Third, ARC is working to institute hazard education curriculum in the City of Sacramento public schools.

By joining with an established, organized public information effort that is already familiar with multi-hazard issues, the City Department of Utilities can maximize its effectiveness of disseminating the flood risk information for which it is responsible. The value of this information is in providing it to citizens, students, businesses, families and visitors so that they may make educated decisions about their personal safety and risks they may not be aware of.

The ARC's school program provides a good example of their comprehensive effort to coordinate the dissemination of hazard information. ARC has existing curriculum materials available for schools called Masters of Disaster®. The curriculum is designed to help children grades K-8 learn about the science behind various types of disasters and then what to do when they occur. The main curriculum kit includes lessons for General Preparedness, Floods, Earthquakes, Hurricanes, Tornados and Lightening. Additional lesson sets are available for Home Safety, Wildland Fires and Facing Fear (dealing with man made disasters). The curriculum is aligned to both National and California educational standards. The City of Sacramento Utilities Department will work with the Sierra Chapter of the ARC to customize the flood materials as best possible for the City of Sacramento.

Other public information efforts will be to continue the City's current annual notifications regarding floods, flood insurance, reducing flood losses, and the National Flood Insurance Program. The Utilities Department mails letters describing the flood hazard to everyone in the City, and specifically tailored letters for the Repetitive Loss properties. The brochures, described on page 6.2-35 will continue to be distributed, and the City will continue its ongoing map-reading service. The public information brochures are also available at Utility Department offices and library display racks. The City is currently reviewing various public information sources regarding living in areas protected by levees and plans to distribute this information in the future also..

Annual program evaluation will be accomplished through the annual monitoring and evaluation of this plan.

OTHER ONGOING MITIGATION ACTIVITIES

Community Rating System. The City of Sacramento has been involved in the NFIP since January 1975. To the benefit of the citizens of Sacramento the City made application to the NFIP's Community Rating System (CRS) in December 1990 and again in 1992. CRS participation offers discounted flood insurance for residents of communities that implement efforts beyond the NFIP minimum standards.

Repetitive Losses. The City helped fund the elevation of three repetitive loss properties with the use of HMGP funding after flooding in 1997. The City conducted outreach activities to owners of repetitive loss properties in 2001. The City sends a letter and brochure each year specifically targeting owners of repetitive loss properties. The brochure includes information on flood safety and property protection.

Drainage System Maintenance. The City performs routine maintenance of waterways, including inspection and cleaning. Public information on this activity sends the message that keeping gutters and drains clean is everyone's responsibility.

Stormwater Management. The goal of the City's Drainage Master Planning is to provide a higher level of flood protection to the residents of the City of Sacramento. In conjunction with improving the drainage system, the City's overall planning program encourages consideration of water quality; preservation and restoration of natural areas such as wetlands, riparian corridors, streams and heritage oaks; and public facility enhancements in the master planning process. For example, the planning program has identified several opportunities for creation of detention basins, which can also serve as public parks.

The City continues to make efforts to improve the quality of stormwater runoff to protect the receiving water bodies, to the maximum extent practicable. The City continues to implement the federally mandated National Pollutant Discharge Elimination System (NPDES) Stormwater Discharge Permit. The Stormwater Management Program identifies and measures the effectiveness of Best Management Practices (BMPs) implementation. This program includes implementation of BMPs for construction activities in accordance with the City's "Grading, Erosion and Sediment Control Ordinance" and associated Manual. The stormwater program requires new developments to implement BMPs such as grassy swales and detention basins to reduce increases of stormwater pollution to the maximum extent practicable.

Hazard Disclosure. The State of California requires real estate agents to notify prospective buyers of Special Flood Hazard Areas. The City notifies real estate agencies and/or boards on an annual basis of the requirement and where they can obtain disclosure statement forms.

Elevation Certificates. The City Building Department requires that any new construction or substantial improvements in a Special Flood Hazard Area Inundated by the 100-year Flood (FHA) file an elevation certificates. The Building Department has been maintaining FEMA elevation certificates for post-FIRM (Flood Insurance Rate Map) buildings located in the SFHA, excluding A99 zones. The elevation certificates are on computer software provided by FEMA. The City plans to continue updating the certificates on the computer software so that they will be more easily accessible.

Tree Maintenance. The City Parks and Recreation Department has a Tree Services Division has a City Arborist on staff that recommends removal of trees and limbs that pose an imminent hazard to public safety and/or property or infrastructure. The Sacramento Tree Services Best Management Practices Review and Report, 2003 contains recommendations to extend the capabilities of the Tree Services Division.

OTHER HAZARDS

Wildfire

This planning process has identified one wildfire hazard area within the City of Sacramento. The location is within the American River Parkway in the vicinity of Bushy Lake. This area is

undeveloped and crossed by two major and two minor power transmission lines that are heavily under grown with 'environmentally sensitive' plants that has led to difficult vegetation control. In the event of a large fire, the lines could trip off due to smoke or fire around the structures could cause damage or destruction. If the fire coincided with a hot, heavy power usage day, loss of the major lines could contribute to widespread power outages in northern California.

Earthquake

Based on the risk analysis previously discussed in Section 4-2, the city is at risk to moderate earthquake shaking. A web-based USGS risk-by-zip-code methodology was used to determine refine the risk based on the downtown Sacramento Zip code of 95814.

Based on this methodology the city is at risk to moderate earthquake shaking (PGA about 14 percent of gravity or MMI VI) with a 10 percent chance of being exceeded in the next 50 years. According to the USGS, the perceived shaking in a MMI VI earthquake would be strong, but the potential damage would be light. The City could experience ground accelerations of 24 percent of gravity, or roughly MMI VII, but there is a two percent chance of this ground shaking value being equaled or exceed in the next 50 years. This would be perceived as a very strong earthquake with a potential for moderate damage.

The city's risk to earthquakes differs from the rest of the planning area only in the large amount of building stock, population and lifeline infrastructure exposed to shaking. According to the Sacramento County Assessor the City of Sacramento has $28.6 Billion in building stock and 411,200 persons exposed to earthquake shaking. Non-structural damage to building contents would likely be the source of the largest losses during a moderate sized event. In terms of structural and non-structural damage, older buildings, particularly unreinforced masonry, would be most susceptible to damage from earth shaking. Most of this damage would likely be

confined to historic districts. Indirect losses that could be expected would include business interruption losses associated with the inability to operate a business because of the damage sustained during the earthquake.

Drought

The city of Sacramento was one of the last holdouts on the issue of water meters but with diminishing influence. The suburbs recognized the value of water meters in helping preserve the crown jewel of the city, the American River, and in providing adequate water for growth. Most local water districts voluntarily agreed to install meters as part of a landmark regional pact known as the Water Forum. Sacramento did not because the city charter forbids the measurement devices. State law, however, can trump a city charter, and in September 2004, environmental groups and Southern California legislators passed legislation requiring all cities, Sacramento included to install water meters by 2025. Certain old neighborhoods in the city, particularly homes with water mains in back yards, will be difficult to retrofit with water meters and it will be expensive. However, you can't control water usage if you can't measure it. (Sacramento Bee 10/1/04)

DEVELOPMENT TRENDS

Sacramento experienced 10.2% change in population between 1990 and 2000 by adding 37,653 persons. The following discussion details the growth trends by stream group.

American River Stream Group. In the City of Sacramento, the American River is confined by major levees, and the floodplain between the levees is currently developed as a park compatible with flood stages. However, portions of the California State Exposition Complex are located in a floodplain along the river inside the levees. In the northern portions of the American River Stream Group area, floodplain development consists of agricultural improvements and low-to-moderate density residential areas. Numerous thoroughfares are also located in floodplain areas. This steadily urbanizing area is expected to continue to expand in the coming years. The northern portion is affected by runoff from urbanization of areas outside of the City limits to the north and east extending into neighboring Placer County.

Natomas Area Stream Group. The Natomas Basin was an agricultural reclamation district that has experienced significant development pressure during the past two decades and now contains over $2 billion worth of damageable residential, commercial and industrial property, including Sacramento Metropolitan Airport. A map of the North Natomas Major Development Areas that shows the location of approved PUD's can be accessed on the City's web site.

Morrison Creek Stream Group. Principal land use in the floodplains of the Morrison Creek Basin is devoted mainly to residential use, dwindling agricultural pursuits, and increasing industrial activities. Low-density residential districts and suburban subdivisions predominate in the western half of the basin, particularly in the northwestern sector. Single-family rural residences and farmhouses are scattered throughout the remainder of the basin. Agricultural endeavors, devoted basically to irrigated and non-irrigated pasture, are located principally in the

southwestern sector. An extensive and expanding industrial area exists in the northeastern sector. Small pocket areas of commercial and medium-density residential development are spotted sporadically throughout the basin. A rapid growth in both dwellings and population is occurring in the area near the Unionhouse Creek downstream of state highway 99. Mather Air Force Base and the Sacramento Army Depot are situated inside the basin boundaries.

Sacramento River. The Sacramento River is confined by project levees in the study area. No permanent development exists within its floodplain. The Sacramento River Forum has been exploring some development opportunities along the river, but within the parameters of the City's local floodplain management ordinance.

Other Areas Affecting the City of Sacramento Drainages. The headwaters for the Dry Creek watershed are in Placer County. Placer County is one of the fastest growing counties in California. Within the city of Roseville, streams have been cleaned and levees raised for the protection of city areas. This action has removed some of the floodway area and caused the storm water to move downstream faster and get deeper. All of the development streets, parking and roofs have increased the storm water elevations and speed of arrival in the Rio Linda/ Elverta area.

Building Permit Trends

Single-family new house construction building permits: SACRAMENTO CITY

- 1996: 412 buildings, average cost: $85,400
- 1997: 258 buildings, average cost: $102,200
- 1998: 350 buildings, average cost: $126,300
- 1999: 922 buildings, average cost: $138,300
- 2000: 1954 buildings, average cost: $143,300
- 2001: 2739 buildings, average cost: $147,800
- 2002: 3242 buildings, average cost: $148,500
- 2003: 3603 buildings, average cost: $134,000

COMMUNITY-SPECIFIC RECOMMENDATIONS

1996 Comprehensive Floodplain Management Plan Recommendations Progress

Several flood protection recommendations were outlined in the 1996 City of Sacramento Comprehensive Flood Management Plan. This plan supersedes the floodplain management aspects of the 1996 Plan.

The following is a progress report on the recommendations regarding Critical Facility protection from 1996:

1. Provide a site for the temporary relocations north of the American River for the City of Sacramento and the Department of Utilities Emergency Operations Centers. *The City EOC has been relocated outside of the floodplain. The Department of Utilities EOC has not moved to date.*

2. Permanently relocate the Sacramento Police/Fire Department Communications Centers. *The Sacramento Fire Department Communications Center has been consolidated with the Sacramento Metropolitan Fire Communications Center which is outside the 100-year floodplain. The Sacramento Police Department Communications Center and 911 Call Center is currently under construction at a location outside the 500-year floodplain. Completion of construction and move-in is anticipated to be in January 2006.*

3. Permanently flood proof critical pump stations and the Sacramento River Water Treatment Plant (SRWTP). *It was determined that due to the depth of flooding of a 100-year flood, floodproofing pump stations was not feasible. The Sacramento River Water Treatment Plant was elevated and reconstructed outside the 10-year floodplain.*

4. Have City Council propose that SMUD submit a detailed report on how power will be rerouted in the event that a bulk substation listed as a critical facility is flooded. *City staff will work with SMUD to get the report. Utilities staff now has liaisons stationed at the SMUD EOC.* The State of California should take appropriate actions regarding relocations and/or flood proofing of critical public facilities, including the State Office of Emergency Services. *The California Office of Emergency Services, including the State Operations Center have been relocated out of the floodplain.*

5. Obtain enhanced topographical information. In 2001 The City hired a contractor to develop high resolution LIDAR (LIght Detection and Ranging) to provide accurate digital elevation and orthophotographic data to support the City's geographic information system (GIS) and flood modeling capabilities. *The LIDAR data have four-meter horizontal 0.2-meter vertical accuracy. New LIDAR data should be available in the fall of 2004.*

6. Conduct computer-modeling analysis. *GIS analysis of the floodplain exposure was conducted as part of this plan update. The City intends to use enhanced LIDAR data to evaluate drainage problem areas.*

7. Evaluate the effectiveness of the secondary flood protection system, including floodgates and railroad levees, and develop recommendations and cost estimates for upgrades. *This evaluation process is being deferred until the primary flood control projects (i.e., levees, Folsom Dam modifications, etc) are substantially complete. Currently, a study is being conducted to determine the area protected from flooding due to the Southern Pacific Railroad levee north of C Street.*

2004 Recommendations

The following action items were identified by the City during the development of this plan:

Sacramento City Action Item #1: Update the Repetitive Loss list
Category (for CRS purposes): Property Protection

Issue/Background Statement: The original list of 40 repetitive loss structures needs to be changed to reflect the three properties that were elevated with HMGP funds in 1997.

Other Alternatives Considered: No Action

Responsible Office/Person: City Department of Utilities

Priority (H, M, L): Medium

Cost Estimate/Potential Source of Funding: City Staff time

Cost-Effectiveness Explanation: Contributes to reducing cost of flood insurance

Schedule: Within 90 days

Sacramento City Action Item #2: Repetitive Losses: Evaluate appropriate mitigation strategies for each repetitive loss property

Category (for CRS purposes): Property Protection

Issue/Background Statement: Explore and implement appropriate mitigation strategies for the remaining repetitive loss structures as a follow-up to recent efforts by the City to define repetitive loss problem areas. The first step is to identify interested property owners.

Other Alternatives Considered (including No Action): No Action

Responsible Office/Person: City Department of Utilities

Priority (H, M, L): Medium

Cost Estimate/Potential Source of Funding: City Staff time, FMA. This is an existing budgeted item. The Repetitive Loss letter seeks interested property owners and states that protective measures could be funded.

Cost-Effectiveness Explanation:

Schedule:

Sacramento City Action Item #3: Complete Flood Erosion Protection Projects to achieve recertification of 100-yr. protection on American River – removing most of Sacramento City from the 100-yr. Flood Plain (SAFCA Recommended Action Item #1 Section 6.9)

Category (for CRS purposes): Structural Protection

Other Alternatives Considered (including No Action): None

Issue/Background Statement: This is a priority of SAFCA of will be completed in late 2004, with remapping completed in early 2005.

Responsible Office/Person: SAFCA, DWR, USACE

Priority (H, M, L): High

Cost Estimate/Potential Source of Funding:

Cost-Effectiveness Explanation: Life Safety, Reduced flood losses, reduced insurance costs.

Schedule: Late 2004 for erosion protection, early 2005 for levee recertification and floodplain remapping.

Sacramento City Action Item #4: Coordinate with SAFCA on Proposed Levee Improvements Along Morrison Creek (SAFCA Recommendation Action Item #2, Section 6.9).

Category (for CRS purposes): Structural Protection

Other Alternatives Considered (including No Action):

Issue/Background Statement: These improvements include raising existing levees and deepening the channel of Morrison Creek.

Responsible Office/Person: SAFCA/City Department of Utilities

Priority (H, M, L): High

Cost Estimate/Potential Source of Funding:

Cost-Effectiveness Explanation:

Schedule: Improvements on lower Morrison Creek from the Sacramento River to the Junction with Elder Creek are scheduled to begin in 2005. Improvements on upper Morrison Creek from Elder Creek to Franklin Blvd are anticipated to start in 2006.

Sacramento City Action Item #5: Coordinate with SAFCA on completion of South Sacramento Streams Group (includes Florin and Morrison Creeks) Projects in 2005. Provide greater than 100-year protection by improving conveyance and raising levees. (SAFCA Recommended Action Item #3, Section 6.9).

Category (for CRS purposes): Structural Protection

Other Alternatives Considered (including No Action): USACE report analyzed alternatives.

Issue/Background Statement: SAFCA has USACE document detailing these projects.

Responsible Office/Person: SAFCA/ City Department of Utilities

Priority (H, M, L): High

Cost Estimate/Potential Source of Funding: SAFCA

Cost-Effectiveness Explanation: Life safety, reduced flood looses, reduced insurance costs

Schedule: SAFCA estimates this work to begin in 2007-08.

Sacramento City Action Item #6: Coordinate with SAFCA, CA-DWR, USACE, and Sacramento County on Proposed Flood Control projects on Magpie Creek (SAFCA Recommended Action Item #9, Section 6.9)

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 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): Ongoing

Cost Estimate/Potential Source of Funding: SAFCA

Cost-Effectiveness Explanation:

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

Sacramento City Action Item #7: Coordinate with the County and State to Create defensible space to protect vital infrastructure located in the American River Parkway from wildfires(See County recommendation # 16, Section 6-1).

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. The County owns the Parkway, but this portion is within the City limits.

Other Alternatives Considered (including No Action): No Action

Responsible Office/Person: City Fire Department and City Emergency Services through coordination with Sacramento County, State of California, and SMUD.

Priority (H, M, L): M

Cost Estimate/Potential Source of Funding: TBD. Existing budgets.

Cost-Effectiveness Explanation: Cost of cutting/thinning vegetation in vicinity of transmission line towers is less than replacing the towers, or the cost of interrupted service, should there be a fire.

Schedule: 2005

Sacramento City Action Item #8: Integrate the critical facilities identified during this DMA planning effort with the City's GIS technical group to support emergency management efforts.
Category (for CRS purposes): Emergency Services

Issue/Background Statement: GIS databases of critical facilities have been used by the City for incident management and emergency planning purposes. These databases need to be updated with the results from GIS analysis associated with the development of the Multi-Hazard Mitigation Plan.

Other Alternatives Considered (including No Action): No Action

Responsible Office/Person: City GIS Technical Group, City Department of Utilities, and City Office of Emergency Management

Priority (H, M, L): H

Cost Estimate/Potential Source of Funding: Low cost; City staff time

Cost-Effectiveness Explanation:

Schedule: 2005

Sacramento City Action Item #9: Explore the use of Reverse 911 to warn residents about impending hazards such as floods.

Category (for CRS purposes): Emergency Services

Issue/Background Statement: Explore and implement the use of Reverse 911 technology as appropriate. This is not intended to replace the existing siren system, but to have the siren system, provide a valuable and redundant warning capability.

Other Alternatives Considered (including No Action): No Action

Responsible Office/Person: City Office of Emergency Services, Fire Department and Police Department.

Priority (H, M, L): M

Cost Estimate/Potential Source of Funding: TBD

Cost-Effectiveness Explanation: Life-safety

Schedule: 2005

Sacramento City Action Item #10: Coordinate with SAFCA 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, and the remaining vulnerability to property owners in the South Sacramento Streams Group, a small portion of the American River floodplain and along Chicken/Strong Ranch slough floodplain. (See SAFCA Recommended Action Item #2, Section 6-9, and County Recommended Action Item #18).

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 late 2004. 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: SAFCA

Cost-Effectiveness Explanation:

Schedule: Late 2004/Early 2005

Sacramento City Action Item #11*: Implement the Public Information Program Strategy 3 Year Plan outlined in the Public Information section of the Capability Assessment-Section 6-2.*

Category (for CRS purposes): Public Information

Issue/Background Statement: A Public Information Program working group was created by the City as part of the DMA/CRS planning process. The purpose of the group is to develop a coordinated strategy to inform and educate the public on floods and other hazards that affect the City of Sacramento. A 3 year plan drafted by the group includes the following outreach efforts: Year 1- work with SAFCA on conversion of A99 to Shaded X (see Recommendation #9; Year 2

– develop an information and notification program on evacuation of areas due to deep flooding from hypothetical levee breaches; and Year 3 - coordinate with existing efforts of ARC programs to provide hazard information.

Other Alternatives Considered (including No Action): No Action

Responsible Office/Person: City PIO, City Webmaster, City Department of Utilities- CRS Coordinator, Public representatives

Priority (H, M, L): H

Cost Estimate/Potential Source of Funding: City Staff time

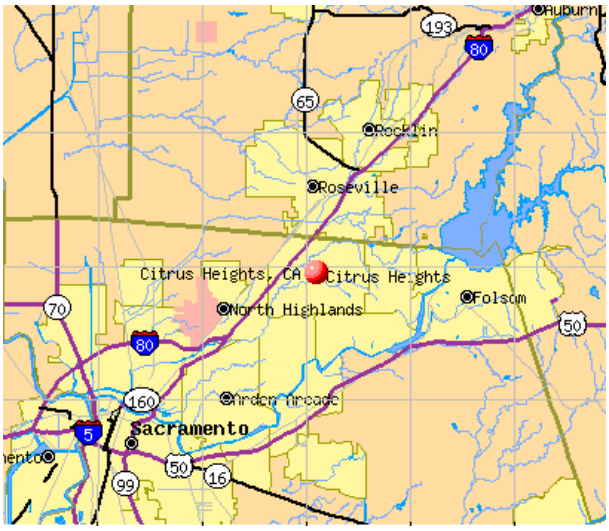
Cost-Effectiveness Explanation:

Schedule: Late 2004-2006

(This page has been intentionally left blank.)

Multi-Hazard Mitigation Plan

6.3 Citrus Heights Community Element



CITY OF CITRUS HEIGHTS COMMUNITY PROFILE

Citrus Heights is situated in northern Sacramento County between the City of Sacramento to the south and Roseville to the north, along the Interstate 80 corridor. Citrus Heights has a population of 89,942 and 35,358 housing units. Citrus Heights growth from a rural farming and orchard community to an urbanized area began after the construction of the state highway system and Highway 40, the predecessor to Interstate 80, in 1912. The year 1932, during the Great Depression, ended Citrus Heights attempts at fruit farming when a winter freeze destroyed most of the working orchards.

Population grew steadily after World War II to about 22,600 in 1960. The development of three major shopping centers in the early 1970's spurred many new office buildings and housing tracts, most of which were built in the 1970's and 1980's. Continued growth into the 1990's and the demands that accompanied it spurred the community to incorporate in 1997. *Source: www.ci.citrus-heights.ca.us*

TOTAL VALUES AT RISK FROM HAZARDS

The total values at risk from all hazards are presented as a worst-case baseline. Like other values presented in this plan, these are deceptively low because they do not include the values of infrastructure, government and church facilities, or the local economy. 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.

	Total Value	Land Value
2/3/4PLEX	194,713,842	54,432,125
COMMERCIAL/INDUSTRIAL	831,235,831	304,054,651
MULTI-FAMILY	432,793,446	85,980,904
SINGLE FAMILY	3,188,287,041	795,897,318
VACANT LAND/AG	24,026,997	22,761,752
CITRUS HEIGHTS	4,671,057,157	1,263,126,750

Source: *Sacramento County Assessor's Office, Assessments by Land Use; 9-10-04*

The Risk Assessment portion of this plan indicates that Citrus Heights does not face a catastrophic natural disaster, so in any given disaster event one could expect the damages to be less than the $4.6 Billion displayed in the table above. However, the risk for Citrus Heights varies from the rest of the County within the mapped floodplain due to its different size, and the varying numbers of structures and varying values of those structures. Therefore, the following section takes a closer look at Citrus Height's vulnerability to flooding.

With regards to Critical Facilities, Citrus Heights has the following:

- Four Fire stations
- 25 schools
- One sewage pump station

Of these, only the Creative Frontiers Private Elementary School lies adjacent to the 100-year floodplain.

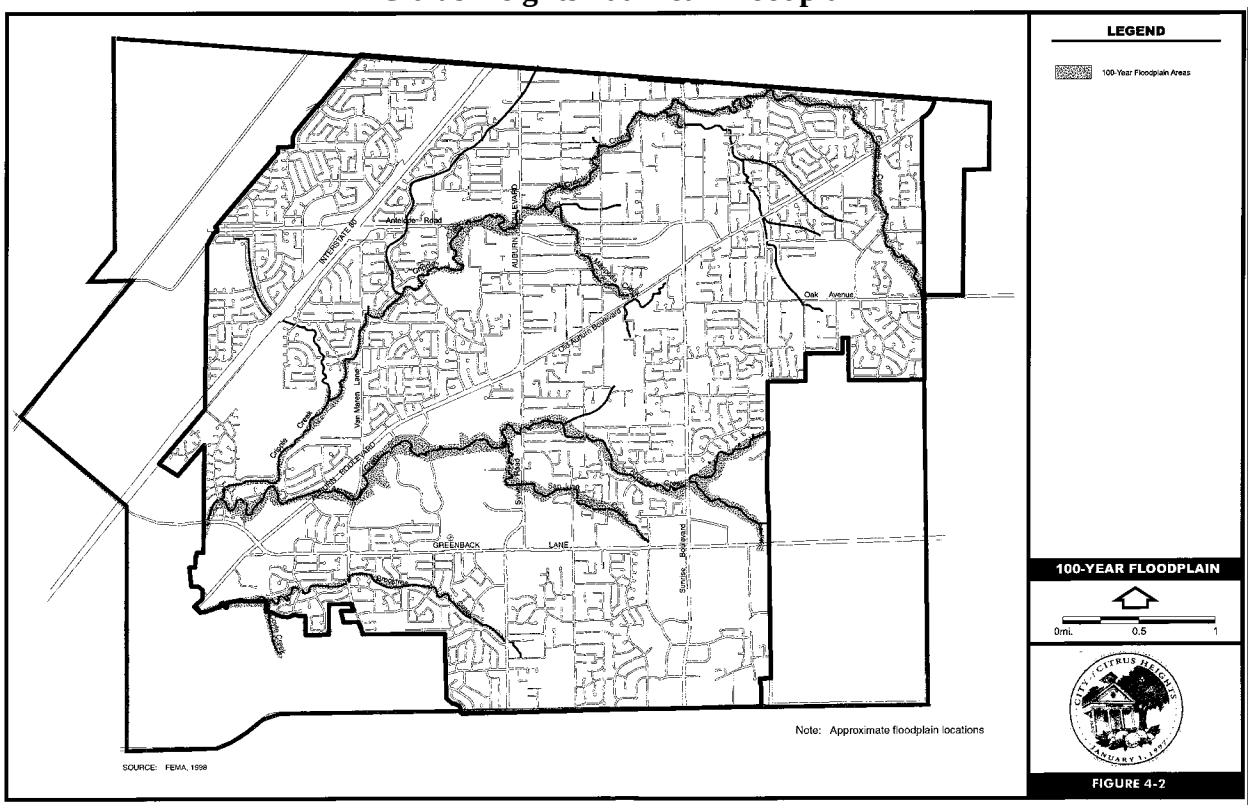
NFIP DATA AND FLOODPLAIN INVENTORY

Citrus Heights lies within the Natural Streams Group watershed and includes Arcade and Cripple Creeks and their tributaries, including Brooktree, Mariposa, San Juan and Coyle Creeks. All of these streams flow generally west into Arcade Creek to the Natomas Main Drainage Canal and then the Sacramento River. The streams in Citrus Heights are basically unaltered and maintain a riparian corridor. The City's storm drainage empties into these creeks. Arcade and Cripple Creeks have relatively small hydraulic capacity and can be quickly overtopped during severe storm run-off events, leading to overflow of the stream banks and the temporary inundation of floodplain and adjacent low-lying areas. *Source: Citrus Heights General Plan 2000.*

Utilizing GIS and HAZUS-MH data, the HMPC estimates that there are approximately 3,559 persons and 1080 structures within the various A Zones of the 100-year floodplain. The types of properties include 1,069 residential, nine commercial, one industrial, and one public. The total value of these structures and their contents is estimated to be $317,858,000. A detailed explanation of the methodology used for this vulnerability assessment is discussed in the Sacramento County section of this plan.

Citrus Heights participates in the National Flood Insurance Program. Citrus Heights is NFIP Community 060765. NFIP Insurance data indicates that as of 2-29-04, there are 113 flood insurance policies in City of Citrus Heights, with one claim paid for $6,535. *Source: FEMA Region IX* Sacramento County data on repetitive loss properties indicate that Citrus Heights contains 25 of these properties, seven of which have done some type of flood mitigation.

Citrus Heights 100-Year Floodplain



OTHER HAZARDS

There are no other hazard risks within Citrus Heights that differ from those facing the rest of the county. Other than flood, there are no other mapped, identified natural hazard areas for Citrus Heights. Earthquake shaking from distant sources could cause damage in Citrus Heights, though damage would probably be minor due to the relative newness of the building stock and the absence of tall buildings. There is no significant wildland fire hazard.

EXPLANATION OF CAPABILITY ASSESSMENT MATRIX

Does the Community have:

Comp Plan: A Comprehensive Long-Term Community Growth Plan?
Land Use Plan: A plan that designates type of Land Use desired/required; uses Zoning
Subdivision Ordinance: A regulation that dictates lot sizes, density, setbacks and construction type
Zoning Ordinance: An ordinance that dictates type of Use and Occupancy, Implements Land Use Plan
NFIP/FPM Ord: A Floodplain Management Ordinance: Directs development in identified Flood Hazard Areas. Required for Participation in NFIP and Availability of Flood Insurance
Sub. Damage: Does your FPM Ordinance contain language on Substantial Damage/Improvements?
Administrator: Do you have a Floodplain Management Administrator (someone with the responsibility of enforcing the ordinance and providing ancillary services (e.g., map reading, public education)
# of FP Bldgs: How many buildings are in the mapped Floodplain?
# of policies? How many buildings are insured against flood through the NFIP?
# of RL's: # of Repetitive Losses: (Paid more than $1,000, twice in 10 years)
CRS Rating: A Community Rating System rating from the NFIP, and if so, what is it?
BCEGS: A Building Code Effectiveness Grading System Rating
LEOP: A Local Emergency Operations Plan – a disaster RESPONSE plan
HM Plan: A Hazard Mitigation Plan
Warning: Any type of system, such as "Storm Ready" Certification from NWS, NOAA Weather Radio reception, outdoor sirens, Cable (TV) Override, or an Emergency Warning Notification System?
GIS: A Geographic Information System
Structural Protection Projects: (levees, drainage facilities, detention/retention basins)
Property Protection Projects: (buy-outs, elevation of structures, floodproofing, small "residential" levees or berms/floodwalls)
Critical Facility Protection: (for example, protection of power substations, sewage lift stations, water-supply sources, the EOC, police/fire stations or medical facilities that are at risk)
Natural And Cultural Inventory: Do you have an inventory of resources, maps, or special regulations within the community? (wetlands and historic structures/districts, etc.)

Capability Assessment Matrix

	CITRUS HEIGHTS
Comp Plan/General Plan	Y
Land Use Plan	Y
Subdivision Ord	Y
Zoning Ordinance	Y
NFIP/FPM Ordinance	Y
- Map Date	Jul-98
- Substantial Damage language?	Y
- Certified Floodplain Manager?	N
- # of Floodprone Buildings?	88-1,080
- # of NFIP policies	113
- Maintain Elevation Certificates?	Y
- # of Repetitive Losses?	25
CRS Rating, if applicable	N
Stormwater Program?	Y
Building Code Version	N
Full-time Building Official	Y
- Conduct "as-built" Inspections?	Y
BCEGS Rating	N
Local Emergency Operations Plan	N (working)
Hazard Mitigation Plan	Y
Warning System in Place?	N
- Storm Ready Certified?	N
- Weather Radio reception?	N
- Outdoor Warning Sirens?	N
- Emergency Notification (R-911)?	Y
- Other? (e.g., cable over-ride)	N
GIS System?	Y
- Hazard Data?	Y
- Building footprints?	N
- Tied to Assessor data?	N
- Land-Use designations?	Y
Structural Protection Projects	N
Property Owner Protection Projects	Y-Acq/El.
Critical Facilities Protected?	N
Natural Resources Inventory?	Y
Cultural Resources Inventory?	Y
Erosion Control procedures?	Y
Sediment Control procedures?	Y
Public Information Program/Outlet	Y
Environmental Education Program?	Y

Administrative Mitigation Capabilities

A review of Citrus Heights existing mitigation capabilities was conducted for this plan. The City currently contracts with Sacramento County to provide storm drainage and flood control services. As NFIP participants, the City applies the standard NFIP development regulations as well as the County Water Agency Drainage Ordinance and Citrus Heights Drainage Ordinance.

Flood Control/Management. The City of Citrus Heights is provided flood control and management services from the Sacramento County Water Agency (SCWA). The SCWA, through its efforts at managing the flood control system under its jurisdiction, has created three units called Zones, which the City of Citrus Heights is covered under. These Zones include Zone 11, Zone 12, and Zone 13. Zone 11 is a drainage fee zone formed to provide funding for the construction of drainage facilities in Sacramento County. Fees are collected through Zone 11 from development. Zone 12, now a separate utility, provides storm drain maintenance and improvements for Sacramento County, such as channel clearing and servicing pumping plants. Zone 13, an assessment district, provides funding for flood control and water supply planning, groundwater studies, and FEMA programs. Zone 13 collects fees from benefiting parties.

The City of Citrus Heights Engineering Department is currently updating/revising a city wide chronic flood map showing areas of past chronic flooding with in the City of Citrus Heights. This map will include flood complaints registered with the Engineering Department utilizing data from the past several years.

Overlay Zones. Although the City of Citrus Heights is mostly built-out, natural and biological resources remain scattered within the City's boundaries. Generally, the City's biological resources can be found in the Cripple Creek and Arcade Creek riparian areas. These corridors have been designated with flood and natural stream overlay zones adopted to preserve environmental resources and to protect other public interests such as safety. The flood and natural stream overlay zones are cumulatively considered a minor constraint on housing. The flood overlay zone prohibits structures to be erected within the overlay zone unless the first floor elevation is higher than required by the City Drainage Ordinance.

The flood overlay zone is considered a constraint on housing, but serves the greater public interest. A total of 3.17 medium density acres in two properties were found within the flood overlay zone, but the flood overlay zone did not occupy the entire properties. The natural stream overlay zone permits the initial zone uses with a conditional use permit. Conditional use permits within the natural stream zone may be granted at the staff level. A total of 11.6 acres in six properties were found with the natural stream overlay zone. Of which, no properties are considered significantly constrained by the natural stream overlay zone. The flood and natural stream overlay zones also intersect Stock Ranch, the largest of vacant lands in the City. The Stock Ranch areas within the natural stream and flood overlay zones will be designated open space and are not a constraint of the development of housing.

NPDES Permits. In the City of Citrus Heights, storm water discharge through the City's municipal storm drain system is managed through a joint NPDES Permit with the County of Sacramento and the cities of Sacramento, Folsom, and Galt. The joint NPDES permit regulates all wet and dry weather runoff discharge in the County, including the City of Citrus Heights. Management of permit compliance is conducted by the Sacramento County Water Agency. The joint permit requires implementation of a storm water management program including the use of Best Management Practices (BMP).

City of Citrus Heights General Plan Summary

The following discussion summarizes elements from the City's General Plan that pertain to floodplain management and public safety.

- The Community Health Element includes policies associated with flooding and drainage as well as seismic hazards. This element recognizes that property owners along creek areas have major concerns about flooding and the potential increased run-off with future growth. Further, it states that Citrus Heights currently contracts with the County to provide storm drainage and flood control services. The City identifies flood damage prevention as a "high priority". To achieve the goal of protecting life and property from flood related hazards, an action item calls for the use of drainage fees or other funding sources to assist in the raising of existing residences above the 100-year base flood elevation.

- The Community Health Element states that there are no active faults within or near the City of Citrus Heights, nor are there Seismic Hazard Zones (as of October 2000), and that the City is located in Seismic Zone 3. Closest active fault mapped is the Foothills Fault Zone, 15 miles northeast. Main goal is to protect life and property from risk associated with seismic activities. Policies include promotion of public education (earthquake preparedness), implementation of Uniform Building Code, and require soils reports for new developments to identify potential for liquefaction, expansive soils, ground settlement, and slope failure.

- The Resource Conservation Element includes polices for the preservation and public education of cultural resources in the community.

- The Resource Conservation Element includes an action item to update development standards to limit construction activity and development in buffer zones adjacent to drainages.

- The Community Development Element includes a policy, which requires proponents of new development in rural areas provide a depiction of the 100-year floodplain boundaries under fully developed pre- and post- runoff conditions. Another policy under the "Neighborhoods" section requires flow information be provided for any proposed project which requires a rezoning to increase the allowable residential density; the information must demonstrate their project will not contribute to or worsen flooding problems in the locale.

Citrus Heights Zoning Code, 8/03

The following discussion summarizes elements from the City's Zoning Code that pertain to floodplain management.

Title II: Land Use Zones, Chapter 35, Overlay and Other Zones

- The Flood Overlay Zone is intended to comprise all land covered by rivers, creeks, and streams and land subject to flooding within the City. Requires all buildings and structures within this zone to comply with standards of the City's Drainage Ordinance.

- The Natural Streams Overlay Zone is intended to regulate property within flood prone areas and protect occupants from flood hazards. Further it aims to protect and preserve the natural character and amenities of the Natural Streams, minimize fill in floodplain areas, and enhance water quality entering the Natural Streams. Designated Natural Streams, or portions of streams designated Natural Streams include Arcade Creek, Brooktree Creek, Coyle Creek, Cripple Creek, and Mariposa Creek.

- Development Guidelines for the Natural Streams Overlay Zone require that all new construction within the zone shall have the lowest habitable floor floodproofed or elevated at least **one foot** above the water surface elevation of the 100-year floodplain. Parking lots and driveways shall not be constructed lower than one foot below the 100-year floodplain. Utilities and sanitary facilities are also required to be one foot above the 100-year floodplain, or buried at least 30 inches below grade using watertight construction.

- No new construction is permitted within the **floodway**, with the exception of culverts, bridges, fences, or other similar structures. Placement of fill in the floodplain is also strictly regulated.

Title III: Use Regulations and Development Standards

- The City has adopted special planning area development standards, which for example, are intended to protect and preserve the creeks and floodplains in a natural condition.

Structural Mitigation Capabilities

Emergency Services Mitigation Capabilities

The City is currently writing a Local Emergency Operations Plan.

Previous Mitigation Projects

Sacramento County has been involved with acquisition/relocation projects with repetitive loss properties in Citrus Heights. The repetitive loss map of the Natural Streams watershed in the Sacramento County portion of this plan shows the locations of these properties.

Drainage Improvement Projects

The Sacramento County Public Works Department Water Resources Division (WRD) is currently working on the design of five Capital Improvement Program (CIP) projects for the City of Citrus Heights. The following is a brief description of the drainage problem and proposed solutions for each of the projects.

Debbie Ann Court. Water surging out of the drainage inlet in the backyard of a house on

Debbie Ann Court has caused extensive localized flooding. Possible solutions include: improving drainage inlets throughout the neighborhood, upsizing existing storm drain pipes, and creating an overland release path down the south property line of the affected home to nearby Cripple Creek.

Viscount Way. Three properties located on Viscount Way have reported annual wet weather flooding in the past. This is an on-going drainage problem. Possible solutions include: adding and/or improving drainage inlets throughout the neighborhood, and upsizing existing storm drain pipes.

Guenivere Way/Birdcage Street. Two houses and garages on Guenivere Way experienced flooding in the heavy winter storms of 1986 and 1995. A related flooding problem also occurs at the intersection of Birdcage Street and Macy Plaza Drive. The problem stems primarily from inadequate capacity in the existing storm drain pipe system. Possible solutions include: adding drainage inlets and associated main line piping on Guenivere Way north and west of the flooded residences, improving existing drainage inlets and upsizing existing storm drain pipes to increase flow capacity, and creating an overland release path for the 100-year event between the two affected properties to the intersection of Birdcage Street and Macy Plaza Drive.

HISTORIC PRESERVATION

There are no structures listed on State or Federal Historic Preservation District Registers within Citrus Heights.

DEVELOPMENT TRENDS

Citrus Heights is mostly built-out. According to the Sacramento Area Council of Governments (SACOG) Citrus Height's 2005 population will be 91,350 persons and 35,530 housing units. By 2015 the City will have 91,775 persons and 35,865 housing units and gradually change to 91,124 persons and 35,923 housing units by 2025. This equates to a total housing unit increase of 393 units between 2005-2025.

SINGLE-FAMILY NEW HOUSE CONSTRUCTION BUILDING PERMITS:
CITRUS HEIGHTS

- 1997: 14 buildings, average cost: $116,100
- 1998: 175 buildings, average cost: $102,400
- 1999: 90 buildings, average cost: $169,500
- 2000: 165 buildings, average cost: $181,800
- 2001: 51 buildings, average cost: $188,900
- 2002: 21 buildings, average cost: $147,700
- 2003: 27 buildings, average cost: $146,900

NATURAL RESOURCES IDENTIFIED IN CITRUS HEIGHTS

Although Citrus Heights is largely developed, natural and biological resources remain scattered within the City's boundaries. Generally, the City's biological resources can be found in the Cripple Creek and Arcade Creek riparian areas. The following list was generated from The California Natural Diversity Database and contains all known occurrences of rare plants and animals, and terrestrial and aquatic communities located within the City of Citrus Heights.

- California linderiella
- Sanford's arrowhead

COMMUNITY-SPECIFIC RECOMMENDATIONS

Citrus Heights Action Item #1: *Rinconada Floodwall and Drainage Improvements*

Issue/Background Statement: When Arcade Creek water exceeds its banks numerous houses on Rinconada Drive have reported flooding, with up to two-feet of water invading houses and garages. Property-owners have also reported that the street floods even before nearby Arcade Creek rises. Possible solutions include: adding and/or improving drainage inlets throughout the neighborhood, improving the storm drain pipe system, creating an overland release path to Arcade Creek, and constructing a floodwall along Arcade Creek at the sag of Rinconada Drive.

Other Alternatives Considered (including no action): Elevate homes, construct a floodwall, or construct an upstream peak flow detention basin. If a wall is constructed, analyze the gravity storm drain system to assure that runoff from the neighborhood is rapidly discharged to the stream and does not pond on the dry side of the wall.

Responsible Office/Person: City of Citrus Heights should take the primary lead in determining the extent to which this project is desired. There should be some preliminary estimates available at Sacramento County Department of Water Resources.

Priority (H,M,L): TBD

Cost Estimate/Potential Source of Funding: TBD

Cost-Effectiveness Explanation: TBD

Schedule: TBD

Citrus Heights Action Item #2: *Appleby Way floodwall and drainage improvements*

Issue/Background Statement: Appleby Way is a short seven-lot cul-de-sac in the City, around which Arcade Creek makes a “dog-leg” curve. The 100-year flood plain comes out of the banks of Arcade Creek at this location and crosses over Appleby Way. Also, as the Creek rises above

its banks, it causes water to back up higher in the drainage system. Structure flooding has been reported at a number of the houses on Appleby Way. The Appleby Way project consists of constructing a floodwall along the north side of Arcade Creek. Additional work on the project includes upgrading existing gutter drain inlets and storm drainpipes in the vicinity of the cul-de-sac, and improving the flow capacity in Arcade Creek.

Other Alternatives Considered (including no action):

Responsible Office/Person: City of Citrus Heights should take the primary lead in determining the extent to which this project is desired. There should be some preliminary estimates at Sacramento County Department of Water Resources.

Priority (H,M,L): TBD

Cost Estimate / Potential Source of Funding: TBD

Schedule: TBD

Citrus Heights Action Item #3: *Participate with the development of a seasonal multi-hazard public education campaign to be implemented annually*

Issue/Background Statement: Refer to Section 5-4 Countywide Mitigation Recommendations. Public Education is one of the primary mechanisms in reducing future hazard related losses, and one that is inexpensive in comparison to other mitigation projects. This effort should be coordinated between the many organizations that already have extensive and/or limited programs in place.

The following topics could be addressed through this effort that apply to Citrus Heights:

- Floods
  - Warning system components
  - Regional Evacuation plans/procedures (response to warning)
  - Public Info regarding manhole covers popping off: what they are, what they are for
  - Natural & Beneficial value of floodplains
  - Placing Flood-Depth signs county-wide
- Severe Weather
  - Tree-limb trimming
  - Fog – driving tips
  - Warning (NOAA Weather [All-Hazards] Radio)
- Earthquakes
- Health Hazards (West Nile Virus)
- Water Conservation (In conjunction with existing San Juan WD program effort)
- Develop/enhance Business Continuity Planning
- Conduct disaster exercises
- Train consumers/volunteers to be read to help when disasters strike
- Provide all-hazard curriculum for teachers

Other Alternatives Considered: Do nothing

Responsible Offices/Persons: City & County Emergency Management offices, City & County Floodplain Management Offices, SAFCA, the America Red Cross, Sacramento County Health Department, San Juan Water District, the California Fire Alliance, the Institute of Building and Home Safety, CA-OES, CA-DWR, CA-Reclamation Board and FEMA Region IX.

Priority (H,M,L): High

Cost Estimate / Potential Source of Funding: HMGP

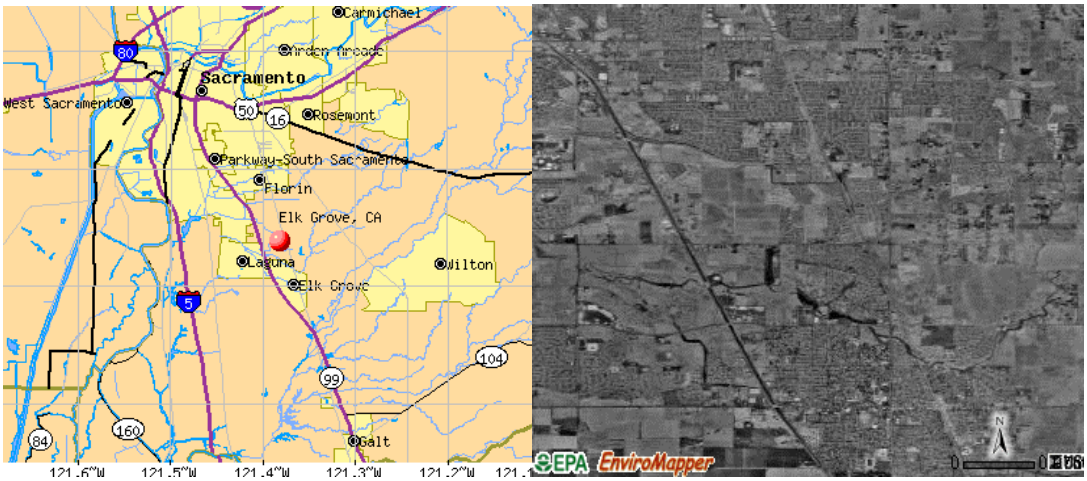
Cost-Effectiveness Explanation: Life Safety and property loss reduction

Schedule: Annually, beginning in 2005

(This page has been intentionally left blank.)

Multi-Hazard Mitigation Plan

6.4 Elk Grove Community Element



CITY OF ELK GROVE COMMUNITY PROFILE

The City of Elk Grove incorporated on July 1, 2000, but its roots trace back to 1850 when it was established as a hotel (photo, right) and stage stop. It is located about 15 miles south of historic Sutter's Fort and thus became a crossroads for business, entertainment, mail service and agriculture. It also served as a home base for miners in nearby communities.

The community is located in the south-central portion of Sacramento County. Despite being close to California's capitol city, Elk Grove has remained independent of Sacramento's growth until the 1980's. Elk Grove started as an agricultural community that continues to contribute to the area's economy with vineyards, diary and cattle and row crops. The City now has high technology, professional service, commercial and retail enterprises in addition to agriculture. ***(Source:*** *http://www.Elkgrovecity.org/*

According to the 2000 Census Elk Grove's population was estimated at 72,665 persons with 23,934 housing units. ***(Source:*** *http://www.sacog.org/)*

TOTAL VALUES AT RISK FROM HAZARDS

The total values at risk from all hazards are presented as a worst-case baseline. Like other values presented in this plan, these are deceptively low because they do not include the values of infrastructure, government and church facilities, or the local economy. 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.

2/3/4PLEX	54,287,824	14,680,825
COMMERCIAL/INDUSTRIAL	1,080,754,061	289,945,530
MULTI-FAMILY	163,996,084	21,629,520
SINGLE FAMILY	9,111,356,261	2,265,507,947
VACANT LAND/AG	321,419,927	317,727,349
ELK GROVE	10,731,814,157	2,909,491,171

Source: *Sacramento County Assessor's Office, Assessments by Land Use; 9-10-04*

The Risk Assessment portion of this plan indicates that Elk Grove does not face a catastrophic natural disaster, so in any given disaster event one could expect the damages to be less than the $10.7 Billion displayed in the table above. However, the risk for Elk Grove varies from the rest of the County within the mapped floodplain due to its different size, and the varying numbers of structures and varying values of those structures. Therefore, the following section takes a closer look at Elk Grove's vulnerability to flooding.

With regards to Critical Facilities, Elk Grove has the following, none of which lie in identified hazard areas:

- Five fire stations
- Police stations (contract with County Sheriff), work out of City Hall, and Sheriff has own facility nearby for other areas of responsibility.
- 22 schools
- One propane distribution facility

Fire protection, as well as parks and recreation services, is provided through the Elk Grove Community Services District. Electricity is supplied by the Sacramento Municipal Utility District (SMUD), which has no major facilities in the City. The County provides wastewater services and Pacific Gas & Electric Company (PG&E) provides natural gas. There are no hospitals in town.

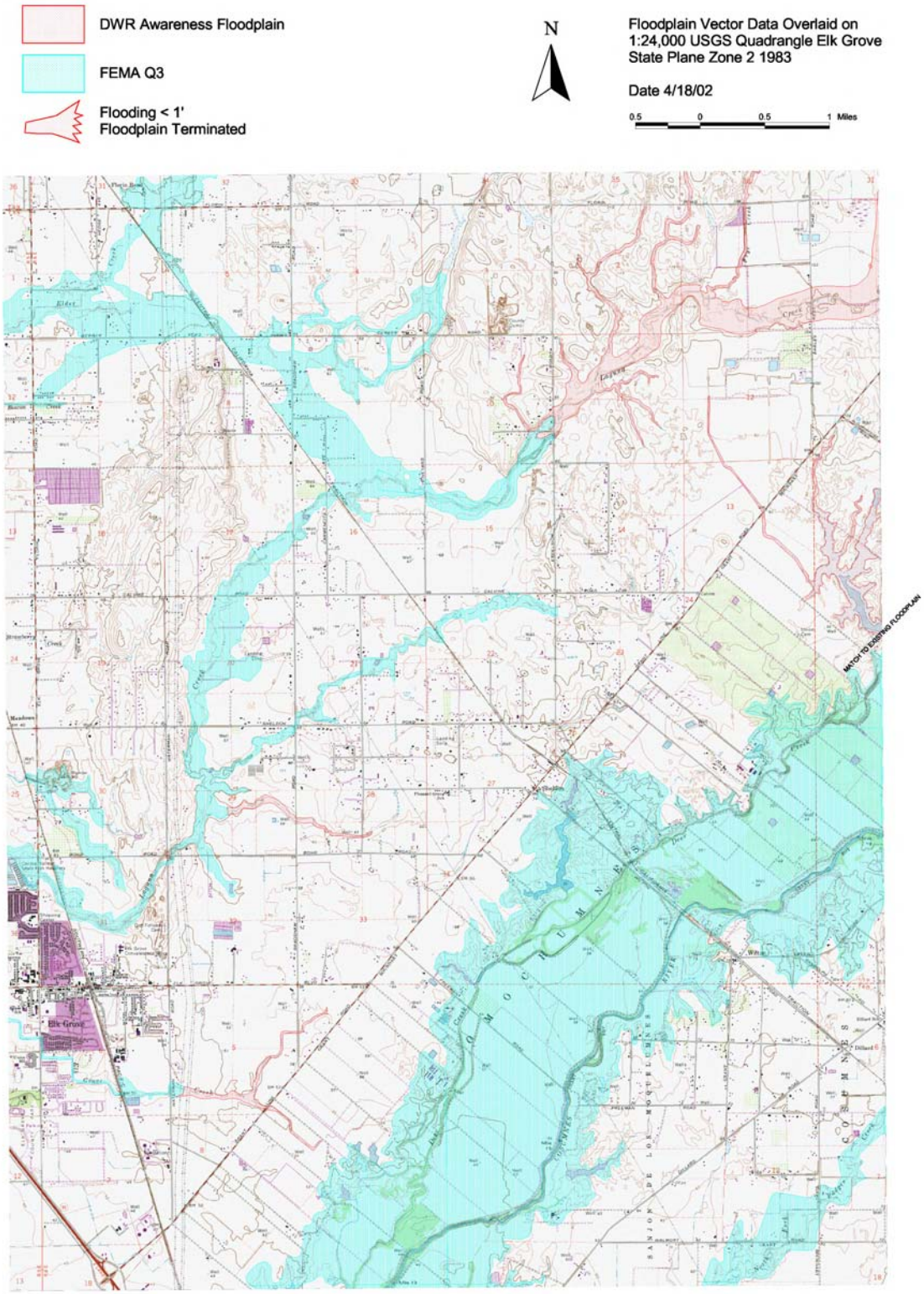
NFIP DATA AND FLOODPLAIN INVENTORY

The City of Elk Grove straddles portions of the Morrison Creek and Delta/Cosumnes River watersheds. Flood problems are typically associated with Laguna Creek and its tributaries. According to the Elk Grove General Plan, flooding affects a large part of the City, primarily in the eastern portion where major drainage facilities have not been built and stormwater flows either in natural channels or small ditches whose capacity is frequently exceeded. In the "Sheldon" area of Elk Grove, local flooding is widespread but generally minor; the flat land causes floodwaters to spread out, reducing threats to life. Along the eastern and southern edges of the community, the Cosumnes River represents a major flood hazard. The Cosumnes River is the last river in California that remains undammed along its entire length, so flooding caused by this river can be extensive.

Utilizing GIS and HAZUS-MH data, the HMPC estimates that there are 2,911 persons and 1,107 structures within the various A Zones of the 100-year floodplain. The types of properties include 1,098 residential, 7 commercial, 1 industrial, and 1 public. The total value of these structures and their contents is estimated to be $305,878,000. A detailed explanation of the methodology used for this vulnerability assessment is discussed in the Sacramento County section of this plan.

NFIP Insurance data indicates that as of 02-29-04, there are 28 flood insurance policies in City of Elk Grove. There have been no claims paid in Elk Grove since the City joined the program in 2002. *Source: FEMA Region IX*

CALIFORNIA DIVISION OF WATER RESOURCES AWARENESS FLOODPLAIN MAP FOR ELK GROVE AND VICINITY



OTHER HAZARDS

There are no other hazard risks within Elk Grove that differ from those facing the rest of the county. Other than flood, there are no other mapped, identified natural hazard areas for the City of Elk Grove. Earthquake shaking from distant sources could cause damage in Elk Grove, though damage would probably be minor due to the relative newness of the building stock and the absence of tall buildings. There is no significant wildland fire hazard.

CAPABILITY ASSESSMENT

Administrative Mitigation Capabilities

The following is a result of an inventory of existing administrative capabilities that can result in the mitigation of natural hazards. Elk Grove's capability assessment matrix reveals that the City's General Plan and Zoning ordinances, and building codes address flooding and seismic hazards. The focused goal of the Safety Element of the City's General Plan is "A safe community, free from manmade and natural hazards."

Action taken by Resolution in 2002 approved participation in the National Flood Insurance Program. This resolution also adopted the Sacramento County Floodplain Management Policies and authorizes the County to be the City's floodplain manager. In addition the City adopted the Sacramento County Floodplain Management Ordinance, the Sacramento County Water Agency Code Title 1 and 2, the Sacramento County Water Agency Engineer's Report for the Formation of Zone 11, the Sacramento County Hydrology Standards, and the Drainage Section of the Sacramento County Improvement Standards.

EXPLANATION OF CAPABILITY ASSESSMENT MATRIX

Does the Community have:

Comp Plan: A Comprehensive Long-Term Community Growth Plan?
Land Use Plan: A plan that designates type of Land Use desired/required; uses Zoning
Subdivision Ordinance: A regulation that dictates lot sizes, density, setbacks and construction type
Zoning Ordinance: An ordinance that dictates type of Use and Occupancy, Implements Land Use Plan
NFIP/FPM Ord: A Floodplain Management Ordinance: Directs development in identified Flood Hazard Areas. Required for Participation in NFIP and Availability of Flood Insurance
Sub. Damage: Does your FPM Ordinance contain language on Substantial Damage/Improvements?
Administrator: Do you have a Floodplain Management Administrator (someone with the responsibility of enforcing the ordinance and providing ancillary services (e.g., map reading, public education)
# of FP Bldgs: How many buildings are in the mapped Floodplain?
# of policies? How many buildings are insured against flood through the NFIP?
# of RL's: # of Repetitive Losses: (Paid more than $1,000, twice in 10 years)
CRS Rating: A Community Rating System rating from the NFIP, and if so, what is it?
BCEGS: A Building Code Effectiveness Grading System Rating
LEOP: A Local Emergency Operations Plan – a disaster RESPONSE plan
HM Plan: A Hazard Mitigation Plan
Warning: Any type of system, such as "Storm Ready" Certification from NWS, NOAA Weather Radio reception, outdoor sirens, Cable (TV) Override, or an Emergency Warning Notification System?
GIS: A Geographic Information System
Structural Protection Projects: (levees, drainage facilities, detention/retention basins)
Property Protection Projects: (buy-outs, elevation of structures, floodproofing, small "residential" levees or berms/floodwalls)
Critical Facility Protection: (for example, protection of power substations, sewage lift stations, water-supply sources, the EOC, police/fire stations or medical facilities that are at risk)
Natural And Cultural Inventory: Do you have an inventory of resources, maps, or special regulations within the community? (wetlands and historic structures/districts, etc.)
Erosion Or Sediment Control: Do you have any projects or regulations in place?
Public Information And/Or Environmental Education Program: Do you have an ongoing program even if its primary focus is not hazards? Examples would be "regular" flyers included in city utility billings, a website, or an environmental education program for kids in conjunction with Parks & Recreation?)

Capability Assessment Matrix

	ELK GROVE
Comp Plan/General Plan	Y
Land Use Plan	Y
Subdivision Ord	Y
Zoning Ordinance	Y
NFIP/FPM Ordinance	Y
- Map Date	Y
- Substantial Damage language?	Y
- Certified Floodplain Manager?	County
- # of Floodprone Buildings?	1,107
- # of NFIP policies	Y
- Maintain Elevation Certificates?	County
- # of Repetitive Losses?	none
CRS Rating, if applicable	N/A
Stormwater Program?	Y
Building Code Version	2001 UBC
Full-time Building Official	Y
- Conduct "as-built" Inspections?	Y
BCEGS Rating	N
Local Emergency Operations Plan	Y
Hazard Mitigation Plan	Y
Warning System in Place?	N
- Storm Ready Certified?	N
- Weather Radio reception?	N
- Outdoor Warning Sirens?	N
- Emergency Notification (R-911)?	N
- Other? (e.g., cable over-ride)	Y
GIS System?	Y
- Hazard Data?	Y
- Building footprints?	N
- Tied to Assessor data?	Y
- Land-Use designations?	Y
Structural Protection Projects	
Property Owner Protection Projects	N
Critical Facilities Protected?	Y
Natural Resources Inventory?	N
Cultural Resources Inventory?	N
Erosion Control procedures?	Y
Sediment Control procedures?	Y
Public Information Program/Outlet	Y
Environmental Education Program?	Y

Zoning Ordinance

The Zoning Code of Elk Grove has the following sections that pertain to floodplain management:

Title II: Land Use Zones, Chapter 35 Special and Combining Land Use Zones
Article 2: (F) Flood (Combining Land Use Zone)
235-10. Purposes

The (F) Combining Zone as shown on the Comprehensive Zoning Plans is intended to comprise all land covered by rivers, creeks, and streams and land subject to flooding within the unincorporated area of the County. The Board of Supervisors in adopting the regulations in this Article recognizes that:

(a) The promotion of the orderly development and beneficial use of lands subject to recurrent flooding is necessary if the potential property damage which results from improper development is to be minimized.
(b) There is a need to protect current and future occupants of land subject to flooding from the physical damage of flooding.
(c) The health, general welfare and safety of the public of the County as a whole requires that lands subject to flooding be strictly regulated as to the uses permitted on the land and the amount of open space which separate buildings and structures.
(d) Inundation frequently causes extensive property damage.
(e) Strict regulation of flood lands is necessary to protect prospective buyers of land from deception as to the utility of the land within the flood zones.

235-11. Prohibition

No building, structure, vehicle, sign, or area in any zone with which the (F) Combining Zone is combined shall be used, nor shall any building, structure, sign, or vehicle be erected, altered, moved, enlarged, or stored in any zone with which the (F) Combining Zone is combined, except as hereinafter specifically provided in this Chapter or elsewhere in this Code; nor shall any area, building, structure, vehicle, or sign be used in any manner so as to create problems inimical to the public health, safety, or general welfare, or so as to constitute a public nuisance. Any building, structure, vehicle, sign, or lot, or the use of any building, structure, vehicle, or lot in any zone with which the (F) Combining Zone is combined shall be regulated and governed by the provisions of this Article, the regulations and provisions applicable to the zone with which the (F) Combining Zone is combined, and the regulations and conditions for each use in Title III of this Code. To the extent of any conflict between the provisions of the zone with which the (F) Combining Zone is combined the provisions of this Article shall prevail.

235-12. Elevations

No building or structure designed for human habitation shall hereafter be erected, altered, moved or enlarged with a first floor elevation lower than required by the Sacramento County Water Agency Drainage Ordinance, and regulations adopted pursuant thereto.

Article 9: (NS) Natural Streams (Combining Land Use Zone)
235-160. Purpose

The Natural Streams (NS) Combining Zone as shown on the Comprehensive Zoning Plans shall be used to regulate property along the designated Natural Streams within the unincorporated area of the County to:

(a) Protect current and future occupants of land subject to flooding from the physical damage of flooding.
(b) Protect property from flood losses and prevent noncompatible development in floodprone areas.
(c) Protect and preserve the natural character and amenities of the Natural Streams.
(d) Minimize the placement of fill in floodplain areas of the Natural Streams.
(e) Protect and enhance the quality of water entering and flowing within the Natural Streams.
(f) Preserve the recreation potential of the Natural Streams

Title III Use Regulations and Development Standards
Chapter 27: Tributary Standards
Article 1: Development Standards for Property Adjacent to Designated Tributaries
327-01. Application

No building or structure shall be erected or maintained within the 100-year floodplain of designated tributaries, as defined in Section 130-53.3, and no lot shall be created unless the standards and requirements set forth in this Article are complied with and maintained.

327-02. Development Standards
The following development standards shall apply to the placement of structures within floodplains of designated tributaries.

(a) All construction except fences shall be located either
    (1) Outside the 100-year floodplain of the tributary, or
    (2) At least twenty-five (25) feet from the center line of the designated tributary and outside the floodway.
(b) All construction shall maintain a habitable finished floor elevation at least one (1) foot above the water surface elevation of the 100-year floodplain.
(c) Fences and other structures such as culverts and bridges which must be constructed within the floodway shall be designed to the requirements of the County Water Resources Division of Public Works so as to prevent an obstruction or diversion of flood and drainage flow and to minimize adverse effects to natural riparian vegetation.
(d) Tributary channels shall remain in their natural state and shall not be altered (i.e., piped or channelized) unless the proposal is heard and approved by the appropriate authority in conjunction with any application for rezone, use permit, special development permit, variance or other similar application. If no such application has

been filed, the proponent of such alteration shall apply for a development plan approval to be heard by the Project Planning Commission.

(e) All proposed projects within designated tributary floodplains shall meet the requirements and regulations set forth in the Tree Ordinance of the Sacramento County Code, Title 19, Chapter 19.04.

(f) No fill shall be permitted within the 100-year floodplain of designated tributaries unless:

(1) The 100-year flood depth prior to the fill is less than two (2) feet,
(2) The fill is for the minimum area to accommodate a structure and allow for a five (5) foot border area which shall have a side slope of 4:1 or flatter when no landscaping or erosion control is provided by the proponent,
(3) There are no trees nine (9) inches in diameter or larger which cannot be successfully transplanted or otherwise protected from the impact of the fill,
(4) The toe of the fill will not encroach within twenty-five (25) feet of the center line of the designated tributary, and
(5) The fill will not result in adverse hydrologic impacts on the stream, as determined by the Water Resources Division.

General Plan Excerpts

The following excerpts from Elk Grove General Plan pertain to floodplain management and public safety.

Conservation and Air Quality Element
Conservation Policies: Flooding and Drainage

CAQ-17 The City recognizes the value of naturally vegetated stream corridors, commensurate with flood control and public acceptance, to assist in removal of pollutants, provide native and endangered species habitat and provide community amenities.

CAQ-18 Post-development peak storm water runoff discharge rates and velocities shall be designed to prevent or reduce downstream erosion, and to protect stream habitat.

CAQ-20 Fill may not be placed in any 100-year floodplain as delineated by currently effective FEMA Flood Insurance Rate Maps or subsequent comprehensive drainage plans unless specifically approved by the City. No fill shall be permitted in wetland areas unless approved by the City and appropriate state and federal agencies.

CAQ-21 Development adjacent to a natural stream(s) shall provide a ‘stream buffer zone’ along the stream. Stream buffer zones should generally measure at least 50 (fifty) feet from the stream centerline (total width of 100) feet or more, depending on the characteristics of the stream.

CAQ-22 Stream crossings shall be minimized and be aesthetically compatible with the natural appearance of the stream channel. The use of bridges and other stream crossings with natural (unpaved) bottoms shall be encouraged to minimize impacts to natural habitat.

CAQ-23 Uses in the stream corridors shall be limited to recreation and agricultural uses compatible with resource protection and flood control measures. Roads, parking, and associated fill slopes shall be located outside of the stream corridor, except at stream crossings.

CAQ-24 Open space lands within a stream corridor shall be required to be retained as open space as a condition of development approval for projects that include a stream corridor. Unencumbered maintenance access to the stream shall be provided.

Open Space Element

PTO-18 To the extent possible, retain natural drainage courses in all cases where preservation of natural drainage is physically feasible and consistent with the need to provide flood protection.

Safety Element: General Policies

SA-3-Action 2 The City shall maintain a database which records, in maps and text, the identified off-site hazards from any reasonably foreseeable events at hazardous facilities in Elk Grove, and shall make this information available to the public.

SA-5 The City will cooperate with other local, regional, state, and federal agencies, and with rail carriers in an effort to secure the safety of all residents and businesses in Elk Grove.

SA-5-Action 1 Establish an Emergency Operations Center (EOC) to coordinate and direct overall emergency response operations. The establishment of the EOC should be coordinated with the Elk Grove Police Department, appropriate City departments, the Elk Grove CSD Fire District, and the County Sheriff's Department.

SA-6 Consider developing and adopting a predisaster ordinance for post-disaster recovery and reconstruction that includes provisions for debris clearance, damage assessment, demolitions, re-occupancy and building moratorium criteria, fee waivers and deferrals, and expedited permitting procedures for repair and reconstruction.

Safety Policies: Drainage and Flooding

The City opposes the construction of flood control facilities, which would alter or reduce flows in the Cosumnes River and supports retention of the Cosumnes River floodplain in non-urban uses consistent with location in an area subject to flooding.

SA-16 A buildable area outside the 100-year floodplain must be present on every residential lot sufficient to accommodate a residence and associated structures. Fill may be placed to create a buildable area only if approved by the City and in accordance with all other applicable policies and regulations.

SA-18 Creation of lots whose access will be inundated by flows resulting from a 10-year or greater storm shall not be allowed. Bridges or similar structures may be used to provide access over creeks or inundated areas, subject to applicable local, state, and federal regulations.

SA-19-Action 1 Lots or parcels which will contain two or more buildable areas on both sides of a creek or floodplain shall be discouraged.

SA-21 Where necessary due to clear dangers to life or property, the City will support the construction of flood control projects.

SA-21-Action 1 The City will participate through the Sacramento Area Flood Control Agency in obtaining federal authorization for construction of a backbone flood control project along the Sacramento River and the immediate …

SA-21-Action 2 The City will continue local efforts that encourage implementation of the Federal Flood Insurance Program.

SA-22 New and modified bridge structures shall not cause an 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.

SA-23 The City 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.

Safety Policies: Geologic and Seismic Hazards

SA-25 The City supports efforts by Federal, State, and other local jurisdictions to investigate local seismic and geological hazards and support those programs that effectively mitigate these hazards.

SA-25-Action 1 Implement the Uniform Building Code to ensure that structures meet all applicable seismic standards.

SA-26 The City shall seek to ensure that new structures are protected from damage caused by geologic and/or soil conditions.

SA-26 Action 1 Require that a geotechnical report or other appropriate analysis be conducted to determine the shrink/swell potential and stability of the soil for public and private construction projects and identifies measures necessary to ensure stable soil conditions.

Safety Policies: Fire Protection

SA-32 Cooperate with the Elk Grove Community Services District (EGCSD) Fire Department to reduce fire hazards, assist in fire suppression, and promote fire safety in Elk Grove.

Structural Mitigation Capabilities

Recent annexation of the area known as Laguna West has resulted in the City inheriting about six miles of local levees from Sacramento County near I-5 and the City's western boundary.

Emergency Services Mitigation Capabilities

The City has an "Emergency Flood Control Plan" that details contact numbers and actions to take during a flood emergency.

All of the City's building inspectors are state-qualified "Disaster Service Workers", which is a mutual aid program managed by State OES through the California Building Officials Organization (CALBO).

HISTORIC PRESERVATION

There are two sites within Elk Grove listed on the National Register of Historic Places. On March 1, 1988, Old Town Elk Grove became nationally recognized as the Elk Grove Historic District on the National Register of Historic Places. There are 3 State Historic Landmarks within the City. Also, 93 Native American archaeological sites have been identified in the Elk Grove Planning area.

State and Federal Historic Preservation District Registers
Elk Grove Historic District (added 1988 - **District** - #87002410)
Also known as **Old Elk Grove; Old Town Elk Grove**
8986--9097 Elk Grove Blvd. also School, Gage and Grove Sts., Elk Grove
Source: http://www.nationalregisterofhistoricplaces.com/CA/Sacramento/state.html

Historic Resource Policies (from General Plan)

HR-1 Encourage the preservation and enhancement of existing historical and archaeological resources in the City.

HR-1-Action 1 Develop and update a comprehensive Historic Resource inventory using the National Register, the California Register, California Historical Landmarks, California Points of Historical Interest, and any other structures or properties the City Council determines to have historic value. The Inventory should contain a map that shows the location of all of the structures with a historically significant designation, and a list of all of the historically significant structures within Elk Grove.

Old Town Special Planning Area. In 1985, Sacramento County adopted the Elk Grove Old Town Special Planning Area (SPA) Ordinance, to serve as the guiding policy document for the historic area.

DEVELOPMENT TRENDS

Elk Grove is a growing community. According to the Sacramento Area Council of Governments (SACOG) Elk Grove's population will increase to 168,465 persons by 2025. Total housing units are estimated to be 61,759 in 2025, an increase of 36,942 units from the year 2000 estimate of 24,817. One of the reasons that Elk Grove incorporated in 2000 was to better manage the community's growth. The City Council passed a Growth Management Policy in June 2004 to ensure that future development is consistent with the adopted General Plan and implementation measures.

The City General Plan envisions the potential for converting some additional lands from agriculture to urban uses in the "Urban Study Areas" east of Grant Line Road and south of Kammerer Road that as of 2002 were outside of the city limits. Although not within the current incorporated boundaries of Elk Grove, a portion of the Sacramento River Delta is inside the larger Planning Area of the General Plan. Therefore, the City's long-term land use policies will require coordination with the Delta Protection Commission (a state agency) once these lands are included within the corporate boundary of Elk Grove.

In 2000-02 about 375 acres were urbanized in the Lakeside Community area of Elk Grove, including new Elliott Ranch Elementary School, AAA Call Center building, and housing. *(Source: CA Dept of Conservation)*

Recent Building Permit Data for Elk Grove

Single-family new house construction building permits

- 2002: 804 buildings, average cost: $212,700
- 2003: 3,716 buildings, average cost: $239,000

Buses Example of Elk Grove's Municipal Destiny
http://www.sacbee.com/content/news/story...

"The vehicles Elk Grove plans to unveil for its downtown Sacramento routes are billed as among the most advanced on the road. Running on hybrid gasoline-electric engines, they promise a smoother ride and some of the lowest emissions in public transportation. They will be equipped for eventual wireless Internet access. They'll feature reclining seats and individual tray tables… And they'll offer on-board satellite TV, allowing Brown and anyone else to use a headset receiver to hear the televised broadcasts on designated frequencies… These upscale buses and the new service that begins Jan. 2 are the latest example of Elk Grove's attempt to carve out its own municipal destiny. The city has abandoned the garbage company it inherited when it incorporated four years ago, is re-evaluating its police services contract and soon may buy a local water district." (Sacramento Bee 10/3/04)

NATURAL RESOURCES IDENTIFIED IN ELK GROVE

The following list was generated from The California Natural Diversity Database and contains all known occurrences of rare plants and animals, and terrestrial and aquatic communities located within the City of Elk Grove.

CITY OF ELK GROVE

- Boggs Lake hedge-hyssop
- California linderiella
- Northern Hardpan Vernal Pool
- Sanford's arrowhead
- Swainson's hawk
- Dwarf downingia
- Giant garter snake
- Legenere
- Midvalley fairy shrimp
- Northwestern pond turtle
- Tri-colored blackbird
- Vernal pool fairy shrimp
- Vernal pool tadpole shrimp

COMMUNITY-SPECIFIC RECOMMENDATIONS

Elk Grove Action Item #1: *Participate with the development of a seasonal multi-hazard public education campaign to be implemented annually.*

Issue/Background Statement: Refer to Section 5-4 Countywide Mitigation Recommendations. Public Education is one of the primary mechanisms in reducing future hazard related losses, and one that is inexpensive in comparison to other mitigation projects. This effort should be coordinated between the many organizations that already have extensive and/or limited programs in place.

The following topics could be addressed through this effort that apply to Elk Grove:

- Floods
  - Warning system components
  - Regional Evacuation plans/procedures (response to warning)
  - Public Info regarding manhole covers popping off: what they are, what they are for
  - Natural & Beneficial value of floodplains
  - Placing Flood-Depth signs county-wide
- Severe Weather
  - Tree-limb trimming
  - Fog – driving tips

    - Warning (NOAA Weather [All-Hazards] Radio)
- Earthquakes
- Health Hazards (West Nile Virus)
- Water Conservation (In conjunction with existing San Juan WD program effort)
- Develop/enhance Business Continuity Planning
- Conduct disaster exercises
- Train consumers/volunteers to be read to help when disasters strike
- Provide all-hazard curriculum for teachers

Other Alternatives Considered: Do nothing

Responsible Offices/Persons: City & County Emergency Management offices, City & County Floodplain Management Offices, SAFCA, the America Red Cross, Sacramento County Health Department, San Juan Water District, the California Fire Alliance, the Institute of Building and Home Safety, CA-OES, CA-DWR, CA-Reclamation Board and FEMA Region IX.

Priority (H,M,L): High

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

Cost-Effectiveness Explanation: Life safety, hazard loss reduction

Schedule: 2005

Elk Grove Action Item # 2: *Fully implement the Elk Grove General Plan Safety Element policies # SA-5 and SA-6.*

Issue Statement: Policy SA-5 establishes the effort to secure the safety of all residents and businesses in Elk Grove, and includes the development of an Emergency Operations Center (EOC). Policy SA-6 considers developing and adopting a pre-disaster ordinance for post-disaster recovery and reconstruction that includes provisions for debris clearance, damage assessment, demolitions, re-occupancy and building moratorium criteria, fee waivers and deferrals, and expedited permitting procedures for repair and reconstruction. Both of these policies would be beneficial to the overall mitigation effort.

Other Alternatives Considered: No Action

Implementation Manager: Elk Grove City Council

Priority (H,M,L): High

Cost Estimate: EOC: TBD; The pre-disaster ordinance only requires staff time

Cost-Effectiveness Explanation: The benefit of the EOC is in a coordinated and effective response to any emergency event, which in turn reduces losses. An effective response

establishes the credibility and foundation for additional efforts to minimize the impacts of any emergency event, such as those proposed in the pre-disaster ordinance.

Schedule: TBD

Elk Grove Action Item # 3*: Participate with Sacramento County in achieving Storm-Ready certification by the National Weather Service.*

Issue Statement: Storm-Ready certification recognizes a community's ability to understand and disseminate weather warning information. It is a relatively low cost effort that can provide the "lead time" necessary to save lives and reduce property damage from severe meteorological events. The Capability Assessment for Elk Grove revealed that there is currently little institutionalized warning capability.

Other Alternatives Considered: No Action

Implementation Manager: Elk Grove Emergency Manager (or designee) in conjunction with the Sacramento County Sheriff's Department, OEM.

Cost Estimate: TBD

Cost-Effectiveness Explanation: Life safety, reduced property losses resulting from improved warning

Schedule: 2005

Elk Grove Action Item # 4: *Promote and support the purchase of flood insurance by the owners of structures within the mapped 100-year floodplains. Sponsor "Lenders" and "Agents" Flood Insurance Workshops if provided.*

Issue Statement: The HMPC research efforts estimate that there are 1107 structures within the 100-year floodplains of Elk Grove, yet only 28 flood insurance policies in force. While there may be an explanation for some of this disparity, it is likely that there are property owners that could benefit from having this insurance, and others that may be required to own it.

Other Alternatives Considered: No Action

Implementation Manager: Elk Grove Floodplain Administrator in conjunction with Sacramento County Department of Water Resources

Cost Estimate: TBD. Developing/mailing a letter to the structure owners would cost less than $500 not including staff time. There is no cost to host the Lender and Agent NFIP workshops.

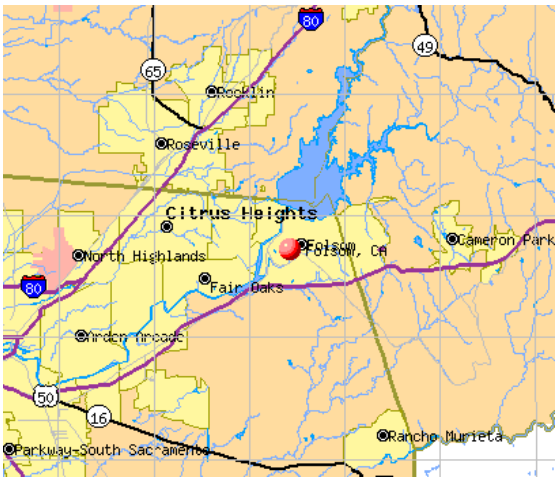
Cost-Effectiveness Explanation: Increased insurance coverage; improved compliance with Mandatory Purchase requirements; Continuing education benefits to insurance agents and banking lenders.

Schedule: 2005

(*This page has been intentionally left blank.)*

Multi-Hazard Mitigation Plan

6.5 Folsom Community Element



CITY OF FOLSOM COMMUNITY PROFILE

Folsom is conveniently located 20 miles east of California's state capitol in Sacramento and about halfway between San Francisco and Lake Tahoe. Folsom is bordered on the north by Folsom Lake, an 18,000-acre lake that draws more than two million visitors a year. The town also is intersected by a wide stretch of the American River called Lake Natoma, which is ringed by walking, biking and equestrian trails. Folsom has miles of preserved wetlands and creeks which are bordered by developed trails.

Folsom is approximately 15,170 acres or 24 square miles in size and single family residential zoning comprises 26 percent of the developed land. Folsom has experienced a stead population growth. Currently, the City has 57,233 residents (63,800 including prison inmates), and is expected to reach a build-out population of about 69,333 residents by 2009.

Originally a gold mining town and the site of the first passenger train terminal west of the Rockies, Folsom is steeped in a rich and colorful history. The town served as a transportation hub to the mother lode during the Gold Rush. In 1860 and 1861, Folsom was the western terminus of the Pony Express. Today, Folsom's historic district consists of fine homes and landmarks from this era, as well as the City's original downtown, now an eclectic collection of antique stores, gift shops and restaurants.

TOTAL VALUES AT RISK FROM HAZARDS

The total values at risk from all hazards are presented as a worst-case baseline. Like other values presented in this plan, these are deceptively low because they do not include the values of infrastructure, government and church facilities, or the local economy. 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.

	Total Value	Land Value
2/3/4PLEX	35,103,215	10,679,684
COMMERCIAL/INDUSTRIAL	1,491,913,066	335,011,319
MULTI-FAMILY	397,618,828	53,828,607
SINGLE FAMILY	4,970,993,698	1,284,266,696
VACANT LAND/AG	219,459,030	216,493,417
FOLSOM	7,115,087,837	1,900,279,723

Source: *Sacramento County Assessor's Office, Assessments by Land Use; 9-10-04*

The Risk Assessment portion of this plan indicates that Folsom does not face a catastrophic natural disaster so damage during any given disaster event would be less than the $7.1 Billion displayed. However, the risk for Folsom varies from the rest of the County within the mapped floodplain due to its different size, and the varying numbers of structures and varying values of those structures. Therefore, the following section takes a closer look at Folsom's vulnerability to flooding.

With regards to Critical Facilities, Folsom has the following, none of which lie in identified hazard areas:

- Four fire stations
- 14 schools
- One hospital (Mercy Hospital)

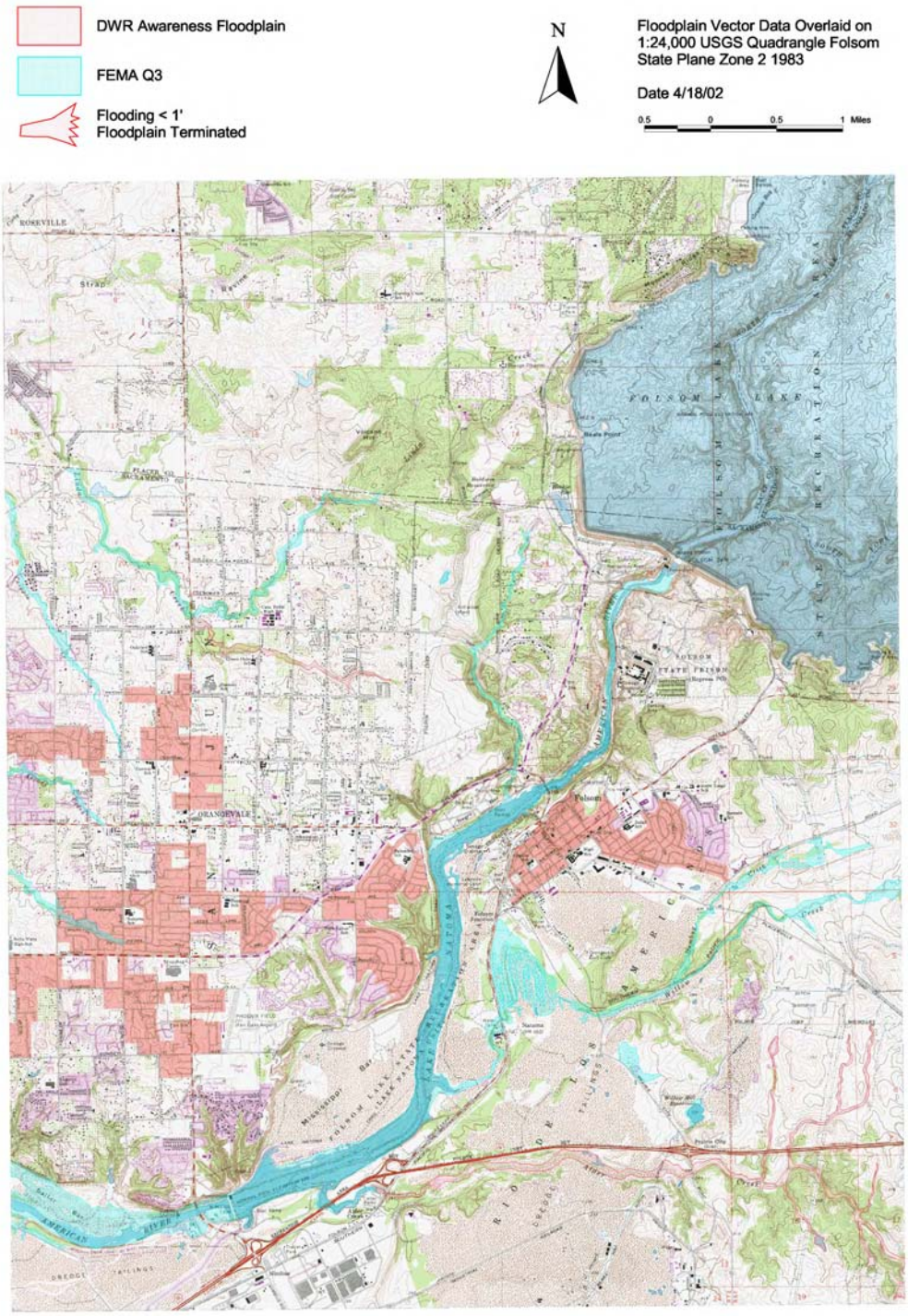
NFIP DATA AND FLOODPLAIN INVENTORY

Folsom lies within the Natural Streams Group watershed and includes the main stem of the American River and its tributaries. Flood risks are associated with the American River and Willow and Humbug creeks.

A flood vulnerability model that utilized GIS and HAZUS-MH data calculated approximately 7,381 persons and 426 structures within the various A Zones of the 100-year floodplain. The types of properties include 414 residential, eight commercial, one industrial, and three public. The total value of these structures and their contents is estimated to be $627,019,000. A detailed explanation of the methodology used for this vulnerability assessment is discussed in the Sacramento County section of this plan.

NFIP Insurance data indicates that as of 02-29-2004, there are 71 flood insurance policies in the City of Folsom. There have also been 22 claims for properties located within the mapped floodplain for a total of $402,195

CALIFORNIA DIVISION OF WATER RESOURCES AWARENESS FLOODPLAIN MAP FOR FOLSOM AND VICINITY



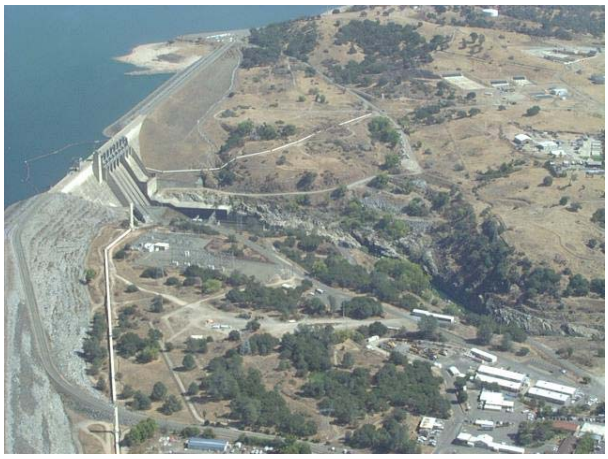
Vulnerability to Dam Failure

Despite its location just below Folsom Reservoir, Folsom is relatively protected from a dam failure inundation flood since most of the flows would be confined to the narrow American River Canyon. Emergency access to and across the canyon would be severely limited during an event. The City's General Plan recommends that evacuation plans and the movement of emergency equipment and materials need to be coordinated with surrounding agencies and communities.

Folsom Dam Construction, 1955

Folsom Dam Floodgate Failure, 1995

Source: www.myfolsom.com/historicalphotos.shtml



Source: *HMPC photos, September 2004*

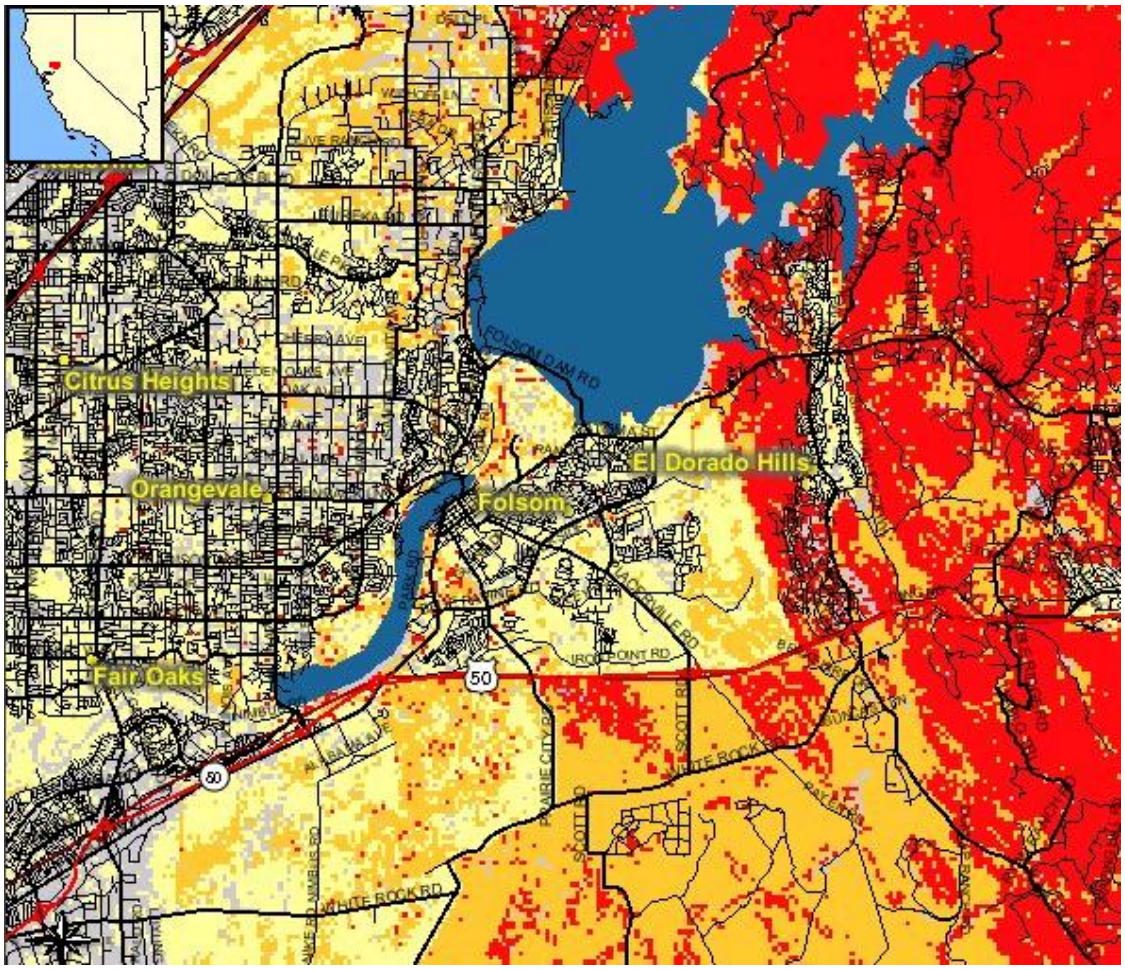
However, in addition to Folsom Dam, there are a series of earth dams or dykes that have also created Folsom Lake. These dykes form most of the northern boundary of the City. Failure of any of these facilities has the potential to cause significant property damage and loss of life in the City. The degree of impact would be affected by the water level of the lake at the time of failure.

In a sudden failure, there would be little warning and evacuation time. In a gradual failure, there should be at least several hours warning time. If a failure were to occur, the most likely cause would be a situation where there is more water coming into the lake than the spillways can handle, causing overtopping of the dykes. Over topping can cause erosion of the dyke, resulting in gradual failure. A more detailed discussion can be found in the City's Local Emergency Management Plan.

Vulnerability to Wildfires

The planning process identified Folsom as having the greatest density of housing subject to wildfire within Sacramento County. The map below was created from the California Fire Alliance website and shows the fire threat in the Folsom area. Deeper shades of red indicate a higher fire threat along the eastern and southern city limits.

Wildland Fire Threat Map – Folsom Area



Source: http://wildfire.cr.usgs.gov/fireplanning/ interactive web map

CAPABILITY ASSESSMENT -

A capability assessment revealed several resources the City of Folsom has in-place to help reduce risk of natural hazards including: a certified floodplain manager; cable override emergency notification system; few buildings located in the floodplain; detention ponds; and important public emergency information online with contacts for police and fire departments; an online "family disaster plan"; and a recently adopted Local Emergency Management Plan (4/27/04).

EXPLANATION OF CAPABILITY ASSESSMENT MATRIX

Does the Community have:

Comp Plan: A Comprehensive Long-Term Community Growth Plan?
Land Use Plan: A plan that designates type of Land Use desired/required; uses Zoning
Subdivision Ordinance: A regulation that dictates lot sizes, density, setbacks and construction type
Zoning Ordinance: An ordinance that dictates type of Use and Occupancy, Implements Land Use Plan
NFIP/FPM Ord: A Floodplain Management Ordinance: Directs development in identified Flood Hazard Areas. Required for Participation in NFIP and Availability of Flood Insurance
Sub. Damage: Does your FPM Ordinance contain language on Substantial Damage/Improvements?
Administrator: Do you have a Floodplain Management Administrator (someone with the responsibility of enforcing the ordinance and providing ancillary services (e.g., map reading, public education)
# of FP Bldgs: How many buildings are in the mapped Floodplain?
# of policies? How many buildings are insured against flood through the NFIP?
# of RL's: # of Repetitive Losses: (Paid more than $1,000, twice in 10 years)
CRS Rating: A Community Rating System rating from the NFIP, and if so, what is it?
BCEGS: A Building Code Effectiveness Grading System Rating
LEOP: A Local Emergency Operations Plan – a disaster RESPONSE plan
HM Plan: A Hazard Mitigation Plan
Warning: Any type of system, such as "Storm Ready" Certification from NWS, NOAA Weather Radio reception, outdoor sirens, Cable (TV) Override, or an Emergency Warning Notification System?
GIS: A Geographic Information System
Structural Protection Projects: (levees, drainage facilities, detention/retention basins)
Property Protection Projects: (buy-outs, elevation of structures, floodproofing, small "residential" levees or berms/floodwalls)
Critical Facility Protection: (for example, protection of power substations, sewage lift stations, water-supply sources, the EOC, police/fire stations or medical facilities that are at risk)
Natural And Cultural Inventory: Do you have an inventory of resources, maps, or special regulations within the community? (wetlands and historic structures/districts, etc.)
Erosion Or Sediment Control: Do you have any projects or regulations in place?
Public Information And/Or Environmental Education Program: Do you have an ongoing program even if its primary focus is not hazards? Examples would be "regular" flyers included in city utility billings, a website, or an

Capability Assessment Matrix

	FOLSOM
Comp Plan/General Plan	Y
Land Use Plan	Y
Subdivision Ord	Y
Zoning Ordinance	Y
NFIP/FPM Ordinance	Y
- Map Date	various
- Substantial Damage language?	Y
- Certified Floodplain Manager?	Y
- # of Floodprone Buildings?	0
- # of NFIP policies	0
- Maintain Elevation Certificates?	N
- # of Repetitive Losses?	0
CRS Rating, if applicable	N/A
Stormwater Program?	Y
Building Code Version	1997 UBC
Full-time Building Official	Y
- Conduct "as-built" Inspections?	Y
BCEGS Rating	Y - 6
Local Emergency Operations Plan	Y
Hazard Mitigation Plan	N
Warning System in Place?	N
- Storm Ready Certified?	N
- Weather Radio reception?	N
- Outdoor Warning Sirens?	N
- Emergency Notification (R-911)?	N
- Other? (e.g., cable over-ride)	Y- Cable over-ride
GIS System?	limited
- Hazard Data?	N
- Building footprints?	N
- Tied to Assessor data?	N
- Land-Use designations?	N
Structural Protection Projects	Y- detention ponds
Property Owner Protection Projects	N/A
Critical Facilities Protected?	Y
Natural Resources Inventory?	various
Cultural Resources Inventory?	various
Erosion Control procedures?	Y
Sediment Control procedures?	Y
Public Information Program/Outlet	Y
Environmental Education Program?	Y

General Plan

Folsom's General Plan (1988) is a long-term policy guide for the physical, economic and environmental growth of the City. The plan's Safety Element aims at reducing death, injuries, damage to property and economic and social dislocation resulting from fire, flood and geological hazards. The plan is in the process of being updated. The following policies related to hazard mitigation are listed in the plan:

Goal 29: To protect lives and property from unacceptable risks resulting from natural or manmade hazards.

Policy 29.3 The City shall develop standards for building within the 100-year floodway to assure that the water flows above stream and downstream from a property will not be altered from existing levels.

Policy 29.4 The City shall work with the U.S. Army Corp of Engineers in developing standards for development within the inundation boundary resulting from a failure of Folsom Dam or the dikes retaining Folsom Lake.

Municipal Code (3/04) Excerpts

Health, Sanitation and Welfare, Title 8

- Chapter 8.36, Fire Protection. This chapter describes that buildings in outlying districts require inspections by the fire chief at least twice per year and buildings in closely built portions of the City of Folsom at least four times per year (with the exception of the interior of private dwellings).

- Chapter 8.70, Stormwater Management and Discharge Control. The purpose of this chapter is to protect and enhance the water quality of watercourses, water bodies within the City. Includes policies to limit urban pollutants to stormwater runoff.

Floodplain Management Ordinance (Buildings and Construction, Title 14; Chapter 14.32, Flood Damage and Prevention)

This chapter is very similar to the City of Sacramento's floodplain management ordinance and includes some identical policies. This chapter aims to minimize public and private losses due to flood conditions. It includes standards for preventing flood damage for the following: construction, utilities, subdivisions, manufactured homes, recreation vehicles, and floodways. It requires that residential construction, new or substantial improvement, shall have the lowest floor, including basement, elevated at least **two feet** above the flood elevation. Further, the elevation of the lowest floor must be certified by a California registered professional engineer or land surveyor and verified by the chief building official.

Subdivision Ordinance, Title 16

Section 16.16.040, Geotechnical reports. This section requires that an engineer's soils report and engineering geology report, prepared by a civil engineer and engineering geologist registered in the state and based upon adequate borings, shall be submitted to the city engineer for subdivisions of five or more parcels. The city engineer may require that such reports be submitted for subdivisions of four or less parcels.

Zoning Ordinance, Title 17

- Chapter 17.39, Open Space and Conservation District, permitted land uses include river or stream courses and floodplain areas;

- Chapter 17.52, Historical District, aims to preserve and enhance the atmosphere of the historic district as it developed between 1850 and 1950;

- Chapter 17.74, RMH, Trailers and Trailer Parks. Construction standards require that adequate underground storm drains be provided to prevent flooding of mobile home sites; and

- Chapter 17.95, Drainage Facility Improvement Charges, states, "The city council declares and finds that it is necessary to adopt and establish the entire city as a zone for the improvement and construction of trunk and collection drainage facilities, including waterways, pumping plants, levees and other facilities utilized for controlling drainage and storm waters within the city in order to promote and protect the public health, safety, comfort, convenience and general welfare from uncontrolled drainage and storm water. The fee for residential structures is $540 per dwelling unit; fee for commercial, industrial, other is $3,280 per acre."

Hillside Development Guidelines (2/14/95)

- The City of Folsom has developed Hillside Development Guidelines in order to prepare applicants with site design, architectural design, and landscape design concepts encouraged by the City and are utilized to evaluate compliance with the City's Hillside Ordinance. The Guidelines include requirements for grading, drainage, and landscape measures to be incorporated for hillside development.

Local Emergency Management Plan (4/27/04)

- The City of Folsom adopted a new Local Emergency Management Plan on 4/27/04.

HISTORIC PRESERVATION

Folsom has a large number of historic structures. The following are listed on State and Federal Historic Preservation District Registers:

Chung Wah Cemetery (added 1995 - **Site** - #95000999)
Also known as **Sze Yup--Sam Yup Cemetery**
Mormon St. vicinity, near Lake Natoma, Folsom

Cohn House (added 1982 - **Building** - #82002228)
305 Scott St., Folsom

Folsom Depot (added 1982 - **Site** - #82002229)
200 Wool St., Folsom

Folsom Powerhouse (added 1973 - **Building** - #73000426)
Off Folsom Blvd. in Folsom Lake State Recreation Area, Folsom

Natoma Ground Sluice Diggings (added 1990 - **Site** - #90000682)
Also known as **Chinese Diggings**
US 50 and Folsom Blvd., Folsom
Source: http://www.nationalregisterofhistoricplaces.com/CA/Sacramento/state.html

NATURAL RESOURCES IDENTIFIED IN FOLSOM

The following list was generated from The California Natural Diversity Database and contains all known occurrences of rare plants and animals, and terrestrial and aquatic communities located within Folsom city limits.

City of Folsom

- Northern Hardpan Vernal Pool
- Sacramento orcutt grass
- Valley Needlegrass Grassland
- Great blue heron
- Great egret
- Northwestern pond turtle
- Tri-colored blackbird
- Valley elderberry longhorn beetle
- Vernal pool fairy shrimp

DEVELOPMENT TRENDS

Folsom has been growing steadily at approximately five to seven percent over the past five years. *Source: www.folsom.ca.us* The relatively undeveloped character of the outlying city limits and proximity to the City of Sacramento has driven the recent growth. According to SACOG, Folsom will grow to 76,333 residents and 29,000 housing units by 2015. That is an increase of 13,433 people and 6967 housing units over the 2005 estimate of 62,900 persons and 22,033 housing units. *Source: www.sacog.org*

Folsom is experiencing rapid retail growth along Highway 50 and East Bidwell Street in southeastern Folsom. The table below documents the general rate of residential growth over the past 8 years.

Single-family new house construction building permits: **FOLSOM**

- 1996: 628 buildings, average cost: $188,200
- 1997: 826 buildings, average cost: $184,900
- 1998: 934 buildings, average cost: $203,300
- 1999: 1087 buildings, average cost: $216,900
- 2000: 1243 buildings, average cost: $222,400
- 2001: 867 buildings, average cost: $218,100
- 2002: 615 buildings, average cost: $233,500
- 2003: 734 buildings, average cost: $248,900

COMMUNITY-SPECIFIC RECOMMENDATIONS

Folsom Action Item #1: Encourage Defensible space practices

Issue/Background Statement: Good defensible space practices reduce fire potential and increases chances to save structures from fire damage.

Other Alternatives Considered (including No Action): No action.

Responsible Office/Person: City Fire Department

Priority (H, M, L): Medium

Cost Estimate/Potential Source of Funding: City staff time

Cost-Effectiveness Explanation: Property loss reduction

Schedule: Annually, prior to fire season

Folsom Action Item #2: Develop Emergency Ingress/Egress Plans

Issue/Background Statement:
Dam failure flooding or wildfires could cause problems with emergency vehicle ingress/egress and evacuations unless adequate plans are developed.

Other Alternatives Considered (including No Action) None.

Responsible Office/Person: Police and Fiore Departments along with Public Works Department

Priority (H, M, L): Low

Cost Estimate/Potential Source of Funding: City staff time

Cost-Effectiveness Explanation: Life Safety

Schedule: 2005/2006

Folsom Action Item #3: Enforce subdivision regulations regarding the following:

- Water
- Access
- Defensible space
- Fencing
- Firebreaks
- Non-combustible materials

Issue/Background Statement: To ensure the quality of life to city residents and reduce future fire related losses, these measures are needed as part of the process for new development.

Other Alternatives Considered (including No Action): None

Responsible Office/Person: Community Development Department

Priority (H, M, L): Medium

Cost Estimate/Potential Source of Funding: City staff time; Developer

Cost-Effectiveness Explanation: Costs are developer's responsibilities.

Schedule: On-going enforcement

Folsom Action Item #4: Investigate joining the California Fire alliance (See State Hazard Mitigation Plan, Appendix #10)

Issue/Background Statement: Many communities in surrounding counties have found it very useful to join the California Fire Alliance. The Alliance helps local fire departments identify hazards, educate property owners, and develop plans for hazard reduction activities such as fuels management programs (thinning).

Other Alternatives Considered (including No Action): No action

Responsible Office/Person: City Fire Department

Priority (H, M, L): Low: Waiting for Fire Department feedback

Cost Estimate/Potential Source of Funding: Existing Fire Department budget

Cost-Effectiveness Explanation: Life Safety and reduced fire losses

Schedule: 2005

Folsom Action Item #5: Participate with the development of a seasonal multi-hazard public education campaign to be implemented annually

Issue/Background Statement: Refer to Section 5-4 Countywide Mitigation Recommendations. Public Education is one of the primary mechanisms in reducing future hazard related losses, and one that is inexpensive in comparison to other mitigation projects. This effort should be coordinated with the organizations that already have extensive and/or limited programs in place.

The following topics could be addressed through this effort that apply to Folsom:

- Floods
  - Warning system components
  - Regional Evacuation plans/procedures (response to warning)
  - Public Info regarding manhole covers popping off: what they are, what they are for
  - Natural & Beneficial value of floodplains
  - Placing Flood-Depth signs county-wide
- Severe Weather
  - Tree-limb trimming
  - Fog – driving tips
  - Warning (NOAA Weather [All-Hazards] Radio)
- Wildfire (defensible space, subdivision regulations, ingress/egress, severe fire hazard mapping)
- Earthquakes
- Health Hazards (West Nile Virus)
- Water Conservation
- Develop/enhance Business Continuity Planning
- Conduct disaster exercises
- Train consumers/volunteers to be ready to help when disasters strike
- Provide all-hazard curriculum for teachers

Other Alternatives Considered: Do nothing

Responsible Offices/Persons: City & County Emergency Management offices, City & County Floodplain Management Offices, SAFCA, the America Red Cross, Sacramento County Health Department, the California Fire Alliance, the Institute of Building and Home Safety, CA-OES, CA-DWR, CA-Reclamation Board and FEMA Region IX.

Priority (H,M,L): Medium

Cost Estimate/Potential Source of Funding: City staff time, plus funds for printing and distribution; up to $15,000/year

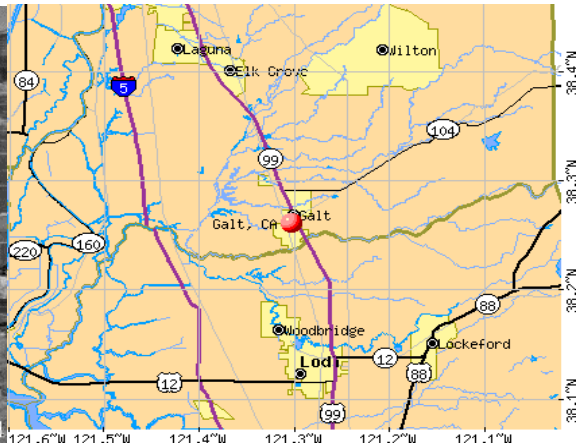
Cost-Effectiveness Explanation: Life Safety, reduced losses

Schedule: Start in 2005

(*This page has been intentionally left blank.)*

Multi-Hazard Mitigation Plan

6.6 Galt Community Element



CITY OF GALT COMMUNITY PROFILE

In the early 1850's, a man named Mr. Fuggitt founded a settlement which he called Liberty, after his hometown in Missouri. It served as a stopping place for freight haulers who had to rest their horses on their way to the mother lode, taking supplies brought up river by ship from San Francisco. In 1861, Liberty was appointed as a stagecoach stop for the line that brought people from Stockton to Sacramento. Liberty was a part of a federal land grant comprised 32,000 acres and stretched from the Cosumnes to the north, to the Mokelumne River to the south.

In 1869, Dr. Harvey was successful in getting the Central Pacific Railroad to lay track near his property, a mile north of Liberty. Dr. Harvey saw a need to build a town along the right-of-way of the railroad track, and so he built his town according to the laws of 1869, which stated that anyone could create a town by having the area surveyed and selling lots. The town was named by John McFarland, a successful rancher, after a town in Canada, Gault, and Ontario. Mr. McFarland was also a builder who built some of the first brick buildings

in Galt. One such building is located on the corner of 4th and B streets and is still in use today. Galt was originally 120 acres square and was to have a church on every corner. The streets were planned as a grid running north, south, east and west.

Front Street (now 4th Street) became the center of business as farmers brought their cattle, hogs, wheat and barley to be shipped to the east. People moved into Galt to work and live, and the little town of Liberty was moved, building-by-building, until all that remained was its cemetery. For years, Galt was the agricultural center of the Sacramento Valley. Then came the Lincoln Highway, which went right through the east side of town. When the Dry Creek Bridge was built, it was the longest steel bridge in California. And as people began traveling by car to and from town, the businesses moved from 4th Street to the area along the new Lincoln Highway - the street now known as Lincoln Way. ***(Source:*** *http://galthistory.org/*

Although Galt has grown to a population of 22,000 today, it is still an agriculturally oriented community. The Sacramento County Fair, which used to be held in Galt where the flea market area and Fairsite School are currently located, was moved to Sacramento. The Galt Market, held every Tuesday and Wednesday, began in 1953 as a traditional tailgate flea market and farmers market. Since that time it has expanded to become one of Northern California's largest outdoor retail and wholesale markets and generates significant income for the City, which is solely dedicated for parks and recreation.

Many large ranches and dairies still dot the countryside, although Galt is growing, but it still retains peace of quiet countryside. Today, Galt covers 5.9 square miles. The estimated population in July 2002 was 22,321 population, up from 19,472 in 2000, and 8,889 in 1990. The average elevation is 47 feet above sea level ***(Source:*** www.city-data.com/city/Galt-California).

TOTAL VALUES AT RISK FROM HAZARDS

The total values at risk from all hazards are presented as a worst-case baseline. Like other values presented in this plan, these are deceptively low because they do not include the values of infrastructure, government and church facilities, or the local economy. 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.

	Total Value	Land Value
2/3/4PLEX	24,506,120	6,088,725
COMMERCIAL/INDUSTRIAL	127,754,903	31,671,815
MULTI-FAMILY	27,223,461	3,620,832
SINGLE FAMILY	958,906,793	237,225,920
VACANT LAND/AG	29,457,225	29,293,091
GALT	1,167,848,502	307,900,383

Source: *Sacramento County Assessor's Office, Assessments by Land Use; 9-10-04*

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 $1.2 Billion displayed. The Risk Assessment portion of this plan also supports the statement that Galt does not face a catastrophic natural disaster. However, the risk for Galt varies from the rest of the County within the mapped floodplain due to its different size, and the varying numbers of structures and varying values of those structures. Therefore, the following section takes a closer look at Galt's vulnerability to flooding.

NFIP DATA AND FLOODPLAIN INVENTORY

Galt participates in the National Flood Insurance Program. Galt is NFIP Community #: 060264, with two-map panel printed, # 001C and 002C:

The HMPC investigation into Galt's vulnerability to flooding yielded some important information, and underscores the value of the DMA planning process, as a whole. Prior to the initiation of the mitigation planning in Sacramento County, Galt believed that there were no (zero) structures within the 100-year floodplain of Galt. The city had channelized both the north and south arms of Deadman Gulch (below) during the 1980's so that the 100-year event could be contained within the Gulch. Deadman Gulch is a main drainage way that enters the upper third of Galt from the East and traverses westward through the City. A Letter of Map Revision (LOMR) was filed with FEMA to reflect the change in the Gulch's flood boundaries.

However, NFIP Insurance data indicates that as of February 29, 2004, there are 71 flood insurance policies in City of Galt, with three claims having been filed for payments totaling $69,338. This raised the question of why would there be 71 policies in the floodplain of Galt if no structures were located there? The HMPC discovered that only data from the north arm Channelization project was sent to FEMA as part of the LOMR request. Galt has developed a recommendation within this plan to re-submit a LOMR request that includes the

Channelization of the South Fork of Deadman's Gulch. The City still believes there are no structures within the 100-year floodplains of Galt.

Because the 100-year floodplain is now contained within their channels, there are no critical facilities, or historic or natural resources with the flood risk area.

OTHER HAZARDS

There are no other hazard risks within Galt that differ from those facing the rest of the county. Other than flood, there are no other mapped, identified natural hazard areas for the City of Galt. Floods, to date, have not adversely impacted City. Severe weather has had not significant impacts. There has been no major crop damage recorded. There is no significant wildland fire hazard.

CAPABILITY ASSESSMENT

Administrative Mitigation Capabilities

Galt's capability assessment matrix reveals few surprises. Galt would benefit from the county's participation in the NWS's StormReady Certification program, as they have little institutionalized warning capabilities. They would also benefit from a review of their Floodplain Management Ordinance to ensure its currency with such issues as Substantial Damage. Title 19 of the Galt Municipal Code contains Galt's Local Floodplain Management Ordinance, which meets the federal minimum standards. The Code was last updated in July 2003. The Municipal Code also includes Galt's stormwater drainage regulations.

EXPLANATION OF CAPABILITY ASSESSMENT MATRIX

Does the Community have:

Comp Plan: A Comprehensive Long-Term Community Growth Plan?
Land Use Plan: A plan that designates type of Land Use desired/required; uses Zoning
Subdivision Ordinance: A regulation that dictates lot sizes, density, setbacks and construction type
Zoning Ordinance: An ordinance that dictates type of Use and Occupancy, Implements Land Use Plan
NFIP/FPM Ord: A Floodplain Management Ordinance: Directs development in identified Flood Hazard Areas. Required for Participation in NFIP and Availability of Flood Insurance
Sub. Damage: Does your FPM Ordinance contain language on Substantial Damage/Improvements?
Administrator: Do you have a Floodplain Management Administrator (someone with the responsibility of enforcing the ordinance and providing ancillary services (e.g., map reading, public education)
# of FP Bldgs: How many buildings are in the mapped Floodplain?
# of policies? How many buildings are insured against flood through the NFIP?
# of RL's: # of Repetitive Losses: (Paid more than $1,000, twice in 10 years)
CRS Rating: A Community Rating System rating from the NFIP, and if so, what is it?
BCEGS: A Building Code Effectiveness Grading System Rating
LEOP: A Local Emergency Operations Plan – a disaster RESPONSE plan
HM Plan: A Hazard Mitigation Plan
Warning: Any type of system, such as "Storm Ready" Certification from NWS, NOAA Weather Radio reception, outdoor sirens, Cable (TV) Override, or an Emergency Warning Notification System?
GIS: A Geographic Information System
Structural Protection Projects: (levees, drainage facilities, detention/retention basins)
Property Protection Projects: (buy-outs, elevation of structures, floodproofing, small "residential" levees or berms/floodwalls)
Critical Facility Protection: (for example, protection of power substations, sewage lift stations, water-supply sources, the EOC, police/fire stations or medical facilities that are at risk)
Natural And Cultural Inventory: Do you have an inventory of resources, maps, or special regulations within the community? (wetlands and historic structures/districts, etc.)
Erosion Or Sediment Control: Do you have any projects or regulations in place?
Public Information And/Or Environmental Education Program: Do you have an ongoing program even if its primary focus is not hazards? Examples would be "regular" flyers included in city utility billings, a website, or an environmental education program for kids in conjunction with Parks & Recreation?)

Capability Assessment Matrix

1		GALT
2	Comp Plan/General Plan	Y
3	Land Use Plan	Y
4	Subdivision Ord	Y
5	Zoning Ordinance	Y
6	NFIP/FPM Ordinance	Y
7	- Map Date	1995
8	- Substantial Damage language?	N
9	- Certified Floodplain Manager?	Y
10	- # of Floodprone Buildings?	0
11	- # of NFIP policies	0
12	- Maintain Elevation Certificates?	NONE
13	- # of Repetitive Losses?	0
14	CRS Rating, if applicable	?
15	Stormwater Program?	Y
16	Building Code Version	2001 CA
17	Full-time Building Official	Y
18	- Conduct "as-built" Inspections?	Y
19	BCEGS Rating	3
20	Local Emergency Operations Plan	Y
21	Hazard Mitigation Plan	Y
22	Warning System in Place?	N
23	- Storm Ready Certified?	N
24	- Weather Radio reception?	Y
25	- Outdoor Warning Sirens?	N
26	- Emergency Notification (R-911)?	N
27	- Other? (e.g., cable over-ride)	N
28	GIS System?	Y
29	- Hazard Data?	N
30	- Building footprints?	N
31	- Tied to Assessor data?	Y
32	- Land-Use designations?	Y
33	Structural Protection Projects	Y-CHANNEL
34	Property Owner Protection Project	Y/Elev
35	Critical Facilities Protected?	Y
36	Natural Resources Inventory?	Y
37	Cultural Resources Inventory?	Y
38	Erosion Control procedures?	Y
39	Sediment Control procedures?	Y
40	Public Information Program/Outlet	Y
41	Environmental Education Program	Y

Structural Mitigation Capabilities

Flooding along Hen Creek is controlled by the Greer Detention Basin. Hen Creek is a separate drainage, which meanders through a portion of the southwestern section of city. Historically, the upper reaches of this drainage were underground and did not surface until almost out of the city.

This drainage continues westward out of the city. To continue to minimize the Hen Creek drainage impacts within the city limits the Greer Detention Basin was constructed. The Basin is a depressed area created when the Greer Middle School was constructed. The area is used as a sports field for the Middle School. In the rainy season the basin contains and modulates the peak runoff from the Hen Creek drainage.

Emergency Services Mitigation Capabilities

The Public Works Department has emergency power generators to provide standby power in the event of prolonged power outages. At the three water reservoir sites permanent emergency generators are available to continue to deliver the water already stored in the tanks. At present there is not standby power to also pump raw water and continue treatment. Several trailer-mounted generators are mobilized on a rotational plan to keep the sanitary sewer lift stations operational.

HISTORIC PRESERVATION

There are numerous historic structures located within Galt, two of which are pictured below. None of the structures are located within identified mapped hazard areas.

In addition, the following four structures are on the National Historic Structures list:

Brewster Building (added 2000 - **Building** - #00000981)
Also known as **Oddfellows Hall**
201 Fourth St., Galt

Brewster House (added 1978 - **Building** - #78000740)
Also known as **Cinquinis House**
206 5th St., Galt

Liberty Schoolhouse (added 1977 - **Building** - #77001617)
113 Fourth St., Galt

Utah Condensed Milk Company Plant (added 1978 - **Building** - #78000741)
Also known as **Sego Milk Plant**
621 3rd St., Galt
Source: http://www.nationalregisterofhistoricplaces.com/CA/Sacramento/state.html

NATURAL RESOURCES IDENTIFIED IN GALT

According to the California Natural Diversity Database the following threatened and endangered species have been identified with the Town of Galt:

City of Folsom

- California linderiella
- California tiger salamander
- Swainson's hawk
- Tri-colored blackbird
- Valley elderberry longhorn beetle
- Vernal pool fairy shrimp
- Vernal pool tadpole shrimp

DEVELOPMENT TRENDS

Galt is situated 25 miles south-southeast of Sacramento, where the County begins to transition to the more agricultural environment of the Delta. As such, Galt has been able to preserve its country setting. However, the growth trends of Sacramento County are starting to be felt in Galt. The city more than doubled between 1990and 2000, and they are planning for a three percent annual growth rate which will result in about 50,000 people living there by 2020. They have taken a steady approach at growth to date, as evidenced by the number of residential permits they have issued over the past 8 years. With the exception of 2002, housing values have risen steadily.

Single-family new house construction building permits: **GALT**

- 1996: 243 buildings, average cost: $83,500
- 1997: 146 buildings, average cost: $93,800
- 1998: 213 buildings, average cost: $96,900
- 1999: 202 buildings, average cost: $101,600
- 2000: 219 buildings, average cost: $116,400
- 2001: 233 buildings, average cost: $116,900
- 2002: 104 buildings, average cost: $104,200
- 2003: 200 buildings, average cost: $129,900

The City of Galt is beginning a two-year process to update the City's General Plan. The General Plan is the overarching policy document that guides land use, transportation, infrastructure, community design and other decisions. The

General Plan is intended to provide for orderly growth and convey the community's values and expectations for the future.

The General Plan is coordinated with area efforts to improve the access to Galt on Highway 99, as well as to minimize how the road divides the community in two. This is coordinated with a larger transportation and land-use planning effort for the entire Sacramento County region.

COMMUNITY-SPECIFIC RECOMMENDATIONS

Galt Recommended Action Item #1: Apply for a LOMR for the south arm of Deadman's Gulch, by submitting the design and construction data that documents the removal of the land from the mapped floodplain that was formerly subject to flooding. Check past development in that area to ascertain if elevation certificates will be required for those structures built within the floodplain following the channelization project but prior to this map change request.

Other Alternatives Considered (including No Action): None

Issue/Background Statement: This planning effort has revealed that a Letter of Map Revision (LOMR) was never filed for the portion of the project completed on the south arm of Deadman's Gulch. This would finalize the removal of al structures from the floodplains within Galt. The issue regarding elevation certificates will ensure that those buildings constructed within the former floodplain, but before the LOMR is approved, will have met all the administrative requirements of the NFIP.

Responsible Office/Person: City floodplain Administrator in conjunction with Public Works and California DWR Floodplain Management Program.

Priority (H, M, L): High

Cost Estimate/Potential Source of Funding: There is a fee associated with processing LOMR's. Less than $5,000. Public Works budget.

Cost-Effectiveness Explanation: First, processing the LOMR will accurately reflect a flood control project that is already in place. The benefits are already being provided in terms of reduced losses. Secondly, all of the 71 properties identified as policy-holders within this floodplain will no longer face a mandatory purchase requirement for flood insurance on federally guaranteed backed loans.

Schedule: 2005

Galt Recommended Action Item #2: Review the current Floodplain Management Ordinance to ensure currency with federal minimum standards, e.g., substantial damage.

Other Alternatives Considered (including No Action):

Issue/Background Statement: Capability matrix competed as part of this planning process suggested that there may be portions of the local ordinance that are out of date with changing federal standards. This would make the ordinance current.

Responsible Office/Person: Floodplain Administrator

Priority (H, M, L): Medium

Cost Estimate/Potential Source of Funding: Staff time only. Coordination with DWR. Presentation to governing board for adoption if changes are required.

Cost-Effectiveness Explanation: Maintains community compliance with NFIP

Schedule:

Galt Recommended Action Item #3: Participate with the development of a seasonal multi-hazard public education campaign to be implemented annually.

Issue/Background Statement: Refer to Section 5-4 Countywide Mitigation Recommendations. Public Education is one of the primary mechanisms in reducing future hazard related losses, and one that is inexpensive in comparison to other mitigation projects. This effort should be coordinated between the many organizations that already have extensive and/or limited programs in place.

The following topics could be addressed through this effort that apply to Galt:

- Floods
    - Warning system components
    - Regional Evacuation plans/procedures (response to warning)

    - Public Info regarding manhole covers popping off: what they are and what they are for
    - Natural & Beneficial value of floodplains
    - Placing Flood-Depth signs county-wide
- Severe Weather
    - Tree-limb trimming
    - Fog – driving tips
    - Warning (NOAA Weather [All-Hazards] Radio)
- Earthquakes
- Health Hazards (West Nile Virus)
- Water Conservation (In conjunction with existing San Juan WD program effort)
- Develop/enhance Business Continuity Planning
- Conduct disaster exercises
- Train consumers/volunteers to be read to help when disasters strike
- Provide all-hazard curriculum for teachers

Other Alternatives Considered: Do nothing

Responsible Offices/Persons: City & County Emergency Management offices, City & County Floodplain Management Offices, SAFCA, the America Red Cross, Sacramento County Health Department, San Juan Water District, the California Fire Alliance, the Institute of Building and Home Safety, CA-OES, CA-DWR, CA-Reclamation Board and FEMA Region IX.

Priority (H,M,L): High

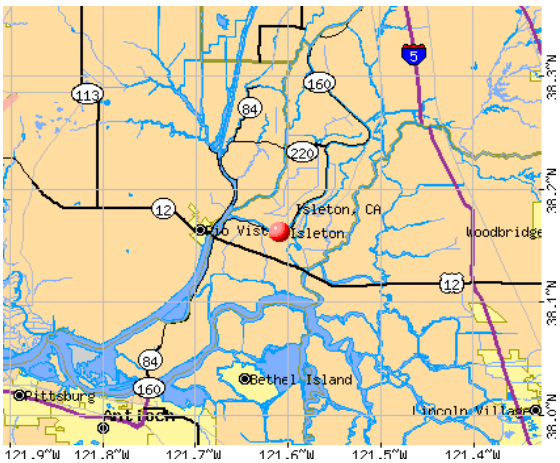
Cost Estimate / Potential Source of Funding: TBD/HMGP

Cost-Effectiveness Explanation: Life safety and hazard loss reduction

Schedule: 2005

Multi-Hazard Mitigation Plan

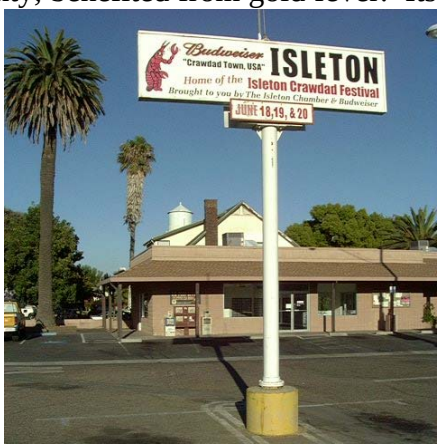
6.7 City of Isleton and "The Delta" Community Element



CITY OF ISLETON AND "THE DELTA" COMMUNITY PROFILE

The small town on Isleton is located in southern Sacramento County in the Delta Region along the banks of the Sacramento River. The Delta is a land of rivers, agriculture, boating, fishing, and rich history. Isleton was once referred to as the "Little Paris on the Delta."

Josiah Pool founded Isleton in 1874. Isleton, like many other communities in Sacramento County, benefited from gold fever. Its location on the river brought commerce and trade since the river was the primary source of transport. Improving the waterways for deeper channels that would permit year round travel brought about levee construction. The levees remain though the town has since dwindled from its boom days



Isleton's resident population is currently 840, but swells to as many as 200,000 during the popular Crawdad Festival held every year on Father's Day weekend. The town hosts several other festivals, including the Spam Contest, which originated as a direct result of the floods of 1996. Displaced families during the flood were given shelter at the Hotel Del

Rio, owned by Ralph and Charli Hand. When people visited their homes, they remarked that the labels on the Spam cans were the only labels that survived. Charli decided to make some fun of it and the Spam Contest was created. Contestants cook Spam, carve Spam, dress Spam up in costumes and even appoint a "Captain Spam." *Source: http://www.isletoncoc.org*

TOTAL VALUES AT RISK FROM HAZARDS

The total values at risk from all hazards are presented as a worst-case baseline. Like other values presented in this plan, these are deceptively low because they do not include the values of infrastructure, government and church facilities, or the local economy. 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.

	Total Value	Land Value
2/3/4PLEX	2,178,275	559,822
COMMERCIAL/INDUSTRIAL	9,101,616	2,914,932
MULTI-FAMILY	139,081	34,363
SINGLE FAMILY	18,813,447	5,360,538
VACANT LAND/AG	3,601,490	3,588,353
ISLETON	33,833,909	12,458,008

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 $33.8 Million displayed. However, the entire community of Isleton is in the Sacramento River 100-yr floodplain (Zone AE), so it is possible that the community could be inundated from a flood. The following section takes a closer look at Isleton's vulnerability to flooding.

NFIP DATA AND FLOODPLAIN INVENTORY

HAZUS MH data indicate that there are 271 residential structures in the mapped 100-year floodplains of Isleton. NFIP Insurance data indicates that as of February 29, 2004, there are 173 flood insurance policies in the City of Isleton. There have been 19 claims paid for properties located within the mapped floodplain for a total of $457,109.

OTHER HAZARDS

Earthquakes
Isleton's location and underlying soils make it more susceptible to earthquakes than any other part of Sacramento County.

Secondary Earthquake Disasters: *Sacramento-San Joaquin Delta levees*
An April 2000 study assessed the potential earthquake vulnerability of the 660 mile complex of Sacramento-San Joaquin Delta levees. Several regional and local fault models were used, and it was found that the earthquake hazard is "dominated by moderate local events, [but] it is unlikely that the entire Delta region will be subjected to large motions in any single earthquake." Thus, several potential moderate magnitude (6.0 – 7.1) earthquakes were used to estimate potential damage. ***Source:*** *Calfed Bay-Delta Program, Seismic Vulnerability of the Sacramento-San Joaquin Delta Levees, April 2000.*

The study defined four (I-IV) potential damage zones in the Delta region. Zones I, II, and IV are of particular interest to Sacramento County. Zone I (highly susceptible to earthquake damage) includes only Sherman Island; Zone II (medium to medium-high susceptibility and by far the largest zone) runs from about Walnut Grove on the north, Isleton-Rio Vista on the west, Terminous on the east, and below the San Joaquin County line to the south; and Zone IV (low susceptibility) includes an area south of Hood to the Cosumnes River.

The Delta is subject to flooding from earthquake induced levee failures. The greatest risk is when river levels are at their highest and the levees are in their most saturated condition.

CAPABILITY ASSESSMENT

Isleton has no full-time staff and was unable to complete the Capability Assessment matrix that the HMPC utilized in the other incorporated communities. The town is afforded significant protection by the levees along the Sacramento River, as it is situated tens of feet below the water surface elevation.

HISTORIC PRESERVATION

Isleton has a number of historic structures. The following Historic District is listed on State and Federal Historic Preservation District Registers:

Isleton Chinese and Japanese Commercial Districts (added 1991 - **District** - #91000297), also known as **Isleton Asian--American District**
Bounded by River Rd. and Union, E and H Sts., Isleton
Source: http://www.nationalregisterofhistoricplaces.com/CA/Sacramento/state.html

NATURAL RESOURCES IDENTIFIED IN ISLETON

The following list was generated from The California Natural Diversity Database and contains all known occurrences of rare plants and animals, and terrestrial and aquatic communities located within Isleton city limits.

CITY OF ISLETON

Delta tule pea
Northern California black walnut

DEVELOPMENT TRENDS

The following building permit listing indicates that Isleton is not experiencing any growth.

Single-family new house construction building permits: ISLETON

- 1996: 1 building, average cost: $12,000
- 1997: 0 buildings, average cost: $0
- 1998: 0 buildings, average cost: $0
- 1999: 0 buildings, average cost: $0
- 2000: 0 buildings, average cost: $0
- 2001: 0 buildings, average cost: $0
- 2002: 0 buildings, average cost: $0
- 2003: 0 buildings, average cost: $0

COMMUNITY-SPECIFIC RECOMMENDATIONS – ISLETON

Isleton Recommended Action Item #1: *Participate with the development of a seasonal multi-hazard public education campaign to be implemented annually*

Issue/Background Statement: Refer to Section 5-4 Countywide Mitigation Recommendations. Public Education is one of the primary mechanisms in reducing future hazard related losses, and one that is inexpensive in comparison to other mitigation projects. This effort should be coordinated between the many organizations that already have extensive and/or limited programs in place.

The following topics could be addressed through this effort that apply to the Isleton-Delta area:

- Floods
  - Warning system components
  - Flood insurance availability and Preferred Risk policies behind levees City/County/SAFCA Program
  - Regional Evacuation plans/procedures (response to warning)
  - Public Info regarding manhole covers popping off: what they are, what they are for
  - Natural & Beneficial value of floodplains
  - Placing Flood-Depth signs county-wide
  - Investigate the "Living with Levees" program
- Severe Weather
  - Tree-limb trimming
  - Fog – driving tips

    - Warning (NOAA Weather [All-Hazards] Radio)
- Earthquakes
- Health Hazards (West Nile Virus)
- Water Conservation
- Develop/enhance Business Continuity Planning
- Conduct disaster exercises
- Train consumers/volunteers to be read to help when disasters strike
- Provide all-hazard curriculum for teachers

Other Alternatives Considered: Do nothing

Responsible Offices/Persons: City & County Emergency Management offices, City & County Floodplain Management Offices, SAFCA, the America Red Cross, Sacramento County Health Department, San Juan Water District, the California Fire Alliance, the Institute of Building and Home Safety, CA-OES, CA-DWR, CA-Reclamation Board and FEMA Region IX.

Priority (H,M,L): High

Cost Estimate/Potential Source of Funding: TBD/HMGP

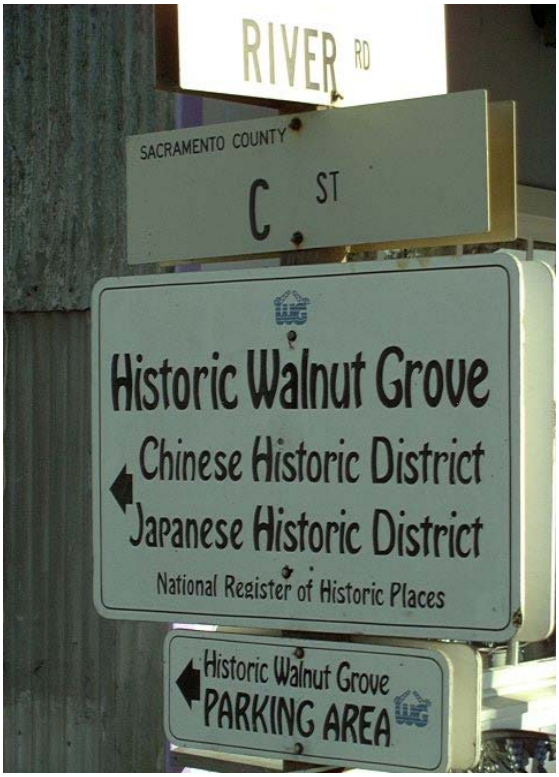
Cost-Effectiveness Explanation: Life-safety, hazard loss reduction

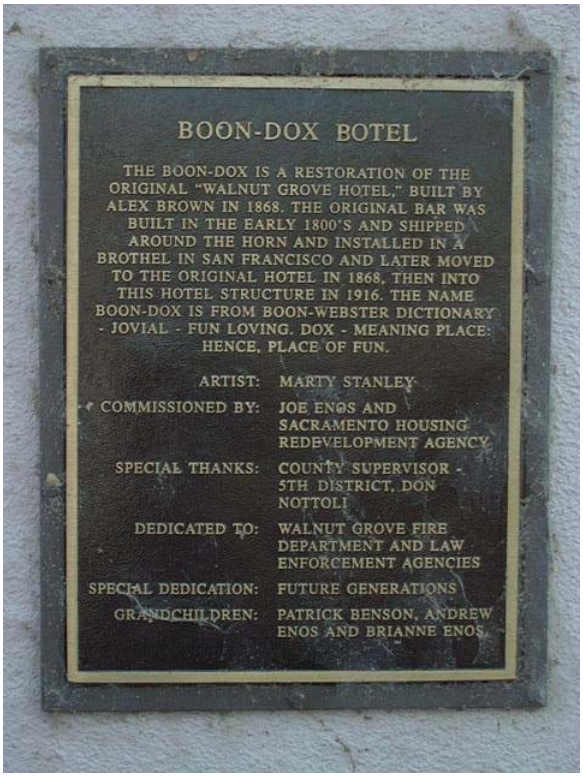
Schedule: 2005

COMMUNITY PROFILE FOR – "THE DELTA"

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. It is more commonly referred to as that area of the southern County (below Galt) that is between the Sacramento and San Joaquin Rivers. The Delta is a 700,000-acre region characterized by rivers, sloughs, levees and islands. It is a major agricultural producer, a major recreational playground, and an important wildlife habitat. (***Source:*** *Sacramento County General Plan)*

The Delta is rich in history, much like the rest of Sacramento County, dating back to the Gold Rush and with the Sacramento River providing water transport to San Francisco and beyond.





DELTA ISSUES AND HAZARD PROBLEMS

From flood control to waterborne commerce to water supply. The original upstream flood management system created over the century following the Gold Rush consisted of levees, weirs, bypasses, and overflow areas and worked well in its ability to convey large floods downstream with minimal damage. In addition to protecting lives and property, the original system was intended to facilitate use of the rivers for waterborne commerce. The downstream water conveyance and flood protection system levees, much of it built with hand labor in the 19th century, protected towns and farms, while providing for water-borne commerce. Over the years, the intensification of agriculture led to subsidence across the Delta largely due to the exposure of the peat soils to air, causing them to oxidize. So the surrounding land sank and the levees grew in height.

Today, the use of the water control system has changed since it was constructed, with water supply conveyance replacing waterborne commerce. The Delta, fed by rivers carrying rain and snowmelt from the Sierra Nevada, provides two-thirds of California residents with fresh drinking water distributed through the California Aqueduct. The delta is also a major source of water for Central Valley farms. California, especially Southern California, is utterly dependent on the Delta for water ***(Source:*** *Sacramento Bee and Los Angeles Times)*

The Delta became a political football during the 1960s and 1970s when interests clashed over control of its water. The federal Central Valley Project drew water - initially captured by Shasta, Folsom and other big dam-reservoir projects - from the Delta for delivery to San Joaquin Valley farmers, and the state weighed in with its own massive water project in the 1960s to transfer

Delta water to Southern California's growing and thirsty cities. So much water was being removed from the southern edge of the Delta that river flows began to reverse and brackish water from San Francisco Bay began to intrude. State and federal engineers then devised a 42-mile-long "Peripheral Canal" that would carry water from the Sacramento River around the Delta - and ignited two decades of bitter political warfare.

Environmental groups feared that once in place, the Peripheral Canal (portions of which were excavated to provide material for construction of Interstate 5 between Sacramento and Stockton) would allow water transfers to be increased dramatically and threaten North Coast rivers that had been off-limits to development. Delta farmers opposed the canal over concerns for water quality and the implications for the maintenance of the existing levees, reasoning that if state and federal water continued to flow through the existing system the maintenance responsibilities could be shared with the governments. The canal was defeated at the polls in 1982. ***(Source:*** *Sacramento Bee and Los Angeles Times)*

In recent years, the creation of CALFED, a multi-agency program aimed at making incremental changes in the management of Delta water, aims to both enhance water quality and allow pumps to draw more water for shipment southward. CALFED was created after a 1992 reauthorization of the federal Central Valley Project that shifted a huge amount of water from farmers to environmental enhancement. The central issue today is whether plans should include more water storage to meet future demands or rely primarily on conservation to work within existing supplies, but there are dozens of specific issues of contention. The current California administration is rewriting a conservation-centered water policy that had been developed under the predecessor administration, putting more emphasis on water storage.

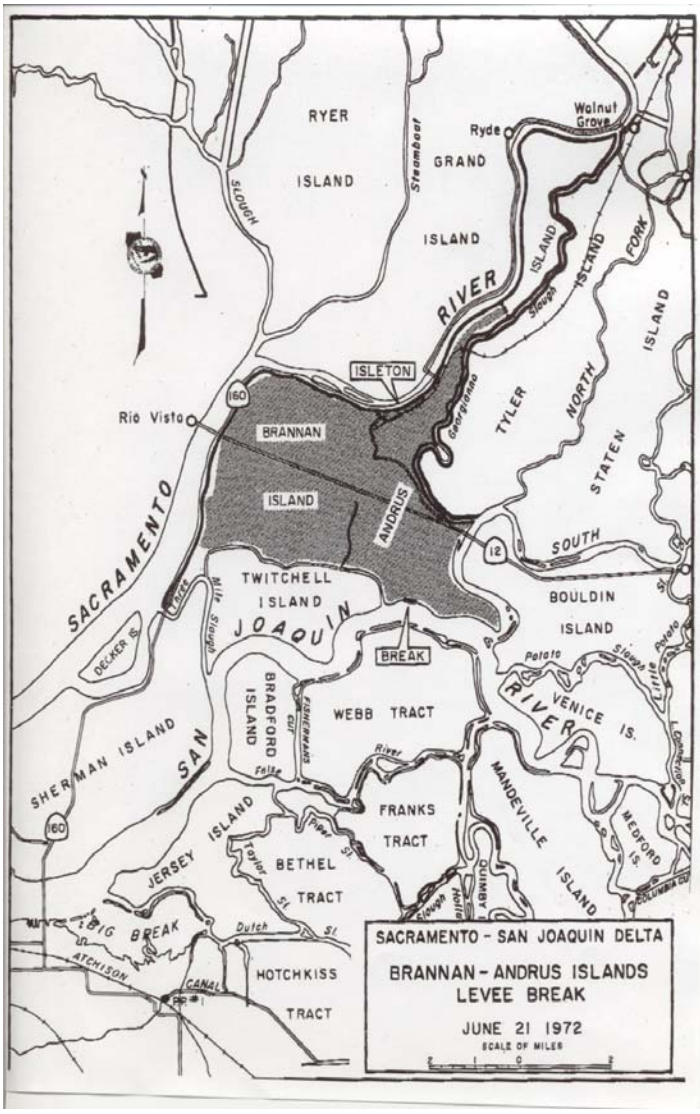
Since 1994, a state federal water program called Cal-Fed has been studying ways to improve Delta drinking water supplies and fisheries without building a canal. If those plans don't produce results in a few years, Cal-Fed has the option of pursuing a "through-Delta facility," an alternate version of the peripheral canal.

Section 4-3 of this plan detailed how CALFED, the state and federal government program agreement preserve and protect the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta), and how the Bay-Delta region is of critical importance to California, as the hub of the State's water supply system and an area of ecological importance. CALFED created an agreement calling for a joint state-federal process to develop long-term solutions to problems in the Bay-Delta Estuary related to fish and wildlife, water supply reliability, natural disasters, and water quality. This led to the long-term Plan for the Bay-Delta.

The California Bay-Delta Act of 2003 established the California Bay-Delta Authority which seeks to improve the quality and reliability of California’s water supplies while restoring the Bay-Delta ecosystem. The California Bay-Delta Authority is focused upon improving Bay-Delta levees, by acting to protect water supplies needed for the environment, agriculture and urban uses by reducing the threat of levee failure and seawater intrusion. Delta levees also protect major interstates, roadways, cities, towns, agricultural lands, and environmental and aquatic habitat.

Delta Levee Failures. Levee failures have occurred throughout the Central Valley and the Delta for years, flooding thousand of acres, causing millions of dollars in damages, and multi-millions of dollars in awards resulting from liability lawsuits.

In June 1972, the Brannan - Andrus Island's levee failed and flooded Isleton. 150,000 acre-feet of water covered the islands, which is as much as 20 feet below sea level. The USACE and many volunteers built an emergency bow levee around Isleton to protect it, but a break in a chemical pipe at the sewage treatment plant and forced the closing of the plant and the evacuation of Isleton. After 36-hours the bow levee failed and Isleton flooded.



A bigger battle was waged against the "invisible" flooding of saltwater. The freshwater inflow to the Delta was not enough to maintain a freshwater outflow and flood the islands, so saltwater from Suisun Bay moved in to fill the void. Pumping through the Central Valley Project at Tracy was cut-back, and releases from Folsom, Oroville and Shasta reservoirs was increased, but it took 1.5, 3 and 5 days respectively for that water to reach the Delta and create the hydraulic barrier needed. Saltwater remained trapped in the central and southern Delta. The water released through the dams was enough to create the hydraulic barrier but not enough to flush the Delta. Pumping was ordered. It wasn't until August 16, 8 full weeks later, that salinity levels dropped to pre-failure levels.

Damages were estimated between $20-40 million. USACE spent $1.4 million just to repair the breach. Federal disaster assistance totaled $2.4 million. Saltwater intrusion degraded water supply for central Delta farms, and business at marinas and restaurants

suffered from rumor and negative publicity.

It has been reported that the Peripheral Canal (described in more detail in the next few pages), had it been in place, would not have prevented the levee break or the saltwater intrusion, but it would have limited the saltwater intrusion in the southern Delta and it would have been possible to flush the saltwater back into Suisun Bay more quickly and efficiently (3 weeks versus 8 weeks), and there would not have been the need to dispose of 53,000 tons of salt.

Bacon Island Road, west of the town of Holt, offers a view of the June 3 levee break.
(Source: *Sacramento Bee file, 2004/José Luis Villegas)*

Most recently, on June 3, 2004, the Jones Tract levee failed near the Town of Holt (not in Sacramento County), flooding more than 11,000 acres of farmland. Levee breaks can cause a radical shift in water along the delta, as fresh water floods the low-lying areas. The vacuum draws in saltwater from San Francisco Bay, which is connected to the delta through a series of bays and rivers.

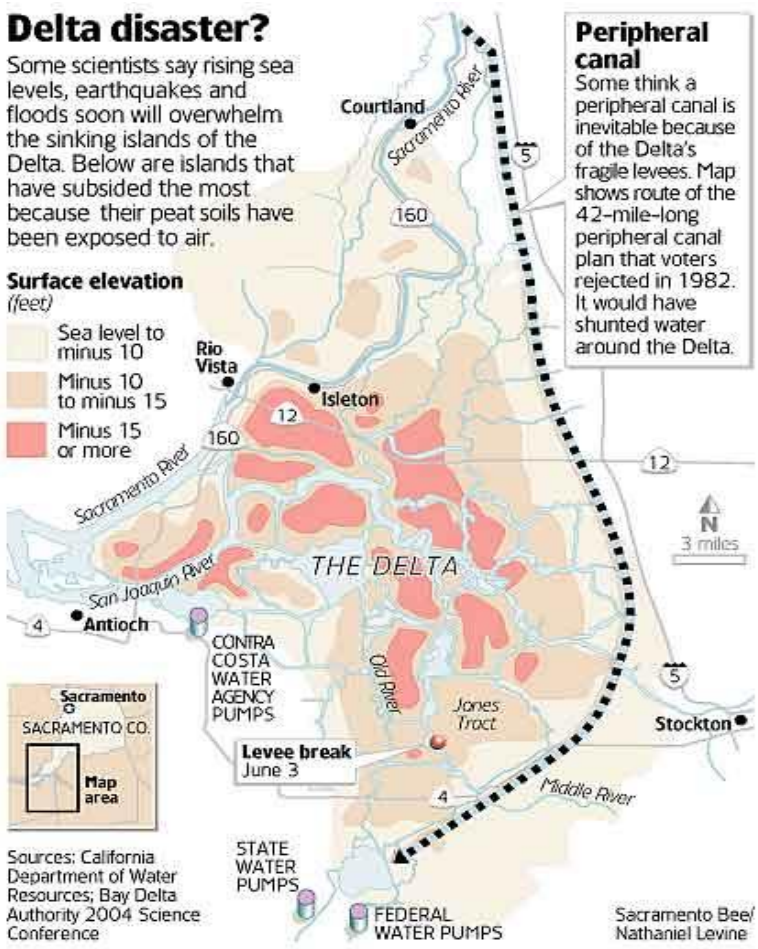
The saltwater then contaminates the drinking-water supply. The levee break in Holt forced officials to shut down the pumping of fresh water out of the delta for three days until its salt content could be reduced to normal levels. The breach renewed concerns among state water officials about the aging levees and the delta's islands, which continue to sink. ***(Source: Los Angeles Times 6/19/04)***

A Presidential Disaster Declaration was made, and FEMA granted the state more than $7.3 million to repair the levee break and help prevent future breaches. The funds will cover 75 percent of the repair and prevention costs. Total costs from the disaster are estimated at $90 million. ***(Source: Los Angeles Times 10/30/04)***

A scientific symposium held in October 2004, on the Sacramento-San Joaquin Delta included the state's top geologists and fishery biologists. The conference tackled the issues of how to lessen the state's dependence on this critical water source so that California's water supply isn't so vulnerable to the failure of just a small piece of the system, while recognizing that the rivers continue to flow, the levees continue to erode and demands for more water from an ever-expanding population continue to mount. ***(Source:*** *Sacramento Bee).*

The symposium scientists emphasized that multiple levee failures in the Sacramento-San Joaquin Delta are almost sure to disrupt California's water system in the next 50 years, and the state needs to start planning for that contingency. One scientist stated that the odds were more than 60 percent that multiple levees could fail in a single event within 50 years. That, in turn, would

draw saltwater toward the Delta water pumps, shutting down the drinking supplies of 22 million Californians.



Another speaker said the state should take a fresh look at a peripheral canal, which would shunt water around the Delta and - in the eyes of some - reduce some conflicts in the estuary. "Taking this off the table is a bit of a mistake," continuing that it would be better to carefully plan a peripheral canal than hastily build one following a disaster. "What I am worried about is a peripheral canal being built on an emergency basis. If one of these scenarios … comes true, you would suddenly have a brackish water system where there is now a freshwater system." ***(Source:*** *Sacramento Bee).*

Actions taken in September/October, 2004: Congressional leaders authorized $90 million to reconstruct levees in the Sacramento-San Joaquin Delta by passing a sweeping $395 million California water bill September 15,2004. The bill re-authorizes CALFED which aims to restore California's Sacramento-San Joaquin Delta and ensure a reliable water supply for millions of users. It represents the first major changes to California's water systems since the 1960s.

"Under pressure from some of California's biggest cities and farm districts, federal and state officials are planning major changes in how water is stored and distributed across the state, including increased pumping of supplies from the Sacramento-San Joaquin Delta… The proposed changes, outlined in an obscure state-federal document called the Operations Criteria and Plan, sets the stage for California's most far-reaching plumbing shifts in a decade. Under the plan, water contractors would increase pumping from the Delta by 27 percent, sending more to Southern California and the San Joaquin Valley. Less water would flow to the San Francisco Bay and less would be reserved for endangered salmon during the driest of droughts." ***(Source:*** *Sacramento Bee 9/26/04)*

The bill also authorizes studies of dams on the upper San Joaquin River and in Colusa County. It tries to ensure Sacramento-San Joaquin Delta water quality. It prescribes Tracy Pumping Plant fish screens and other environmental protections ***(Source:*** *Sacramento Bee 10/17/04)*

To get this bill through Congress however, California's representatives had to reduce the funding request for this bill from an estimated $2.4 billion down to $395 million to be stretched over four years. That is a reduction of more than 80 percent, and some are quick to note that the state's list of water and habitat project needs has not decreased by a similar amount. "If anything, it has grown." ***(Source:*** *Sacramento Bee 10/26/04)*

"The National Marine Fisheries Service issued an opinion on [October 22, 2004] that opens the door to increased water exports from the Sacramento-San Joaquin Delta. The agency concluded that additional pumping from the delta, as well as changes in dam operations, would not seriously harm endangered or threatened salmon species… That reversed earlier draft findings by its biologists that could have stymied plans to send more water south to the farms of the San Joaquin Valley and the cities of Southern California." ***(Source: Los Angeles Times 10/23/04)***

President Bush signed a landmark California water bill October 25, 2004.

CAPABILITY ASSESSMENT/DEVELOPMENT TRENDS

The Rural Growth Management Strategy section of the Land Use Element of the Sacramento General Plan 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. The County drainage and floodplain management regulations further limits the ability for any significant or substantial growth to take place.

In December 2002, the *Sacramento and San Joaquin River Basins* S-1 *Interim Report Comprehensive Study*, was released. State and Federal legislation authorized the development of comprehensive plans for flood damage reduction and ecosystem restoration along the Sacramento and San Joaquin rivers following the disastrous floods that occurred in January 1997. … The authorizing legislation recognized that a durable flood management system that can be effectively maintained on a long-term basis requires a design to accommodate and respect natural processes and the current benefits and uses offered by the river systems.

The report concludes that "a comprehensive effort to develop an effective plan for the flood management system requires evaluating how the complete system functions, how its performance could be improved, and how changes to parts of the system affect its overall performance. The capability of analyzing the flood management system comprehensively would replace the past practice of making incremental changes to the system without fully understanding how it may affect other parts of the system and the performance of the system as a whole". A major undertaking of the study was developing the necessary analytical tools to evaluate how changes to the system affected the performance of the system as a whole.

The report also notes that, "over time, public interest has expanded to include conserving and protecting natural systems, rather than replacing them with more intensive uses and recognizes that it is not necessary for public safety and economic prosperity to conflict with conserving natural systems. If conflicts do occur, they can be managed through a balanced approach that retains protecting lives and property as the system's paramount purpose. The need for system-wide comprehensive analysis applies to both flood damage reduction and ecosystem restoration objectives".

COMMUNITY-SPECIFIC RECOMMENDATIONS – "THE DELTA"

Recommended Action Item #1: Delta - Dredge River (See also All Reclamation District Action #1, Section 6.9)

Category (for CRS purposes): Structural Protection

Issue/Background Statement: The carrying capacity of the Delta rivers continue to be diminished by the heavy sediment loads that are carried from the Sierra foothills and deposited in the lower, slower reaches of the watercourses. The residents and reclamation districts of the Delta have gone "on record' for over 20 years in support of dredging the Sacramento River --- a practice that was "routine" sixty years ago. The issue hasn't changed, but conditions have continually worsened, and the entire water distribution system is at a point where *something* has to be done.

Environmental concerns and the temporary/ongoing maintenance nature of dredging are recognized by a citizenry devoted to land and water conservation and stewardship, but seen as barriers to any effective solution and a primary cause of lengthy inaction that only further exacerbates the problems.

Other Alternatives Considered: Peripheral Canal, No Action

Responsible Office/Person: CALFED Bay-Delta Project, State Reclamation Board, Local Reclamation Districts, FEMA, USACE, F&WS, CA-DG&F, CA-OES

Priority (H, M, L): H

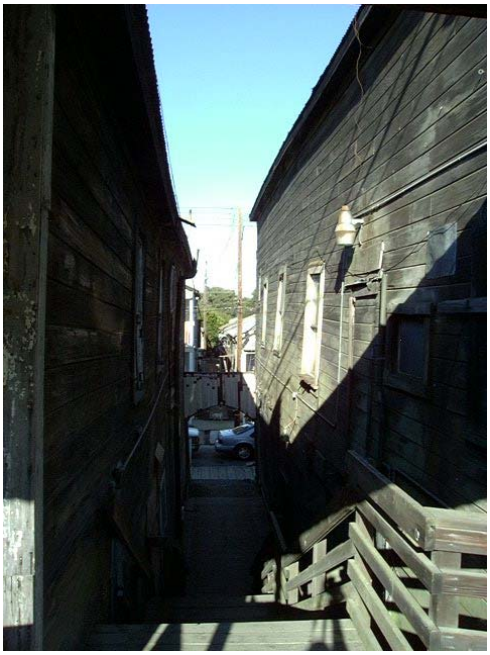
Cost Estimate/Potential Source of Funding: TBD/Congress, State, FEMA, USACE, State and local Reclamation Boards and *all* beneficiaries: Water Supply users, Recreational Water Users, Levee Road Users, Protected communities and agricultural business operations. Levee repair funds included in recent CALFED appropriation.

Briefly Explain why this is cost-effective: The levee system is no longer strictly a flood control system, it supports water-borne commerce, and most importantly, provides a significant portion of southern California's water supply. Analysis of the impacts of past and recent levee failures vividly demonstrate that there are extreme costs associated with losing water supply, preventing saltwater intrusion, and reallocating upstream flows from major reservoirs. While there is

significant benefit locally to communities and businesses, there is a benefit many times over in maintaining water supplies for a vast and growing population downstream and downstate.

Schedule: ASAP

The following pictures help describe the Delta history and community profile.

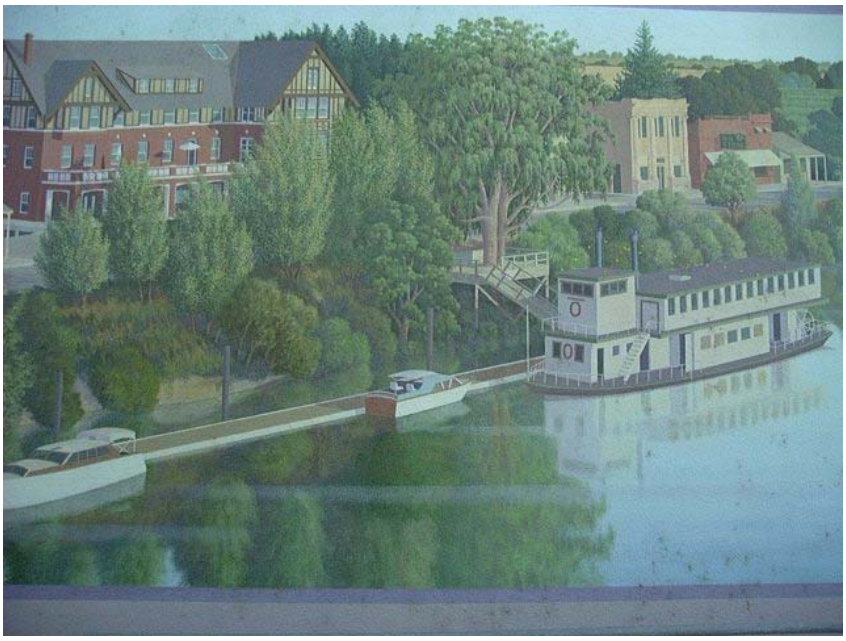


Historic Locke, looking landward and downhilli to the protected community and farms significantly below the surface elevation of the Sacramento River.

River recreation and levees are common Delta features

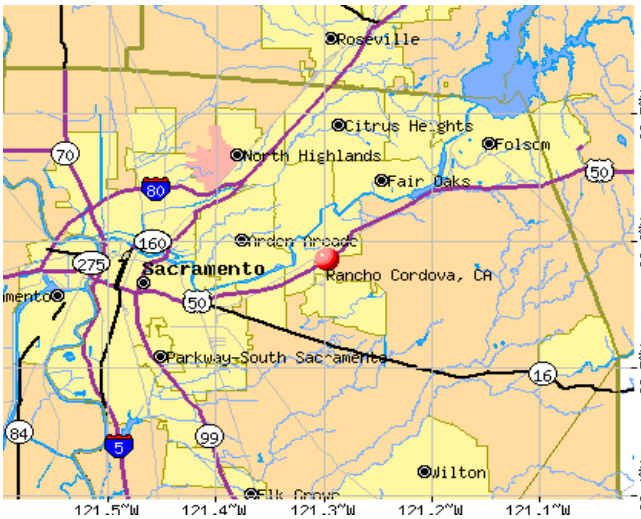
The Delta Reclamation Districts hold a special meeting in Walnut Grove to discuss their regional issues and provide input into this DMA plan, August 18, 2004

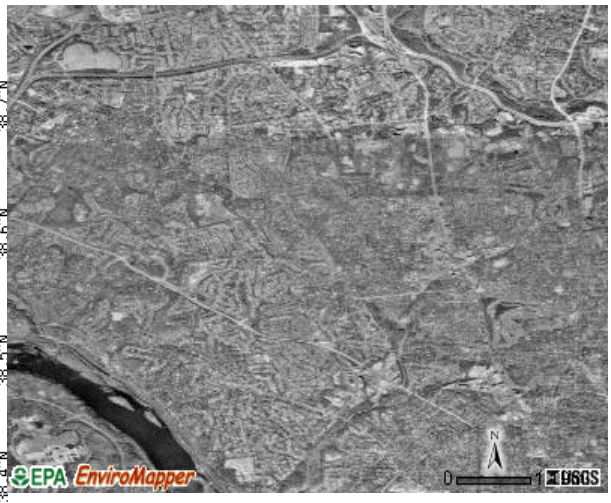
Walnut Grove mural



Multi-Hazard Mitigation Plan

6.8 Rancho Cordova Community Element





CITY OF RANCHO CORDOVA COMMUNITY PROFILE

Rancho Cordova, a Sacramento County suburb of 55,000, was first incorporated on July 1, 2003. The City covers an area of 33 square miles just east of the center of the County. Rancho Cordova has a rich past, which encompasses both agriculture and military service. Its history stretches back to the Gold Rush and the Pony Express. Mills Station, one of the stopping points for the Pony Express, is now being renovated into a community center.

Rancho Cordova is bound on the north by the American River Parkway, which extends 23 miles from near downtown Sacramento dam east to Nimbus Dam. The parkway provides hiking, biking, picnicking, fishing, swimming and other outdoor activities. Goethe Park is also located along the river.

Mather Field, once an Air Force Base in Rancho Cordova, is now in operation as a civilian air field and business park. Currently being developed at Mather is a 1,270-unit single-family project at Mather known as Independence at Mather.

A General Plan for the city is currently being drafted and the estimated date of adoption is December 2005.

TOTAL VALUES AT RISK FROM HAZARDS

The total values at risk from all hazards are presented as a worst-case baseline. Like other values presented in this plan, these are deceptively low because they do not include the values of infrastructure, government and church facilities, or the local economy. 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.

	Total Value	Land Value
2/3/4PLEX	114,168,263	30,268,521
COMMERCIAL/INDUSTRIAL	1,865,525,567	433,416,298
MULTI-FAMILY	303,518,223	55,851,589
SINGLE FAMILY	1,545,585,238	409,100,919
VACANT LAND/AG	364,963,460	364,400,643
RANCHO CORDOVA	4,193,760,751	1,293,037,970

Source: *Sacramento County Assessor's Office, Assessments by Land Use; 9-10-04*

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 $4.2 Billion displayed. The Risk Assessment portion of this plan also supports the statement that Rancho Cordova does not face a catastrophic natural disaster. However, the risk for Rancho Cordova varies from the rest of the County within the mapped floodplain due its different size, and the varying numbers of structures and varying values of those structures. Therefore, the following section takes a closer look at Rancho Cordova's vulnerability to flooding.

NFIP DATA AND FLOODPLAIN INVENTORY

Rancho Cordova's northwest city limit is the American River. The American River is the primary source of flood problems for the City. Rancho Cordova applied to the National Flood Insurance Program on July 7, 2004. Based on the application, the City estimated that 1,216 acres within the City limits were subject to flooding. Seventy-six structures were estimated to be within the floodplain; of these twenty-four were identified as residential structures. The estimated population within the floodplain is 65 persons. Since the City is newly incorporated and only recently applied to the NFIP program, additional information such as the number of flood insurance policies and past flood insurance claims are still contained within the unincorporated county information.

OTHER HAZARDS

There are no other hazard risks within Rancho Cordova that differ from those facing the rest of the county. Other than flood, there are no other mapped, identified natural hazard areas for the City of Rancho Cordova. Floods, to date, have not adversely impacted City. Severe weather has not resulted in significant impacts. There has been no major crop damage recorded. There is no significant wildland fire hazard.

CAPABILITY ASSESSMENT

As a newly incorporated city, most of the city's existing capabilities are those that were established under the County's jurisdiction. The City council, as its first action after incorporation, adopted by reference certain provisions of the county code and zoning code of the County of Sacramento (Ordinance No. 20-2003). The City also has adopted other county programs and procedures such as those for Stormwater and Erosion and Sediment Control.

Rancho Cordova Community Plan. Prior to the incorporation of the City of Rancho Cordova, the County of Sacramento completed a lengthy planning process which led to the creation of the Cordova Community Plan, a policy document which implemented the County's General Plan at a more detailed level. Hundreds of Rancho Cordova residents were part of the planning process that led to the creation of the Community Plan, working over a period of years to create that document. The Community Plan did not address the entire area included in the City of Rancho Cordova, and in particular did not cover the area south of Douglas Road where much of the future growth of Rancho Cordova is expected to occur, but it represents an important planning effort. The Community Plan contained a "Vision Statement" which laid out the following general vision for community:

> *"The plan aims to achieve a high quality of life for all residents and employees, young and old, of the community described by the Cordova Community Plan by building on its rich history and proud heritage, active citizenry and the multidisciplinary work of community-based interest groups, social and economic diversity, industry, recreational amenities, and its relation to surrounding communities."*

Rancho Cordova General Plan: Vision Book and Interim General Plan. As an interim step, the City has initiated a process to develop a General Plan for the City. Currently, the City has a Vision Book and Interim General Plan. The process of describing the "Vision" for Rancho Cordova involved several different forms of community input, including:

- A series of four "Vision" workshops in June and July
- A General Plan survey, distributed at various locations in Rancho Cordova and on the City's web site. (A copy of the General Plan survey with a summary of results is included as an appendix to this Vision Book.)
- A Visual Preference survey, also distributed in printed form and on the web site.

The results of the input received from hundreds of Rancho Cordova residents through this multifaceted Visioning process is reflected in the Vision statements for the City. The Vision statements are arranged into the twelve sections, or "Elements" of the General Plan.

EXPLANATION OF CAPABILITY ASSESSMENT MATRIX

Does the Community have:

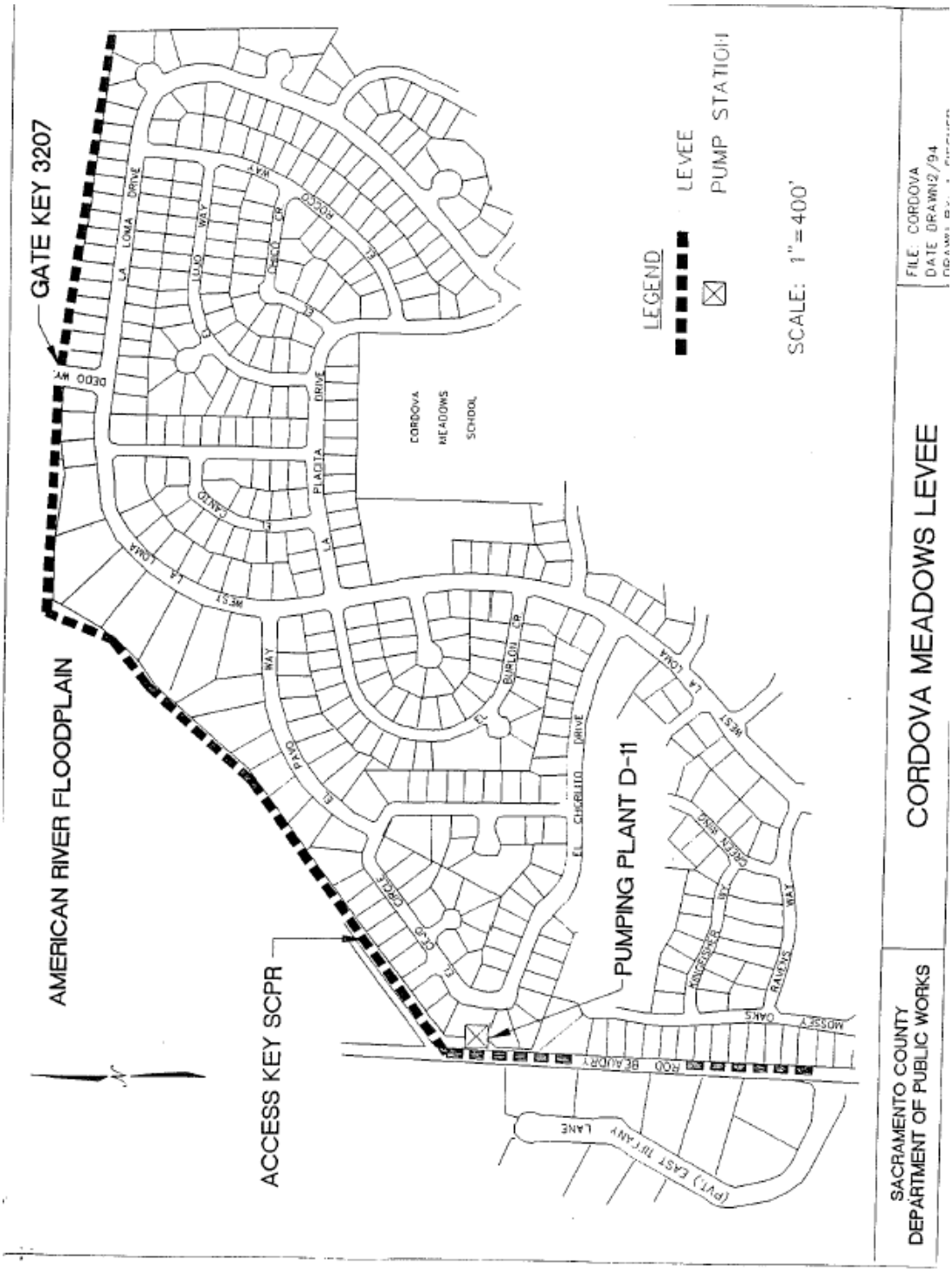
Comp Plan: A Comprehensive Long-Term Community Growth Plan?
Land Use Plan: A plan that designates type of Land Use desired/required; uses Zoning
Subdivision Ordinance: A regulation that dictates lot sizes, density, setbacks and construction type
Zoning Ordinance: An ordinance that dictates type of Use and Occupancy, Implements Land Use Plan
NFIP/FPM Ord: A Floodplain Management Ordinance: Directs development in identified Flood Hazard Areas. Required for Participation in NFIP and Availability of Flood Insurance
Sub. Damage: Does your FPM Ordinance contain language on Substantial Damage/Improvements?
Administrator: Do you have a Floodplain Management Administrator (someone with the responsibility of enforcing the ordinance and providing ancillary services (e.g., map reading, public education)
# of FP Bldgs: How many buildings are in the mapped Floodplain?
# of policies? How many buildings are insured against flood through the NFIP?
# of RL's: # of Repetitive Losses: (Paid more than $1,000, twice in 10 years)
CRS Rating: A Community Rating System rating from the NFIP, and if so, what is it?
BCEGS: A Building Code Effectiveness Grading System Rating
LEOP: A Local Emergency Operations Plan – a disaster RESPONSE plan
HM Plan: A Hazard Mitigation Plan
Warning: Any type of system, such as "Storm Ready" Certification from NWS, NOAA Weather Radio reception, outdoor sirens, Cable (TV) Override, or an Emergency Warning Notification System?
GIS: A Geographic Information System
Structural Protection Projects: (levees, drainage facilities, detention/retention basins)
Property Protection Projects: (buy-outs, elevation of structures, floodproofing, small "residential" levees or berms/floodwalls)
Critical Facility Protection: (for example, protection of power substations, sewage lift stations, water-supply sources, the EOC, police/fire stations or medical facilities that are at risk)
Natural And Cultural Inventory: Do you have an inventory of resources, maps, or special regulations within the community? (wetlands and historic structures/districts, etc.)
Erosion Or Sediment Control: Do you have any projects or regulations in place?
Public Information And/Or Environmental Education Program: Do you have an ongoing program even if its primary focus is not hazards? Examples would be "regular"

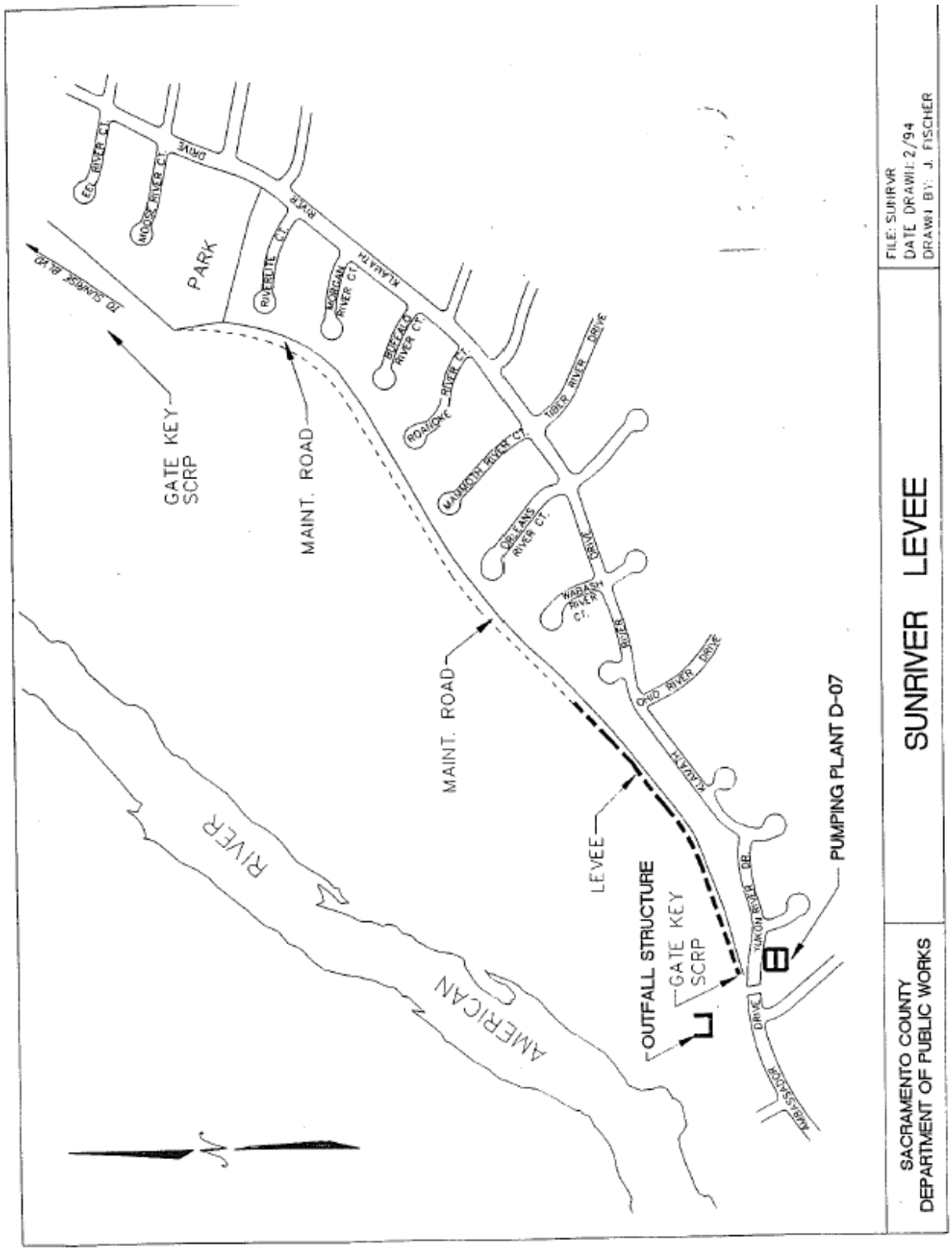
Capability Assessment Matrix

	RANCHO CORDOVA
Comp Plan/General Plan	Y- underway
Land Use Plan	Y- underway
Subdivision Ord	Y
Zoning Ordinance	Y
NFIP/FPM Ordinance	Y- adopts County's Ordinance
- Map Date	same as County
- Substantial Damage language?	Y
- Certified Floodplain Manager?	Y- County Manager
- # of Floodprone Buildings?	??
- # of NFIP policies	in County total
- Maintain Elevation Certificates?	Y
- # of Repetitive Losses?	0
CRS Rating, if applicable	N/A
Stormwater Program?	Yes, RC has adopted County policy
Building Code Version	UBC
Full-time Building Official	Y
- Conduct "as-built" Inspections?	Y
BCEGS Rating	N
Local Emergency Operations Plan	N
Hazard Mitigation Plan	N
Warning System in Place?	N
- Storm Ready Certified?	N
- Weather Radio reception?	N
- Outdoor Warning Sirens?	N
- Emergency Notification (R-911)?	N
- Other? (e.g., cable over-ride)	N
GIS System?	Y- County System
- Hazard Data?	Y- with County
- Building footprints?	N
- Tied to Assessor data?	Y- County System
- Land-Use designations?	Y
Structural Protection Projects	Y-Levees
Property Owner Protection Projec	N
Critical Facilities Protected?	Y
Natural Resources Inventory?	N
Cultural Resources Inventory?	N
Erosion Control procedures?	Y- adopted County policy
Sediment Control procedures?	Y- adopted County policy
Public Information Program/Outle	Y
Environmental Education Program	N

Structural Mitigation Capabilities

The levee system within the City consists of the Cordova Meadows Levee, which is approximately 5,000 feet long, and the Sunriver Levee which is approximately 1,500 feet long. Maps showing the locations of these levees are provided below.




SUNRIVER LEVEE
SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS
FILE: SUNRVR
DATE DRAWN: 2/94
DRAWN BY: J. FISCHER
PARK
GATE KEY SCRP
MAINT. ROAD
MAINT. ROAD
LEVEE
OUTFALL STRUCTURE
GATE KEY SCRP
PUMPING PLANT D-07
AMERICAN
RIVER
TO SUNRISE BLVD
EEL RIVER CT.
MOOSE RIVER CT.
RIVERLITE CT.
MORGAN RIVER CT.
BUFFALO RIVER CT.
ROANOKE RIVER CT.
MAMMOTH RIVER CT.
ORLEANS RIVER CT.
WABASH RIVER CT.
TIBER RIVER DRIVE
OHIO RIVER DRIVE
KLAMATH RIVER DRIVE
YUKON RIVER DR.
AMBASSADOR DRIVE

HISTORIC PRESERVATION

There are several historic structures located within Rancho Cordova, three of which are pictured below.

One structure listed below appears on the National Historic Preservation District Register.

State and Federal Historic Preservation District Registers:

American River Grange Hall No. 172 (added 1996 - **Building** - #96001079)
2720 Kilgora Rd., Rancho Cordova
Source: http://www.nationalregisterofhistoricplaces.com/CA/Sacramento/state.html

NATURAL RESOURCES IDENTIFIED IN RANCHO CORDOVA

According to the California Natural Diversity Database the following threatened and endangered species have been identified with the City of Rancho Cordova:

CITY OF RANCHO CORDOVA

Ahart's dwarf rush
Bank swallow
Boggs Lake hedge-hyssop
Burrowing owl
California linderiella
Cooper's hawk
Great blue heron
Great egret
Legenere
Midvalley fairy shrimp
Northern Hardpan Vernal Pool
Sacramento orcutt grass
Sanford's arrowhead
Slender orcutt grass
Tri-colored blackbird
Valley elderberry longhorn beetle
Vernal pool fairy shrimp
Vernal pool tadpole shrimp
Western spadefoot
White-tailed kite

DEVELOPMENT TRENDS

Although the city has a large employment base with dozens of offices along Highway 50, including several Fortune 500 companies, a few retail centers are nearly empty. One example is the largely vacant Mervyn's shopping center at Folsom Boulevard and Olson Drive. Another recent blow was Sam's Club's announcement that it would close its Sunrise Boulevard store at the beginning of next year and reopen in Folsom.

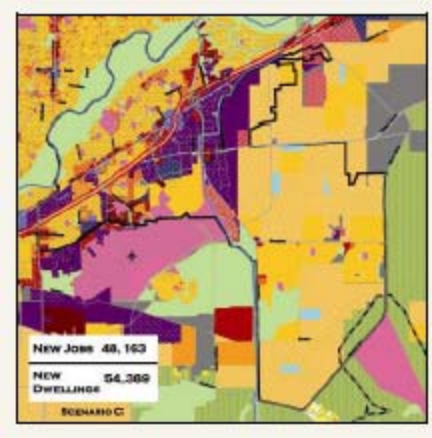
The city also is on the verge of an explosive population growth with the 22,000-home Sunrise Douglas development and the Rio del Oro proposal for 12,000 homes. Together, these projects on Rancho Cordova's southeast side would more than double the city's population.

Meanwhile, other subdivisions, such as Villages of Zinfandel, which has been under construction for the last two years, also are increasing the city's population. The Folsom Cordova Unified School District already reports that it expects to accumulate more developer fees from Rancho Cordova than from Folsom.

A major concern of Rancho Cordova's leaders is connecting its new and older communities so they don't splinter into two cities years from now.

The Interim General Plan for the City of Rancho Cordova includes a variety of visions statements reflecting the development trends of this new community:

- Land uses in Rancho Cordova should generally reflect the types and intensity of land uses shown in the Blueprint's "Scenario C" (shown below) which envisions relatively higher overall residential densities than currently in place. While not establishing 'buildout targets', this land use scenario anticipates the addition of approximately 54,000 to 60,000 new households and 48,000 new jobs in the current Rancho Cordova city limits (based on assumptions used in the Blueprint process), with possible additional growth in the planning area.
- The land use vision for Folsom Boulevard is to show higher intensity development than Scenario C, focusing development at the light rail stations.
- Development within the Planning Area should be contained within the current "Urban Service Boundary" as shown on the General Plan.
- Civic and educational uses along Folsom Boulevard.
- Less industrial use of the Aerojet property within Rancho Cordova.



- New uses along the American River Parkway (such as: expanded recreational, supportive commercial, amphitheater, and nature center)
- Regenerate existing underutilized commercial centers (including the Zinfandel/Olson Drive area and other underutilized commercial centers) by improving existing centers or by wholesale changes in land use Incentives to encourage infill development in the existing developed areas of the city
- A circulation system that links to regional destinations, including a proposed new Highway 50-Highway 99-I 5 connector.

COMMUNITY-SPECIFIC RECOMMENDATIONS

Rancho Cordova Action Item #1: *Participate with the development of a seasonal multi-hazard public education campaign to be implemented annually*

Issue/Background Statement: Refer to Section 5-4 Countywide Mitigation Recommendations. Public Education is one of the primary mechanisms in reducing future hazard related losses, and one that is inexpensive in comparison to other mitigation projects. This effort should be coordinated between the many organizations that already have extensive and/or limited programs in place.

The following topics could be addressed through this effort that apply to Rancho Cordova:

- Floods
  - Warning system components
  - Regional Evacuation plans/procedures (response to warning)
  - Public Info regarding manhole covers popping off: what they are, what they are for
  - Natural & Beneficial value of floodplains
  - Placing Flood-Depth signs county-wide
- Severe Weather
  - Tree-limb trimming
  - Fog – driving tips
  - Warning (NOAA Weather [All-Hazards] Radio)
- Earthquakes
- Health Hazards (West Nile Virus)
- Water Conservation (In conjunction with existing San Juan WD program effort)
- Develop/enhance Business Continuity Planning
- Conduct disaster exercises
- Train consumers/volunteers to be read to help when disasters strike
- Provide all-hazard curriculum for teachers

Other Alternatives Considered: Do nothing

Responsible Offices/Persons: City & County Emergency Management offices, City & County Floodplain Management Offices, SAFCA, the America Red Cross, Sacramento County Health Department, San Juan Water District, the California Fire Alliance, the Institute of Building and Home Safety, CA-OES, CA-DWR, CA-Reclamation Board and FEMA Region IX.

Priority (H,M,L): High

Cost Estimate / Potential Source of Funding: Existing budgets

Cost-Effectiveness Explanation: Life Safety, Reduced losses

Schedule: 2005

Multi-Hazard Mitigation Plan

6.9 "The Districts" Community Element

DMA 2000 includes "Districts" in its definition of local governments subject to the requirements of multi-hazard mitigation planning. Types of Districts vary in both form and function. The various types of Districts in Sacramento County include:

- Special Districts
- Multi-purpose Districts
- Joint Powers Authority

Special Districts that include both independent and dependent districts provide the full range of services to citizens of the County such as drinking water, electricity, garbage service, fire protection and Parks and Recreation service. An independent special district has a legislative body whose members are elected by registered voters from within the district or, in the case of cemetery districts, appointed by the Board of Supervisors to run the affairs of the district. A dependent special district may have appointed advisory boards, however, the Board of Supervisors, ex officio, is ultimately responsible for district affairs.

Multipurpose districts in Sacramento County consist of County Service Areas (CSA), Community Services Districts (CSD), and Municipal Utility Districts (i.e., SMUD). Each of the three types of districts provides a similar range of services. The primary distinction between the County Service Areas, the Community Services District and Municipal Utility District is their respective type of governance. A County Service Area is a dependent district, governed by the County Board of Supervisors, whereas a Community Services District or Municipal Utility District can be an independent district, governed by its own elected Board of Supervisors.

A Joint Powers Authority consists of two or more public agencies jointly exercising powers, limited by the combined territorial jurisdictions of the individual agencies. Examples include SAFCA, Sacramento Transportation Authority and Sacramento County Housing and Redevelopment Agency.

The Sacramento County HMPC included representatives from 69 districts --- many of which have never received any damage from a natural hazard, disaster assistance from state or federal programs, or mitigation assistance from FEMA. They chose to participate in the development of this DMA plan nonetheless, in order to preserve and maintain their eligibility for future mitigation assistance should the need and the opportunity arises. Thus, not every District has an individual Action Item recommended, while others have several. Each District, however, now recognizes the overall risk and vulnerability of the County and their role in minimizing future damage and facilitating recovery. In that light, each District will participate in the overall countywide public education recommendation that follows. The Districts, as all local

governments, reserve their right to revise this element of the plan to reflect new threats and to propose new mitigation activities as the need and the concepts arise.

All Districts Recommended Action Item: *Participate with the development of a seasonal multi-hazard public education campaign to be implemented annually*

Issue/Background Statement: Refer to Section 5-4 Countywide Mitigation Recommendations. Public Education is one of the primary mechanisms in reducing future hazard related losses, and one that is inexpensive in comparison to other mitigation projects. This effort should be coordinated between the many organizations that already have extensive and/or limited programs in place.

The following topics could be addressed through this effort that apply to all the districts:

- Floods
  - Flood insurance availability and Preferred Risk policies behind levees
  - City/County/SAFCA Program
  - Warning system components
  - Regional Evacuation plans/procedures (response to warning)
  - Public Info regarding manhole covers popping off: what they are, what they are for
  - Natural & Beneficial value of floodplains
  - Placing Flood-Depth signs county-wide
- Severe Weather
  - Tree-limb trimming
  - Fog – driving tips
  - Warning (NOAA Weather [All-Hazards] Radio)
- Earthquakes
- Health Hazards (West Nile Virus)
- Water Conservation (In conjunction with existing San Juan WD program effort)
- Wildfire (defensible space, subdivision regulations, ingress/egress, severe fire hazard mapping)
- Develop/enhance Business Continuity Planning
- Conduct disaster exercises
- Train consumers/volunteers to be read to help when disasters strike
- Provide all-hazard curriculum for teachers

Other Alternatives Considered: Do nothing

Responsible Offices/Persons: City & County Emergency Management offices, City & County Floodplain Management Offices, SAFCA, the America Red Cross, Sacramento County Health Department, San Juan Water District, the California Fire Alliance, the Institute of Building and Home Safety, CA-OES, CA-DWR, CA-Reclamation Board and FEMA Region IX.

Priority (H,M,L): High

Cost Estimate / Potential Source of Funding: TBD/HMGP

Cost-Effectiveness Explanation: Life Safety, Hazard loss reduction

Schedule: 2005

LOS RIOS COMMUNITY COLLEGE DISTRICT

It is important for CA-OES and FEMA Region IX to recognize that LRCCD is a political subdivision of the state, and that it has facilities in three counties, one of which is Sacramento. LRCCD was receiving mixed signals at the onset of their efforts to participate in the DMA planning process, and could not determine whether it was appropriate to participate at the state or local level – and if at the local level, with which of the three counties. The Sacramento County HMPC invited LRCCD to participate in this effort.

Los Rios Community College District (LRCCD) has undertaken an in-depth analysis of their previous losses and their continuing vulnerability to disasters as a result of their participation in this planning effort. The LRCCD representative followed FEMA's detailed "How To" guidance series and developed a wealth of documentation --- too extensive to include within this plan. For the purposes of LRCCD's continued eligibility for FEMA mitigation funding, the LRCCD documentation is on file with the Sacramento County-OES, with the rest of the county planning files. A brief synopsis is provided below, followed by their recommendations.

LRCCD has 261 structures, with an occupancy of 71,877, that are subject to light and moderate earthquake damage. LRCCD used the web-based USGS risk-by-zip-code methodology to determine risk at each site. The replacement value of the buildings is $267.1 million. The replacement value of the contents is $78 million. The value of the functional use, at $179/SF is $350.5 million. Because these buildings are scattered across the landscape in unmapped hazard areas, all of the above values also hold true for the severe weather hazard.

There are 159 structures in the floodplain (Zones AR, A99 and Shaded X) with an occupancy of 49,483, and a replacement value of at $191.2 million. They incurred $62,531 in damages from the January 1995 flooding, and $13,335 from the March 1995 floods. (Losses could have been larger as these figures represent FEMA and State reimbursement only from federal disaster declarations).

Historically, these two events, coupled with smaller flood and wind losses in 1994, 1997, 2003 and 2004, LRCCD has suffered approximately $120,000 in damages, of which approximately $97,500 was recovered through disaster assistance programs.

LRCCD has four structures exposed to the wildfire hazard – all in Eldorado County.

LRCCD developed the beginning of their own mitigation plan, from which the following summary was excerpted:

In a cooperative effort with Sacramento County, Los Rios Community College District will be an annex to the Sacramento City/County plan to include all of our educational facilities (leased & owned), and operational facilities. Please note we have leased classrooms in Davis (Yolo County) with an occupancy 220 people, and in El Dorado County we have an outreach center that has an occupancy of 665 people. The District has established a hazard mitigation committee to participate in the development of this plan. Debbie Turner (Risk Management Specialist) is the acting liaison with Sacramento's committee attending and participating in the meeting along with being the Chairperson for our local committee. In support of obtaining public input, the District posted the public meeting information on the Districts Safety & Risk Management website.

To identify the hazards for the 17 locations, the committee provided historically data from past damages caused by natural disasters. We also contacted our Regional FEMA office for claim information. During the Winter Storms of 1995 (FEMA disaster reference number 1044 & 1046), of the District filed claims, 12 claims were approved by FEMA. An additional, 25 minor repair claims were under a $1,000 and were covered by the District. The total amount paid to repair damages resulting from the Winter Storm of 1995 was $119,882. FEMA and OES paid $97,436 of the total repair cost. While the District paid out $22,446. Since the 1995 winter storms the District has had minor damage to buildings due to the strong winds and heavy rains during the winters of 1997, 2003, and 2004. In 1994, a portion of the parking lot of our South Sacramento Campus flooded but did not cause any damage.

As part of our Risk Assessment, the following chart summarizes our risk for Earthquake, Flood, Severe Weather, and Wild Fire. Also, attached are several detailed worksheets for each hazard. This information includes all leased and owned buildings.

Hazard	**Risk**	**Number of Structures in Hazard Area**	**Total Square Feet in Hazard Area**	**Occupancy Count**
Earthquake	Moderate	263	1,992,210	27,680
Flooding	Moderate	161	1,431,244	24,257
Severe Weather-Heavy Rains/winds	Moderate	263	1,992,210	27,680
Wild Fire	Very High	4	47,919	665

The following are LRCCD's Mitigation goals:

1. Minimize risk from Wild Fire for the El Dorado Center with proper defensible space.
2. To reduce property damage from flooding, examine re-locating certain operations out of the flood zone or flood way.
3. Examine practicality of obtaining flood insurance policies
4. To reduce operational cost for flood insurance, by having the ARC buildings surveyed and possibly removed from FEMA's flood zone.
5. To monitor and maintain healthy trees.

LRCCD Recommended Action Item #1: Protect critical facilities at the District Office at 1919 Spanos Court and 2100 Northrop from flood damage.

Issue/Background Statement: There is potential flooding from Strong Ranch Slough and Chicken Ranch Slough from either overloading the pump station and flooding the local area or flooding from the overflowing creeks. Although, two of our buildings are located next to the levee, our risk of flooding from a levee break may be minimal due to being located on the North side of the levee. According to Sac County the South side of the levee is more vulnerable to erosion and breaks.

Should our District computer operations become damaged from floodwater, we would incur significant equipment loss and a District Wide IT interruption.

Our building elevation is estimated at 34 feet and the base flood elevation according to the FIRM MAP (panel 0602620185F July 6, 1998) is 43.5 feet. The Strong Ranch Slough flooded at 36.4 on Feb 1986 at S/O Hurley @ Clinton Rd Apt. Bridge, which is near our facility.

Other Alternatives Considered (including No Action):

1. Flood proofing coordination with SAFCA and Sacramento County to improve the Strong Ranch Slough and Chicken Ranch Slough

2. Within the next two years, we are planning to move our critical computer/server equipment to the second floor of our building at Ethan Way. Although the Ethan Way building is still in the flood zone, the equipment will be on the second floor, which is estimated at 12-feet. The move will serve to protect the equipment verse replacing the equipment. The cost of the move has not been determined.

Responsible Office/Person: Debbie Turner – Risk Management Specialist

Priority (H,M,L): #1 is a priority set by SAFCA or Sac County. #2 is a high priority and will be completed within the next two years.

Cost Estimate/Potential Source of Funding: #2 Currently, LRCCD does not have a cost estimate and is looking to mitigation grant money to assist in the move. The equipment alone is estimated at $200,000.

Briefly Explain why this is cost-effective: #2 - Moving the equipment is more cost effective than replacing the equipment should it become damaged during a flood. In addition, moving critical operations to another building is less expensive than moving 133 people and operations to a new building outside the flood zone. Historically, we have not had damages to our two buildings.

Schedule: #2-Moving the equipment and operations to the Ethan Building should be completed in two years (December 2006).

LRCCD Recommended Action Item #2: Protect facility at 1410 Ethan Way from flood damages

Issue/Background Statement: There is potential flooding from Strong Ranch Slough and Chicken Ranch Slough from either overloading the pump station and flooding the local area or flooding from the overflowing creeks.

Although, our building is near the levee our risk of flooding from a levee break may be minimal due to being located on the North side of the levee. According to Sac County, the South side of the levee is more vulnerable to erosion and breaks.

Our goal is to prevent flood damage to our building, equipment, and office furniture. In addition, avoid building closure due to flood damages especially since the critical computer operations will be located on the second floor.

Our building elevation is estimated at 36.3 feet and the base flood elevation according to the FIRM MAP (panel 0602620185F July 6, 1998) is 34.5 feet. The Strong Ranch Slough flooded at 36.4 on Feb 1986 at S/O Hurley @ Clinton Rd Apt. Bridge, which is near our facility.

Historically, we have not incurred any damages to this building. However, during the 1986 area flooding the water came within inches of the entrance door.

Other Alternatives Considered (including No Action):

1. Flood proofing coordination with SAFCA and Sacramento County to improve the Strong and Chicken Ranch sloughs.

2. Add a 3-foot floodwall/berm around the building for added protection and use sandbags for the two entrances if the area is flooded. The building is already protected by a 7-foot block wall constructed on the East side of the property, shielding 1/3 of the building.

Responsible Office/Person: Debbie Turner – Risk Management Specialist

Priority (H,M,L): Medium

Cost Estimate/Potential Source of Funding: We do not have a cost at this time. Apply for Pre-Mitigation grant money to complete the work.

Briefly Explain why this is cost-effective: The cost of adding a floodwall/berm is significantly lower than moving all the operations to another building outside the flood zone. LRCCD is interested in constructing a berm to protect the other 2/3 of the building.

Schedule: For either alternative listed above is based on funding.

LRCCD Recommended Action Item #3:

Chicken Ranch – Protect critical functions of Los Rios Comm. College District from flooding (relocation vs. flood proofing)

LRCCD Recommended Action Item #4:

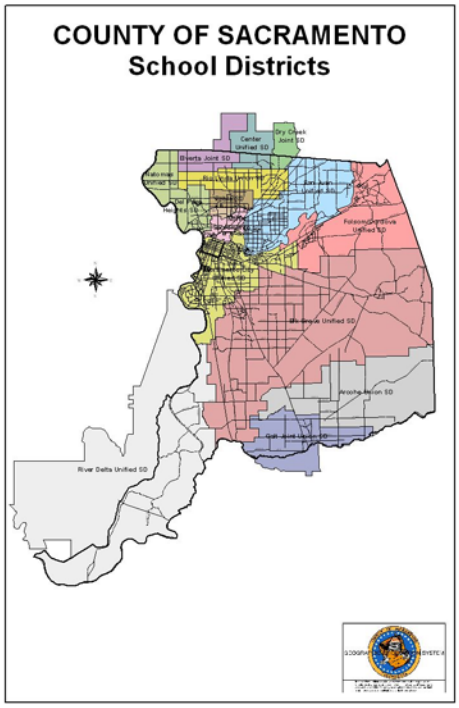
Defensible space

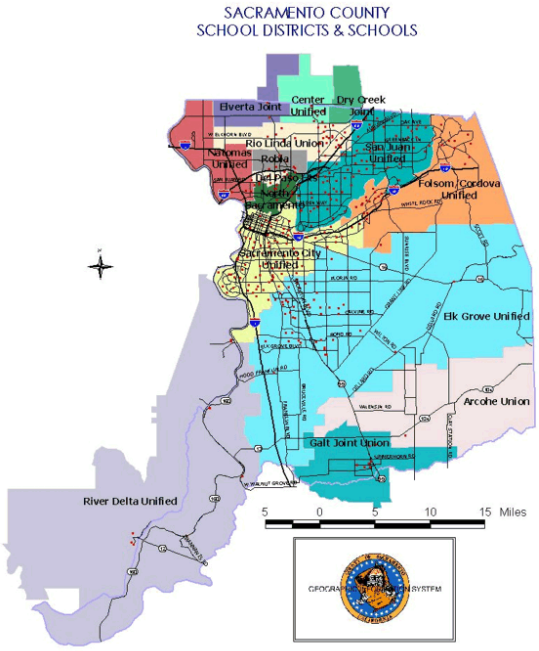
- El Dorado Center College Facilities
- Vital Infrastructure (Life Lines)

Areas w/problem:

- American River Parkway near the District offices
- Fair Oaks off Hazel Avenue La Cerrena
- Folsom
- El Dorado Center
    - Los Rios CC (El Dorado County)

SCHOOL DISTRICTS





The San Juan Unified School District incurred damages to eight schools in the floods of January and March 1995. The District developed a 57-page report, detailing damages to trailer classrooms on a school-by-school, trailer-by-trailer basis. The damage estimates prepared for the eight schools total $527,612 in the aggregate. The damage is typical of that to manufactured buildings impacted by deep flooding; roofs, siding, skirting; ceiling, wall and floor finishings; and doors, windows and trim. The report is on file with Sacramento County OES.

RECOMMENDED ACTIONS FOR SCHOOL DISTRICTS

Recommended Action Item #1: Emergency Training/Planning for Sacramento City Unified School District

- Develop loss estimates
- Coordinate with City/County Emergency Services

Category (for CRS purposes): Emergency Services

Issue/Background Statement: Through this mitigation planning process, the Sacramento City Unified School District has become more aware of the hazards and risks threatening their facilities, and are now ready to move forward with detailed loss estimates that will assist the District in making prioritized decisions regarding undertaking protective measures.

Other Alternatives Considered: (No Action)

Responsible Office/Person: Sacramento City Unified School District, Risk Management

Priority (H, M, L): H

Cost Estimate/Potential Source of Funding: Staff time only to conduct loss estimates

Briefly Explain why this is cost-effective: Leads to loss reduction actions, promotes hazard awareness

Schedule: Begin in next six months

Recommended Action Item #2: SAC School Unified, Natomas Unified and Elk Grove Unified School Districts are interested in tornado and sever winds and storm protection, particularly:

- Glass Protection
- Saferooms

Category (for CRS purposes): Protective Measures

Issue/Background Statement: These School Districts have suffered previous damage from severe weather/thunderstorm events and are seeking protection form broken, flying glass as well as safe shelter.

Other Alternatives Considered: No Action

Responsible Office/Person: Sacramento City Unified School District, Risk Management

Priority (H, M, L): H

Cost Estimate/Potential Source of Funding: Staff time only to conduct loss estimates

Briefly Explain why this is cost-effective: Life Safety, Leads to loss reduction actions, promotes hazard awareness

Schedule: Begin in next six months

Recommended Action Item #3: Natomas Unified School District seeks technical assistance in developing and testing school all-hazards evacuation procedures

Category (for CRS purposes): Emergency Services

Issue/Background Statement: The school district has facilities in all four "corners" of the intersection of I-80 and I-5 and is concerned about where to go and how to get there, should an

emergency need arise. The emergency could be severe weather, or a transportation accident and hazardous materials spill on the nearby interstates that resulted from severe weather.

Other Alternatives Considered: No action

Responsible Office/Person: Natomas Unified School District in conjunction with the City of Sacramento Office of Emergency Management

Priority (H, M, L): M

Cost Estimate/Potential Source of Funding: Staff time only

Briefly Explain why this is cost-effective: Life-safety, reduction in potential liability

Schedule: 2005

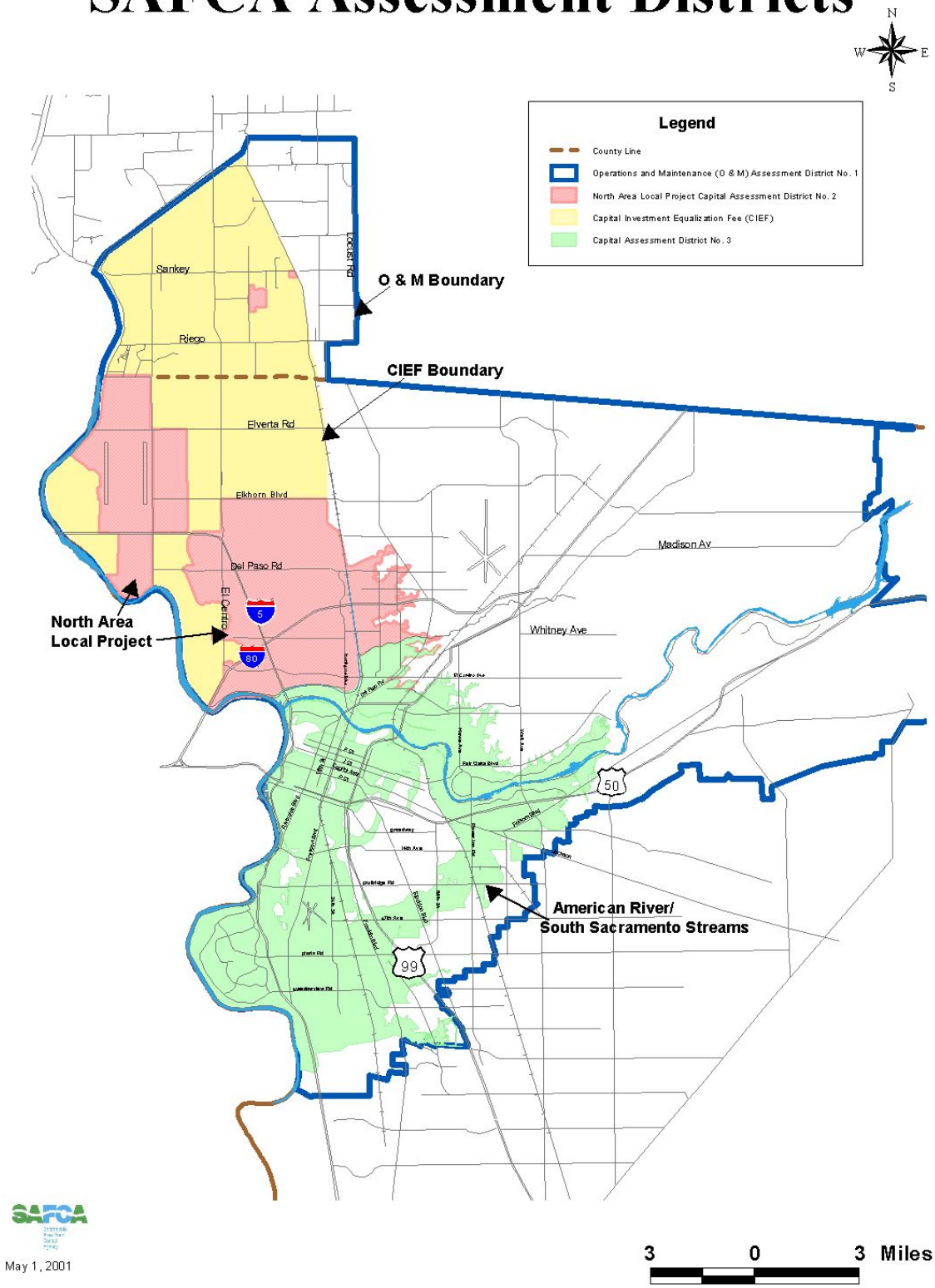
FLOOD CONTROL DISTRICTS

SAFCA

SAFCA's activities are funded from development fees and annual assessments imposed on benefiting properties in three separate districts in Sacramento and Sutter Counties. District 1 provides funding for annual operation and maintenance expenses and covers all of the properties in the Natomas Basin, including those lying within Sutter County, and all the properties in Sacramento County lying with the drainage basin of the American River. District 2 provides funding for capital improvements to the levees protecting Natomas and North Sacramento and covers all of the properties directly benefiting from these improvements. District 3 provides funding for capital improvements to Folsom Dam, the levees along the American River, and the levees and related flood control facilities along Morrison Creek and its tributaries in South Sacramento County and covers all the properties benefiting from these improvements.

A map displaying SAFCA's Assessment Districts is on the following page.

SAFCA Assessment Districts



May 1, 2001

SAFCA Recommended Action Item #1: Complete Flood Erosion Protection Projects to achieve recertification of 100-year flood protection from the American River – removing most of the City of Sacramento from the 100-yr. floodplain.

Category (for CRS purposes): Structural Protection

Issue/Background Statement: This project is underway and near completion. It is part of SAFCA's primary mission to lessen insurance requirements in the Sacramento area and to work towards protection from the 200-year food event. Two additional programs are being planned in conjunction with the pending map change; first, an "Agent's Workshop" to ensure that the insurance industry is prepared for up to 40,000 policy holders no longer required to maintain NFIP flood insurance, and can explain the benefits of switching to a "Preferred Risk" policy rather than simply canceling their existing policy; and second, a public education campaign explaining the pending map changes and the befits of maintaining a "Preferred Risk" policy.

Other Alternatives Considered: No Action

Responsible Office/Person: SAFCA

Priority (H, M, L): High

Cost Estimate/Potential Source of Funding: Work completed. Funded by SAFCA, CA-DWR, State Reclamation Board and USACE

Benefits: Reduced insurance costs, increased flood protection

Briefly Explain why this is cost-effective: Life safety, reduced flood losses, significantly reduced insurance premiums

Schedule: 2004/2005

SAFCA recommended Action Item #2: Coordinate with the City and County 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 Department of Utilities and County Department of Water Resources.

Priority (H, M, L): High

Cost Estimate/Potential Source of Funding: $220,000. SAFCA with FEMA grant.

Cost-Effectiveness Explanation: Life safety, reduced flood losses, significantly reduced insurance premiums

Schedule: Late 2004/Early 2005

SAFCA Recommended Action Item #3: Complete South Sacramento Streams (includes Florin and Morrison Creeks) Group Projects in 2005. Provide greater than 100-year protection by improving conveyance and raising levees.

Category (for CRS purposes): Structural Protection

Issue/Background Statement: The flood of 1986 revealed that the South Sacramento Streams do not provide the desired level of protection to the community. In 1997, another series of storms confirmed that additional protection was needed. A project study was undertaken that identified measures that would provide greater than 100-year level of protection to the community.
A USACE document describes issues and alternatives and is available from SAFCA.

Other Alternatives Considered: No Action

Responsible Office/Person: SAFCA, CA-DWR, State Reclamation Board, USACE

Priority (H, M, L): High

Cost Estimate/Potential Source of Funding: $90 million/ SAFCA/State DWR – Rec Board/Corps

Cost-Effectiveness Explanation: Life safety, reduced flood losses, significantly reduced insurance premiums

Schedule: Project to start in 2005

SAFCA Recommended Action Item #4: Folsom Dam – enlarge outlets & increase flood storage capacity by an additional 100,000 acre-feet.

Category (for CRS purposes): Structural Protection

Issue/Background Statement: These are two separate projects, grouped together because they both relate to the Reoperation of Folsom Dam. The outlets from Folsom Lake are inadequate in terms of releasing large enough volumes of water given the short lead-time that can accurately predict storms that will drain into the lake. Larger outlets will dump larger volumes of water, quicker, yet still be contained within the downstream levee system. The lowering of the lake provides additional flood control storage. The raise of the dam also provides additional storage.

Other Alternatives Considered: Upstream storage coupled with the increased downstream conveyance.

Responsible Office/Person: SAFCA, BOR and USACE

Priority (H, M, L): High

Cost Estimate/Potential Source of Funding: $450 Million for the two projects combined. $200,000,000 outlets, $250,000,000 Long Term (Long Term Project includes the raise, bridge, dam safety at LL Anderson, ecosystem restoration, Temperature shutters). Congressional appropriations (approved), SAFCA, CA-DWR, State Reclamation Board, BOR and USACE

Briefly Explain why this is cost-effective: Reduced flood losses, increased flood storage and control

Schedule: Major work to be initiated in 2005.

SAFCA Recommended Action Item #5: Stabilize Eroding Banks Along the Sacramento River South of Downtown

Category (for CRS purposes): Structural Protection

Issue/Background Statement: The Sacramento river levees provide protection to a large portion of the Sacramento area. These levees are subject to erosive forces from high river flows and boat wakes. The proposed work is to address areas where erosion has either cut into the levee section or is eroding soft bank material.

Other Alternatives Considered: The project is being designed now and will consider an array of solution that will range from rock protection to green fixes or a combination of the two.

Responsible Office/Person: SAFCA/State DWR – Reclamation Board/Corps

Priority (H, M, L): High

Cost Estimate/Potential Source of Funding: Unknown/ SAFCA/State DWR – Reclamation Board/Corps

Briefly Explain why this is cost-effective: Maintains flood control system. Life Safety, reduced flood losses, reduced insurance costs.

Schedule: 2005

SAFCA Recommended Action Item #6: Forecast Based Operation of Folsom Reservoir

Category: Non- structural Protection

Issues/Background: Forecast based operations of Folsom Reservoir can increase the level of protection provide by the dam. Water is released from the dam in anticipation of flood waters entering the reservoir creating additional storage for the flood event. This would only occur during extremely large events.

Other Alternatives Considered: N/A

Responsible Office/Person: SAFCA/State DWR – Reclamation Board/Corps/BOR

Priority: Medium

Cost Estimate: Unknown

Breifly Explain why this is cost-effective: Life safety, reduced flood loses, increased flood storage and control

Schedule: 2005

SAFCA Recommended Action Item #7: Coordinate with SAFCA, CA-DWR, USACE, and Sacramento County on Proposed Flood Control projects on Magpie Creek (City of Sacramento Recommended Action #6)

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 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

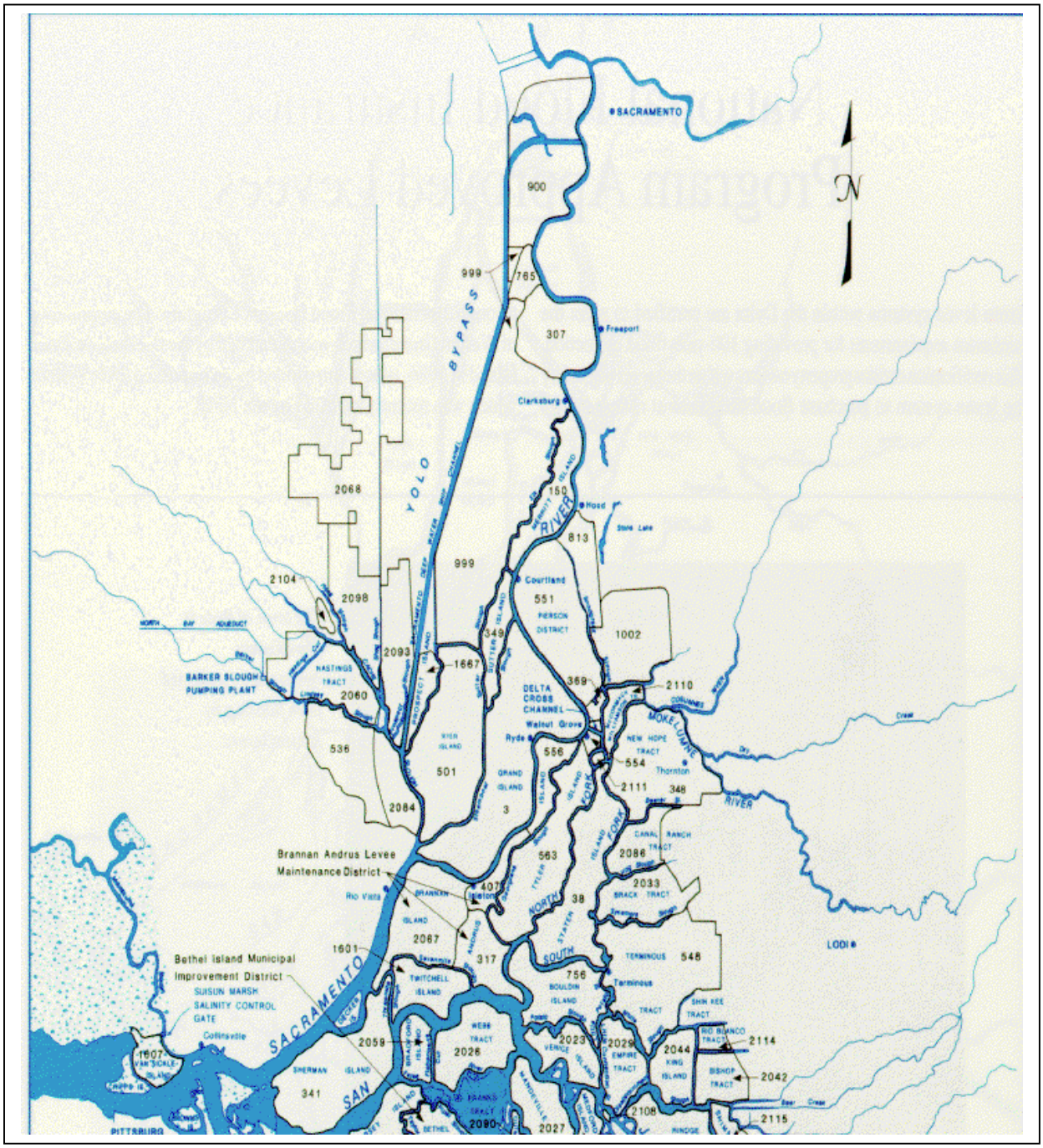
Priority (H, M, L): Ongoing

Cost Estimate/Potential Source of Funding: SAFCA

Cost-Effectiveness Explanation:

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

RECLAMATION DISTRICTS



All District Recommended Action Item #1: Dredge the lower reaches of the Sacramento River throughout the Delta (See "The Delta" recommended Action #1, Section 6.7)

Category (for CRS purposes): Structural Protection

Issue/Background Statement: The primary issue is that *something needs to be done* regarding the entire Delta levee system. The surrounding land and islands are subsiding and the river channel is becoming more and more clogged with upstream sediment, continually increasing the risk to the entire area and beyond. At risk are communities, small and large agricultural operations, and a major component pf the southern California water supply system.

The Reclamation Districts of the Delta Plains have gone on record for over 20 years seeking the resumption of what was once an ongoing maintenance operation. Primary roadblocks are the temporary and ongoing nature of the solution and environmental regulations protecting habitat, aquatic species, and disposal of dredge materials.

With recent and frequent levee failures, and rising state liability for levee failures, the Districts feel it is time to act.

Other Alternatives Considered: Site-specific repairs, a parallel water supply channel, No action.

Responsible Office/Person: CALFED Bay-Delta Program, State Reclamation Board, The Water Forum, Southern California Water Providers, and FEMA,

Priority (H, M, L): High

Cost Estimate/Potential Source of Funding: Millions. State and Federal government, Water Users.

Briefly Explain why this is cost-effective: As a flood control measure alone, the necessary work is probably not cost-effective. However, when the costs of past failures, liability decisions, and the impacts of lost water supplies to Southern California is considered, the solutions appear not only cost-effective, but mandatory and urgent.

Schedule: As soon as possible

RD 800 Recommended Action Item #1: RD800 (East of Hwy. 99) Levee Maintenance & Weir to resolve repeated flooding. Construct overflow weirs on the Cosumnes River within Reclamation District No. 800 jurisdiction and/or rehabilitate existing levee system and construct new levees where needed to provide agricultural protection from a one in one hundred year flood event.

Category for CRS purposes:

Issue / Background Statement: Current levee system provides flood protection limited to a 1 in 10 year event, numerous levee failures have occurred in the past.

Other Alternatives Considered:

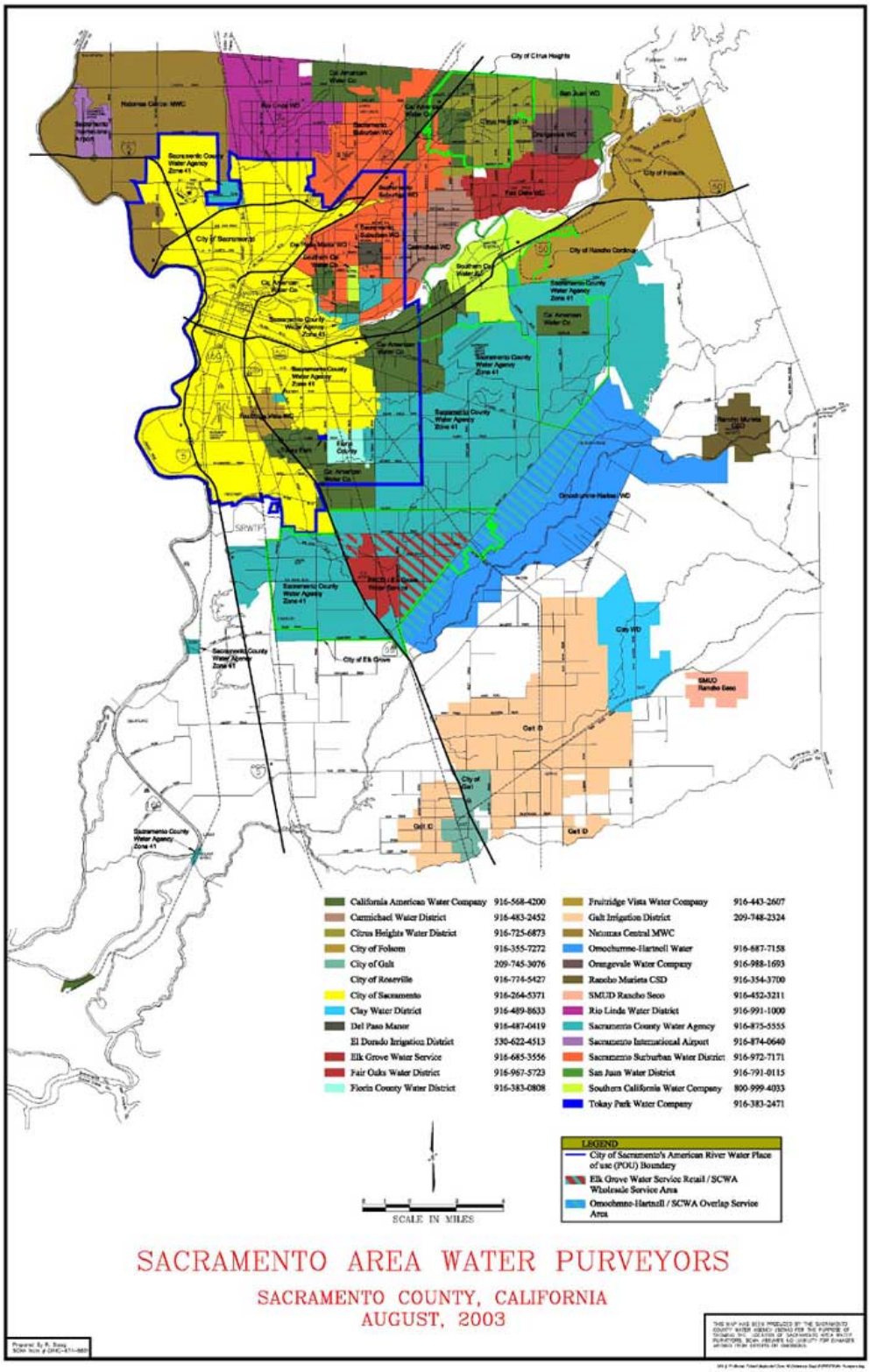
Responsible Office / Person: Reclamation District No. 800, Cosumnes River
Hanson Engineering
c/o Henry Matsunaga
444 North Third Street, Suite 400
Sacramento, CA 95814

Cost Estimate / Potential Source of Funding: Estimate of cost is in excess of $50 million, source of funding is unknown at this time.

Brief Explanation why this may be Cost Effective: Rehabilitating the existing levee system and/or installing overflow weirs will minimize the cyclical nature of rebuilding flood damages to the levee system and facilities within the District's jurisdiction. Flood damage and repair costs of the most recent flood event 1997, was in excess of $30 million inundating approximately 100 homes and flooding nearly 50,000 acres (FEAT Report, 1997). The damages were attributable to flood flows of the Cosumnes River and included areas downstream of the District boundaries. Cost effectiveness is always determined based on cost benefit analysis, and past flood damage costs and subsequent repair costs are not considered in the analysis. The rehabilitation of the system can be phased by river reaches. There have been levee repair projects where, due to funding constraints, levee repair projects were phased in five-mile segments.

Schedule: As soon as possible, once a source of funding is secured.

WATER DISTRICTS



San Juan Water District Recommended Action Item #1: Construction of (5) wells in Sacramento County

Category (for CRS purposes): "Property Protection, Natural Resource Protection, and Structural Projects" – disaster proofing for drought to help maintain and improve water supply

Issue/Background Statement: The primary supply of water for several communities in northern Sacramento County is surface water from Folsom Lake. A ground water supply also exists in the area and is pumped to the community via wells. Much discussion has been given toward preserving the existing ground water supply during wet years with the intent of utilizing the ground water source to supplement surface water supplies drought conditions. As a method of accomplishing this goal, additional wells are needed. San Juan Water District met with agencies within the service area boundary to discuss the possibility of constructing additional wells for this supply. It was proposed that the construction of five additional wells in the service area would be a proactive measure in helping maintain water supply to the area when the surface water supply is limited, as during drought.

Other Alternatives Considered: No action, Interagency Agreements with other agencies and water providers to help supplement water supplies

Responsible Office/Person: San Juan Water District, General Manager

Priority (H,M,L): Medium to High

Cost Estimate/Potential Source of Funding: $5 Million total (approx. $1 Million per well)

Briefly Explain why this is cost-effective: This is a cost effective measure to help supplement a limited surface water supply condition do to the fact that no other sources of supply exists in the area.

Schedule: No date at this time.

San Juan Water District Recommended Action Item #2: Public Information Water Conservation Campaigns

Category (for CRS purposes):"Public Information" – hazard mitigation to help preserve water supply during a drought.

Issue/Background Statement: Conservation is an effective way to help preserve the natural resource of water, especially during drought conditions. Public outreach and information are critical tools toward the effectiveness of any water conservation program. The district currently uses public information campaigns to inform and educate customers on how to conserve and use water more effective for domestic and irrigation purposes.

Other Alternatives Considered: No action, Water patrol

Responsible Office/Person: San Juan Water District, Customer Service Manager

Priority (H,M,L): Medium

Cost Estimate/Potential Source of Funding: Approximately $7,000.00 per publication (2) publications per year. $14,000.00 total.

Briefly Explain why this is cost-effective: It is much more cost-effective to save water using conservation measures via public information campaigns than it is to spend several million dollars to construct additional water storage facilities.

Schedule: No date at this time.

San Juan Water District Recommended Action Item #3: Irrigation System Controller Replacement and Rain Sensor Installation

Category (for CRS purposes):"Natural Resource Protection" – hazard mitigation to help preserve water supply during a drought.

Issue/Background Statement: Landscape irrigation systems are responsible for a large percentage of water used in the residential community of Sacramento County. Irrigation system controllers determine how much water is delivered to landscape thought the irrigation system. Older irrigation controllers have been found to be inefficient and are not designed to accommodate the water efficient irrigating schedules of current conservation programs. Additionally, rain sensors are available which, when connected to an irrigation controller, signal to the controller not to operate during rainy weather thus preventing an unnecessary waste of water. The existing antiquated irrigation controllers should be replaced with newer controllers and rain sensors in order to more effectively manage water used for irrigation.

Other Alternatives Considered: No action, Water patrol

Responsible Office/Person: San Juan Water District, Customer Service Manager

Priority (H,M,L): Medium

Cost Estimate/Potential Source of Funding: Approximately $585,000.00

Briefly Explain why this is cost-effective: The cost for this mitigation measure is a fraction of the cost to construct the alternative which is a water storage tank or reservoir.

Schedule: No date at this time.

Carmichael Water District Recommended Action Item #1: Coordination between SAFCA & Carmichael Water District to protect erosion sites @ facilities when releases exceed 100,000 CFS from Folsom Reservoir. Purpose is to reduce the impact to the American River and specifically the District's Ranney Collectors in the event of high water.

Category (for CRS purposes): Preventative

Issue/Background Statement: Carmichael Water District (CWD) becomes severely impacted during high water events on the American River. CWD owns and operates four Ranney Collectors, three located at Rossmoor Bar one located at Ancil Hoffman Park. A Ranney Collectors are concrete cylinders that are 14 feet in diameter and fifty feet in depth. The collectors are sunken along the edge of the American River at the bottom of each collectors are seven 10-inch diameter perforated pipelines that extended laterally from the collector. These pipelines extended between 50 and 100 feet into the American River. They are approximately 15-20 feet below the bottom of the riverbed. The purpose of these structures is the surface water intakes for the CWD. In addition to these structures CWD also has a conjunction structure that is 29 feet in diameter and 60 feet in depth. The conjunction structure joins all three of the Ranney Collectors into a common 60" pipeline that travels under the American River approximately 30 feet below the bottom of the River.

At 50,000 cfs the collectors become islands that are unreachable at 80,000 cfs, sand and gravels are removed. Between 80,000-130,000 cfs the area is completely under water. During the last two major invents 1986, 1997 over 1 million dollars of damage occurred at the collectors and a total of 100,000 cubic yards of sand and gravel were sent down stream. In 1999 CWD began an improvement project to protect the collectors, and in 2001 the work was completed. Collectors are in better shape to with stand high water events. However flows in excess of 100,000 cfs can results in CWD losing 95% of it water supply for periods of several months.

During the last high water event CWD had to go the stage 3 of the District Urban Water Master Plan which allowed only one day per week of outside irrigation. This lasted for a period of three months while the District made repairs to the collectors.

Other Alternatives Considered (including No Action):

Responsible Office/Person: General Manager, Carmichael Water District

Priority (H, M, L): High

Cost Estimate/Potential Source of Funding: TBD

Briefly Explain why this is cost-effective: This is preventable damage

Schedule: In conjunction with SAFCA actions

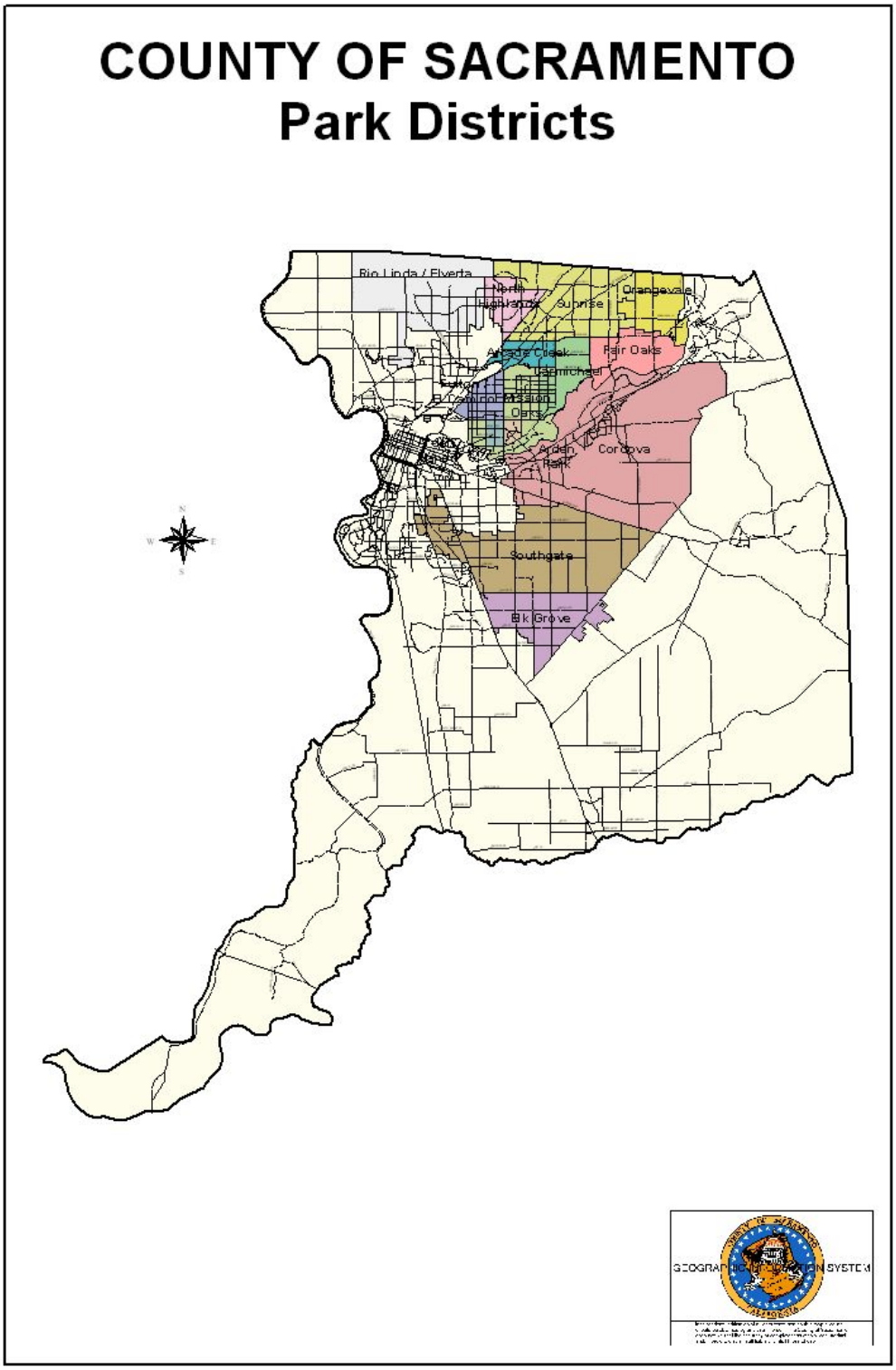
Additional Carmichael Water District Recommended Action Items:

1. **Groundwater Recharge impacts:** Presently there are five uncontained plumes of contamination that is coming from, Aerojet, and Mc Donald Douglas properties. These plumes contain PCE, TCE, Perchlorate, NDMA and potentially others. In the past groundwater recharge or groundwater reinjection has lead to the migration of these plumes which in turn has impacted the water supply for Sacramento County, Rancho Cordova and most recently CWD. While groundwater recharge is a very good ideas, some locations with Sacramento County will lead to increase migration groundwater contamination plumes.

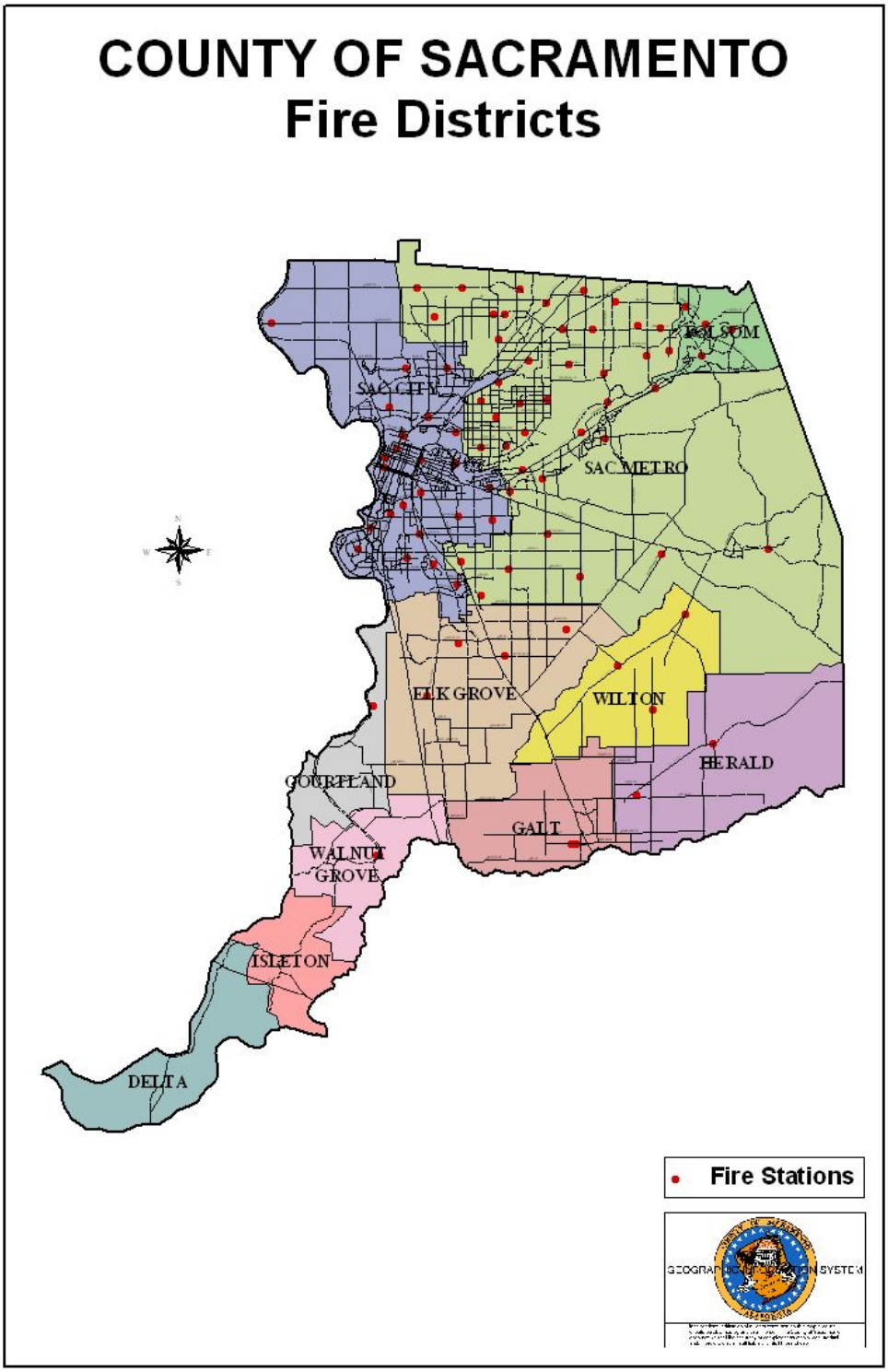
2. **Water Conservation:** CWD has agreed and is currently following the Water Forums Conservation BMP's. These BMPs are set to meet 2030 water supply needs and calls for a 26% water supply reduction. CWD has reduced water consumption by 1500 acft/yr, CWD is within 500 acft/yr of reaching the Water Forum agreement.

3. **Conjunctive Use:** Historically CWD is a conjunctive use agency. We are presently using 75 percent surface water and 25 percent groundwater. In times of drought or high water events the ratio changes from 75 percent surface and 25 percent groundwater to 40 percent surface and 60 percent groundwater. However due to impacts from groundwater contamination from Aerojet, it is unlikely that CWD will be able to reduce surface water supply from 75 percent to 40 percent.

4. **Regional watershed planning:** CWD is currently involved with the Sacramento Groundwater Authority and the Regional Water Authority in development of a Regional Water Master Plan.


COUNTY OF SACRAMENTO
Park Districts
Rio Linda / Elverta
Orangevale
Sunrise
Fair Oaks
Carmichael
Oaks
Arden Park
Cordova
Southgate
Elk Grove

FIRE PROTECTION DISTRICTS



UTILITY DISTRICTS

Sacramento Municipal Utility District (SMUD)

SMUD is the sixth largest public owned utility in terms of customers in the country, and began providing electricity to customers in 1946. SMUD generates, transmits and distributes electric power to a 900-square-mile services area including Sacramento County and portions of Placer County.

SMUD crews consisting of tree trimmers, line workers and troubleshooters perform outage prevention and maintenance activities year-round to help ensure the integrity and reliability of SMUD power lines. Over the past couple of years, tree-trimming efforts took center stage resulting in a huge reduction in tree related outages. As part of an ongoing program, SMUD crews are increasing their effort to replace old underground cable with new cable, which will significantly lower the number of cable-related outages.

SMUD also provides the following tips for preparation for potential power outages during a storm:

"Before a storm ...

Become familiar with your service panel location and how to operate the main circuit breaker. Prepare a basic emergency kit and store it in an accessible place. The kit should contain:

- Flashlight
- Bottled water
- Extra batteries
- Wind-up clock
- Manual can opener
- Battery-operated radio or television

Protect your household appliances and sensitive electronic devices from damaging power surges caused by wind and lightning storms. To learn more about SMUD's Power Protection Service, see our surge protection page in Serving Your Home. If you have an uninterruptible power source -- a device with an internal battery that provides continuous power to computers plugged into it -- remember that the device provides backup power for only a short time, usually a few minutes. However, this is often enough time to ride out power glitches or short outages."

Sacramento Regional County Sanitation District (SRCSD)

SRCSD provides wastewater services for the Cities of Sacramento, Folsom, Elk Grove, Citrus Heights, Rancho Cordova, and the unincorporated areas of Sacramento County. The SRCSD plans to manage a countywide sewer rehabilitation program to replace old sewer pipes and keep the entire system up to date. Further, the SRCSD routinely monitors the condition of older pipelines through a television viewing system where small portable cameras are used to examine the structural integrity of the pipes.

MOSQUITO

The HMPC discussed the conflict between not disturbing "natural drainage ways" and how that sometime promotes "better breeding grounds" for mosquitoes. No actions were determined at this time.

Multi-Hazard Mitigation Plan

7.0 Plan Implementation and Maintenance

44 CFR 201.6(c)(4): "{The plan maintenance process shall include a} section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle."

IMPLEMENTATION

Step 10 of the Plan Development Process: Implementation and Maintenance of the Plan is critical to the overall success of Hazard Mitigation Planning. Upon adoption, the plan faces the truest test of its worth: implementation. Implementation implies two concepts: action and priority. These are closely related.

While this plan puts forth many worthwhile and 'High' priority recommendations, the decision of which action to undertake first will be the first issue that the HMPC faces. Fortunately, there are two factors that will help make that decision. First, there are high priority items and second, funding is always an issue. Thus, pursuing low or no-cost high-priority recommendations will have the greatest likelihood for succeeding.

It will be important to maintain a constant monitoring of funding opportunities that can be leveraged to implement some of the more costly recommended actions. This will include creating and maintaining a bank of ideas on how any required local match or participation requirement can be met. Then, when funding does become available, the HMPC will be in a position to capitalize upon the opportunity. Funding opportunities that can be monitored include special pre- and post-disaster funds, special district budgeted funds, state or federal ear-marked funds, and grant programs, including those that can serve or support multi-objective applications.

With adoption of this plan, Sacramento County and the participating communities commit to:

- Pursuing the implementation of the high priority, low/no-cost Recommended Actions,
- Keeping the concept of Mitigation in the forefront of community decision-making by identifying recommendations of this plan when other community goals, plans and activities overlap, influence, or directly affect increased community vulnerability to disasters, and
- Maintaining a vigilant monitoring of multi-objective cost-share opportunities to assist the participating communities in implementing the Recommended Actions of this plan for which current funding or support exists.

Priority: The HMPC decidedly chose *not* to prioritize our recommended actions – for two reasons. First, the HMPC did not want to have to rank apples and oranges between communities; e.g., fixing a site-specific problem in Citrus Heights, versus area-wide SAFCA projects, which does little or nothing for some of our participating communities, versus a massive, politically-charged, environmentally complicated project such as dredging the Sacramento River throughout

the Delta Plains. Each community has their own recommended actions in their own section and will have to determine how to identify their own match requirements and priorities. The priority assigned for each recommendation is an indication of how the project ranks in priority within the community making the recommendation. Second, the CA-OES state Hazard Mitigation Plan states their own criteria for funding local projects, so the HMPC ranking holds little weight compared to the state's. The DMA regulations state that Benefit-Cost is the #1 method by which projects should be prioritized. In the state ranking, the B/C criteria are one of 10, and while they do not state what their overall priority is, B/C is listed last.

With adoption of this plan, the HMPC should be converted to a permanent advisory body referred to as the Mitigation Coordinating Committee (MCC). This Committee, led by the Sacramento County Department of Water Resources, agrees to:

- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Monitor implementation of this Plan;
- Report on progress and recommended changes to the participating Cities and County Commissioners; and
- Inform and solicit input from the public.

The Committee will not have any powers over County and City staff; it will be purely an advisory body. Its primary duty is to see the Plan successfully carried out and to report to the County Commissioners and the public on the status of Plan implementation and mitigation opportunities in the City of Sacramento and the County. Other duties include reviewing and promoting mitigation proposals, hearing stakeholder concerns about hazard mitigation, and passing the concerns on to the appropriate entities.

Another important implementation mechanism that is highly effective but low-cost, is to take steps to incorporate the recommendations, and equally important, the underlying principles of this Hazard Mitigation Plan into other community plans and mechanisms, such as Comprehensive Planning, Capital Improvement budgeting, Economic Development goals and incentives, or regional plans such as those put forth by the State Department of Transportation. Mitigation is most successful when it is incorporated within the day-to-day functions and priorities of government and development --- and so the best opportunity to be successful is to maintain a vigilance to do this.

Integrating existing planning efforts and mitigation policies and action strategies into this Hazard Mitigation Plan establishes a credible and consistent plan that ties into and supports other community programs. This Plan, therefore, links the specific natural hazards that present a risk in the community with the existing mitigation elements found in the various local government plans, for example the Safety Elements of each community's General Plan. The HMPC has identified and included each community's Safety Element policies within each specific Community Element section of this plan. A description of how the HMPC integrated these mitigation planning efforts with other planning efforts are described on page 3-7, **Relating This Plan to Other Community and Mitigation Planning Efforts and Activities.**

Ongoing integration of plans, policies and programs will be accomplished by a constant, pervasive and energetic effort to network, identify and highlight the multi-objective, “win-win” benefits to each program, the community, and the constituents. This effort is achieved through the often mundane actions of monitoring agendas, attending meetings, sending memos, and promoting safe, sustainable communities. Examples of other ongoing multi-objective planning efforts are addressed in the following section.

Valley Vision is a non-profit organization committed to building civic engagement while addressing regional issues. Valley Vision acts as a neutral convener, provides objective information on issues, and encourages a regional approach to the challenges and opportunities created by rapid growth.

Valley Vision is engaged with a cross-section of the region's leadership, committed to proactive and thoughtful solutions. Our membership includes representatives of business, agriculture, the environmental community, organized labor, education, utilities, government and the non-profit sector.

By partnering with other organizations and agencies, Valley Vision has successfully engaged citizens in a variety of issues. The result had been the creation of innovative outcomes in the areas of transportation and land use, business education partnerships, regional indicators, open-space and agriculture conservation, and services for low-income residents.

Blueprint Project - Region's Residents Can Shape the Future

The Challenge. The Sacramento Region is projected to add more than one million people and 600,000 new jobs in the next 25 years. Preparing and planning for this growth creates challenges for the entire region. Where and how should we grow? And how will this growth affect our standard of living? Implemented through a partnership between SACOG and Valley Vision, The Blueprint Project is a comprehensive regional process aimed at confronting these questions by integrating land use, transportation, air quality, and other regional concerns.

The project began with a preliminary "Base Case" study that examined the implications of the region's projected growth using current development trends. The study found that without changes to development pattern, residents are likely to spend more time commuting, find a severe housing shortage, and lose significant natural lands to development. The Blueprint Project offers an opportunity to get the public involved in planning acceptable growth strategies.

Scenario Planning

The Future of the Sacramento Region to 2025. In 2002, a diverse group of community leaders came together to participate in a structured exercise called, "Scenario Planning." These leaders took an engaging look at potential futures for the Sacramento Region. The result was four stories that project the reader into that future and an analysis of each (see below).

No one can predict the future. But we can see in the present several trends that, moving on their current courses, will change the shape of the Sacramento Region between now and 2025. Forewarned is forearmed.

These four stories were written with the input of a broad cross section of the region's citizens.

Paradise Lost
Paradise Lost reveals a world in which the regions economy booms but its leadership falters. Infighting, parochial thinking and lack of support for necessary public services result in the State's intervention to run a region those locals could not.

New Tech Mirage
New Tech Mirage portrays a world where the Sacramento Region makes a bid to become the New Tech Valley, but circumstances in the global marketplace, combined with mismanagement at home, lead to a failure of the ambitious strategy.

Silver Lining
Silver Lining is about cycles, not in the economy, but instead the weather. The Sacramento Region suffers a 500-year storm and is ill prepared for the flood. But the rebuilding effort reveals new strengths that might not have been tapped without such a challenge.

Rios De Oros
In Rios De Oros the region is able to achieve the balance necessary to create an economy that works. Investments on a variety of fronts are made in a coordinated, strategic plan to position the region for success on a global scale while meeting the needs for residents on a local and neighborhood scale.

Sacramento River Forum

The following is from a SAFCA Board Hearing given on January 15, 2004. There is much desire to further enhance the Sacramento Riverfront with hotels, restaurants, and marinas as well as maintaining the functionally beneficial natural resources and flood control capacity. The Sacramento Area Flood Control Agency formed the Sacramento River Forum to pursue these goals in a holistic manner. The reach of the Sacramento River being studied extends from the Fremont Weir downstream to the town of Courtland.

Key Elements of the Master Plan. The Master Plan presents a vision of the riverfront as a distinctive feature of an emerging downtown core that spans both sides of the river and includes

offices, retail, and restaurants attracting mid and high-density housing developments that help to deter sprawl in the surrounding metropolitan area. This vision would be achieved by:

- Connecting the riverfront internally and to the surrounding urban neighborhoods;
- Creating riverfront destinations;
- Improving public access and river recreation; and
- Enhancing the natural river ecosystem.

Based on these principles, the Master Plan proposes a number of specific short-term, mid-term, and long-term projects and planning efforts as well as some more general improvement ideas. The projects affecting the floodway include:

Promenades and Trails - To connect the riverfront internally and provide pedestrian and bicycle access to the river, the existing promenades on both sides of the river would be extended and the levee tops throughout the riverfront area would be paved and improved to serve as bicycle and pedestrian trails.

New Bridges - Because of the current lack of cross-river connectivity in the riverfront area, the Master Plan calls for five new non-vehicular bridges (Richards Boulevard, R Street, Pioneer Bridge suspension, Miller Park, and Lighthouse to Natomas) and two new vehicular bridges (Broadway and South River Road) in the riverfront area.

Connections to the Riverfront - In order to connect the riverfront to surrounding urban neighborhoods, the Master Plan envisions numerous street level improvements on both sides of the river, including pedestrian access improvements to the I Street Bridge and the Tower Bridge; "Parkway Street" improvements in the Washington Area of West Sacramento and along River Road, Richards Boulevard, 7th Street, R Street and Broadway on the Sacramento side; circulation improvements in Old Sacramento; and minimizing or eliminating the barrier effect of I-5.

Riverfront Developments - The Master Plan envisions office, retail and residential developments at numerous key locations in the riverfront area, including, on the West Sacramento side, the Triangle Area, Pioneer Bluff, Stone Lock Bluff, One Riverfront Plaza (just south of the I Street Bridge), the Washington Area, and Lighthouse (including the Governor's Residence site). On the Sacramento side, major developments are envisioned for the Docks Area, Jibboom Street (the old PG&E building site), Richards Boulevard, and the vicinity of Miller Park.

Parks - New riverfront parks would be created in West Sacramento at Stone Lock Bluff, the Governor's Residence, and Southport (on the south side of the mouth of the barge canal), and in Sacramento at Jibboom Street, the Rail Yards and the Docks Area.

Piers and Boat Docks - New fishing and viewing piers and public boat docks would be constructed at several locations on the Sacramento side of the river (piers only) in Old Sacramento and south of the Tower Bridge, and on the West Sacramento side (piers and docks) at the end of E Street, and at the existing North Pier and South Pier sites.

Marinas - The Master Plan proposes two new off-channel marinas on the West Sacramento side of the river at the Lighthouse lagoon and near the mouth of the barge canal.

Bank and Shoreline Plantings - In order to strengthen the "green commons" that will extend through the riverfront area, the Master Plan calls for creating a riverfront greenbelt connecting Discovery and Tiscornia Parks in the North with Miller Park and the Ship Channel in the South. Within the greenbelt, riparian forest zones would be recreated in large contiguous upland spaces and shoreline plantings would be established on existing shoreline embankments on both sides of the river.

River Corridor Floodway Guidelines. Based on the interaction of planners and flood managers within the Forum, the Master Plan also embraces the goal that riverfront improvements should be designed to avoid adverse impacts to the flood control system in the area and should collectively improve the functionality and reliability of the system. The Guidelines developed by the Forum are intended to provide a framework for achieving this goal. Toward this end, the Guidelines are organized around the following general principles:

- Improve the stability of eroding or unstable banks and levee slopes;
- Maintain the ability to inspect levees and floodwalls;
- Improve access for levee and bank protection maintenance activities;
- Maintain or improve flood conveyance capacity and reliability;
- Reduce navigation and flood-related safety risks; and
- Limit the damage vulnerability of riverfront improvements.

These general principles provide a foundation for developing the following more specific guidelines:

Bank and Levee Stabilization - These guidelines are designed to ensure that riverfront improvements incorporate features that will improve bank and levee stability in the project area. The guidelines call for removal of derelict or abandoned structures from the levee and floodway as part of the riverfront development process; limiting structures on the levee and within ten feet of the landside toe of the levee to infrastructure that is maintained and operated by public agencies; improving deficient levees and protecting eroding banks as part of the riverfront development process; and avoiding structural designs that increase the risk of levee seepage or otherwise compromise levee stability. The guidelines also clarify the applicability of these design principles to irregular levees in the project area and underscore the importance of protecting the eroding banks in the project area that may provide the only remaining landscape in the project area for achieving the Master Plan's greenbelt and recreation access objectives.

Improved Access for Routine Maintenance and Emergency Response - These guidelines recognize that the continuity and condition of the levee roadway is the most essential component of a viable flood operations and maintenance program. Thus, the guidelines complement the Master Plan's call for a continuous system of multiple-use paved levee top promenades and trails throughout the project area. In order to ensure that these facilities are properly designed and maintained, the guidelines call for elimination of barriers and gaps in the levee roadway system; provision of adequate levee top widths to accommodate the safe passage of levee maintenance vehicles; incorporation of adequate levee access points and vehicle turnouts to permit effective levee maintenance; inspection and emergency response activity; and posting of informational signs to explain the rules for shared use of levee roads.

Assurance of Floodway Hydraulic Capacity - A key goal of the guidelines is to ensure that as the development envisioned in the Master Plan unfolds, the capacity of the floodway to safely convey floodwaters is maintained or improved. This goal extends to improving the predictability of hydraulic conditions during floods, evaluating the potential effects of debris and ensuring the security of floating and fixed structures. Toward this end, SAFCA has evaluated the cumulative effects of the Master Plan on the hydraulic capacity of the floodway using a one-dimensional model developed by the U.S. Army Corps of Engineers. This evaluation indicated that these cumulative effects would be minimal due to the relative magnitude of the planned developments in comparison to the size of the river channel. Nevertheless, the guidelines call for additional, detailed modeling of individual facilities as they are proposed, using two-dimensional model simulations as necessary, to ensure that these facilities will not adversely affect channel bed or bank stability in discreet locations of the floodway.

The guidelines also contain specific provisions regarding the design of Master Plan facilities that will encroach into the floodway, including marinas, new bridges, fishing piers, floating docks and bank vegetation. These guidelines anticipate that the two new marinas called for in the Master Plan will be sited exclusively in off-channel locations. The guidelines on fishing piers are intended to reduce the dependence on or use of submerged piles to support piers, or other typical designs that will create new flow obstructions or trap floating debris. The guidelines on floating docks are intended to address the potential for these facilities to inappropriately reduce the conveyance area of the channel, increase the risk of debris accumulation, induce sediment deposition in areas of reduced channel velocities, and heighten the risk of breakaway boats or other structures that can be impinged on bridges or other facilities. The guidelines on bank vegetation are intended to allow for the fulfillment of the greenbelt objective of the Master Plan in a manner that does not impair the maintenance of flood project facilities, flood fight activities, or the inspection of the channel and levee banks. The guidelines do not address the appropriateness of developing riverfront restaurants in the project area. Rather, this issue has been deferred for further consideration in the next phase of the Forum process.

MAINTENANCE

Plan maintenance implies an ongoing effort to monitor and evaluate the implementation of the plan, and to update the plan as progress, roadblocks, or changing circumstances are recognized.

This monitoring and updating will take place through a semi-annual review by the Sacramento County Department of Water Resources, an annual review through the standing HMPC or Mitigation Coordinating Committee, and a 5-year written update to be submitted to the state and FEMA Region IX, unless disaster or other circumstances (e.g., changing regulations) lead to a different time frame. CRS requires an annual re-certification report for Sacramento County and the City of Sacramento.

When the Committee reconvenes for the review they will coordinate with all stakeholders that participated in the planning process – or that have joined the Committee since the inception of the planning process – to update and revise the plan. Public notice will be given and public participation will be invited, at a minimum, through available webpostings and press releases to the local media outlets, primarily newspapers and AM radio stations.

The evaluation of the progress can be achieved by monitoring changes in the vulnerability identified in the plan. Changes in vulnerability can be identified by noting:

- Lessened vulnerability as a result of implementing Recommended Actions;
- Increased vulnerability as a result of failed or ineffective mitigation actions; and/or,
- Increased vulnerability as a result of new development (and/or annexation).

The updating of the plan will be by written changes and submissions, as the Committee deems appropriate and necessary.

APPENDIX A
Acronyms and Abbreviations Used in this Plan

AKA	Also Known As (see CA-DOT, below)
BOR	Bureau of Reclamation
CA-DOT	California Department of Transportation (aka "Caltrans")
CA-DWR	California Department of Water Resources
CA-OES	California Office of Emergency Services
CAL-FED	California-Federal Government Water Supply Plan and Project
CCR	California Code of Regulations
CDBG	Community Development Block Grants
CDF	California Department of Forestry
CERES	California Environmental Resources Evaluation System
CERT	Citizen Emergency Response Team
CGS	California Geological Survey
CRS	Community Rating System
CSA	County Service Area (a multi-purpose district)
CSD	Community Services District
CVP	Central Valley Project
CWD	Carmichael Water District
DMA	Disaster Mitigation Act
FEAT	Flood Emergency Action Team (Governor's post 1997 Flood Task Force)
FEMA	Federal Emergency Management Agency (technically the Emergency Preparedness and Response (EP&R) within the Department of Homeland Security [DHS])

FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study, the report providing the details to the local FIRM
FMA	Flood Mitigation Assistance
FWS	Fish and Wildlife Service
HMGP	Hazard Mitigation Grant Program
HMPC	Hazard Mitigation Planning Committee
HUD	Housing and Urban Development (Department of)
Km	Kilometer
LHMP	Local Hazard Mitigation Plan
LOMR	Letter of Map Revision (an administrative method of changing the mapped floodplain without having to actually re-map it)
LOS	Level of Service
LRCCD	Los Rios Community College District
MMI	Modified Mercalli Scale (one way of measuring earthquakes)
NCDC	National Climatic Data Center, a statistical data base of NOAA/NWS
NFIP	National Flood Insurance Program
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service
OES	Office of Emergency Services
PDM	Pre-Disaster Mitigation (Grant Program)
PIO	Public Information Officer
RCMP	River Corridor Management plan
RM	River Mile

SACOG	Sacramento Area Council of Governments
SAFCA	Sacramento Area Flood Control Agency
SEMS	State Emergency Management System
SMSA	Standard Metropolitan Statistical Area
SMUD	Sacramento Municipal Utility District
SSC	(California) Seismic Safety Commission
UBC	Uniform Building Code
URM	Unreinforced Masonry (e.g., brick buildings, most prone to earthquake damage)
USACE	United Sates Army Corps of Engineers
USC-HRL	University of South Carolina – Hazards Research Lab
USGS	United States Geological Survey
WUI	Wildland Urban Interface (That area where development and forest overlap).
WNV	West Nile Virus

(This page has been intentionally left blank.)

Appendix B: Participating HMPC Representatives

Sacramento County

- Agriculture Commission
  - Ramona Saunders

- Disability Awareness Commission
  - Thomas Prittie

- DERA (Department of Environmental Review and Assessment)
  - Michael Jones

- General Services Department
  - Brian Chin
  - John Finney
  - Craig Rader

- GIS Department
  - Roger Exline

- Planning Department
  - Surinder Singh
  - Nedzlene Ferario

- Municipal Services Agency
  - Juan Perez

- Sheriff's Department
  - Carol Hopwood, Office of Emergency Services
  - Tami Randolph
  - Teresa Stahl, Office of Emergency Services
  - Miko Abbott
  - George Andersen

- Waste Management and Recycling
  - Pat Quinn
  - Kelli Sequest

- Water Quality
  - Mary Snyder

- Water Resources Department
  - George Booth
  - Lucinda Serynck
  - Diane Margetts
  - Bill Forrest
  - Bill Owens
  - Mark Rains

    - Pete Hall

INCORPORATED COMMUNITIES

City of Citrus Heights

- Kevin Becker
- Roger Underwood

City of Elk Grove

- City Managers Office
    - Kara Myers
    - Violet Jakab

City of Folsom

- Public Works Department
    - Gordon Tornberg
    - Tom Garcia
- Utilities Department
    - Roy Hafar

City of Galt

- Police Department
    - Doug Matthews
- Public Works Department
    - Gail Winton

City of Isleton

- George Apple
- Rick Carter

City of Rancho Cordova

- Kathy Garcia

City of Sacramento

- Fire Department
    - Angie Shook, Office of Emergency Services
- Parks and Recreation Department
    - Bob Fleming
- Planning Department
    - Julie Sontag
    - Gary Stonehouse
    - Sandra Yope
- Utilities Department
    - Maria Solis
    - Kimland Yee
    - Jessica Hess
    - Randy Ward – GIS

DISTRICTS

Community Service Districts

- Rancho Murieta (water, sewer, drainage, security)
    - Ed Crouse
    - Suzanne Lindenfeld
- Elk Grove Community Services District-Fire
    - Michael Ridley
    - Richard Holmes
- SRCSD/CSD-1 (sanitary sewer)
    - Mary Snyder (Sac CO DWQ)
    - Rod Davenport (Sac CO DWQ)

Fire Districts

- Courtland Fire District
    - Stan Eddy

- Galt Fire Protection District
    - Peter Sakaris
- Isleton
    - Rick Carter
- Sacramento Metropolitan Fire District (provides for Citrus Heights and Rancho Cordova)
    - Greg Mugartegui
    - Jim Hartley
- Walnut Grove Fire District
    - Ronald Guy
    - Lee Johnson
    - Daniel Juracto
    - Walter Olenick
    - David Robinson
    - Butch Rodriguez
    - James Rodriguez
    - Vic Savalo
    - Casey Tholborn
    - Kevin Thompson
    - Mark Van Loben Sels
    - Warren Yeteak

Mosquito Abatement Districts

- Sacramento-Yolo Mosquito Unified Control District
    - David Brown
    - Gary Goodman

Reclamation Districts (RD)

- RD 38
  - Jim Shanks
- RD 349
  - Thomas Mayes
- RD 501
  - Dick Taylor
- RD 550
  - Kevin Steward
- RD 556
  - Christopher Nee
- RD 563, Walnut Grove
  - Steve Mello
- RD 755
  - Richard Elliot
- RD 813
  - Thomas Herzog
- RD 830
  - Dennis Nunn
- RD 2111 (Dead Horse Island)
  - Tim Wilson
- Brannan Andrus Levee Maintenance District
  - Larry Gardiner
- RD 3, RD 551, RD1002, and RD 2110
  - Mark Fortner, MBK Engineers

Recreation And Park

- Arcade Creek Recreation and Park District
  - Jane Steele
- Arden Manor Recreation and Park District
  - Michael Grace
- Arden Park Recreation and Park District
  - Zachary Aquino
- Carmichael Recreation and Park District
  - Ken DeYoung
- Cordova Recreation and Park District
  - Charlie Rice
- Fair Oaks Recreation and Park District
  - Lorne Prescott
- Mission Oaks Recreation and Park District
  - Lee Holingsworth
- Rio Linda/Elverta Recreation and Park District
  - Kathy Long
- Sunrise Recreation and Park District
  - Scott Russell
  - Noe Villa

School

- Elk Grove Unified School District
    - Brian Barnett
- Galt School District
    - Jim Bauler
- Grant School District
    - David Lugo
    - Bob Medlove
    - Ed Deats
- LECS-SSD
    - Miad Russell
- Los Rios Community College District
    - Debbie Turner
- Mercy General/SSD MRC
    - Bruce Smith
- Natomas Unified School District
    - Rick Rezinas
- Rancho Murieta Consolidated School District
    - Suzanne Lindenfeld
- River Delta Unified School District
    - Charles Humbert
- Sacramento County Unified School District
    - Michelle Dang
- Sacramento City Unified School District
    - Bill West
    - Randy Hood
- San Juan School District
    - Don Myers
    - Bob Lewis

Utility

- Sacramento Metropolitan Utility District
    - Ben Martinez
    - Selby Mohr

***Water* (22)**

- Regional Water Authority (Association of Water Providers, represents 22 providers)
    - Ed Winkler, Executive Director
    - Nancy Egger
- Carmichael Water District
    - Lynette Moreno
    - Scott Bair
- Fair Oaks Water District and Regional Water Authority
    - Walt Pettit
- Fruitridge Vista Water District
    - Robert Cook, Jr.
    - Beth Arnoldy
- Rio Linda/Elverta Commnity Water Dstrict
    - David Andres
- San Juan Water District
    - Ben Martinez
- FDWD 95, Walnut Grove
    - Steve Jack

CITIZENS

- Doug Drinkwine
- Nancy Chambers
- Mary Lynn Ferreira
- Richard Weitzenberg (ASCE, Retired Civil Engineer)
- William Neuman (ASCE, Retired Cal State at Sacramento)
- Charles Zell (Retired transportation engineer)
- Susan Johnson
- Betty Reid
- Thomas Bennet
- Al Roxburgh (SO[V-U]A)
- Larry Luethy (Golf Course Terrace Estates)
- Erwin Hayer (Rio Linda)
- Jim Easton (ASCE, Retired Civil Engineer)
- Chris Adams (retired, CA-OES)
- Angela Carmi
- Chuck Bernardi (North Highlands)

Sacramento County Citizen Corps

- Lynda Toenyes
- Gary McLean
- Steve Dane
- Jim Fischer
- Kelly Heidecker

OTHER STAKEHOLDERS

American Red Cross
- William Allardice
- Kim Planck

Port of Sacramento
- Janie Rankins-Mayle

Representative Doug Ose
- Michelle Smith

Rio Linda/Elverta Community Planning Advisory Council, Flood Subcommittee
- Erwin Hayer

Senator Ortiz Office
- Albert Rivas

Private Engineering Companies
- Jennifer Marr, URS Corporation
- Tom Thompson, HTA Engineering
- Bill Darsie, KSN Engineers
- Henry Matsunago, Hanson Engineers

TECHNICAL AGENCIES

FEDERAL

U. S. Army Corps of Engineers, Sacramento District
- Kell Cloward

STATE

California Office of Emergency Services
- Labeebah Abdullah

California Department of Water Resources
- Russ Eckman

REGIONAL

Sacramento Area Flood Control Agency (SAFCA)
- Stein Buer
- Pete Gelphi

AMEC Earth & Environmental Planning Assistance:
- Clancy Philipsborn, Lakewood CO
- Jeanine Foster, Lakewood CO
- Jeff Brislawn, Lakewood CO
- Chelsey Swanson, Santa Barbara CA
- Kathleen Schaefer, San Rafael CA
    - The Hazard Mitigation Technical Assistance Partnership, Inc.
        - Robert Olson, Robert Olson Associates, Folsom CA
        - French Wetmore, French & Associates, Park Forest IL

(This page has been intentionally left blank.)

APPENDIX C
References

Calfed Bay-Delta Program, Seismic Vulnerability of the Sacramento-San Joaquin Delta Levees, April 2000.
California Department of Water Resources, State-Federal Flood Operations Center, Flood Emergency Operations Manual, February 2002.
California Floodplain Management Task Force, California Floodplain Management Report, December 12, 2002.
California, Office of Emergency Services, State of California Multi-Hazard Mitigation Plan, Draft, July 1, 2004
City of Sacramento, Comprehensive Flood Management Plan, February 1996
FEMA, National Flood Insurance Program, Community Rating System, Example Plans, February 2003.
FEMA, National Flood Insurance Program, Community Rating System, Section 510 Floodplain Management Planning Guidance Document, Edition: 2002.
FEMA, State and Local Mitigation Planning how-to-guide, September 2002.
Interagency Hazard Mitigation Team Report, Response to January 10, 1995 & March 12, 1995 State of California Winter Storm Disaster Declarations, 1995.
Sacramento Area Flood Control Agency, Strong and Chicken Ranch Sloughs, California Feasibility Study, Feasibility Scoping Meeting Document, October 2003.
Sacramento County, Multi-Hazard Disaster Plan, July 1997.
Sacramento County, Strategic Plan, 1999.
Sacramento County, Water Forum Working Group, Water Forum Agreement, January 2000.
The Resources Agency of California, Governor's Flood Emergency Action Team, Final Report, May 10, 1997.
US Army Corps of Engineers Sacramento District, Sacramento and San Joaquin River Basins California Comprehensive Study, Interim Report, December 20, 2002.

General Plans,
Safety Elements

(This page has been intentionally left blank.)

APPENDIX D:
Comments From The Public Meetings Reviewing The 2nd Draft Of Plan

During the week of December 6-10, 2004, the following five HMPC meetings were conducted.

Monday, December 6: Special Meeting for Elected and Governing Boards explaining the plan, it's purpose, the process undertaken, the results to date, and how they would be asked at a future date to formally adopt the document There were no questions other than those regarding the timing for preliminary reviews and adoption.

Tuesday, December 7: Formal public meeting conducted in Citrus Heights. No specific comments were made requiring HMPC review and consideration.

Wednesday, December 8: Formal public meeting conducted in southern portion of the City of Sacramento ("The Pocket"). Meeting was attended by the leadership of the South Pocket Neighborhood Association. They voiced concern over two issues: flooding in their neighborhood from Morrison Creek, to which they will remain vulnerable after re-certification of the American River levee system that will remove a significant portion of the City of Sacramento from the floodplain, and plans and procedures for evacuation from the neighborhood should deep flooding occur, particularly from the overtopping or failure of any upstream levee.

The first issue is addressed in this plan through the recommended actions along Morrison Creek (Sacramento City Action Item #5, Section 6.2; and SAFCA Recommended Action Item #3, Section 6.9). That work is scheduled to begin in 2005, with protection being provided hopefully sometime in 2006.

The second issue has been incorporated into this plan in two ways; first as a Sacramento City Action Item # _____, and second as the Year Two element of the City's Pubic Information Program Strategy. These complimentary efforts will be coordinated between the City Office of Emergency Services and the City Department of Utilities.

Thursday, December 9: Formal public meeting conducted in Sacramento County in the Arden-Carmichael area. No specific comments were made requiring HMPC review and consideration.

(This page has been intentionally left blank.)

APPENDIX E
Alternatives and Criteria Examined and Used by Planning Team

Once planning goals were established, the HMPC identified and evaluated viable alternatives to support identified goals. Several decision-making tools were utilized in this process, including FEMA's recommended STAPLE/E set (Sustainable Disaster Recovery, Smart Growth principles) and Others. These tools are detailed below:

CATEGORIES OF MITIGATION MEASURES

PREVENTION: Preventive measures are designed to keep the problem from occurring or getting worse. Their objective is to ensure that future development is not exposed to damage and does not increase damage to other properties.

- ***Planning***
- ***Zoning***
- ***Open Space Preservation***
- ***Land Development Regulations***
  - ***Subdivision regulations***
  - ***Building Codes***
    - ***Fire-Wise Construction***
  - ***Floodplain development regulations***
  - ***Geologic Hazard Areas development regulations (for roads too!)***
- ***Storm Water Management***
- ***Fuels Management, Fire-Breaks***

EMERGENCY SERVICES measures protect people during and after a disaster. A good emergency services program addresses all hazards. Measures include:

- ***Warning*** (flooding, tornadoes, winter storms, geologic hazards, fire)
  - NOAA Weather Radio
  - Sirens
  - "Reverse 911" (Emergency Notification System)
- ***Emergency Response***
  - ***Evacuation & Sheltering***
  - ***Communications***
  - ***Emergency Planning***
    - Activating the EOC (emergency management)
    - Closing streets or bridges (police or public works)
    - Shutting off power to threatened areas (utility company)
    - Holding/releasing children at school (school district)
    - Passing out sand and sandbags (public works)
    - Ordering an evacuation (mayor)
    - Opening emergency shelters (Red Cross)
    - Monitoring water levels (engineering)
    - Security and other protection measures (police)

- ***Critical Facilities Protection (Buildings or locations vital to the response and recovery effort, such as police/fire stations, hospitals, sewage treatment plants/lift stations, power substations)***
  - Buildings or locations that, if damaged, would create secondary disasters, such as hazardous materials facilities and nursing homes
  - Lifeline Utilities Protection
- ***Post-Disaster Mitigation***
  - Building Inspections
  - ID mitigation opportunities & funding before reconstruction

PROPERTY PROTECTION: Property protection measures are used to modify buildings subject to damage rather than to keep the hazard away. A community may find these to be inexpensive measures because often they are implemented by or cost-shared with property owners. Many of the measures do not affect the appearance or use of a building, which makes them particularly appropriate for historical sites and landmarks.

- ***Retrofitting/disaster proofing***
  - ***Floods***
    - Wet/Dry floodproofing (barriers, shields, backflow valves)
    - Relocation/Elevation
    - Acquisition
    - Retrofitting
  - ***High Winds/Tornadoes***
    - Safe Rooms
    - Securing roofs and foundations with fasteners and tie-downs
    - Strengthening garage doors and other large openings
  - ***Winter Storms***
    - Immediate snow/ice removal from roofs, tree limbs
    - "Living" snow fences
  - ***Geologic Hazards (Landslides, earthquakes, sinkholes)***
    - Anchoring, bracing, shear walls
    - Dewatering sites, agricultural practices
    - Catch basins
  - ***Drought***
    - Improve water supply (transport/storage/conservation)
    - Remove moisture competitive plants (Tamarisk/Salt Cedar)
    - Water Restrictions/Water Saver Sprinklers/Appliances
    - Grazing on CRP lands (no overgrazing-see Noxious Weeds)
    - Create incentives to consolidate/connect water services
    - Recycled wastewater on golf courses

- ***Wildfire, Grassfires***
    - Replacing building components with fireproof materials
        - Roofing, screening
    - Create "Defensible Space"
    - Installing spark arrestors
    - Fuels Modification
- ***Noxious Weeds/Insects***
    - Mowing
    - Spraying
    - Replacement planting
    - Stop overgrazing
    - Introduce natural predators

o ***Insurance***

NATURAL RESOURCE PROTECTION: Natural resource protection activities are generally aimed at preserving (or in some cases restoring) natural areas. In so doing, these activities enable the naturally beneficial functions of floodplains and watersheds to be better realized. These natural and beneficial floodplain functions include the following:

— storage of floodwaters
— absorption of flood energy
— reduction in flood scour
— infiltration that absorbs overland flood flow
— groundwater recharge
— removal/filtering of excess nutrients, pollutants, and sediments from floodwaters
— habitat for flora and fauna
— recreational and aesthetic opportunities

Methods of protecting natural resources include:

o ***Wetlands Protection***
o ***Riparian Area/Habitat Protection/Threatened-Endangered Species***
o ***Erosion & Sediment Control***
o ***Best Management Practices***

Best management practices ("BMPs") are measures that reduce nonpoint source pollutants that enter the waterways. Nonpoint source pollutants come from non-specific locations. Examples of nonpoint source pollutants are lawn fertilizers, pesticides, and other farm chemicals, animal wastes, oils from street surfaces and industrial areas and sediment from agriculture, construction, mining and forestry. These pollutants are washed off the ground's surface by stormwater and flushed into receiving storm sewers, ditches and streams. BMPs can be implemented during construction and as part of a project's design to permanently address nonpoint source pollutants. There are three general categories of BMPs:

1. Avoidance: setting construction projects back from the stream.

2. Reduction: Preventing runoff that conveys sediment and other water-borne pollutants, such as planting proper vegetation and conservation tillage.
3. Cleanse: Stopping pollutants after they are en route to a stream, such as using grass drainageways that filter the water and retention and detention basins that let pollutants settle to the bottom before they are drained

    - ***Dumping Regulations***
    - ***Set-back regulations/buffers***
    - ***Fuels Management***
    - ***Water Use Restrictions***
    - ***Landscape Management***
    - ***Weather Modification***

STRUCTURAL PROJECTS have traditionally been used by communities to control flows and water surface elevations. Structural projects keep flood waters away from an area. They are usually designed by engineers and managed or maintained by public works staff. These measures are popular with many because they "stop" flooding problems. However, structural projects have several important shortcomings that need to be kept in mind when considering them for flood hazard mitigation:

- They are expensive, sometimes requiring capital bond issues and/or cost sharing with Federal agencies, such as the U.S. Army Corps of Engineers or the Natural Resources Conservation Service.

- They disturb the land and disrupt natural water flows, often destroying habitats.

- They are built to a certain flood protection level that can be exceeded by a larger flood, causing extensive damage.

- They can create a false sense of security when people protected by a structure believe that no flood can ever reach them.

- They require regular maintenance to ensure that they continue to provide their design protection level.

Structural measures include:

- ***Detention/Retention structures***
- ***Erosion and Sediment Control***
- ***Basins/Low-head Weirs***
- ***Channel Modifications***
- ***Culvert resizing/replacement/Maintenance***
- ***Levees and Floodwalls***
- ***Anchoring, grading, debris basins (for landslides)***
- ***Fencing (for snow, sand, wind)***
- ***Drainage System Maintenance***
- ***Reservoirs(for flood control, water storage, recreation, agriculture)***

- o ***Diversions***
- o ***Storm Sewers***

PUBLIC INFORMATION: A successful hazard mitigation program involves both the public and private sectors. Public information activities advise property owners, renters, businesses, and local officials about hazards and ways to protect people and property from these hazards. These activities can motivate people to take protection

- o ***Hazard Maps and Data***
- o ***Outreach Projects*** (mailings, media, web, speakers bureau, displays)
- o ***Library Resources***
- o ***Real Estate Disclosure***
- o ***Environmental Education***
- o ***Technical Assistance*** Health & Safety Maintenance (clean-up per hazard)

MITIGATION CRITERIA

Sacramento County Multi-Hazard Mitigation Planning Project
(For use in selecting and prioritizing Proposed Mitigation Measures)
August 18-19, 2004

1. **STAPLE**

   Social: Does the measure treat people fairly? (different groups, different generations)

   Technical: Will it work? (Does it solve the problem? Is it feasible?)

   Administrative: Do you have the capacity to implement & manage project?

   Political: Who are the stakeholders? Did they get to participate? Is there public s support? Is political leadership willing to support?

   Legal: Does your organization have the authority to implement? Is it legal? Are there liability implications?

   Economic: Is it cost-beneficial? Is there funding? Does it contribute to the local economy or economic development?

   Environmental: Does it comply with Environmental regulations?

2. **SUSTAINABLE DISASTER RECOVERY**

   Quality of Life

   Social Equity

Hazard Mitigation

Economic Development

Environmental Protection/Enhancement

Community Participation

3. SMART GROWTH PRINCIPLES

Infill versus Sprawl

Efficient Use of Land Resources

Full Use of Urban Resources

Mixed Uses of Land

Transportation Options

Detailed, Human-Scale Design

4. OTHER

Does measure address area with highest risk?

Does measure protect …

- The largest # of people exposed to risk?
- The largest # of buildings?
- The largest # of jobs?
- The largest tax income?
- The largest average annual loss potential?
- The area impacted most frequently?
- Critical Infrastructure (access, power, water, gas, telecommunications)

Timing of Available funding

Visibility of Project

Community Credibility

APPENDIX F
Community Adoptions

Note to Reviewers: When this plan has been reviewed and approved pending adoption by FEMA Region IX, all adoption resolutions will be scanned and put on a CD which will contain the adoptions, as Appendix F.

(This page has been intentionally left blank.)

APPENDIX G
City of Sacramento Resolution Authorizing Participation in City-County-SAFCA Public Information Campaign Levee Re-Certification, Other Flood Protection Projects, Floodplain Remapping & Insurance

October 7, 2004

City Council
Sacramento, California

Honorable Members in Session:

SUBJECT: **SAFCA FLOOD CONTROL UPDATE AND APPROVAL OF COMMUNITY OUTREACH PLAN PENDING LEVEE CERTIFICATION AND FLOOD INSURANCE RELIEF**

LOCATION AND COUNCIL DISTRICT: Citywide

RECOMMENDATION:

Staff recommends the City Council approve the attached resolution for the Community Outreach Plan to inform Sacramento area property owners and residents about pending levee certification and flood insurance relief actions.

CONTACT PERSON: **Dave Brent, Engineering Services Division Manager, 808-1420**
Maria C. Solis, Principal Engineer, 808-1499

FOR COUNCIL MEETING: October 19, 2004

SUMMARY:

The following presentation provides a flood control update from SAFCA's new Executive Director, Stein Buer and request approval of the attached Resolution authorizing the Department of Utilities in coordination with SAFCA and the County of Sacramento to implement a community outreach plan to inform Sacramento area property owners and residents about pending levee certification and flood insurance relief actions. The plan has two goals: 1) to educate property owners and residents occupying a large portion of the American River floodplain about their flood insurance options once the levees protecting this floodplain are certified and floodplain remapping is approved by the Federal Emergency Management Agency (FEMA); and 2) to inform property owners and residents occupying the South Sacramento Streams Group floodplain, a small portion of the American River floodplain, and the

Chicken/Strong Ranch Slough floodplain, about the status of the flood control projects needed to secure insurance relief. The estimated cost of the plan to be funded by SAFCA is not expected to exceed $225,000.

COMMITTEE/COMMISSION ACTION:

None

BACKGROUND:

SAFCA Priorities

SAFCA's mission is to reduce flood risks for the Sacramento region, thereby minimizing the impacts of floods on human safety, health, and welfare. Consistent with these flood risk reduction goals, SAFCA also seeks to preserve and enhance the environmental and aesthetic values that floodways and floodplains contribute to the quality of life in the region. SAFCA's goal is to achieve at least 200-year flood protection for the urbanized areas within its jurisdiction.

Since 1989 SAFCA has worked closely with its member agencies, the Corps, and the State to aggressively advance this mission, in a three-phase process to reduce its flood risk from high to medium to low.

Addressing High Risk

First, SAFCA seeks to address the most urgent flood issues to provide most of its jurisdictional area with 100-year flood protection. This goal will be achieved through a combination of channel and levee improvements, construction of pumping facilities, and interim re-operation of Folsom Dam.

Much of the required work has been completed. It includes the completed work on the Sacramento River east levee from the Natomas Cross Channel to Freeport, the North Area Local Project, reconstruction of the American River levees, interim re-operation of Folsom Dam, and repair of critical erosion sites along the Sacramento and American Rivers.

Barring unforeseen construction difficulties or an unusually wet fall, SAFCA anticipates that construction of critical levee erosion site repairs will be completed by mid-December. This will allow the Corps to certify that most of the American River and Sacramento River levees are adequate to withstand the 100-year flood. This in turn will set the stage for FEMA to update its Flood Insurance Rate Maps in early winter 2005.

Unfortunately, some areas within the region will remain in the 100-year floodplain until further work can be completed. The South Sacramento region will remain vulnerable to flooding from the Morrison Creek Stream Group and possibly from the Sacramento River, Pocket area levees, until project work on those areas can be completed. The

soonest this work can be completed is during the 2005 construction season. SAFCA is making every effort to move these projects forward as quickly as possible.

Getting to Moderate Risk

A major project to modify the Folsom Dam outlet gates and further work on the Sacramento River levees to control under-seepage are required to provide 140-year flood protection. The Folsom Dam outlet gates will be modified and enlarged to allow the dam to release much greater flows at lower reservoir elevations, thus reserving more flood control storage to contain bigger flood peaks. The Folsom Modifications Project has just moved into the construction phase this fall, with anticipated completion around 2012.

The 1997 flood demonstrated that levee improvements completed since the 1986 flood were not adequate to address levee under-seepage and stability concerns for the Sacramento River levees. Work on this issue has been delayed somewhat by the higher priority work on critical erosion sites, but will be resumed in 2005. This will likely require a fresh look at how to most effectively design and construct the needed improvements.

Getting to Low Risk and Beyond

Flood protection slightly in excess of 200-years will be achieved with implementation of the Folsom Dam mini-raise, which would include raising the spillway gates, raising the dam crest and the eight additional dikes which contain the lake, and constructing a permanent bridge across the American River just downstream of the dam. This project is currently in the initial design stage, with a high priority on designing and constructing the bridge.

In addition, SAFCA is exploring the possibility of cooperatively sponsoring a Lower Sacramento River Regional Project, which would increase the conveyance capacity of the Yolo Bypass downstream of Fremont Weir. This could lower flood stages by as much as several feet, thereby taking pressure off the region's levees while increasing flood conveyance capacity.

SAFCA believes that 200-year flood protection is the minimum acceptable level for a highly urbanized area, which is still less than that provided for most comparable cities throughout the US.

Also, we must be prepared for future potential changes in the Sacramento region's flood risks, and plan accordingly. As we have repeatedly discovered since the 1950's, each major new flood has forced us to reassess our flood risk, which is simply an estimate based on available hydrologic data.

We appear to be experiencing a period of climate change, which is resulting in warmer, more intense flood events.

Finally, urban development and flood control improvements elsewhere in the valley may both increase peak flood runoff and reduce historic flood water storage capacity in the Sacramento Valley.

Thus we must realistically assume that further infrastructure and floodplain management actions must be undertaken beyond those which have been described in the above paragraphs in order to provide a fully acceptable level of flood protection for the region.

Floodplain Management, Environmental Enhancement, and Regional Planning Integration

SAFCA seeks to support regional floodplain management goals, provide environmental enhancements, and support integrated regional planning for economic development as integral elements of its flood protection programs.

First and foremost, SAFCA seeks to assure that residents and businesses in the region fully understand that while the risk of flooding is being reduced, it will not be eliminated. We will work with regional floodplain managers to encourage the at-risk population to carry NFIP flood insurance, even after 100-year protection and more is provided.

SAFCA will help sponsor and participate in regional efforts to protect and enhance our floodplains, farmlands, open space, river corridors, parkways, and creeks. These resources can greatly enhance the quality of life in our communities, and indirectly provide incentives for regional economic growth.

SAFCA will participate in regional planning efforts, such as the SACOG Blueprint effort, in order to encourage more compact development, with a broad range of benefits, including more cost effective flood protection.

Major Challenges

Funding

In a period of tightening fiscal constraints, the greatest challenge will be to provide adequate federal, State, and local funding to complete SAFCA's flood risk reduction projects. It will take about $750 million to complete currently authorized work over the next decade. SAFCA may need to request additional or extended assessments on the local community to provide the requisite local cost share for this work, which may be difficult to achieve once the incentive of flood insurance relief is gone. SAFCA and its member agencies will need to work closely with their State and federal legislative delegations, The Reclamation Board, the Department of Water Resources, and the U.S. Army Corps of Engineers to assure that increased levels of State and federal cost sharing funds are also available when needed.

Long-Term Maintenance and Environmental Compliance

The Sacramento River Flood Control Project was designed and constructed at a time when there was little concern for the environmental values provided by our river

corridors. They were designed to flush hydraulic mining debris from the system by maintaining high channel velocities, and be armored against erosion with rock (rip-rap). Federal project maintenance objectives required that the channels be kept clear of brush and trees where necessary to maintain design conveyance capacity.

Until about 1990, channel maintenance was relatively simple and cost effective: Rock was dumped from barges on erosion sites, and trees, brush, and snags were removed and burned as necessary. Over the past 15 years, federal and State resource agencies have determined that the cumulative effect of rip-rapping, vegetation clearing, damming, and diverting our rivers and streams threaten the survival of wild salmon, steelhead, Delta smelt, giant garter snakes and numerous other species. They require that any new impacts on our river corridors be adequately mitigated by removing rip-rap, setting levees back, planting new vegetation, and other measures.

Levee and channel maintenance has become expensive and difficult to implement. There are limited opportunities to set levees back within SAFCA's jurisdiction, and removal of rip-rap anywhere in our urban corridor would create an unacceptable public safety risk. Our challenge will be to help our member agencies meet their ongoing maintenance requirements while protecting and enhancing environmental values. SAFCA will seek to identify and cooperatively implement mitigation measures which will compensate for our current critical erosion site repairs, as well as to establish opportunities to compensate for future repairs. While SAFCA is primarily exploring options within its own jurisdictional area, we would also be receptive to other opportunities if they were locally supported and mutually beneficial.

Federal Legislative Update

Appropriations – It is now likely that the 2005 Energy and Water Development Appropriations Bill will not move separately in the Senate Appropriations Committee this year. It is being held up in the Energy and Water Development Appropriations Subcommittee over funding issues surrounding the Yucca Mountain Nuclear Waste Repository. Current plans are to roll up the unfinished appropriations bills, including the Energy and Water Appropriations Bill, in an omnibus bill later this year, likely in a post-election "lame duck" session. Only one of the 13 appropriation bills is expected to be completed in the current session.

Water Resources Development Act (WRDA) – The Senate Committee on Environment and Public Works has been working on the WRDA 2004 markup, and some progress has been made. The committee has filed its report, and the draft language is now out for review. At this point, passage in the Senate appears to be unlikely this year due to continuing controversy over Corps reform language, including new, stricter environmental compliance language, planning constraints, and external review requirements.

State Legislative Update

On September 21, 2004 Governor Schwarzenegger signed SB 1280, which will provide State authorization for the Folsom Mini-Raise. In addition, Senator Deborah Ortiz wrote a letter to *The Senate Journal (The Journal)* clarifying the bill's intent to ensure active State participation in planning, designing, and funding for a permanent Folsom Dam Bridge.

The State Reclamation Board (Reclamation Board) had indicated in an August 2, 2004 letter to the Corps that it believes specific State authorization will be required for State cost sharing participation in the permanent bridge over the American River downstream of the dam. I am hopeful that the letter to *The Journal* will address the Reclamation Board's concerns, allowing the State to begin full participation.

SAFCA has been taking a two-pronged approach to the issue of sponsorship for the South Sacramento Stream Group Project.

One element has been to urge the Reclamation Board to reaffirm its traditional sponsorship role for this project, despite the potential concerns about the Paterno Decision. On Friday, September 17, 2004 the Reclamation Board did reaffirm its intent to be the local sponsor for this project.

The second element involved legislation, which would grant the Reclamation Board the discretion to delegate sponsorship to SAFCA on this particular project. Assemblyman Darrell Steinberg sponsored AB 1020 to accomplish this goal. The legislation was signed by the Governor on September 24.

We are grateful for the tremendous support we have received from our State legislators in this process. Special thanks go to Senator Deborah Ortiz and Assemblyman Darrell Steinberg for sponsoring and shepherding these bills through the process. Assemblyman Dave Cox played a key role throughout. We also thank SAFCA Board Chair Illa Collin and Mayor Heather Fargo for writing letters of support at critical junctures.

Progress on Critical American River and Sacramento River Erosion Sites

Our cooperative efforts with the Corps and the State to expedite construction on the six identified FEMA erosion sites have moved forward successfully. All six sites were either under construction or nearing completion as of October 5. A number of last minute construction issues had to be resolved, with the support of City of Sacramento and Sacramento County staff. SAFCA staff is also responding to some inquiries from local residents who have questions and concerns about the ongoing work.

American River Sites

Construction at RM 10.2R, at Estates Drive, was about 95 percent complete as of October 5, 2004.

Construction at RM 10.0L, at the Waterton Way access, was completed on September 15, 2004. Remaining tasks to be completed include planting vegetation and hydroseeding.

Construction for RM 7.0R, between the Howe Avenue Bridge and the H Street Bridge, was underway as of October 5. Construction at this site is complicated by the presence of the regional sanitary sewer interceptor, which is buried close to the levee toe along most of the 3,500-foot construction alignment. Access for construction equipment will generally be through the University Park bike ramp adjacent to Howe Avenue, although the contractor used the Kadema Drive access during startup to bring heavy equipment into the work area. Originally, egress was to be through Cal Expo, but this would have entailed crossing the sewer line with heavy equipment. The City of Sacramento has graciously allowed for egress at the H Street Bridge, which eliminates the pipe crossing concern, as well as reducing construction costs.

Construction at RM 6.9L, adjacent to CSUS, has been completed except for the hydroseeding. However, the September 19, 2004 thunderstorm caused some erosion at the site, resulting in rills and exposed cobbles on the surface. The contractor will place another six inches of soil cover over the levee slope to repair the site before hydroseeding.

Construction at RM 6.4L was nearing completion as of October 5.

Sacramento River Sites

The contractor for construction of the RM 60.0L repair was mobilizing and obtaining final construction clearances as of September 22, 2004. All work is on the land side of the levee, and no significant problems are anticipated.

The contract for the RM 56.7L site, just downstream of Miller Park, has been awarded and construction has begun. The Biological Opinion, issued September 8, 2004 requires that the Corps aggressively pursue mitigation for the impacts to migrating salmonids and designated critical habitat. SAFCA is committed to working closely with the Corps and the Reclamation Board to help identify and develop the required mitigation measures on the designated timeline. I anticipate that we will need to demonstrate significant progress prior to next year's construction season in order to be allowed to proceed with any additional repairs which may be required on the south Pocket sites.

Long-Term Folsom Dam Operations Agreement

The Bureau of Reclamation, the Corps, and SAFCA have reached agreement on an Interim Operations Plan (IOP) and an amended Flood Control Diagram, which would allow for re-operation of Folsom Dam to safely pass a 100-year flood event without exceeding the interim objective release of 145,000 cfs. The agreement is based on a careful reassessment of available hydrologic data (including the last seven years), and emergency operations criteria, which would fully exploit the release capacity of the

existing outlets. The proposed re-operation has been coordinated with the resources agencies, including NOAA Fisheries and USFWS. An Environmental Assessment has been prepared, with a proposed finding of no significant impact (FONSI). The current schedule calls for filing of the EA/FONSI on October 12, and a 30-day public comment period beginning October 15. The execution of the long-term agreement is scheduled for November 15 or sooner.

North Area Local Project

Diamond D General Engineering, Inc. has nearly completed work on renovation of the Hayer Dam site on Dry Creek near Elkhorn Boulevard, including removal of the bridge, dam, and debris, as well as grading of the channel, placement of bank protection, and soil cover. Only placement of a flap gate and re-seeding remains to be completed. Tree mitigation associated with the project will be completed once the location for the bike trail has been determined by County Parks.

SAFCA's contractor, Restoration Resources, has made significant progress in a regional effort to eliminate red sesbania from the Dry Creek watershed. SAFCA's contractor has completed mature sesbania removal in Placer County and is now working on removing the large, remaining infestation in Sacramento County.

Lower American River Integrated Area Planning Grant

SAFCA has received a grant from the California Regional Water Quality Control Board to fund integrated area planning in the lower reach of the American River Parkway in connection with the ongoing update of the American River Parkway Plan. Staff anticipates that a Request for Qualifications will be issued in early October to begin the process of recruiting a qualified consultant team to assist in this effort.

Folsom Modifications Project

The Corps awarded the first construction contract for the Folsom Modifications Project in the second week of September, for a total of $3.8 million. The contractor will upgrade the elevator and on-site power generation capacity. The second contract will facilitate construction of a staging area for the subsequent dam modification work. This contract is expected to cost about $4.0 million. The preparation of plans and specifications for the upper tier gates modification has fallen slightly behind schedule, and will not be going to bid on October 1 as the Corps had hoped. The current target date for release to bid is November 1.

The Corps has made available for comment the draft plans and specifications to elicit technical review from potential bidders. This construction project is complex and potentially hazardous, as it involves repair of a functioning facility, deep diving at the upstream face of the dam, and excavation of the dam material while it is under high pressure. The plan review has been very productive and has yielded valuable feedback, which the Corps' designers are incorporating into the final design. The Corps still believes that construction can get underway next summer.

South Sacramento Streams Group Project

The Reclamation Board's decision on September 17, 2004 to reaffirm its sponsorship of this project has cleared the way for completion of the Local Project Cooperation Agreement and the Project Cooperation Agreement. Staff will work closely with the Corps' and the Reclamation Board's staffs to expedite the agreements. In addition, several documents are in the process of being completed to reflect the minor changes in project scope, which have been incorporated in the past two years.

The Corps has completed a Draft Limited Reevaluation Report, reflecting the design changes needed to safely pass 100-year flows along the upstream portions of the project, east of Franklin Boulevard.

SAFCA staff has issued a Notice of Preparation for a Supplemental EIR for the project, which we intend to have ready for certification by the SAFCA Board at its January 2005 meeting.

The Corps has completed a Draft Environmental Assessment, and released it for public review on September 22, 2004. It will be circulated for public comment for 30 days, with the anticipated FONSI early in November.

Project construction of Phase 1a in the 2005 construction season is contingent upon the availability of Federal funds. SAFCA has requested that $7.0 million be included for this project in 2005; the current House appropriations bill includes $3.5 million. SAFCA is hopeful that this amount can be increased to the requested level when energy and water appropriations are finalized later this year.

Lower Sacramento River Regional Project (LSRRP)

The Sacramento-San Joaquin Comprehensive Study concluded in December 2002, with a recommendation that local agencies coordinate to develop regional projects in accordance with mutually identified needs. The Lower Sacramento River Regional Plan is consistent with the Comprehensive Study implementation principles. The SAFCA Board has authorized staff to initiate such an effort to determine potential planning options and partnership arrangements in such an endeavor. Recent developments underscore the need for SAFCA to advance the regional perspective.

Ongoing and proposed work on the Feather-Yuba River System may significantly affect the flood regime downstream through coordinated forecast-based operations, reservoir structural modifications and re-operation, levee improvements, and levee setbacks. Accordingly, SAFCA is coordinating with our counterparts in Sutter and Yuba counties to encourage a regional perspective, including potential development of a regional project which integrates these projects to optimize flood protection and environmental benefits, while opening the potential for additional Federal and State cost sharing participation.

Similarly, SAFCA is participating in an evaluation of opportunities to improve flood conveyance, habitat restoration, and agricultural practices in the lower Yolo Bypass.

SAFCA staff is exploring the potential for initiating a facilitated collaborative process for initiating regional discussions for improving Yolo Bypass flood conveyance, continued viability of agricultural use, and wildlife habitat. Yolo County and the City of West Sacramento will be key partners in this collaborative process. SAFCA is very appreciative of their ongoing interest and cooperation and will work closely with these and all other interested stakeholders to identify interests, concerns, and opportunities.

FEMA Public Outreach Effort for 100-Year Certification

The intense efforts underway to complete the repairs of the erosion sites and the Folsom Dam Operations Agreement will allow the Corps to certify nearly all of the American River levee system and most of the remaining Sacramento River levee system as well. In turn, FEMA will redraw Sacramento's flood insurance rate maps, eliminating the need for mandatory flood insurance. Some portions of Sacramento will remain in the floodplain until additional work can be completed, notably the Mayhew area on the American River, the South Sacramento area, and portions of the Chicken/Strong Ranch Slough drainage. SAFCA and the City will conduct a major public outreach effort designed to inform the community about the anticipated flood map changes and the benefits of continuing with flood insurance at preferred risk rates.

The proposed community outreach plan anticipates two separate mailings to this group. The first, in early November, will let them know about the pending change in insurance requirements, outline their insurance options once the change occurs, and encourage them to seriously consider maintaining their coverage at a reduced rate. The second mailing in late January 2005 will identify the steps they need to take to modify their insurance coverage and encourage them to attend a series of informational community meetings to get assistance in moving forward.

The outreach plan also anticipates separate mailings in early November to property owners in three areas that will not receive flood insurance relief this year: the South Sacramento Streams Group floodplain, the floodplain along the north side of the American River upstream of the Mayhew Drain, and the Chicken/Strong Ranch Slough floodplain. These mailings will provide information on the status of the projects needed in these areas to provide insurance relief and invite residents to attend informational community meetings in mid-November about local floodplain management issues.

These efforts will be incorporated into the outreach campaign being carried out by Deukmejian Consulting, which the SAFCA Board approved in June of 2003, and which is supported by a grant from FEMA in the amount of $161,156.

FINANCIAL CONSIDERATIONS:

The cost of the November mailings is estimated at $225,000. This sum will be paid out of the SAFCA Operations and Maintenance Budget for FY 2004-05. The cost of the January 2005 mailing and community meetings will be paid out of the FEMA grant.

ENVIRONMENTAL DETERMINATION:

Division 13, Section 21080 of the California Public Resources Code defines discretionary acts and states that CEQA only applies to ”discretionary acts proposed to be carried out or approved by public agencies”. No discretionary action is being taken by approval of this staff report. Therefore CEQA does not apply.

POLICY CONSIDERATIONS:

The proposed outreach effort is being closely coordinated with the floodplain manager for the County of Sacramento and SAFCA and is consistent with the City’s policy of working with these member agencies to inform the community of important changes in floodplain management conditions. The educational information will urge property owners to seriously consider maintaining flood insurance coverage, at a significantly reduced rate, since we are still below our desired level of greater than a 200-year level of flood protection for the community.

ESBD CONSIDERATIONS:

No goods or services are being purchased under this report.

Respectfully submitted,

_____
Dave Brent
Engineering Services Division Manager

RECOMMENDATION APPROVED:

_____
ROBERT P. THOMAS
City Manager

APPROVED:

_____
GARY A. REENTS
Director of Utilities

TABLE OF CONTENTS:

1) Exhibit A – Outreach Schedule – page 12
Resolution – page 13

(This page has been intentionally left blank.)