RESOLUTION NO. 6729

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF REDLANDS ADOPTING THE CITY OF REDLANDS FLOOD PLAN

WHEREAS, at its March 21, 2006 meeting, the City Council of the City of Redlands ("this City Council") authorized staff to apply for the 2006 Flood Mitigation Assistance Grant through the United States Department of Homeland Security/Federal Emergency Management Agency; and

WHEREAS, the purpose of the grant application was to obtain funding for the preparation of a flood plan for the City of Redlands; and

WHEREAS, City staff subsequently applied for and received a 2006 Flood Mitigation Assistance Grant; and

WHEREAS, the City of Redlands' Flood Plan has been prepared and reviewed by City staff and this City Council, and reviewed and approved by both the State of California Governor's Office of Emergency Services and the Department of Homeland Security, Federal Emergency Management Agency; and

WHEREAS, the City of Redlands' Flood Plan is designed to enhance the City's existing Local and Multijurisdictional Mitigation Plan; and

WHEREAS, adoption of the City of Redlands' Flood Plan is a pre-requisite for the City to apply for future Flood Mitigation Assistance Grants;

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF REDLANDS as follows:

Section 1. The Flood Plan attached hereto as Exhibit "A" is hereby adopted.

SIGNED AND APPROVED this 15th day of July, 2008.

Mayor, City of Redlands

ATTEST:

Lorrie Poyzer, City Clerk

DJM/Reso/6729 – Flood Plan
6/19/08 8:24 am

I, Lorrie Poyzer, City Clerk, City of Redlands, do hereby certify that the foregoing resolution was adopted by the City Council at a regular meeting thereof held on the 15th day of July, 2008, by the following vote:

AYES:	Councilmembers Gilbreath, Gallagher, Aguilar, Bean; Mayor Harrison
NOES:	None
ABSENT:	None
ABSTAIN:	None

Lorrie Poyzer, City Clerk

CITY OF REDLANDS, CALIFORNIA

FLOOD PLAN

ADOPTION DATE: JULY 15, 2008

FEMA APPROVAL DATE: JULY 27, 2007

Prepared by

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Quality of Life Department
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List of Reference Documents

Included by Reference; all documents on file in City of Redlands Quality of Life Department:

1. Mission Zanja Creek Study Status, January 15, 1985

2. County of San Bernardino, California Detention Basins Study, Gill & Pullver Engineers, Inc., January 1985

3. Mill Creek Zanja Detention Basin Study, Williamson and Schmid, March 18, 1986

4. Mill Creek Zanja Detention Basin Study Appendices, Williamson and Schmid, March 18, 1986

5. Redlands Chinatown and the Mission Zanja Creek Flood Control Project, Prepared for U. S. Army Corps of Engineers, by Archeological Advisory Group, March 1988.

6. Mill Creek Zanja Storm Drain Hydrology Study, BSI Consultants, Inc., June 17, 1989

7. Mission Zanja Creek Reconnaissance Study, Flood Control and Related Purposes, U. S. Army Corps of Engineers, Los Angeles District, February 1994

8. Mission Zanja Hydraulic Analysis and Evaluation of Flood Protection Alternatives Supplemental Appendix, U. S. Army Corps of Engineers, March 11, 1997.

9. Redlands Unified School District: List of Critical Facilities

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SECTION 1

INTRODUCTION

Section 1 – Introduction

1.1 General Description

The purpose of this document is to provide the City of Redlands with a systematic program for implementation of flood mitigation activities. This plan will provide potential reduction and/or elimination of the potential of loss of life, injury and property damage from future floods.

1.2 Purpose and Authority

The Disaster Mitigation Act of 2000 (DMA 2000), Section 322 (a-d) requires that local governments, as a condition of receiving federal disaster mitigation funds, have a mitigation plan that describes the process for identifying hazards, risks and vulnerabilities, identify and prioritize mitigation actions, encourage the development of local mitigation and provide technical support for those efforts.

The National Flood Insurance Reform Act of 1994 requires "If a community has received mitigation assistance under Section 1366 (the new Flood Mitigation Assistance Program), the credits shall be phased in a manner, determined by the Director, to recover the amount of such assistance provided for the community."

Further, when the ISO/CRS Specialist visits a community that received funds from the Flood Mitigation Assistance Program, those funded projects that are related to CRS credit will be reviewed, and the scores pro-rated based on FEMA's share of the cost.

The City of Redlands was awarded a Flood Mitigation Assistance Grant on June 26, 2006.

1.3 The Adopted Multi-Jurisdictional Mitigation Plan.

The City of Redlands has further determined the optimum value of its local flood hazard mitigation plan can best be reached by incorporation of existing, adopted plans. Individual plans share common goals and objectives, and cumulatively provide the framework for hazard identification and evaluation, capability assessment, proposed mitigation activities, and plan implementation and maintenance. Authorities include the following documents, and are adopted by reference. Copies of all documents may be found in the Reference Section of A. K. Smiley Public Library, 120 E. Vine Street, Redlands, California.

1. City of Redlands General Plan Master Environmental Assessment and Final Environmental Impact Report (MEA/DEIR), adopted October 17, 1995.
2. City of Redlands General Plan, adopted October 17, 1995.
3. Redlands Municipal Code, Chapter 15.32, Flood Hazard Prevention, adopted by Ordinance No. 1673 on January 2, 1979, and amended by Ordinance No. 1995 on April 7, 1987.
4. City of Redlands Emergency Plan, pursuant to the Redlands Municipal Code, Chapter 2.52, Emergency Organization, adopted November 19, 1987, latest revision.

5. San Bernardino County Flood Control District Zone 3 Comprehensive Storm Drain Plan No. 4, Hydrological Design Criteria and Storm Drain Plan, prepared May 1975. 1

1.4 Community Information

The City of Redlands is located in southwestern San Bernardino County, 8 miles east of the City of San Bernardino, and 63 miles east of the Los Angeles metropolitan area. Primarily a residential community, Redlands incorporates approximately 40 square miles, and has a population of 71,375.

Main Historical Facts

"Redlands' early history is similar to that of much of Southern California," as reported by the General Plan. It continues, "It was inhabited by Cahuilla and Serrano Indians, related to the Shoshone of the Great Basin area. During the Spanish period the Indian villages, the San Bernardino Rancho, and the Asistencia were established by the San Gabriel Mission. The missionaries developed the first stable water supply for the area by having the Indians dig a "Zanja" to divert the waters from Mill Creek into the Valley. During the 19th century this water allowed ranching districts to develop in Crafton and in the Asistencia area. Today the Mill Creek Zanja, which is listed in the National Register of Historic Places, is used for local drainage, spreading, and flood control."

"The year 1881 marks the beginning of Redlands as a town. E. G. Judson and Frank E. Brown built a canal from Santa Ana Canyon to Reservoir Canyon located along the path of Interstate 10 from below Panorama Point to Ford Park to bring water to the area for growing citrus. They laid out a town site parallel to the slope and, because the dry adobe soil was red, they named it Redlands. Three years later, Frank Brown built the Bear Valley Dam and reservoir, thereby assuring a water supply for residents of the new town. By 1885, two transcontinental railroads ran through the San Bernardino Valley, although neither stopped in Redlands. The first spur to Redlands was built in 1887."

"California experienced the biggest land boom in its history during the late 1880s. The rate war between the Santa Fe and the Southern Pacific railroads, which caused the boom, had a profound influence on the growth of Redlands, Crafton, and Lugonia as well as various realty tracts known by such names as Terracina and Mound City.

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1 The update was never completed and the County terminated the contract with Boyle several years ago. County staff is looking at updates as they have time, but no formal schedule has been given to the City of Redlands.

"The Redlands area prospered and grew during this period. The collapse of the boom in 1888 left Redlands well-established and in that year Redlands, Lugonia, the Brookside area, and a portion of Crafton voted to incorporate as Redlands. The incorporation joined the two distinctive street patterns that characterize Redlands today: the north-south Lugonia grid merges with the slope oriented Redlands grid at the south edge of the Valley."[2]

Geographical Characteristics

Features include the Santa Ana River to the north, the Crafton Hills to the east, the San Timoteo Canyon to the south, and the City of Loma Linda to the west. Recognized geographical hazards include the San Andreas Fault Zone, generally located one mile north of the City of Redlands, the San Jacinto Fault Zone, generally located in San Timoteo Canyon, and 100-year flood zones which include the Santa Ana River System to the north, the San Timoteo Creek System generally located in San Timoteo Canyon, and the Mission Zanja Creek System, traversing east-west through the city limits.

Economic Background

The City's economic heritage is derived primarily from the citrus industry. Although no longer the prime industry of the city, large and small groves still provide a significant tie to early beginnings. The land boom of the late 1880s was a major influence on the local economy, and even after the collapse in 1888, Redlands was not only well established, but prospered. Redlands' warm winter climate drew Eastern visitors regularly, and for a period in the early 1900's the City was a resort area. Ironically, a momentary lapse in climate in January 1913 was a catastrophe to the orange industry. Citrus losses proved an economic and social disaster; Redlands lost 2,000 residents, and only after World War I did building and neighborhood development renew. The interval from 1920-1930 was another period of growth and economic prosperity, largely due to the citrus industry. The town's other "industry," the University of Redlands, expanded as well and a general increase in population occurred. Another regional contributor was the establishment of Norton Air Force Base, which remained an active military facility until 1994. Because of Redlands' historic and cultural heritage, the City attracted commissioned military personnel as residents. The closure of Norton Air Force Base, coupled with a declining economy beginning in 1990, had a vital impact on the City's economic stability. Due to declining development in general, the City experienced a dwindling General Fund, resulting in a severe decrease in community services. Enactment of a Utility User's Fund, rescinded on April 15, 1997 supplemented portions of the General Fund.

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[2]City of Redlands General Plan, Section 3.20, Historic and Scenic Preservation Element, adopted October 17, 1995.

Infrastructure Features

The City of Redlands has 400 miles of improved streets, illuminated by 4,919 street lights, and controlled by 68 traffic signals. An additional 10 more traffic signals are in the planning phase with development. There are approximately 25 miles of improved storm drain, and very few remaining miles of dirt and stone channel, including the Zanja Creek system as well as other flood control facilities. The Redlands Municipal Airport, a general aviation facility, supports eight airport-related businesses, 230 based aircraft, and 65,300 annual operations.

Other improved infrastructure includes one landfill, two surface water treatment plants, one wastewater treatment plant, 400 miles of water lines and 240 miles of sewer.

The Park and Open Space system includes 16 developed parks, and eight acquired but as yet undeveloped park sites, five regional trails, and 11 primary community trails. The Hillside Memorial Cemetery, is City-owned and operated.

The I-10 Freeway bisects the City east to west, and State Route 30 junctions from the I-10 Freeway close to the west city limit.

General Plan Highlights

The following documents are incorporated as reference, and may be found in the City of Redlands Community Development Department:

Section 8.0, Health and Safety Element, Redlands General Plan

Section 1.0, Summary, Redlands General Plan/EIR
Section 3.0, Land Use, Redlands General Plan/EIR
Section 7.0, Hydrology, Redlands General Plan/EIR
Section 16.0, Community Services, Redlands General Plan/EIR
Section 19.0, Alternatives, Redlands General Plan/EIR
Section 20, CEQA Topics, Redlands General Plan/EIR
Section 21, Monitoring, Redlands General plan/EIR

Section 4.0, Seismicity, Geology and Soils, Redlands General Plan/MEA

SECTION 2

JURISDICTIONAL PARTICIPATION

INFORMATION

Section 2 – Jurisdictional Participation Information

2.1 Primary Point of Contact:
The Point of Contact for information regarding this plan is:

Mary Petite
Administrative Analyst
35 Cajon Street, Suite 222
Redlands, CA 92373
Office: 909-798-7591
mpetite@cityofredlands.org

2.2 Promulgation Authority Information

This Hazard Mitigation Plan was reviewed and approved by the following Promulgation Authorities:

Jon Harrison, Mayor

Contact Information:
City of Redlands
35 Cajon Street, Suite 4
P. O. Box 3005
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909-798-7533
citycouncil@cityofredlands.org

Pat Gilbreath, Mayor Pro Tem

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Pete Aguilar, Councilmember
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Jerry Bean, Councilmember

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Mick Gallagher, Councilmember
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SECTION 3

PLANNING PROCESS DOCUMENTATION

AND

PUBLIC INVOLVEMENT

Section 3 – Planning Process Documentation and Public Involvement

3.1 Planning Process

The City of Redlands Local Disaster Council is comprised of an average of fifty individuals. Representatives include a City Council Liaison, four department heads representing Quality of Life, Redevelopment, Municipal Utilities and Engineering, and Planning and Community Development Departments, staff representatives from each department within the City of Redlands, representatives from the adjoining communities of Yucaipa, Highland, Loma Linda, and San Bernardino, San Bernardino County Office of Emergency Services, Southern California Edison, Sempra Utilities, Redlands Unified School District, the University of Redlands, the Red Cross, Redlands Community Hospital, local businesses, and interested community member-volunteers. This group was responsible for the development and implementation of the City of Redlands Local and Multi-jurisdictional Mitigation Plan.

At the recommendation of the Disaster Council, the City Council of the City of Redlands authorized staff to apply for inclusion in the Community Rating System. Staff initiated the process in 2005, and in October 2006 Redlands received a letter indicating a Class 9 rating. Staff has been addressing and documenting additional activities that will be submitted for an October 2008 elevated rating. Recent adoption of the International Building Code by both the State of California and the City of Redlands will provide significant additional points and increase Redlands' CRS rating.

Furthermore, the Council realized the importance and necessity to develop and implement a separate Flood Mitigation Plan as part of the CRS process. Following introductory workshops to the entire Disaster Council, staff solicited the interest of its members to form a special Flood Plan Subcommittee.

This subcommittee met regularly for six months to develop a list of specific flood hazards and ways to mitigate them. At the same time, the subcommittee reviewed the elements contained in the CRS Application, and developed a list of recommendations to further promote flood mitigation. The subcommittee determined that it would recommend enhanced public education, planning, structural and non-structural mitigation measures.

3.2 Planning Team Member Information

Maximum credit for floodplain management planning: 235 points

The Floodplain Management Plan must have been developed using the standard planning process as presented in steps a – j. TO RECEIVE CREDIT UNDER THIS ACTIVITY, THE PLANNING PROCESS MUST RECEIVE SOME CREDIT FOR EACH OF THE 10 FOLLOWING STEPS, a – j.

Floodplain management planning (FMP) = the total of the following points credited for each of the steps, a – j.

a. Organize to prepare the plan (Maximum credit: 10 points). The credit for this step is the total of the following points which are based on how the community organizes to prepare its floodplain management plan:

1. 2 points, if the planning process is under the supervision or direction of a professional planner; REFERENCE PAGES 18-20 2 POINTS

2. 6 points, if the planning process is conducted through a committee composed of staff from those community departments that will be implementing the majority of the plan's recommendations; REFERENCE PAGES 18-20 6 POINTS

3. 2 points, if the planning process and/or the committee are formally created or recognized by action of the community's governing board.
REFERENCE PAGE 17 2 POINTS

SUB-TOTAL 10 POINTS

FORMAL CREATION: City of Redlands Disaster Council, Multi-jurisdictional Mitigation Plan, Floodplain Management Subcommittee

REDLANDS MUNICIPAL CODE SECTION 2.52.050: Disaster Council Creation Membership/Citizens Corps Council:

The city disaster council shall consist of the following:

A. The mayor of the city, who shall be chairperson;

B. The city manager of the city, who shall serve as the director of emergency services, and who shall be vice chairperson;

C. The emergency services chief who shall coordinate all emergency services for the city and is provided for in the current plan of the city.

D. The disaster council of the City of Redlands shall consist of existing groups that support a strong team merging sectors of the community including elected officials, emergency management, first responders, volunteer services, major industry and commercial, healthcare and education.

E. A citizen's corps council shall be created as a subgroup of the disaster council. The citizen's corps council will utilize members of the disaster council for the management of existing volunteer resources defined by the council, to leverage mutually supportive endeavors among the represented groups, and to direct overall local plans to implement citizen's corps in the community. This council will have the lead role in implementing citizen corp groups within the city of Redlands. (Ord. 2547 § 1, 2003: Ord. 2485 § 2, 2002)

Sub-committee Members, in alphabetical order:

Name:	**Rebecca Estrella**
Title:	**Public Affairs Manager**
Organization:	**Southern California Gas Company**
Category:	**Member, Disaster Council**

Becky Estrella has been a Public Affairs Manager for The Gas Company for nine months, however employed with the company for 11 years. During most of her time with the company, she was an Account Executive working with Commercial and Industrial Customers assisting them with gas requirements of their facilities. As a Public Affairs Manager, she is responsible for the governmental and community issues that impact the cities that she represents on behalf of The Gas Company. The Gas Company has their Regional Headquarters on Lugonia Avenue in Redlands. The facility is occupied by over 500 employees. This includes the Customer Call Center for the entire company, Engineering, Planning & Technical Services, and Marketing.

Name:	**Mitchal McKee**
Title:	**Battalion Chief/Emergency Preparedness Coordinator**
Organization:	**City of Redlands**
	Fire Department
	Office of Emergency Preparedness
Category:	**Implementing Staff, Professional Planner**

Mitchal McKee has worked for the City of Redlands Fire Department for 27 years. He is presently a Fire Battalion Chief, directs the Emergency Services Division for the City of Redlands and acts as the City's chief paramedic. Mitchal developed the City's Emergency Preparedness program to its current level and has directed and coordinated all administrative and operational program parameters for 14 years. Mitchal holds several degrees in Business, Management, Emergency Medical Services and is certified as an Emergency Manager in Disaster Preparedness. Mitchal represents the City of Redlands on the San Bernardino County

Operational Area Coordinating Council and holds multiple committee positions in emergency/disaster management with San Bernardino County.

Name:	**Richard Pepper**
Title:	**Chief Building Official/Floodplain Manager**
Organization:	**City of Redlands**
	Community Development Department
	Building and Safety Division
Category:	**Implementing Staff, Professional Planner**

Richard Pepper has worked for the City of Redlands Building and Safety Department since March 1990. He is presently the Chief Building Official and Floodplain Manager and has served in this capacity since April 1999. Richard is a Certified Building Official by the International Code Council and is also certified by the Governor's Office of Emergency Services as a Building Inspector for Post-disaster Safety Assessment Evaluator.

Name:	**Mary Petite**
Title:	**Administrative Analyst**
Organization:	**City of Redlands**
	Quality of Life Department
Category:	**Implementing Staff; Professional Planner**

Mary Petite has worked for the City of Redlands for over 25 years, and prior to that as a paralegal for the City Attorney in both his public and private practice. In those 25 years, she has worked 10 years in the Community Development Department, 13 years in the Public Works Department, and two years in the Administrative Services Department. For the past 15 years, she has been the City of Redlands' designated authorized agent for both federal and state disaster recovery operations, hazard mitigation grants and programs, and a member of the Executive Steering Committee to the state-sponsored Disaster Resistant California organization.

Name:	**Daniel Shefchik**
Title:	**Lieutenant, Redlands Police Department**
Organization:	**University of Redlands**
	Campus Security
Category:	**Implementing Staff; Disaster Council Member**

Lieutenant Shefchik has worked for the City of Redlands Police Department since December 1979. He is presently assigned as the Director of Public Safety at the University of Redlands, serving in this capacity since March 2005. In his current assignment he represents the University in community emergency planning and mitigation processes. Lieutenant Shefchik has worked with the City's Emergency Preparedness Program for many years and has also served as one of the City's alternate representatives to the Operational Area Coordinating Council.

Name:	**Jennifer Sorenson**
Title:	**Environmental Health and Safety Manager**
Organization:	**University of Redlands**
Category:	**Multi-Jurisdictional Mitigation Partner**
	Disaster Council Member

Jennifer Sorenson is the Environmental Health and Safety Manager for the University of Redlands. She has been in this role at the University for 3 years and in the Environmental Health and Safety field for 7 years. Jennifer is active in the Emergency Preparedness and Planning function at the University and as such is a member of the Flood Mitigation Planning Committee. The University of Redlands is one of the larger organizations located within the floodplain and works closely with the city in flood mitigation efforts.

Name:	**Diana Stead**
Title:	**Risk Manager**
Organization:	**Redlands Unified School District**
Category:	**Multi-Jurisdictional Mitigation Partner**
	Disaster Council Member

Diana Stead is the Risk Manager for the Redlands Unified School District and has served in that role for the last 3 1/2 years. Prior to coming to Redlands, she worked at Moreno Valley and Temecula Valley Unified School Districts with over 15 additional years in the Risk Management field. Diana serves on the Steering Committee for Public Agency Risk Managers Association (PARMA), comprising of Risk Managers in the school, cities, and counties and s Co-Chairman of the R & D Committee Eastern Section for California Association of School Business Officials (CASBO). Diana also serves on the City of Redlands Local Hazard Mitigation Planning Committee and Disaster Council. Diana's duties also include Emergency and Disaster Planning for the District. The Redlands Unified School District is one of the largest organizations located in the floodplains and works in conjunction with the city on these projects.

Name:	**Gary Van Dorst**
Title:	**Director**
Organization:	**City of Redlands**
	Quality of Life Department
Category:	**Implementing Staff Member, Professional Planner**

Gary Van Dorst attended the University of California, Berkeley and the University of the Pacific. He holds a Bachelors Degree in Philosophy and secondary teaching credentials in English. Mr. Van Dorst is a founding staff member and former Executive Director of the Sacramento Local Conservation Corps. He is currently the Quality of Life Department Director for the City of Redlands. Mr. Van Dorst has more than 18 years of experience in Solid Waste Management.

b. Involve the public (Maximum credit: 48 points). The term "public" includes residents, businesses, property owners, and tenants in the floodplain and other known flood hazard areas. The credit for this step is the total of the following points based on how the community involves the public during the planning process. To receive credit for this step, the process must include item 1.

1. 2, for at least one meeting to obtain public input on the draft plan held at the end of the planning process at least two weeks before submittal of the recommended plan to the community's governing body. REFERENCE PAGE 22 2 POINTS

2. 8, if one or more public meetings are held in the affected area(s) at the beginning of the planning process to obtain public input on flood problems and possible solutions.

REFERENCE: http://www.ci.redlands.ca.us/NorthRedlandsVisionPlan060306.pdf
8 POINTS

3. 4, if public information activities are implemented to explain the planning process and encourage input to the planner or planning committee.

REFERENCE PAGE 22 4 POINTS
(Market Night)

4. 4, if questionnaires are distributed asking the public for information on their flood problems and possible solutions. The questionnaires must be distributed to at least 90% of the floodplain residents.

REFERENCE ATT. 2 4 POINTS

5. 4, if written comments and recommendations are solicited from neighborhood advisory groups, homeowners' associations, parent-teacher organizations, the Chamber of Commerce, or similar organizations that represent the public in the affected area(s).

REFERENCE ATT. 3 4 POINTS

6. 26, if the planning process is conducted through a planning committee that includes members of the public. If this is the same planning committee credited under 511.a2 and 3, at least one half of the members must be representatives of the public, preferably from the floodprone areas. The committee must hold a sufficient number of meetings that involve the members in planning steps 241.d,e,f,g, and h (e.g. at least one meeting on each step).

REFERENCE PAGE 23 26 POINTS

SUB-TOTAL 48 POINTS

3.3 Public Involvement

Goal: Set a target date of October 2007 by which we hope to see the first 5% premium.
Result: The first premium reduction will be effective October 2007.

Goal: Add eligible activities to the CRS application.
Result: It is not possible to add any activities at this time to meet the October deadline date; however, this is possible for the next effective date of October 2008. The cutoff date was the end of February for the October effective date. The changes can be submitted in the form of a modification. A modification change cannot be effective any earlier than one year after the last effective date. Draft points were submitted to FEMA by the Insurance Services Office on January 4, 2007.

Goal: Establish a Market Night activity for as soon as possible after we receive the brochures, flyers and stuffers ordered from FEMA.
Result: The R.A.C.E.S. team is coordinating the first activity to be held on June 8, 2007.

Goal: Make the Market Night activity an annual event.
Result: Event is "packaged" and shelf-ready for an annual event.

Goal: Coordinate our CRS planning efforts with the State adoption of the International Building Code.
Result: International Building was adopted by both the State of California and the City of Redlands in January 2008.

Goal: To be eligible as a Class 7 Community by the next premium reduction in October 2008.
Result: To be accomplished by adopting the International Building Code and documenting additional point-qualifying steps taken throughout the year.

Goal. Order public educational materials from FEMA for Market Night distribution.
Result: Ordered and received:

"Your Homeowner Insurance Doesn't Cover Floods"
"Nothing Could Dampen the Joy of Home Ownership"
"Why you need Flood Insurance"
"Flood Preparation and Safety"
"What you need to know about Federal Disaster Assistance and National Flood Insurance"

Goal: Develop a Hazard Identification Survey for distribution to property owners in the floodplain.

Result: Survey developed for distribution. (Attachment #2)

Goal: Order website tutorial from the Insurance Service Office and incorporate into City of Redlands' official website, www.ci.redlands.ca.us.

Result: Template developed for review by City Staff, Management and City Council.

Goal: Develop 10-point flyer for distribution in the Target Area.

Result: Developed and attached. (Attachment #3)

c. Coordinate with other agencies (Maximum credit: 18 points) Other agencies must be contacted to see if they are doing anything that may affect the community's program and to see if they could support the community's efforts. "Other agencies" include neighboring communities and local, regional, state, and federal agencies that implement floodplain management activities.

The credit for this step is the total of the following points. To receive credit for this step, the coordination must include item 4.

1. 3, if the other agencies are contacted at the beginning of the planning process and asked for their input.

REFERENCE PAGE 23-24 3 POINTS

2. 10, if meetings are held with representatives of agencies to review common problems, development policies, mitigation strategies, inconsistencies and conflicts in policies, plans, programs, and regulations.

REFERENCE PAGES 23-24 10 POINTS

3. 3, if the planning includes a review of the community's needs, goals, and plans for the area.

REFERENCE PAGE 23-24 3 POINTS

4. 2, for sending the draft action plan to the other agencies and asking them to comment by a certain date.

REFERENCE PAGE 24 2 POINTS

SUB-TOTAL 18 POINTS

The cities of Redlands, Yucaipa, Loma Linda, San Bernardino and Highland all have representatives to the San Bernardino County Flood Control District, Zone 3 Advisory Committee. Likewise, all of these communities have representatives sitting on the City of Redlands' Disaster Council and are regular attendees. All of these agencies were contacted and in fact worked as sub-committee members during the initial Local/Multi-jurisdictional Mitigation Plan, Planning process.

The purpose of this Advisory Committee is to hold meetings amongst these agencies to review common problems, development policies, mitigation strategies, inconsistencies and conflicts in policies, plans, programs and regulations.

This Advisory Committee meets quarterly in the San Bernardino County Department of Public Works Hearing Room to discuss matters of regional interest and budget considerations. The County Flood Control District has full attendance from the Flood Control Planning Division, and along with department head level local staff, is also attended by mayors or their designees from these communities.

Prior to these quarterly meetings, communities are solicited to update the Advisory Committee on matters of local flooding issues. For example, Attachments # 4 and 5 are letters from the City of Redlands once again stating the hazards of the Mission Zanja and potential mitigation measures.

Included as Attachment # 6 is a sample of the various projects under consideration in Spring, 2006.

d. Assess the hazard (Maximum credit: 10 points). The credit for this step is the total of the following points based on what the community includes in its assessment of the hazard.

To receive credit for this step, the assessment must include:

Item 1. 5, for including the following in the plan:

a. A map of the known flood hazards. "Known flood hazards" means the floodplain shown on the Flood Insurance Rate Map (FIRM), repetitive loss areas, areas not mapped on the FIRM that have flooded in the past, and surface flooding identified in existing studies. No new studies need to be conducted for this assessment.

REFERENCE PAGE 26

b. A description of the known flood hazards, including source of water, depth of flooding, velocities, and warning time, where such data are available.

REFERENCE PAGES 39-41

c. A discussion of past floods, where such data are available.

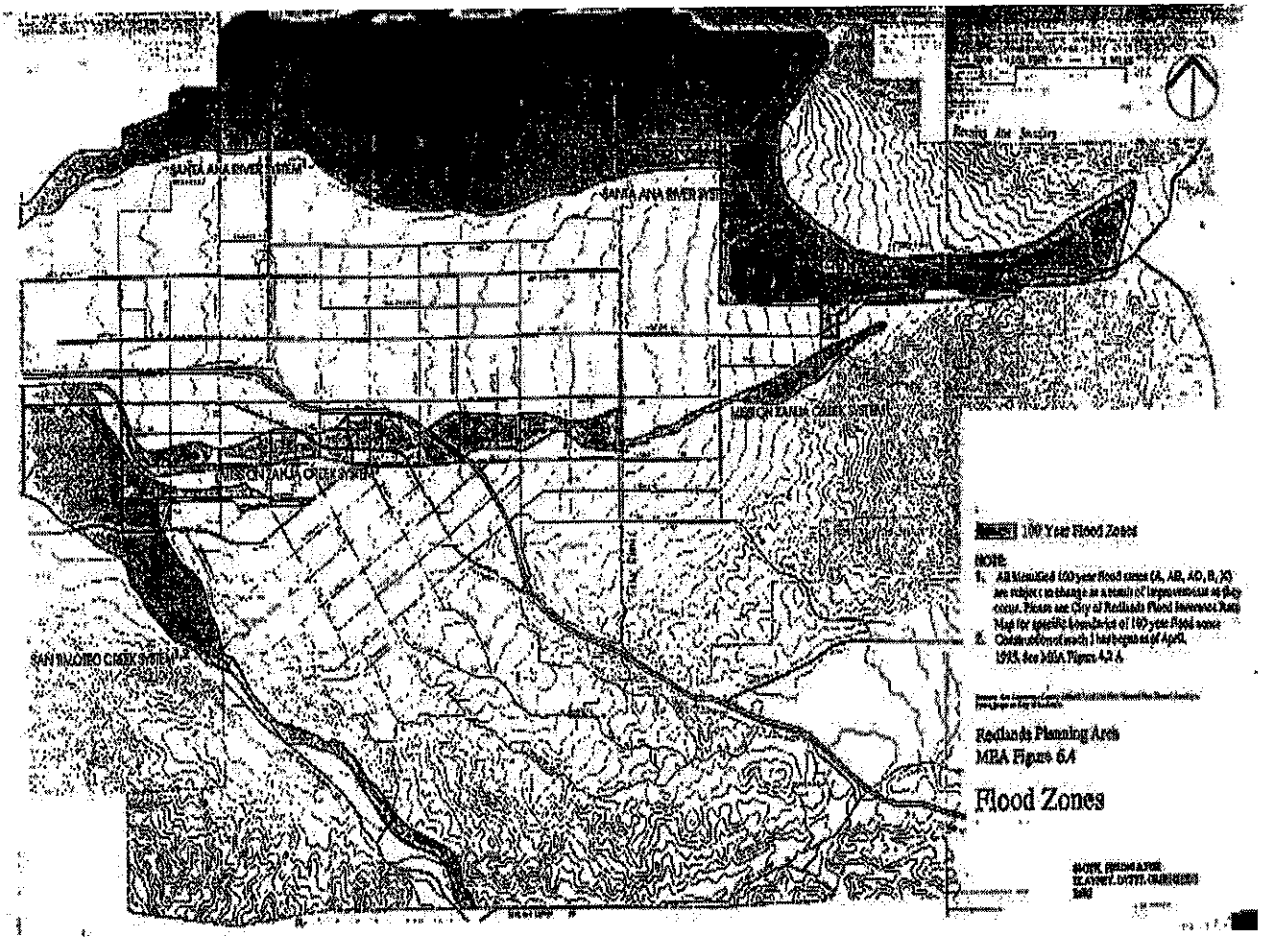
REFERENCE PAGES 27-33

Item 2. 5, if the plan includes a map and description of other natural hazards, such as erosion, tsunamis, earthquakes and hurricanes.

REFERENCE ATT's. 7-10

SUB-TOTAL 5 POINTS

FLOOD HAZARD MAP



MULTI-HAZARD MAPS

SECTION 4

RISK ASSESSMENT

Section 4 – Risk Assessment

4.1 Hazard Identification

Four principal streams drain Redlands, each of which presents identifiable flood hazards at peak flows.

The Santa Ana River/Mill Creek, which emerges from its mountain canyon 5 miles northeast of Redlands, spreads out in shallow, braided channels more than a 1.5 mile-wide wash, mantled with fluvial debris. In 1965, 1966, 1969, 1976, 1980, 1992, 1993, and 1995 the flood waters from the upper regions of the Santa Ana River/Mill Creek were responsible for extensive damage to Orange Street and Alabama Street, ranging from washouts from five to six-foot high flood waters, to extensive, permanent damages from uncontrollable runoff from the upper regions of the San Bernardino mountains.

The Mission Zanja, also known as Mill Creek Zanja and Mission Storm Drain, is part of the area's history. The Mission Zanja was constructed for water supply in 1819. Diverting water from Mill Creek, the Zanja carried water for 12 miles to support the San Bernardino Asistencia and surrounding farms and ranches. Today, as it traverses an east/west direction, the Zanja drains major portions of the City through various storm drain systems. During significant storm periods, the Zanja poses a serious threat to the community, and is presently being studied by the U. S. Army Corps of Engineers to determine if Corps funding might be available for design and construction of facilities to remove the flood hazard. The Mission Zanja, from the 2800 block of Mentone Boulevard to the west edge of Sylvan Park, is a designated landmark, and part of the National Register of Historic Places.

Floods inundate portions of the City of Redlands almost every year. Records show that by 1988, 23-medium to large floods had occurred since construction of Mission Zanja in 1819. Since 1988, additional declared flood disasters have occurred, each producing proportionate damages to the community.

The County of San Bernardino Flood Control District initiated a report following the floods of January and February 1969 which summed up the repetition of flood damage in Redlands and vicinity. It stated that "A review of the occurrence of past floods of serious magnitude in San Bernardino Valley shows that one may be expected on the average of every 20 to 21 years. 'Great floods' have been recorded for the years 1825, 1862, 1867, 1884, 1891, 1916, 1938, 1969 and 1993. Available records indicated that the greatest of these by far was the flood of January 1862. If the reconstructed data for that storm is reasonably accurate, it would have been approximately a once-in-350-years flood!"

4.2 Hazard Profile

OEP-211-DR - Description of Events/Description of Damages

From November 20 to 27, 1965, a series of five storm periods, ranging from light to severe, inflicted extensive damage in the region. The most severe of these storms occurred between November 20 and 25, when eleven deaths (six in San Bernardino County) were attributed to the storms. Property damage estimates greater than $11 million were recorded.

Within Redlands' jurisdiction, Alabama Street suffered extensive damage due to flood waters from the upper regions of the Santa Ana River/Mill Creek. Resultant flows put the Redlands Sewage Treatment Plan out of operation, took the city's largest water reservoir off line and produced significant damage throughout the northern portion of Redlands and its Central Business District. The Mission Zanja Creek, which flows through Redlands from a controlled diversion of Mill Creek for irrigation purposes, produced significant levels of mud and debris deposits, and flooded homes along Sylvan Boulevard. Water carried tons of mud from construction-bared slopes along Palo Alto Drive across Country Club Drive and through the storm drain channel which bisects the golf course. Many intersections throughout the City were flooded, with gutters filled to overflowing with heavy runoff. Floodwater from the overflow of the Zanja flooded the basement of the Crafton Elementary School.

OEP-233-DR - Description of Events/Description of Damages

"During the first third of December 1966, a series of three storms swept through San Bernardino County. December 5 recorded the fourth most severe rainfall period in 76 years of San Bernardino rainfall history with a near-record 4.23."[3]

On December 5, nearly one-half mile of Alabama Street was washed out during flows up to five feet deep. Violent flows from the Santa Ana River also severely eroded the north levee protecting the Redlands Sewage Treatment Plant. The Zanja again overflowed east of Wabash Avenue, poured through an orange grove and flooded the Crafton School Yard. On December 6, overflow from the unimproved "Little Zanja" was widespread. The University area, as well as the Central Business District, was layered with tons of mud and debris after two successive days of flooding. The north approach to the Kansas Street Bridge was washed away, and flows undercut the abutment, dropping the north end of the bridge about two feet. The bridges at both Iowa and New Jersey Streets suffered similar damages.

OEP-253-DR - Description of Events/Description of Damages

"During the months of January and February 1969, two severe storms struck the central and southern California area inflicting more than $213 million in tangible property damage and exacting 115 human lives. Seven coastal counties were declared national disaster

[3]San Bernardino County Flood Control District, Historic and Hydrologic report of the Floods of December 5 -7, 1965.

areas by the President of the United States: San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange, Riverside and San Bernardino."[4]

Of the more significant storms in recent years, the floods of January and February 1969 struck Central and Southern California and inflicted more than $213 million in tangible property damage, and claimed 115 lives. Local regional damage was estimated at $78 million, with the loss of 14 lives. Even though past floods have historically exceeded the volume of the 1969 floods, recent urban development created a vulnerability to the area.

Local damages again included the overflow of the Santa Ana River at Alabama Street, and entire sections of pavement were carried downstream. Heavy rains and melting snows in the mountains swelled the river to flood proportions. The Orange Street Bridge was threatened and traffic restrictions were imposed. Mill Creek, the first major tributary to the Santa Ana River, grew to proportions significant enough to isolate Forest Falls and Mountain Home Village. Erosion damage occurred at the Redlands Municipal Airport, and the southern hillside areas of Redlands were again inundated with flood waters, mud and debris.

SEPTEMBER 24, 1976 FLOOD – Description of Events/Description of Damages

On the afternoon of Friday, September 24, 1976 Redlands experienced a flash flood. Approximately .64 inches of rain fell within a one-hour time period. Flooding and heavy damage were widespread, but the downtown, eastern and northwestern parts of the city were the hardest hit, particularly those areas along the Zanja. Redlands suffered an estimated $2 million dollars in damages (1976 dollars). Full details of this event may be found in Attachment 11.

FEMA- 615-DR - Description of Events/Description of Damages

The floods of February 1980 produced a mirror image of prior floods, as extensive damage again occurred as a result of rising storm waters and runoff from the upper regions of the Santa Ana River. The Santa Ana River at Alabama Street changed course and completely washed out the road in two locations, plugged existing culverts, eroded shoulders at various locations, scoured the existing A.C. pavement and washed out the existing pipe on the north end of the river. Emergency - reopening of Alabama Street occurred on June 10, 1980, after four months' construction, at a cost of $106,390. During the construction phase, additional pipes were added to increase the capacity of the existing pipes. Minor erosion damage occurred on various City streets and some private property. The Zanja experienced collapse between Redlands Boulevard and State Street near Kendall Drive, as well as in a portion of the channel in Sylvan Park. Repairs were instituted by City crews at nominal cost.

[4]San Bernardino County Flood Control District, Historic and Hydrologic Report of the Floods of January and February, 1969.

FEMA- 935-DR – CA - Description of Events/Description of Damages

In February 1992, significant flooding occurred as a result of major storm systems moving through Southern California. The three-day storm system produced most of the 14.96 inches of rainfall for 1991-92.

Historically, the Santa Ana River and Mission Zanja were the cause of the most significant damages, and due to extensive build-out of the southeast area, storm runoff produced increased flooding of the Country Club area. Most significantly, water run-off from the populated Country Club area traversed a private elementary school as well as Ford Street and developed subdivisions to the north of Ford Street. School property was damaged as a result of flood waters flowing through the school's parking lot and only street entrance, resulting in a lawsuit against the City. In 1993-94 the City constructed the Ford Street Storm Drain at a cost of $450,000, and future flooding in that area has been nonexistent. The Bear Valley Pipeline, generally located in Mill Creek near Greenspot Road and Florida Street, sustained $92,000 in damage to approximately 400 feet of steel pipe and supports. The Mill Creek Zanja at Sylvan Blvd. at Judson Street eroded significantly, threatening flooding of neighborhood homes as floodwaters spilled over into the public right-of-way, and causing $12,000 in damage. Public safety, spillway erosions, landfill tipping fees, and debris removal alone resulted in $160,000 in damages for a 3-day period of time. There was no loss of life or private property.

FEMA- 979-DR – CA - Description of Events/Description of Damages

The Winter Floods of 1993 produced the most significant damage to the City of Redlands in recent history. Recurrent flooding during the months of December through March resulted in an over saturation of soil which promoted long-term effects of storm waters in the City and region. Tropical rains melted a heavy snow pack at the higher elevations, producing increased flood activity.

With approximately $6.5 Million in damages, but no loss of life, these storms finally claimed both the Alabama Street and Orange Street bridges. Demolition of the old Orange Street Bridge, and construction of temporary replacement dip crossings resulted in costs of $570,000 and both crossings were opened in July 1993. After 14 years, the Alabama and Orange Street All-Weather Bridges were finally constructed and opened in December 2006 and March, 2007. The Mission Zanja again produced flooding along its banks at Sylvan Blvd. and Judson Street, resulting in channel improvements at that intersection in excess of $27,000. Partial collapse of the Zanja occurred again in Sylvan Park. The Monkey Face Falls waterline, which provides water to residents of Mountain Home Village, was crushed by landslides. One additional water line, serving sparse residences north of the Santa Ana River, was washed out. Repair was affected in October 1993, following subsidence of the Santa Ana River. Tipping fees to the County landfill exceeded $185,000. Several city-owned buildings sustained water damage, including the Smiley Library, which is on the National Register of Historic Places. Fire and Police Department emergency services topped $95,000, with no loss of life. Emergency Protective Measures and Debris Removal accounted for another $125,000 in emergency services. Landslides occurred in the San Timoteo/Live Oak Canyon area, resulting in road closures for a

portion of the three-month Declaration period. Final clean up efforts were accomplished in April 1993 at a cost of $30,000.

FEMA- 1044/1046-DR-CA - Description of Events/Description of Damages

As a result of severe early and late winter storms, January thru March 1995, every County within the State of California received dual Federal Disaster Declarations related to statewide flooding. Redlands received proportionate damage in relationship to identified repetitive hazards.

FEMA 1044-DR-CA:

Besides significant non-reimbursable costs associated with Emergency Protective Measures and Debris Removal efforts, the City experienced a wide array of infrastructure damage. Another section of the Mission Zanja collapsed within Sylvan Park, at an approximate cost of $25,000. Significant erosion occurred at the California Street Landfill, where rain caused gullying along the slopes of the west end of the facility. Regrading of the landfill was necessary to prevent exposure of landfill debris, and hydro seeding was needed to prevent further erosion to comply with state law. The gas collection flare skid was replaced as a result of power interruption due to the winter storm. Further damage occurred at the base of the landfill, where the bank below the County Flood Control access road has been undercut due to the renegade meanderings of the Santa Ana River. Total landfill damage exceeded $100,000. The Tate Water Treatment Plant experienced a mudslide when excess flow from the canyon located south of the plant damaged the pipe which carries the water to the culvert. The cost of replacing CMP pipe, sandbag placement, chain link fence replacement and 100 tons of debris removal exceeded $10,000; however, as a result of excess water turbidity in the region of the Santa Ana River/Mill Creek area, excess water treatment costs were incurred in excess of $100,000 for both storm systems. Storm drains were largely affected. A small segment of storm drain at Garden Avenue and South Street collapsed, at a cost of $12,000. The most severe storm drain damage occurred, however, when the Smiley Storm Drain, between Fern and Cypress Avenues, collapsed. The storm drain traverses through the rear property line of Smiley Elementary School, and a densely populated neighborhood of single family residences. The invert portion of the drain was damaged by excess runoff from the flood, causing sinkholes along the alignment, and settlement and cracks in adjoining residential properties. Cost of damage was in excess of $450,000. San Timoteo Canyon was again closed for several days while City crews removed tons of mud and debris between Pilgrim Road and Rancho Caballo, at a cost of $40,000. Hatfield Buick, located on Redlands Blvd. at Central Avenue, experienced private damage as a result of storm water overflow from the Zanja. The 1/4 mile unimproved portion immediately east of the automobile dealership carried mud and debris over the new car lot, when the inlet box failed to accept all of the excess storm water flow. No dollar estimate was provided, but the 75-100 vehicles parked on the lot were removed "detailed," and sold at a depreciated value as used vehicles as a result of mud flows to undercarriages. In 2000, the City of Redlands received a $1 million dollar Disaster Recovery Initiate Grant from the State of California Office of Housing and Redevelopment to

enlarge the inlet box at 9th Street and Central Avenues. This capital improvement project raised the capacity of the storm drain to accept a five-year storm flow. The City partnered with San Bernardino County Flood Control District, which agency contributed approximately $500,000.00 from County Zone 3 Funds, and provided the contract administration for the project.

FEMA 1046 – DR – CA:

The second storm series resulted in more than $12,000 in damage costs associated with Emergency Protective Measures and Debris Removal. A small storm drain collapse at Church and State Streets created another $4,000 in damage, and another mudslide in San Timoteo Canyon created damages associated with debris removal of approximately $20,000. Additionally, severe ditch and shoulder erosion and culvert damage occurred between Pilgrim Road and Rancho Caballo, at an approximate cost of $200,000. The water line which supplies potable water from Monkey Face Falls to the residents of Mountain Home Village was further buried after damage from two previous disasters. Due to a potential $500,000 cost for debris removal, the water line was relocated at a cost of less than $50,000. The most significant damage, however, was the loss of the temporary emergency crossings at Orange and Alabama Streets. Warm tropical rain, coupled with an extreme snow melt, created severe flooding conditions in the Santa Ana River. Mud, debris, and boulders swept away both roads, which were replaced in 1993 (FEMA 979) at a cost of $570,000, New replacement costs were incurred for $529,000.

FEMA 1203-DR-CA (EL NIÑ0 1998)

The much-publicized El Niño made its impact on San Bernardino County and the City of Redlands itself, on February 26, 1998. As predicted, the entire El Niño phenomenon produced greater than average rainfall in the Inland Empire. On that afternoon, a weather build-up materialized to heavy, driving rains, flash flooding and local landslides that continued throughout the night and well into the next day. This was the first disaster to occur since the 1976 flash flood where private property suffered notable loss.

Landfill erosion accounted for $218,646.00 in damages to public property. On Palo Alto Drive, a private residence suffered substantial loss when the hillside above it collapsed into their garage and swimming pool area. Aging, failing storm drains throughout the City of Redlands accounted for another $300,000.00 in loss. A portion of the Zanja collapsed at 1st and West State Streets, when surface erosion caused a portion of West State Street to erode and collapse into the Zanja; a bottom portion of the channel also eroded significantly. The damage costs were contained to approximately $60,000.00. The California Street Landfill suffered $25,625.00 in erosion damage. Some of the older, open rock wall drainage systems collapsed, resulting in another $25,000.00 in damages. Even Hillside Cemetery was affected by the amount of rain, when gravesites in the newer section behind the Mausoleum collapsed and headstones became dislodged and dislocated. Alabama Street at the Santa Ana River was again overtaken by floodwaters, causing another $250,000.00 in restoration costs. The San Timoteo Canyon suffered landslide and erosion damages, as well as temporarily displacing the Burlington Santa Fe Railroad tracks.

FEMA-1498-DR-CA

Occurring in January 2004, a small series of storms tracked through the Inland Empire. At first damages were thought to be much higher; however, eligible damages peaked at $7,947.00 and were attributable to some Debris Removal, but mostly Emergency Protective Measures.

FEMA-1577-DR-CA

In January 2005 another small series of storms tracked through the Inland Empire. This brief storm is reflected in $34,074.00 in damages, with the most notable issue being inundation of new park playground equipment and the loss of newly installed fencing along the Zanja through Jennie Davis Park, a retention basin designed to control peak overflow.

e. Assess the problem (Maximum credit: 35 points) The credit for this step is the total of the following points based on what is included in the assessment of the impact of flooding on the community. To receive credit for this step, the assessment must include item 1.

1. 2, for including the number and types of buildings subject to the hazards identified in the hazard assessment;

REFERENCE PAGE 56 2 POINTS

2. 5, if the assessment includes a review of all properties that have received flood insurance claims (in addition to the repetitive loss properties),

NO FLOOD INSURANCE CLAIMS

3. 6, if the plan includes a description of the impact that past or predicted flooding has on buildings, infrastructure, public health and safety;

REFERENCE PAGE 56 - 59 6 POINTS

4. 3, if the plan describes the need and procedures for warning and evacuating residents and visitors;

REFERENCE PAGES 88-105 3 POINTS

5. 4, if the plan identifies critical facilities, such as hospitals, fire stations, and chemical storage companies;

REFERENCE PAGE 45 4 POINTS

6. 4, if the plan describes areas that provide natural and beneficial functions, such as wetlands, riparian areas, sensitive areas, and habitat for rare or endangered species;

REFERENCE PAGES 67-88 4 POINTS

7. 5, if the plan includes a description of development, redevelopment, and population trends and a discussion of what the future brings for development and redevelopment in the floodplain, the watershed, and natural resource areas; and

REFERENCE: http://www.ci.redlands.ca.us/community/PDFs/REDBK15FinalPrint.pdf

5 POINTS

8. 6, if the plan includes a summary of the impact of flooding on the community and its economy and tax base.		
	REFERENCE PAGES 55-60 and TG Report	6 POINTS
	SUB-TOTAL	30 POINTS

4.3 Vulnerability Assessment

Santa Ana River Wash: MITIGATED

Many flood hazards existed along the Santa Ana River. Those hazards included the following:

State Route 30 is a four-lane freeway constructed in the late 1980's and early 1990's. The State Route 30 river crossing is constructed to Federal Highway Administration standards, capable of withstanding a 100-year flood event.

Alabama Street and Orange Street are arterial roadways under the jurisdiction of the City of Redlands.

In 1992, warm, tropical rain fell steadily at the higher elevations. This rainfall, combined with melting snow, and excess rain at lower levels, created severe flooding conditions in the Santa Ana River. Rainfall, mud, debris, and boulders swept away both roadway crossings. After fifteen years, newly constructed all-weather bridges re-opened in December 2006 and March 2007. Funding sources of $6.5 Million Dollars included Federal HBRR, California Natural Disaster Assistance Act (CDAA) and HUD-EDI (Economic Development Incentive).

Redlands Municipal Airport: UNMITIGATED

Redlands Municipal Airport is a general aviation facility with 230 based aircraft and 65,300 annual operations. The airport lies immediately next to the Santa Ana River in the northeast corner of the City of Redlands. The airport is along the southerly bank of the river approximately 30 feet above the river floor.

The airport is protected by an earthen dike and a revetment fence maintained by the San Bernardino County Flood Control District (SBCFCD). The dike and fence may not be capable of containing a 100-year flood. If flood waters breach the dike, airport property would be eroded and the potential is high for damage to the runway, navigational lighting and airport drainage systems.

Other than erosion damage from the 1969 storms, no damage has occurred at the Airport as a result of any flooding disasters.

California Street Landfill/Wastewater Treatment Plant: UNMITIGATED.

The Wastewater Treatment Plant is located adjacent and east of the California Street landfill. A storm drain was constructed in 1993 which provides 100-year protection to the wastewater treatment plant from local flooding along Nevada Street and areas south of the treatment plant.

The California Street Landfill and Wastewater Treatment Plant are the primary and sole facilities which service the population of the City of Redlands and unincorporated areas of San Bernardino County. Both the landfill and wastewater treatment plant are protected from flows in the Santa Ana River along this reach by an earth and rock levee which has a post and wire revetment located at the toe of the landfill slope. The levee and revetment are owned by the San Bernardino County Flood Control District, and were constructed approximately 30 years ago.

The historic location of the main channel flow of the Santa Ana River in this reach has been in the northerly portion of the floodplain (away from the landfill and wastewater treatment plant). This location was controlled and maintained by the San Bernardino County Flood Control Department by "center cutting" or grading the channel to the northerly portion of the floodplain as necessary. This practice continued until recent environmental changes resulted in restrictions to grading activities in the channel. This reach of the river is habitat to a now federally listed as endangered plant species, the Santa Ana River Woolly star (Woolly star). Because of potential impacts to the Woolly stars and its habitat, grading and channel maintenance activities in the area along the reach of the landfill and wastewater treatment plant have been restricted.

Over the past few years, without the channel grading, flows in the river have meandered southerly placing the low flow channel adjacent to the landfill and wastewater treatment plant. As a result, the revetment, which is no longer maintained by the San Bernardino County Flood Control District, may not be relied upon to provide long-term flood protection to critical facilities such as the wastewater treatment plant and landfill. According to the San Bernardino County Flood Control District, post and wire revetments are no longer built or maintained by the San Bernardino County Flood Control District, and existing levees are reinforced with large rock or rip-rap in areas with the San Bernardino County Flood Control District deems critical.

Storm flows during the winter of 1995 (estimated to be a 10-15 year event) were concentrated against a portion of the revetment, causing damage not only to that structure, but erosion of the levee which protects the landfill and wastewater treatment plant. An estimate to provide emergency repairs to the damaged levee by the Office of Emergency Services (OES) was set at $62,000. Although the San Bernardino County Flood Control District provided rip-rap to the City for emergency repairs to the levee, the San Bernardino County Flood Control District has prioritized other projects along the Santa Ana River for long-term improvements. As a result, limited, if any, funds are available from the San Bernardino County Flood Control District to provide enhanced protection or annual maintenance to the levee.

Due to the environmental constraints presented by the Woolly star plant, it is not anticipated that channel grading will be resumed. Without such channel control, it is likely storm water will continue to flow more southerly, following the low flow channel established in winter 1995 storms. It is anticipated that in the best case, smaller storm events such as those in winter 1995,

will result in repetitive damage to the revetment and levee, causing the need for annual repairs of at least the magnitude estimated to repair the 1995 damages by OES.

San Timoteo Canyon / Live Oak Canyon: UNMITIGATED

San Timoteo Creek and Live Oak Creek traverse the south and southwesterly portions of the City of Redlands. These streams flow generally through rural areas. Some local development has occurred in the area with several structures being within the 100-year flood zones. Local streets and roads are subject to infrequent flooding and closures due to water and mud flows in the canyon areas. General maintenance along the San Timoteo creek is performed by the SBCFCD.

Mudslides in San Timoteo Canyon create damages associated with debris removal. Additionally, severe ditch and shoulder erosion, as well as culvert damage, have forced temporary closure of the road for several days. Federal Highways Administration/ER funds have frequently been used for debris removal and some reconstruction.

In 2007, the City of Redlands contracted for a grind and overlay of seven miles of San Timoteo Canyon Road. While no particular flood control measures were combined with the project, grindings were used in some areas to redirect the flow of storm water.

San Timoteo Creek Flood Control Channel: MITIGATED

Severe flooding has been a reoccurring challenge to San Timoteo/Live Oak Canyon. Most have been manageable. However, a 1969 flood brought 19,000 cubic feet of water per second along the creek, destroying 400 houses, 300 vehicles, five bridges and a school. One person was killed.

As a result, San Bernardino County Flood Control, the Army Corps of Engineers, and the cities of Redlands and Loma Linda participated in a $9 million dollar flood control channel, intended to protect the east valley of San Bernardino from a flood so large it could be expected only once in 100 years. According to documentation, during such a flood the channel would carry as much as 20,000 cubic feet of water per second, or enough to fill an Olympic-size swimming pool every two seconds.

Some areas are hard-channeled; however, within Redlands' city limits citizen participation resulted in 18 earthen retention basins separated by check dams that help trap debris before water pours into the concrete channel.

In Loma Linda, the channel improvements have already spawned the biggest building boom in the city's 37-year history. That boom has generated growth control to give the city time and opportunity to revamp its general plan to guide growth.

Meanwhile, as many as 10,000 property owners from Redlands to Colton are projected to save hundreds of dollars a year in flood insurance premiums when federal officials recognize

completion of a seven-mile improvement project along the San Timoteo Creek Flood Control Channel.

Local Storm Drain Systems: SOME MITIGATION

A number of local storm drain systems run through the City of Redlands. Several of these have experienced local flooding during recent storm events. Several drains are proposed in areas with the greatest potential for local flooding:

- Church Street from Pennsylvania Avenue to the Santa Ana River – currently under design, construction anticipated in FY 08-09.

- Judson Street from Brockton Avenue to the Mill Creek Zanja – SWD in place in Judson Street from Brockton Avenue to Colton Avenue, and Colton Avenue SWD constructed to Church Street SWD

- Mt. View Avenue from Lugonia Avenue to the Santa Ana River – SWD in place from Almond Avenue to Santa Ana River; plans approved for private development installed SWD between Lugonia Avenue and Almond Avenue.

- Lugonia Avenue from Alabama Street to the Mission Channel – Private development required to complete missing segments with reimbursement agreement, const anticipated in FY 08-09.

- Judson Street, from Brockton Avenue to the Mill Creek Zanja, exhibits the greatest ability to produce direct and indirect damage costs to both public and private facilities. Due to the increased density of development in both the City and the County, storm water flows are exacerbated. For example, of the $321,000 associated with Emergency Protective Measures and Debris removal alone during the winter storms of 1993, it is estimated that 75% of that sum was generated to aid citizens in this northeast quadrant of the City of Redlands

The City of Redlands General Plan, Health and Safety Element, evaluates the flood hazards which exist within the City of Redlands. The guiding and implementing policies are incorporated within this document, as attached. Mitigation provided by General Plan Policy is also provided.

Figure GP 8-A depicts the Environmental Hazards addressed by the Plan, which include 100-year Flood Zones, soils, and fault zones.

Repetitive Loss Properties: MITIGATED

The City of Redlands has no repetitive loss properties.

Mill Creek / Mission Zanja: UNMITIGATED

The Mill Creek Zanja serves as the principle storm drain for the eastern and southeastern portions of the City of Redlands. This drain carries the single greatest impact for flooding to the City of Redlands. Recognizing the potential for impact, this plan will provide a volume of information not relegated to other, less serious hazards. Since the watershed for this drain includes portions of City and County territory, a regional solution to flooding along the drain must be sought.

Several attempts have been made to set assessments or development impact fees to fund improvements along this drain. Due to the extremely high cost of improvements, such efforts have failed. The Army Corps of Engineers conducted a study for an expanded inlet project on the Zanja between Redlands Boulevard and the I-10 Freeway to determine the feasibility of a full Federal project to provide channel improvements and storm protection for this area of the City of Redlands.

The Zanja bears a National Register Designation 5, and portions within Sylvan Park were again damaged as a result of continued erosion from floodwater.

Appendices "A" through "E" fully outline this risk, including documentation, studies, and potential mitigation.

The following italicized information is an excerpt from the U. S. Army Corps Study, October 1997. Two significant changes have occurred since this document was prepared. First, significant upstream development in the unincorporated areas east of Redlands and within the regional drainage area has increased, reducing the amount of permeable surface. This increased development has put an additional strain on Redlands' storm drain system, and significantly on the Mission Zanja Creek. Secondly, the 9th Street inlet has been enlarged to accept a larger storm water discharge. This $1.5 million capital improvement project, while a successful phased partial mitigation measure, will not resolve the potential for significant flooding in an over-the-event scenario.

Mission Zanja Creek is somewhat unique, composed of man-made drainage channels that do not consistently follow a natural or pre-existing watercourse. The creek flows over a broad and sloping alluvial plain, and the surrounding terrain is of low topographic relief with a poorly defined drainage pattern. Since the creek follows the gradient of the terrain, flows that exceed the channel capacity will generally flow in the direction of the creek, however do not necessarily re-enter the channel immediately. Past Mission Zanja Creek floods have overtopped the channel in the historically significant areas east of Sylvan Park, but these floods have not extended well beyond the channel boundaries, reentering the stream at downstream locations. Much of the recent flooding in the downtown Redlands had been the result of the limited capacity of the 300 cfs box inlet to the culvert located under Redlands Boulevard.

Hydrologic and Hydraulic Conditions

5 Nomination, National Register of Historic Places

A hydrologic engineering analysis was carried out to outline the meteorlogic and hydrologic characteristics of the study area, to establish peak discharge-frequency relationships for Mission Zanja Creek and Reservoir Canyon drain, and to provide without- and with-project expected probability peak discharge frequency values for present and future conditions at selected concentration points along Mission Zanja Creek. Because ultimate watershed development is expected in the future, "present conditions" and "future conditions" are considered to be essentially the same.

The existing channel capacity or "bank full" discharge is estimated at a 50-year discharge from Church Street to the upstream limit, 25-year discharge from 9th Street to Church Street and less than 10-years from 9th Street to the inlet to the culvert under Redlands Boulevard. Bridge capacities at Church Street and 9th Street are 820 cfs and 560 cfs, respectively, as determined by the inlet-control and outlet-control capacity calculations. The 9th Street Bridge will convey less than a 10-year flood, while the Church Street Bridge will convey an 11-year flood.

Table 1. Summary of Without-Project Discharges for the Mission Zanja at Redlands

LOCATION	DRAINAGE AREA (sq. mi.)	(CFS) 500-YR	(CFS) 100-YR	(CSF) 50-YR	(CFS) 25-YR	(CFS) 10-YR
Mission Zanja at I-10	9.2	14,500	4,100	2,600	1,600	780
Mission Zanja at 9th St. upstream of confluence	9.6	13,700	4,100	2,575	1,510	730
Reservoir Canyon drain upstream of Mission Zanja Confluence	4.9	12,300	4,000	2,625	1,790	970
Mission Zanja downstream of Reservoir Cyn confluence	14.7	26,000	8.100	5,200	3,300	1,700
Mission Zanja at First Street	15.2	25,000	7,400	4,800	3,000	1,650
Mission Zanja at Texas Street	15.6	24,000	7,400	4,700	3,100	1,650

Culvert Analysis

The hydrologic and hydraulic analyses assumed peak coincident discharge conditions at the confluence site downstream of the inlet, where Mission Zanja Creek flows intersection Reservoir Canyon drain flows, to account for the worst of possible flow conditions. Culvert capacities were estimated using the Los Angeles County procedure for calculating hydraulic conditions in closed conduits under pressure. The pressure flow calculations were supplemented by inlet control calculations for the Mission Zanja inlet using the Federal Highway Administration HEC-5 procedure and the hydraulic orifice equation.

The maximum capacity for Reservoir Canyon drain was defined as that discharge that would not exceed the design hydraulic grade line at the confluence with the Oriental drain. Maximum

capacity for Mission Zanja was defined as that discharge that would not create a hydraulic grade line above the surface of the existing ground above the Mission Zanja inlet. Both conditions had to be met simultaneously to determine system capacity. These procedures show that the capacity of the inlet is about 300 cfs, 2,220 cfs downstream of the inlet, and 1,920 cfs for Reservoir Canyon drain. The hydraulic grade line at the Mission Zanja inlet was substantially below the ground surface. Since the inlet control headwater was greater, 300 cfs is the maximum discharge for pressure control (outlet-control) calculations as well as for inlet control. Flows beyond this amount will break out of the channel in the direction of the Hatfield Buick dealership and onto Redlands Boulevard. A discharge of 300 cfs has a return period of about 4 years, or statistically a 25% chance of occurrence in any given year.

Table 2. Summary of Peak Discharge, Culvert Capacity and Overflow (Floodplain) Discharges for the Mission Zanja and Reservoir Canyon Culverts.

Flood Return Period (Yrs)	*(CFS)*	*(CFS)*	*(CFS)*	*(CFS)*	*(CFS)*	*(CFS)*	*(CFS)*	*(CFS)*	*(CFS)*
	Mission Zanja U/S6	*Reservoir Canyon7*	*Mission Zanja D/S8*	*Mission Zanja U/S*	*Reservoir Canyon*	*Mission Zanja D/S*	*Mission Zanja U/S*	*Reservoir Canyon*	*Mission Zanja D/S*
10	*730*	*970*	*1700*	*300*	*970*	*1270*	*430*	*0*	*430*
11	*780*	*1030*	*1810*	*300*	*1030*	*1330*	*480*	*0*	*480*
12	*830*	*1080*	*1910*	*300*	*1080*	*1380*	*530*	*0*	*530*
13	*890*	*1140*	*2030*	*300*	*1140*	*1440*	*590*	*0*	*590*
14	*940*	*1190*	*2130*	*300*	*1190*	*1490*	*640*	*0*	*640*
15	*990*	*1240*	*2230*	*300*	*1240*	*1540*	*690*	*0*	*690*
16	*1040*	*1300*	*2340*	*300*	*1300*	*1600*	*740*	*0*	*740*
17	*1100*	*1350*	*2450*	*300*	*1350*	*1650*	*790*	*0*	*790*
18	*1150*	*1410*	*2560*	*300*	*1410*	*1710*	*850*	*0*	*850*
19	*1200*	*1460*	*2660*	*300*	*1460*	*1760*	*900*	*0*	*900*
20	*1250*	*1520*	*2770*	*300*	*1520*	*1820*	*950*	*0*	*950*
21	*1300*	*1570*	*2870*	*300*	*1570*	*1870*	*1000*	*0*	*1000*
22	*1350*	*1630*	*2980*	*300*	*1630*	*1930*	*1050*	*0*	*1050*
23	*1410*	*1680*	*3090*	*300*	*1680*	*1980*	*1100*	*0*	*1100*
24	*1460*	*1740*	*3200*	*300*	*1740*	*2040*	*1160*	*0*	*1160*
25	*1510*	*1790*	*3300*	*300*	*1790*	*2090*	*1210*	*0*	*1210*
50	*2580*	*2630*	*5210*	*300*	*1920*	*2220*	*2280*	*710*	*2990*
100	*4100*	*4000*	*8100*	*300*	*1920*	*2220*	*3800*	*2080*	*5880*
500	*13700*	*12300*	*26000*	*300*	*1920*	*2220*	*13400*	*10380*	*23780*

Floodplain Analysis

Based on the culvert capacity calculations and upstream channel capacities for Mission Zanja Creek, overflow discharges were estimated and a surface flow hydraulic model (HEC-2) was

6 Mission Zanja Creek upstream of confluence (DP-2).
7 Reservoir Canyon upstream of confluence. 19,20 cfs capacity equals a 27-yr flood event.
8 Mission Zanja Creek culvert, downstream of confluence (CP-3D).

developed to estimate the depths and extent of flooding between the I-10 freeway and Texas Street for the 10-, 25-, 50-, 100- and 500-year flood events. Cross-sections for the HEC-2 model were obtained from Corps of Engineers 1988 topography (1' contours – 1" = 100') and USGS topographic mapping (1"=2000') in areas where the floodplain extended beyond the limits of the Corps topography. More detailed field surveys of the Mission Zanja channel were also performed in August 1996. The model assumed a subcritical flow regime, consisting of a total of 54 channel cross-sections approximately 200 feet apart. Manning's "n" values representing the roughness of the channel and the overbanks were determined based upon field evaluation of current conditions, and ranged in values from 0.030 for the Mission Zanja Creek main channel bed to 0.080 for the channel banks. Bridges modeled using the HEC-2 normal bridge method included Division St. bridge, the railroad trestle, Church St. bridge, 9th St. bridge, and Kendall St. bridge. Modeling of the Church St. and 9th St. bridges included separate inlet control capacity calculations. Flood depths are shown in Table 3 and floodplains are shown in Figures 5-9.

Table 3. Without-Project Condition Floodplain Depths in Feet

	Flood Depth	*Flood Depth*	*Flood Depth*	*Flood Depth*	*Flood Depth*
Reach	*10-yr*	*25-yr*	*50-yr*	*100-yr*	*500-yr*
Division to Railroad/I-10	*0.3*	*0.7*	*1.2*	*1.8*	*4.8*
RR/I-10 to Church Street	*0.3*	*0.8*	*1.0*	*1.5*	*3.5*
Church Street to 9th Street	*0.1*	*0.3*	*0.6*	*1.3*	*2.4*
9th Street to Inlet	*0.3*	*0.6*	*1.0*	*1.3*	*1.8*
Inlet to 6th Street	*0.4*	*0.6*	*1.1*	*1.6*	*2.4*
6th Street to Orange Street	*0.4*	*0.6*	*1.1*	*1.6*	*2.2*
Orange Street to Eureka Street	*0.2*	*0.4*	*0.7*	*1.2*	*2.3*
Eureka Street to Outlet	*0.2*	*0.3*	*0.8*	*1.3*	*2.7*
Outlet to Kendall Street	*0.5*	*0.8*	*1.0*	*1.4*	*3.2*

The Southern Pacific railroad track between the main portion of downtown Redlands and the I-10 freeway is approximately 1- to 2-feet above the surrounding ground and is used in the HEC-2 model to confine overflows to the south, through the downtown area, for the 10-year and 25-year discharges. A split-flow analysis was performed to determine the amounts of overflow into the area to the north of the railroad for the 50-year and 100-year return periods. It was found that approximately 380 and 1,950 cfs will overflow to the north of the railroad during 50-year and 100-year floods, respectively. No split flow analysis was performed for the 500-year discharge because it is large enough to inundate the entire area to the I-10 freeway.

4.4. Asset Inventory

4.4.1 Community Asset Overview

The critical facilities included in this plan to date include essential government services facilities, both structural and infrastructure.

The City of Redlands' Local/Multi-jurisdictional Mitigation Plan dated March 4, 2005 makes projections based upon Redlands current General Plan. According to the City of Redlands General Plan the projected population at build-out in the year 2020 is 90,000. The City of Redlands Housing Element suggests that there will be an additional 30,720 residential structures, an additional 8,646,200 square feet of commercial development; 10,048,400 square feet of additional office development, and 21,641,990 square feet of projected industrial development by build-out 2020.

Future critical facilities include at least one fire station and a Justice Civic Center. Locations of these facilities are based on General Plan build-out in 2020. The current list of the City of Redlands Critical Facilities can be found at

4.4.2 Critical Facility List

This section provides a listing of the Critical Facilities in the City of Redlands. If represented by as asterisk (*) these facilities are also located within a Special Flood Hazard Area.

- **EOC**
  Emergency Response Facilities
  Size: 6290 sq.ft.
  Facility Description: Emergency Operations Center, fully equipped with audio-visual media, equipment and communications systems.

  Primary Contact:
  Fire Chief (Vacant)
  1270 W. Park Avenue, Building C (Lon: 117125.84, Lat: 34335.6883)
  Redlands, CA 92373
  Phone: 909-798-7600
  Fax: 909-798-7602
  E-mail: mmckee@confire.org

- **Safety Hall ***
  Police Stations
  Size: 13,126 sq.ft.
  Facility Description: Primary Police and Communications Facility

  Primary Contact:
  Police Chief Jim Bueermann
  212 Brookside Avenue (Lon: 11711; Lat: 6.67473)
  Redlands, CA 92373
  Phone: 909-798-7621
  Fax: 909-798-7602
  E-mail: jbueermann@redlandspolice.org

- **Fire Station 261 ***
  Fire Stations
  Size: 10,755 sq.ft.
  Facility Description: Downtown Fire Station.

  Primary Contact:
  Fire Chief (Vacant)
  525 E. Citrus Avenue (Lon: 1171032.42; Lat: 34320.7761)
  Redlands, CA 92373
  Phone: 909-798-7600
  Fax: 909-798-7602
  E-mail: jdrabinski@confire.org

- **Fire Station 262**
  Fire Stations
  Size: 3,624 sq.ft.
  Facility Description: Full-response fire station located in the southern portion of Redlands.

  Primary Contact:
  Fire Chief (Vacant)
  1690 Garden Street (Lon: 117916.282; Lat: 34134.4843)
  Redlands, CA 92373
  Phone: 909-798-7600
  Fax: 909-798-7602
  E-mail: jdrabinski@confire.org

- **Fire Station 263**
  Fire Stations
  Size: 6,393 sq.ft.
  Facility Description: Full-response fire station, located in the northern portion of Redlands.
  Primary Contact:
  Fire Chief (Vacant)
  10 W. Pennsylvania Avenue (Lon: 11710; Lat: 55.518303)
  Redlands, CA 92374
  Phone: 909-798-7600
  Fax: 909-798-7602
  E-mail: jdrabinski@confire.org

- **Fire Station 264**
  Size: 12,000 sq.ft.
  Facility Description: Full-response fire station, located in the southwest portion of Redlands.

  Primary Contact:
  Fire Chief (Vacant)
  1270 W. Park Avenue, Building C (Lon: 117125.84; Lat: 34335.6883)
  Redlands, CA 92373
  Phone: 909-798-7600
  Fax: 909-798-7602
  E-mail: jdrabinski@confire.org

  - **Police Annex Building**
    Police Stations
    Size: 20,554 sq.ft.
    Facility Description: This facility houses the City of Redlands Police Department administrative and investigative staff.

  Primary Contact:
  Police Chief Jim Bueermann
  30 Cajon Street (Lon: 1171055.9; Lat: 34317.7104)
  Redlands, CA 92373
  Phone: 9097987621
  Fax: 9097987602
  E-mail: jbueermann@redlandspolice.org

- **Corporate Yard**
  HAZMAT storage areas
  Size: 67418
  Facility Description: This is the City's multi-facility corporate yard, including Purchasing, Equipment Maintenance, Electric & Water Shop, Street Maintenance Truck and Equipment shelters. Also a LPNG tower is installed at this site.

  Primary Contact:
  N. Enrique Martinez, City Manager
  1270 W. Park Avenue, Bldgs A, B, D-M (, Lon: 117125.84, Lat : 34335.6883)
  Redlands, CA 92373
  Phone: 909-335-4761
  Fax: 909-335-4762
  E-mail: nemartinez@cityofredlands.org

- **Highland Avenue Water Complex** (Lon: 117934; Lat: 34236)
  Water and Sewer
  Size: 2303335
  Facility Description: This water treatment plant includes offices, lab and pump house, maintenance shop, storage chlorinator shelter reservoir (10 million gallons), Pump building, Wells #14, #16, and Ford Park Pump Station. This is part of a water system consisting of 18,000 service connections serving a population of 75,000.

  Primary Contact:
  Rosemary Hoerning, Municipal Utilities and Engineering Director
  City of Redlands, Municipal Utilities Department
  Redlands, CA 92373
  Phone: 909-798-7698
  Fax: 909-798-7670
  E-mail: rhoerning@cityofredlands.org

- **1 City Plaza - City Hall Government Facilities ***
  Size: 20554
  Facility Description: Houses all City Departments outside of the Corporate Yard: Fire Administration, Treasurers Office, City Manager, City Attorney, City Council, Quality of Life, Municipal Utilities and Engineering Department, Community Development and Planning, Downtown Business Development Offices, Finance and Administrative Services.

  Primary Contact:
  N. Enrique Martinez, City Manager
  Civic Center, 35 Cajon Street (Lon: 1171051.48; Lat: 34318.3928)
  Redlands, CA 92373
  Phone: 909-335-4741
  Fax: 909-335-4762
  E-mail: nemartinez@cityofredlands.org

  Henry Tate Water Treatment Plant (Lon: 117422; Lat: 34421)
  Water and Sewer
  Size: 0
  Facility Description: Mill Creek - Tate Water Filtration Plant:
  1. Building, $951,084.
  2. Clarifiers, $808,104.
  3. Reservoir - 2 mil gallons, $58,543.
  4. Reservoir - .19 mil gallons, 56,191.
  5. Oak Wells#1, #2 w/bldg #2A, #8.

Primary Contact:
Rosemary Hoerning, Municipal Utilities and Engineering Director
City of Redlands, P. O. Box 3005
Redlands, CA 92373
Phone: 909-798-7698
Fax: 909-335-4762
E-mail rhoerning@cityofredlands.org

- **Hinkley Water Treatment Plant - Emergency Response Facilities**
  Size: 26614 sqft.
  Facility Description: Facility includes the following:
  1. Water Operations building, 7,422 sqft, $953,610.
  2. Mechanical facility, $174,615.
  3. Filter facility, 5,650 sqft, $751,800.
  4. Filter mechanical facility, $222,075.
  5. Floc/Sed Tanks, 13,542 sqft, $652,155.
  6. Utility building, $84,945.
  7. Influent mixing facility, $70,245.
  8. Tanks, basins, equip, elec. etc.,
  Square footage provided where available.

  Primary Contact:
  Rosemary Hoerning, Municipal Utilities and Engineering Director
  1604 Crafton Avenue (Lon: 117112; Lat: 34421)
  Redlands, CA 92373
  Phone: 909-798-7666
  Fax: 9093354762
  E-mail: rhoerning@cityofredlands.org

- **Mt. View Lift Station - Energy Related**
  Size: 3000 sq.ft.
  Facility Description: Sewer Lift Station.

  Primary Contact:
  Rosemary Hoerning, Municipal Utilities and Engineering Director
  2481 W. San Bernardino Avenue (Lon: 1171432; Lat: 34437)
  Redlands, CA 92374
  Phone: 909-798-7698
  Fax: 909-798-7670
  E-mail: rhoerning@cityofredlands.org

- **Redlands Wastewater Plants**
  High Population Area
  Size: 10290
  Facility Description: This includes all City of Redlands Wastewater Treatment Facilities, thirty (30) facilities citywide.

  Primary Contact:
  Rosemary Hoerning, Municipal Utilities and Engineering Director
  City of Redlands, 35 Cajon Street
  Redlands, CA 92373
  Phone: 909-798-7698
  Fax: 909-798-7670
  E-mail:rhoerning@cityofredlands.org

- **California Street Landfill**
  Size:
  Facility Description:

  Primary Contact:
  Gary Van Dorst, Quality of Life Department Director
  City of Redlands, 35 Cajon Street
  Redlands, CA 92373
  Phone: 909-798-7655
  Fax: 909-798-7642

- **Redlands Unified School District**
  High Population Area
  Size: 2330315
  Facility Description: See attached spreadsheet listing each facility by description, contact name, size type and value.

  Primary Contact:
  Diana Stead
  20 W Lugonia Avenue, P O Box 3008
  Redlands, CA 92373
  Phone: 9093075300
  Fax: 90903075321
  E-mail: diana_stead@redlands.k12.ca.us

  - *Associated Files*
    Reference Title: Critical Facilities List - RUSD
    File Description: This document provides a listing, facility by facility, providing all requested detail based on the impact of flood, fire or earthquake disasters.

CRITICAL FACILITY LISTING

Name	Facility Type	Critical Rank
EOC	Emergency Response Facilities	Critical
Safety Hall	Police Stations	Critical
Fire Station 261	Fire Stations	Critical
Fire Station 262	Fire Stations	Critical
Fire Station 263	Fire Stations	Critical
Fire Station 264	Fire Stations	Critical
Police Annex Building	Police Stations	Critical
Corporate Yard	HAZMAT storage areas	Critical
Highland Avenue Water Complex	Water and Sewer	Critical
1 City Plaza - City Hall	Government Facilities	Critical
Henry Tate Water Treatment Plant	Water and Sewer	Critical
Hinkley Water Treatment Plant	Emergency Response Facilities	Critical
Mt. View Lift Station	Energy Related	Critical
Redlands Wastewater Plants	Water and Sewer	Critical
California Street Landfill	Refuse/Disposal	Critical
Redlands Unified School District	Emergency Response Facilities/Shelters	Critical

4.4.3. Non-Critical Facility List

(1) Approximately 75 percent of the community's Non-Critical Facilities are vulnerable.

(2) The specific Non-Critical Facilities vulnerable in City of Redlands are:

a. The entire downtown commercial district.
b. Chamber of Commerce.
c. Downtown industrial businesses
d. University of Redlands.
e. Redlands Unified School District facilities

- **University of Redlands**
  High Population Area

Facility Description: "University of Redlands is a private liberal arts and sciences university,

consistently ranked among the best universities in the nation by U.S. News & World Report. Founded in 1907, the university historically has been committed to a mission dedicated to the individual student and an innovative academic program."

Primary Contact:
Corey Nomura
1200 E. Colton Avenue (Lon: -117.165; Lat: 34.0616)
Redlands, CA 92373
Phone: 909-793-2121
Fax: 909-335-5252
E-mail: Cory_Nomura@redlands.edu

Reference Title: Critical Facilities List: University of Redlands
File Description: This spreadsheet identifies all critical facilities of the University of Redlands system if impacted by flood disaster.

NON-CRITICAL FACILITY LISTING

Name	Facility Type	Critical Rank
University of Redlands	High Population Area	High

4.4.4. Individual Hazard Vulnerability Analysis

Population.

(1) Approximately 1.51 percent of the community's population is vulnerable.

Critical Facilities.

(1) Approximately 25 percent of the community's critical facilities are vulnerable.

(2) The specific critical facilities vulnerable in City of Redlands are:

a. City of Redlands Police Annex
b. City of Redlands Safety Hall
c. City of Redlands Civic Center, including City Hall, Fire Administration, Municipal Utilities and Engineering, Finance, Treasurer, Administrative Services and Planning Departments.
d. Redlands Fire Station 261.

4.5 Potential Loss Estimation

Note: Italicized portion of document is from USACE Flood Study, October 1997.

4.5.1 1997 Economic Loss Estimation

Flood waters breaking out of the inlet and the channel extend into the City of Redlands' central business district. Old town Redlands is located to the south of the inlet, and caters to shoppers interested in antiques, arts, fine furniture, books and other goods and services.

The City of Redlands' Civic Center, which houses all Essential Government Services facilities, is located south of the inlet, within the Special Flood Hazard Area, as is the Redlands Police Department Main Facility.

The business district's major regional mall is also located adjacent to the old town area. The northern portion of the floodplain consists of newer commercial structures and residential area.

Flood waters over 300 cfs exceed the inlet capacity, but it is assumed that economic damages do not occur until flood flows exceed 500 cfs, the combined 300 cfs inlet capacity and the 200 cfs Redlands Boulevard curb-to-curb street capacity. 500 cfs floods are associated with an 8-year expected return period. Flood damages were calculated using Hydrologic Engineering Center's Expected Annual Flood Damage model utilizing frequency, discharge and damage functions. Other sources of information used to calculate damages were: field surveys of structure's property size, type, condition, contents, and first floor elevations; Damar real estate data on building size and construction type, TRW Redi real estate data for parcel size and mapping; Marshall and Swift Evaluation Services for localized depreciated replacement cost values for all construction types and grades; FEMA depth-damage functions; and, scaled aerial photos.

4.5.2 January 2006 Economic Analysis

A summary of a report dated January 10, 2006 contains the assessed value of the land and improvements and the amount of property taxes that are produced on an annual basis. These parcels are all partially or completely within the 100-year Zanja flood zone between Texas and Church Streets:

Assessed Land Value:	$ 45,627,582.00
Assessed Improvement Value:	$ 99,048,687.00
Total	$144,676,269.00
Taxes	$ 1,905,069.76
Total Businesses:	10,699

FY 04/05

	3rd Qtr	4th Qtr	1st Qtr
Regular Payments	409,005	422,593	416,148
Adjustments	(3,259)	2,606	2,895
Grand Totals	405,746	425,199	419,043

FY 05/06

	2nd Qtr	3rd Qtr	Fiscal YTD
Regular Payments	459,918	490,593	950,511
Adjustments	(1,343)	(3,661)	(5,004)
Grand Totals	458,575	486,932	945,507

4.5.3 Floodplain Property Inventory

The 500-year floodplain contains public, commercial, and industrial structures; homes, mobile homes, and apartment buildings. The H&H analysis split the flood plain into nine separate reaches, based on varying hydrologic, geographic and topographic conditions. The economic analysis combined the nine H&H reaches into three economic reaches. The first reach extends from the I-10 freeway to 8th Street, the second reach from 8th Street to 1st, and the third reach from 1st Street to Texas Street.

The number of structures within the floodplain are shown in Table 4. This information is based upon the 2000 Census, and a study will be needed to perform a comprehensive update.

Table 4. Structures in Floodplain

Floodplain	*Homes*	*Apartments*	*Mobile Homes*	*Commercial*	*Industrial*	*Public*	*Total*
500-yr	*132*	*22*	*31*	*170*	*47*	*9*	*411*
100-yr	*72*	*18*	*0*	*91*	*11*	*5*	*197*
50-yr	*64*	*13*	*0*	*89*	*11*	*3*	*180*
25-yr	*44*	*11*	*0*	*84*	*11*	*3*	*153*
10-yr	*23*	*7*	*0*	*59*	*6*	*3*	*98*

4.5.4 Redevelopment and Economic Impact

Reference: www.redlandsrda.org

Redevelopment is an essential element of this flood plan. Without flood control improvements, much if not all of Redlands goals and objectives cannot be met. In the Downtown Redlands Specific Plan, it states:

- Economic Goal:
    - to provide for continued orderly and diversified economic growth in the City of Redlands and the adjacent area.
- Objectives:
    - to aid in the development of viable, stable, and attractive commercial areas.
    - to upgrade and improve existing commercial areas.
    - to encourage and promote orderly development and growth of industrial areas.
- Central Business District

  The General Plan recognizes the importance of revitalization of the Central Business district and states the following policies:

    - Provide sufficient commercial land area within the City and Planning Area to meet the ultimate needs of the community when developed to capacity.
    - Promote the development of commercial facilities which are convenient to residents of the Planning Area.
    - Establish the Central Business District of Redlands as the principal commercial area within the city.
    - Take full advantage of the excellent vehicular circulation system that presently exists and recognize that roadway improvements are attainable that will further enhance the central city's accessibility.
    - Create a superior environment for shoppers, workers, visitors and residents.

- Industrial
    - Industrial development should take place within organized, well designed industrial subdivisions with adequate internal traffic circulation and all necessary utility installments.

The highest and best economic use of the Specific Plan area is for expansion of Central Business District commercial uses. This should be balanced with allowance for service commercial activities that provide business and residential support services to the downtown area and neighboring housing districts. Manufacturing and light industrial uses in the city should be placed in larger planned industrial districts outside the downtown area.9

4.5.5 Facility Replacement Costs

The Facility Replacement Costs within the floodplain are shown in Table 5. Again, this information is based upon the 2000 Census, and a study will be needed to perform a comprehensive update.

Table 5. Structure (Depreciated Replacement Value) and Content Values ($,000)

		500-yr	*100-yr*	*50-yr*	*25-yr*	*10-yr*
Homes	*Structure*	*7,951*	*4,390*	*3,911*	*2,772*	*1,708*
	Content	*3,976*	*2,195*	*1,955*	*1,386*	*854*
Apartments	*Structure*	*2,451*	*1,877*	*1,571*	*1,444*	*1,169*
	Content	*1,226*	*939*	*786*	*722*	*585*
Mobile Homes	*Structure*	*1,012*	*0*	*0*	*0*	*0*
	Content	*506*	*0*	*0*	*0*	*0*
Commercial	*Structure*	*69,784*	*41,700*	*41,087*	*40,364*	*30,357*
	Content	*79,769*	*47,509*	*46,803*	*45,972*	*34,898*
Industrial	*Structure*	*13,215*	*5,708*	*5,708*	*5,708*	*2,377*
	Content	*13,215*	*5,708*	*5,708*	*5,708*	*2,377*
Public	*Structure*	*8,511*	*6,818*	*5,943*	*5,943*	*5,943*
	Content	*4,256*	*3,409*	*2,971*	*2,971*	*2,971*
Subtotal Structure		*102,924*	*60,494*	*58,220*	*56,231*	*41,554*
Subtotal Content		*102,947*	*59,760*	*58,224*	*56,760*	*41,686*
Grand Total 1999		*205,871*	*120,254*	*116,444*	*112,991*	*83,240*
Grand Total 2007		**331,205**	**193,464**	**187335**	**181,780**	**133,916**

4.5.6 Floodplain Inundation Damage Estimates

9 Downtown Specific Plan, City of Redlands Specific Plan No. 45 as amended to November 19, 1996

The inundation level by flood event was derived for each property by subtracting the without project flood depths presented in Table 3 from the field survey's first floor elevations. Inundation damage was then calculated by applying the applicable FME depth-damage function for either structure or content to the property's depreciated replacement cost for structure or content. Inundation damages by event are shown in Table 6.

The Facility Replacement Costs within the floodplain are shown in Table 5. Again, this information is based upon the 2000 Census, and a study will be needed to perform a comprehensive update.

Table 6. Inundation Damages (,000).

		500-yr	*100-yr*	*50-yr*	*25-yr*	*10-yr*
Homes	*Structure*	*1,437*	*474*	*196*	*119*	*113*
	Content	*979*	*179*	*89*	*44*	*20*
Apartments	*Structure*	*543*	*306*	*174*	*143*	*143*
	Content	*370*	*174*	*128*	*80*	*34*
Mobile Homes	*Structure*	*325*	*0*	*0*	*0*	*0*
	Content	*107*	*0*	*0*	*0*	*0*
Commercial	*Structure*	*15,007*	*6,150*	*5,184*	*2,984*	*2,694*
	Content	*17,495*	*5,961*	*3,401*	*1,553*	*852*
Industrial	*Structure*	*2,726*	*788*	*439*	*262*	*162*
	Content	*2,836*	*503*	*279*	*188*	*90*
Public	*Structure*	*1,595*	*235*	*78*	*52*	*0*
	Content	*1,134*	*55*	*19*	*0*	*0*
Grand Total, fy 1998- 1999		*44,544*	*14,825*	*9,988*	*5,425*	*4,110*
Grand Total, fy 2006-2007		71,679	23,581	16,068	10,338	6,612

4.5.7 Planning Constraints

The hydrologic discharge-frequency analysis shows that peak flows arrive at the confluence site at about the same time, even though there is a difference in the size of the Mission Zanja Creek and the Reservoir Canyon drainage areas (9.6 mi. and 4.9 mi respectively). City officials have indicated under certain historic conditions, such as isolated thunderstorms, there have been fairly significant flows in Mission Zanja Creek with little or no contributory flow from Reservoir Canyon drain. Because of the geographic proximity of the drainage areas, the city officials also agree that it is prudent to assume concurrent peak flow conditions. Therefore, the without project condition and alternative measures assume the worst case hydrologic condition of concurrent peak flows in Mission Zanja Creek and Reservoir Canyon drain. The assumption of

concurrent peak flow conditions constrain the level of protection that can be provided by inlet expansion measures.

The existing capacity of the culvert downstream of the confluence is 2,220 cfs, which equals the sum of the current Reservoir Canyon drain capacity (1,920 cfs) and the Mission Zanja inlet (300 cfs). Modification of the downstream culvert is not economically justified because it would be more costly than the channel bypass plan that was investigated in previous studies (references and 2) due in part to costly right-of-way acquisitions and utility relocations. Inlet expansion alternatives are constrained due to the downstream channel capacity, and the hydraulically complex junction of Mission Zanja Creek and Reservoir Canyon drain peak flows. Increased flows entering from an expanded Mission Zanja inlet could induce more frequent flooding in portions of the Reservoir Canyon drainage area due to the backwater effects caused by additional flows overwhelming the capacity of the downstream culvert, resulting in pressure flow conditions on Reservoir Canyon drain. Although alternative measures address the possibility of induced flooding, the downstream culvert capacity limits the level of protection offered by inlet expansion measures.

There is an automotive dealership located above the inlet that had frequently been inundated. The parent corporation recommended that the owner relocate to another city, but both the owner and as a dealership expressed that they wanted to remain in the existing location, if able to expand the facilities. Following the effects of the 1998 El Niño, the City of Redlands received a $1 million Disaster Recovery Initiative Grant to expand the strained inlet and extend it to the vicinity of the 9th Street Bridge. The City and San Bernardino County partnered on this project, which ultimate cost was $1.5 million. The County contributed the construction costs in excess of $1 million and was responsible for the project and contract administration.

4.5.8 Human Loss Estimate

Summary of Human Losses

a. The estimated number of fatalities resulting from this hazard is approximately 2.
b. The estimated number of injuries resulting from this hazard is approximately 40.
c. The estimated number of displacees resulting from this hazard is approximately 1000.
d. Total number of people affected: 1042.
e. Percent of community's population at risk: 1.51%.

4.6 Analysis of Community Development Trends

The National or Federal objective of water and related land resources planning is to contribute to national economic development (NED) consistent with protecting the Nation's environment, pursuant to national environmental statues, applicable executive orders, and other Federal planning requirements. Contributions to NED are increases in the net value of the national output of goods and services, expressed in monetary units. A NED comparison of alternatives will be used to identify the beneficial and adverse effects that the plans may have on the national

economy. The result will be identification of the NED plan, defined as the plan providing the greatest net benefits as determined by subtracting annual costs from annual benefits.

The specific objective is to reduce flood damages in the City of Redlands caused by the limited capacity of the inlet to the covered channel section of Mission Zanja Creek, located under Redlands Boulevard.

4.6.1 Future Development

Future development of the downtown area is directly related to Redlands' ability to initiate, develop, mitigate and enhance flood control. The City of Redlands hired the firm of Torti Gallas to develop a new Master Plan for Redlands' downtown. It may be found at: http://www.ci.redlands.ca.us/community/PDFs/REDBK15FinalPrint.pdf

Further reference to Future Development is contained at:

www.ci.redlands.ca.us/plans/general_plan_update.htm.
and
www.ci.redlands.ca.us/community/plan.html

Section 5

Mitigation Strategy

Section 5 – Mitigation Strategy

5.1 Community Capability Assessment

The City has a number of already adopted development code ordinances that strengthen and enhance Redlands' capability to mitigate damages that could be sustained as a result of existing identified hazards. The Local Mitigation Plan provides the foundation to support and sustain continued use and enforcement of those mitigation-based ordinances. For example, in a Community Assistance Visit (CAV) on June 26, 2003 the FEMA representative found no programmatic, engineering, or floodplain management issues that would preclude the City of Redlands from participating in the Community Rating Status program. This finding supports that Redlands' local ordinances are responsive to flood hazards. The City of Redlands has a Building Code Effectiveness Grading Schedule (BECG) rating of 10. This finding supports that Redlands' local ordinances are responsive to a variety of hazards, including seismic, flooding and wind.

- Storm Water Management Ordinances: Yes
- Stream Management Ordinances: Yes
- Zoning Management Ordinances: Yes
- Subdivision Management Ordinances: Yes
- Erosion Management Ordinances: Yes
- Floodplain Management Ordinances: Yes
- Floodplain Management Plan Published Date: 3/31/1996
- Floodplain Management Last Delineation Date: 3/31/1996
- Elevation Certificates Maintained: Yes
- National Flood Insurance Program Community: Yes
- National Flood Insurance Join Date: 1/3/1979
- NFIP Number: 060279
- Land Use Plan: Yes
- Land Use Plan Last Update: 8/5/2003
- Community Zoned: Yes
- Zoned Date: 8/5/2003
- Established Building Codes: Yes
- Building Codes Last Updated: 02/19/08
- Type of Building Codes: California Building, Electrical, Plumbing, Mechanical, Fire
- Local Electric Utilities: Southern California Edison
- Local Water Utilities: City of Redlands Municipal Utilities
- Local Sewage Treatment Utilities: City of Redlands Municipal Utilities
- Local Natural Gas Utilities: Southern California Gas Company
- Local Telephone Utilities: Verizon
- Fire Insurance Rating: ISO Rating 3/9
- Fire Insurance Rating Date: 10/15/2002

- Previous Mitigation Plans: A copy of a memorandum identifying hazard mitigation programs and activities, which resulted in the awarding of a 2004 Disaster Resistant California Community Award to the City of Redlands is attached.
- Flood Insurance Claims: A copy of a memorandum identifying hazard mitigation programs and activities, which resulted in the awarding of a 2004 Disaster Resistant California Community Award to the City of Redlands, is attached.

5.1.1 Existing Plans, Policies, and Ordinances

The City will evaluate its existing General Plan, Municipal Code and policies and recommend incorporating those changes as may be required to implement the Local Mitigation Plan. The City would do this by reference, possibly adding a policy that refers to the implementation of the Local Mitigation Plan.

Existing Community Plans/Documents:

- City of Redlands General Plan - Refer to www.ci.redlands.ca.us/plans/general_plan.htm
- California Environmental Quality Act (CEQA) – Refer to www.ca.gov , Click on Environmental & Natural Resources, then California Environmental and Natural Resource Laws, then CEQA.
- California Office of Planning & Research - Refer to http://www.opr.ca.gov
- State of California Hazard Mitigation Plan - Refer to www.oes.ca.gov , Click on Hazard Mitigation and follow links to the State Plan.

5.1.2 Prior Mitigation Actions and Projects

This section serves to identify the Previous Mitigation Plans, Projects and Actions:

Previous Mitigation Plans, Projects and Actions:

- Attached is a copy of a memorandum identifying hazard mitigation programs and activities, which resulted in the awarding of a 2004 Disaster Resistant California Community Award to the City of Redlands.

5.1.3 Completed and On-Going Flood Hazard Mitigation Projects

Project #1: Ford Street Project

1. Name: Ford Street Storm Drain
2. Description: Construction of a storm drain to divert waters in case of flooding.
3. Alternatives: None
4. Strategy: Design and construction of a storm drain to collect drainage adjacent to the Valley Preparatory Elementary School and adjacent residential structures from recurrent flooding.

5. Status: Complete
6. Completion Date: 6/1/1994
7. Local Priority: High
8. Longitude:
   Latitude:
9. Hazards Mitigated: Flooding
10. Total Cost: 500000
11. Calculated BC Ratio: 0
12. Custom BC Ratio: 1
13. Description of Custom BC Ratio: No B/C existed at time of mitigation grant award.

Project #2: 99-DISASTER INITIATIVE GRANT-010

1. Name: Disaster Initiative Grant
2. Description: This Disaster Initiative Resistant Grant was for the installation of a storm drain at 9th and Central in Redlands.
3. Alternatives: Not to construct the storm drain.
4. Strategy:

   - The City of Redlands entered into a cooperative agreement with the San Bernardino County Flood Control District to construct an enlarged storm drain at the corner of 9th and Central (the historic Mission Zanja) in Redlands.
   - The City paid $19,000 for the Environment Impact Report and the County of San Bernardino administered the contract and paid all other costs (over $1,000,000).

5. Status: Complete
6. Completion Date: 11/1/2003
7. Local Priority: High
8. Longitude:
   Latitude:
9. Hazards Mitigated:

   - Flooding: 75%

10. Total Cost: 1400000
11. Calculated BC Ratio: 157.5343
12. Custom BC Ratio: 1
13. Description of Custom BC Ratio:

    - City paid $19,000 for the EIR, and County of San Bernardino paid over $1,000,000.

    14. Funding Description: City paid $19,000 for the EIR, and County of San Bernardino paid over $1,000,000.

f. Set goals (Maximum credit: 2 points). The two credit points for this step are provided if the plan includes a statement of the goals of the community's floodplain management program.

REFERENCE PAGE 66 2 POINTS

SUB-TOTAL 2 POINTS

5.2 Mitigation Goals

5.2.1 To reduce both the short and long term effects of the 100-year flood plain as defined in the Flood Insurance Rate Map (FIRM) and the City of Redlands;

5.2.2 To reduce the National Flood Insurance Premiums for property owners in the Community Development Block Grant Target Area. and encourage property owners to purchase and maintain flood insurance;

5.2.3 To protect the National Register property known as the Mission Zanja Channel and other natural habitats in the floodplain from future flood damages;

5.2.4 To promote preparedness and mitigation strategies to property owners;

5.2.5 To develop enhanced stormwater management policies and procedures that meets and/or exceeds the minimum requirements of the NFIP.

g. Review possible activities (Maximum credit: 30 points) The plan must describe those activities that were considered and note why they were or were not recommended. If an activity is currently being implemented, the plan must note whether it should be modified. The discussion of each activity needs to be detailed enough to be useful to the lay reader. The credit for this step is the total of the following points based on which floodplain management activities are reviewed in the plan.

1. 5, if the plan reviews preventive activities, such as floodplain and storm water management regulations and preservation of open space and the effectiveness of current regulatory and preventive standards and programs;
REFERENCE PAGES 64-85, PAGE 106 5 POINTS

2. 5, if the plan reviews property protection activities, such as acquisition, flood proofing, and flood insurance;
REFERENCE PAGE 67 5 POINTS

3. 5, if the plan reviews activities to protect the natural and beneficial functions of the floodplain, such as wetlands protection. REFERENCE PAGES 64-85 5 POINTS

4. 5, if the plan reviews emergency services activities, such as flood warning and sandbagging;
REFERENCE PAGES 85-102 5 POINTS

5. 5, if the plan reviews structural projects, such as reservoirs and channel modifications; and;
REFERENCE PAGES 103-106 5 POINTS

6. 5, if the plan reviews public information activities, such as outreach projects and environmental education programs. REFERENCE PAGE 106 5 POINTS

SUBTOTAL 30 POINTS

5.3 Review of Mitigation Activities

5.3.1 Preventative Activities and Property Protection

Please refer to Exhibit G, Chapter 15.32, FLOOD DAMAGE PREVENTION.

k. Habitat Conservation Plan
HCP = 10, if the community has adopted a community-wide Habitat Conservation Plan. This credit is subject to acceptance of the plan by the U. S. Fish and Wildlife Service or the National Marine Fisheries Services.
REFERENCE PAGES 67 – 88*
SUB-TOTAL 10 POINTS
*Highlighted areas relate to Floodplain Management

5.3.2 Natural Resources and Habitat Conservation Plan

Following, as italicized, is an excerpt
from the City of Redlands' General Plan, wherein Open Space and Habitat Conservation are included as an Element of the Plan.

7.0 OPEN SPACE AND CONSERVATION ELEMENT 10

Several types of open space or areas identified for conservation are shown on the General Plan Diagram, including Parks/Golf Courses, Agriculture, Flood Control/Construction Aggregates, Conservation/Habitat Preservation, and Resource Conservation. These land use categories are described more fully in Section 4, Land Use Element.

In addition to the General Plan Diagram, seven figures depict open space or conservation areas throughout the Planning Area. These are found in the General Plan and associated with Master Environmental Assessment (MEA) and include GP Figure 8.2, Slope, GP Figure 7.2, Biotic Resources, GP Figure 8.1, Environmental Hazards, MEA Figure 5.2, Agricultural Lands, and MEA Figure 10.1, Archaeologic Sensitivity.

The Citizens of Redlands, continuing their founders' heritage, place a high value on scenic resources, open space (especially citrus preservation), parks and recreation lands. This commitment was documented by the passage of a bond measure in 1987 for the purpose of acquisition of land for parks and open space.

Integration of the Open Space Element and Conservation Element

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10 City of Redlands General Plan

In function and content, the Open Space Element and Conservation Element often overlap. The Conservation Element is oriented toward the management of natural resources to prevent waste, destruction or neglect. The Open Space Element, in contrast, emphasizes open space as a land use and requires that preservation and management of natural resources be considered in land use planning and decision-making. This combined Open Space and Conservation Element describes conservation practices within the state-designated types of open space described below, meeting the requirements of both elements. In addition, Redlands' archaeological resources are considered.

Cross-Reference to Other Elements

Issues concerning open space for public health and safety are fully described in the Health and Safety Element. Preservation of historic resources is considered in the City Design and Preservation Element. Open space districts are defined in the Land Use Element.

State Classification of Open Space

State law requires that four types of open space be analyzed in the Open Space Element. Open space land is any parcel or area of land or water that is essentially unimproved and devoted to open space use, which may include:

- *Open space for outdoor recreation including areas of outstanding scenic and cultural value, areas suited for parks/recreation purposes, areas which link major recreation and open space reservations such as utility easements, banks of rivers and streams, trails and scenic highway corridors.*
- *Open space for the preservation of conservation of natural resources, including, but not limited to, preservation of nature, wildlife migration, riparian, scenery, and points of interest.*
- *Open space for the managed production of resources, including, but not limited to, agricultural lands.*
- *Open space for public health and safety such as flood plains, watersheds, earthquake fault zones, and unstable soil areas.*

Parks and Recreational Open Space

This section contains policies for parks, golf courses, and recreation purposes, including areas that serve as links between major recreation and open space reservations, such as trails, and areas of outstanding scenic and cultural value and corresponds to the "open space for outdoor recreation" category in State Planning Law. Land acquired or dedicated for permanent agricultural use, even if part of a park, is described under Section 7.40, Managed Production of Resources. Open space reservations could include term utility easements, and banks of rivers and streams.

The General Plan Diagram uses circles or polygons with rounded corners to indicate proposed parks. At some locations more than one site in the vicinity of the symbol may be appropriate and could be approved without amending the General Plan. Pocket parks (two acres or less) are not shown on the General Plan Diagram. A complete listing of parks is found in GP Table 7.1.

Many of the park and recreational open space policies and proposals are taken from the June 1987 Park and Open Space Plan adopted in principle by the City Council.

Standards

Neighborhood parks are designed primarily to meet the needs of elementary- school-age-children households within one mile. These parks include picnic and play areas. The seven existing parks range from five to 17 acres. The Plan proposes three additional parks ranging from eight to 15 acres. It is recommended that, where possible, neighborhood parks be located in conjunction with schools. A broadly held standard for park acreage in California is 10-15 acres.

Community parks serve all ages and may include parklike landscaped areas, fields, courts, and large play areas. The four developed community parks and two partially developed sites range from 11 to 27 acres and also serve as neighborhood parks for nearby residents. The California standard recommends 15 to 30 acres for these parks. Three additional community parks would range from 20 to 25 acres.

City parks serve all ages and would be similar to community parks but broader in range of activities. The Plan proposes two city parks ranging from 40 to 100 acres. The California standard is 100 acres. The City park proposed in San Timoteo Canyon could be a joint venture with the City of Loma Linda. The second site is in northeast Redlands at the northwest corner of Wabash and San Bernardino.

Regional parks have no standard recommendations though they are generally 150 acres and serve an entire geographical area. The Plan proposes two regional parks. The most appropriate and possible use for the two landfill sites in Redlands' Planning Area would be a joint venture between the City and San Bernardino County for the reuse of the landfill in San Timoteo Canyon and for the site at Palmetto and Nevada Streets. Methane gas migration from landfill sites should be carefully studied prior to reuse of landfill sites.

The need for additional facilities for organized sports will be met in the vicinity of Wabash Avenue and San Bernardino Avenue in northeast Redlands; at the new high school and in San Timoteo Canyon. Other proposed city and regional parks would also provide additional sports fields.

Existing and Proposed Parks

Park	*Neighborhood*	*Community*	*City*	*Regional*	*City Groves*	*Other*[1]	*Applicable to Acres/ 1,000 Residents Standard*[2] *(Policy 7.10j)*
EXISTING							
Brookside	*9.2*						*9.2*
Caroline Park	*16.8*						*8.0*
Centennial Park[3]						*30.0*	*3*
Community Center						*2.6*	*2*
Community Park		*18.2*					*18.2*
Crafton Park	*7.5*						*7.5*
Ed Hales Park						*.3*	*.3*
Ford Park		*27.0*					*27.0*
Franklin Park						*.6*	*.6*
Jennie Davis Park (Zanja/Detention Basin)	*5.2*						*5.2*
Judson/San Bernardino [3]	*4.75*				*6*		*12.8*
Prospect Park		*11.4*			*24*		*11.4*
Simonds Parkway						*.9*	*.9*
Smiley Park	*9.2*						*9.2*
Park	*Neighborhood*	*Community*	*City*	*Regional*	*City Groves*	*Other*[1]	*Applicable to Acres/ 1,000 Residents Standard*[2] *(Policy 7.10j)*

Sylvan Park		*23.3*					*23.3*
Texonia Park	*8.8*						*8.8*
Orange Avenue Farm[3]		*18.7*					*18.7*
San Timoteo Canyon[3]						*39.0*	*13.0*
Sunset Hills[3]						*40.0*	*5.0*
Lincoln/Laramie[3]						*.8*	*.8*
Crafton Hills[3]						*238*	*25*
Amethyst/Hwy 38[3] *Scout House*		*27.1*					*17.0*
Texas Armory						*2.0*	*0*
The Terrace						*2.5*	*2.5*
Palmetto/Nevada[3]				*80*		*16.7*	*80*
Pioneer/Wabash San Bernardino[3]			*90*		*10*		*90*
Texas/Webster					*13*		*0*
Fifth Ave.					*13*		*0*
Park	*Neighborhood*	*Community*	*City*	*Regional*	*City Groves*	*Other*[1]	*Applicable to Acres/ 1,000 Residents Standard*[2] *(Policy 7.10j)*
San Bernardino/Tennessee					*10*		*0*
I-10/California					*5*		*0*
Nevada/Palmetto					*16.7*		*0*
Olive Ave.					*3.75*		*0*
9 Elementary Schools[5]	*28.0*						*28.0*
3 Junior Highs 3 High Schools[5]		*50.0*					*50.0*
Subtotal	*89.45*	*175.7*	*90*	*80*	*101.5*	*373.4*	*477.4*
PROPOSED							
San Timoteo[4] *Canyon Jt.*			*40.0*			*30.0*	*40.0*

West Redlands[4]	*8.0*						*8.0*
Wabash at I-10[4]	*16*					*2.0*	*16*
Mission/Zanja[4]						*.7*	*.7*
Zanja Det. Basin[4]		*20*				*20*	*20*
Mentone[4]		*20.0*					*20.0*
Sand Canyon Area[4]	*15*						*15*
Park	*Neighborhood*	*Community*	*City*	*Regional*	*City Groves*	*Other*[1]	*Applicable to Acres/ 1,000 Residents Standard*[2]
Live Oak Canyon[4]	*12.0*						*12.0*
Greenspot[4]		*25.0*					*25.0*
Northeast Airport[4]						*60.0*	*30.0*
Palmetto/Nevada[4]				*80*		*16.7*	*80*
Pioneer/Wabash San Bernardino[3/4]			*66*				*66*
San Tim Landfill[4]				*75.0*			*75.0*
Elementary[4]	*15.0*						*15*
Subtotal	*50*	*65*	*40*	*75*	*0*	*110.7*	*260.7*
Total at Buildout	*140.45*	*240.7*	*130*	*155*	*101.5*	*484.1*	*738.1*

1 Other for proposed Parks = flood control, natural for viewing, pocket (mini) parkland. Other for Existing Parks = Natural areas/mini pocket parks; 2 Land not applicable to the standard consists of steep hillsides, flood control area, and pocket parks that may be valuable components of the parks system but are not suited for intensive use; 3 Acquired but undeveloped parks; 4 Proposed but undeveloped parks; 5 School site area is assigned half-credit toward meeting the acres per thousand residents standard, consistent with the 1987 Recreation Element. Acreage shown is 50% of recreation area.

Proposed Parks: Sites and Facilities

NEIGHBORHOOD PARKS

West Redlands: *A few sites remain for a neighborhood park to serve the medium-density area located north of Brookside Avenue between Center and Alabama.*

Beazer Homes Park: *Beazer Homes Tract north of Pioneer and west of Orange Street*

Sand Canyon Area: *The residential area in the vicinity of San Canyon should include a 15 acre park.*

Live Oak Canyon:	*The neighborhood east of Redlands Country Club lacks park service, but good sites remain south of the subdivided area and near proposed trail system. A 12 acre park could be combined with natural open space areas.*
COMMUNITY PARKS	
Zanja Detention Basin:	*By adding to the acreage needed for flood control, all or a portion of the basin could have park value or be used for athletic facilities.*
Mentone:	*A community park on Nice Avenue would be a major recreation facility oriented to Mentone (Note: There is a sports field site near Amethyst and Highway 38 which might serve this same purpose.)*
Greenspot:	*A community park may be appropriate to serve the Greenspot area.*
CITY PARKS	
SanTimoteo Canyon:	*This proposed site has been considered good park land with citrus preservation for future development. It could be a strong possibility as a joint City venture with Loma Linda or developments across the Riverside County line.*
REGIONAL PARKS	
SanTimoteo Canyon:	*This proposed park site is the County Landfill site and exists on the County plan for a park site. It could be a joint venture between the City and the County.*
OTHER	*Mini or pocket parks should be located throughout the City for neighborhood convenience. Equally valuable to the City are bridle trails, jogging trails, linear parks along the Santa Ana Wash, medians, greenbelts, right-of-way, easement, wash area, scenic viewpoints near and far.*

The City's efforts to acquire more parkland and open space have been led by the Open Space Committee of the Redlands Parks Commission which was designated to recommend acquisition of land in accordance with the allocation of funds specified in Measure O, the Open Space and Park Land Acquisition measure approved by voters in 1987. Land allocation percentages of the $7.2 million bond were as follows: citrus preservation, 22 percent; expanded parks and recreation, 27 percent; natural area preservation, 15 percent; sports complex, 14 percent; strip parks and trails, 12 percent; and City entrance land, 9 percent. These percentages were established by City Council based upon community survey.

Golf Courses
The General Plan anticipates three 18-hole golf courses in addition to the private Redlands Country Club course, thus meeting the traditional standard of one golf course per 25,000 residents. The site adjoining the Santa Ana Wash north of Mentone (160 acres) is within the Redlands Airport noise impact area and is envisioned as a municipal course. The Greenspot (204 acres) and San Timoteo Canyon (140 acres) golf courses are expected to be developed in conjunction with large residential subdivisions. The location of the Mentone and Greenspot golf

courses are schematically shown on the land use map reflecting a non-specific site. A golf course in San Timoteo Canyon is also shown on the land use Diagram in a non-specific location.

Guiding Policies: Parks and Recreational Open Space

7.10a Create a high quality, diversified park system that enhances Redlands' unique attributes.

7.10b Provide adequate park acreage and recreation facilities conveniently accessible to all present and future residents.

7.10c Enhance the presence of natural and recreational opportunities in the City and increase park use by selecting new, highly accessible locations for parks.

7.10d Identify the needs of special user groups, such as the disabled and elderly, and address these in park and recreation facility development.

7.10e Minimize substitution of private recreation facilities for developer fee payment or park dedication to ensure that a public park system will be permanently available to the entire community.

7.10f Encourage preservation of natural areas within and outside the Planning Area as regional parks or nature preserves.

7.10g Review park standards periodically to determine whether needs are being satisfied and how long-term costs will be met.

7.10h Continue cooperative efforts with the Redlands Unified School District through joint use agreements for park and recreational facilities. Locate new neighborhood parks in conjunction with elementary or middle schools wherever feasible.

Although school/park areas are not available for public use at all times and do not contain complete park facilities, substantial cost savings justify shared use.

7.10i Equitably share the cost of improved park standards between existing and new residents, businesses, and property owners.

Implementing Policies: Parks and Recreational Open Space

7.10j Provide 5 to 6 acres of neighborhood, community, and city park area for each 1,000 Planning Area residents. This standard excludes specialized, low use park acreage and includes half of the area of school sites.

If all parks designated on the General Plan Diagram are acquired, there will be 7.9 acres per 1,000 residents at buildout vs. 7.2 acres existing (developed and undeveloped) in 1994 (City

population only). When considering only developed parks, (189 acres) there are approximately 3 acres per 1,000.

7.10k Where suitable land is available at acceptable cost, provide all residential areas with a neighborhood/community park (8 or more acres where available).

7.10l Calculate park fees to enable purchase of acreage and provision of off-site improvements for 5 acres of park land per 1,000 residents added.

State law (Quimby Act) allows the City to require dedication or payment of in-lieu fees sufficient to buy and provide off-site improvements for a maximum of 3 acres per 1,000 new residents if existing parks are at or below this standard and up to 5 acres if a higher standard has been maintained. Fees, even if updated annually, are rarely sufficient; appraisals at the time a final subdivision map is recorded are authorized by the law.

7.10m Continue levying a parks and open space fee on nonresidential development commensurate with expected use of park and recreational facilities by employees.

A number of California cities collect such fees.

7.10n Seek any available State and federal grant assistance in implementing the parks and open space proposals of the General Plan.

State bond funds available to Redlands have been committed (1991).

7.10o Use available techniques to minimize acquisition costs.

Sale below appraised market value ("bargain sale") to a non-profit land trust that re-sells to the City can provide tax savings to the seller.

7.10p Continue annual review of five-year plan recommendations by Strategic Planning/Open Space Committee of Parks Commission for needs and available funding mechanisms.

7.10q Continue the dedication of land along the Santa Ana bluff for a continuous linear park to be used as picnic and scenic area, and trail.

7.11r Encourage the development through acquisition and/or dedication of a linear park along the Zanja and the railroad right-of-way.

7.11 Trails

The City of Redlands has a long tradition in the use of trails by bicyclists, equestrians, hikers, and joggers. Many trails are unmarked or unidentified. Other trail systems are identified such as the beautifully illustrated Bridle Trail map of Isaac Ford commissioned in 1941 by the Chamber of Commerce. The existing trails can provide the framework for a system of scenic pathways that will enhance health, safety, and recreational enjoyment of the community.

A multi-use Master Plan of trails will expand and enhance individuals' opportunities for recreation, thereby improving the quality of life. With the increased awareness of the health benefits of walking and jogging, as well as the growing recreational use of bicycles, trails become more valuable to a greater portion of the community.

Concern about health is also reflected in the efforts to improve air quality. This has led to adoption of the Regional Air Quality Plan, from which policies have been adapted and included in the Health and Safety Element. Policies call for the provision of bicycle and pedestrian pathways to promote nonmotorized transportation and lessen dependency on private automobile use. These routes are to link activity centers to residential development. (See Section 8.12, Air Quality and Ground Transportation, and Section 8.14, Air Quality and Land Use.)

Trails can also serve as emergency evacuation routes in the event of a catastrophe that may make some trafficways impassable.

Rail and trail corridors designated on the General Plan Diagram have existing or proposed right-of-ways that at different locations and times may include either or both facilities. Five corridors are shown:

- *Santa Ana Wash blufftop adjoining the proposed Scenic Drive;*
- *Santa Fe Railroad which provides freight service to Mentone and is proposed as a future commuter rail line;*
- *Mill Creek Zanja (Sankee), the historic irrigation ditch;*
- *San Timoteo Canyon adjoining the San Timoteo Creek; and*
- *Southern Pacific Railroad mainline.*

A trails map was prepared by a City Council appointed Trails Committee and adopted by the City Council on October 7, 1992. The Trails Map (See Figure 7.1) identifies the general locations of Regional Trunk Trails and Primary Community Trails within the planning area. The Committee recognized four major types of trails; Regional Trunk Trails, Primary Community Trails, Secondary Community Trails and Connector Trails. The definition of these types of trails is as follows:

- *Regional Trunk Trail - a trail which originates out of city and terminates out of city, but passes through the City of Redlands. Generally considered to be of regional significance, linking cities to regional amenities. This type of trail usually has been defined by agencies beyond Redlands, such as San Bernardino County. Examples of this kind of trail are the Santa Ana River Trail and the San Timoteo Creek Trail.*
- *Primary Community Trail - a trail which originates within the City of Redlands and terminates at one of the following:*
    a. *an entrance to a Regional Trunk Trail (thus giving the community access to the regional amenities).*
    b. *a major trail traffic generator (recreational site, school, park, equestrian center, business district).*

Examples of this kind of trail are the Downtown Zanja Greenway and children's trail, the Sunset Hills trails connecting the equestrian center and residential area with the regional trail, and the trails described in the East Valley Corridor Plan.

- *Secondary Community Trail - (a.k.a. local feeder trail) a trail which provides a local neighborhood with routes for recreation, or access to primary trails. Usually this type originates within a residential area and experiences lighter usage than a primary trail. Optimally, these trails are designed in a loop configuration and located in scenic areas to maximize pleasurable usage.*

  Examples of this kind of trail are the loops within the Sunset Hills Development which augment the primary trails.

- *Connector Trail - a short section of trail route which allows the linkage of two sections of primary and/or secondary community trail. This designation carries the connotation of short linkage which might not be of the same standard as a formal primary or secondary trail, but which allows users to "connect" with the nearby trail.*

Examples of this type of connector trail might be a driveway, roadway, or bridge.

GP Figure 7.1, Trails Map

The Trails Map within the General Plan includes only Regional Trunk Trails and Primary Community Trails. Secondary Community Trails and Connector Trails will be incorporated in the Trails Master Plan as described in Implementing Policies 7.11d and 7.11k.

Guiding Policies: Trails

7.11a Create and maintain a system of trails serving both recreational and emergency access needs. The system is to accommodate walking, hiking, jogging, and equestrian and bicycle use.

7.11b Prepare a Trails Plan depicting regional multi-purpose trails, community trails, local feeder trails, and including design standards.

7.11c It is the intent of the General Plan Trails Component of the Open Space and Conservation Element, and the policy of the implementing agency to work with landowners to develop, acquire, and maintain the trail system.

Implementing Policies: Trails

7.11d The Trails Plan (Figure 7.1) designates and generally locates the Regional Trunk Trails and Primary Community Trails within the Redlands Planning Areas. A Trails Master Plan should be developed to show all types of trails including Secondary Community Trails and Connector Trails.

7.11e Establish guidelines and standards for trails.

7.11f Establish agreement with public agencies and private entities for development and maintenance of trails in rights-of-way and utility corridors.

7.11g Encourage creation of a non-profit organization to assist in developing and managing the trails system.

7.11h Seek grants and alternative funding mechanisms for trail development and maintenance.

7.11i Consider referring projects to the Parks Commission for review and recommendations of trails.

7.11j Coordinate location of trails to relate to neighboring properties.

7.11k Review new development proposals for compliance with Trails Master Plan and provide for right-of-way dedication and improvement/development of trails.

7.11l Consider recreational amenities such as rest areas, benches, water facilities, and trial hitching posts to be incorporated in Master Plan trails.

7.11m Locate trail rights-of-way with concern for safety, privacy, convenience, preservation of natural vegetation and topography, and work with landowners on development proposals to incorporate and provide for continuous multi-use trail system.

Policy 7.21v in Section 7.21, Biotic Resources, specifies coordination of trail planning with habitat and species protection.

7.11n The trails incorporated in the 1972 General Plan shall continue to exist, as an interim policy, until the Trail Master Plan is adopted by City Council.

7.11o Expand street landscape standards to include trail landscape standards.

7.20 Preservation of Natural Resources

The natural resources for which policies of preservation have been designed include biotic resources (including vegetation, wildlife, and habitats), water resources, and energy resources. Preservation of each of these resources will contribute to the preservation of open space within the Planning Area. Waste management and recycling are also addressed in this section, since informed consumption can preserve natural resources by preventing overproduction of goods and by reduction in the production of nonrecyclable materials. In addition, the promotion of the reuse of recyclable materials can diminish the need for the use of virgin materials, and can aid in preserving as open space those lands that might otherwise be needed as landfill.

7.21 Biotic Resources

Prior to European settlement in the San Bernardino Valley, the Santa Ana River channel was lined with a leafy border of alders, sycamores, cottonwoods, and willows along an alignment which would now be centered in the Santa Ana Wash. The channel was a dominant landscape feature which contrasted with the Valley floor beyond, comprised of a series of dry, brush-covered areas separated by stretches of moist or swampy land. In general, prior to the introduction of widespread irrigation, which distributed water evenly across the area, the extreme dry and wet areas were more extensive than they are today.

The naturally occurring biotic communities within the Planning Area are principally defined by the climate, which is typical of Southern California inland areas. Mild winters, low annual rainfall, and prolonged, dry summers all profoundly influence the vegetative make-up and, consequently, the wildlife supported by it. Since the time of European settlement, the vegetation has been dramatically altered, replaced by urban development and agriculture. Animal populations that have not been eliminated have been generally diminished, and most species have been displaced, suffering a loss of range. Remnants of native vegetation, found primarily in riparian areas, are today interspersed with introduced annual grasses, shrubs, or trees, and agricultural fields, all of which provide some habitat for remaining animals.

The Redlands Planning Area is fortunate in being surrounded by remnants of past natural communities, and by some of the surviving species characteristic of these habitats. Most of these valued habitats are found along waterways and serve as wildlife corridors in addition to habitat for the species which grow or dwell within them. To the north, the Santa Ana River Wash and Mill Creek provide habitat and function as wildlife corridors which connect the Wash and Creek habitats with the wildlands of the San Bernardino National Forest.

The Crafton Hills, whose slopes are covered primarily with introduced European species, perform an important role as a physical link between the Santa Ana River-Mill Creek-San Bernardino Mountains habitats and the Live Oak-San Timoteo canyons-Badlands area which frames the southern Planning Area. Wildlife, including larger mammals such as mule deer and mountain lion, are thought to traverse much of the corridor from the San Bernardino Mountains to the Badlands, a route they can travel in relative isolation from humans.

San Timoteo and Live Oak canyons each contain remnants of past natural communities of regional importance. The Badlands, while physically peripheral to the Planning Area, is ecologically linked with San Timoteo and Live Oak canyons, sharing some of the same vegetative associations and wildlife. San Timoteo Canyon Creek reconnects with the Santa Ana River west of the Planning Area, closing the circle which outlines a rough ring of habitat areas and wildlife corridors around the Planning Area.

The Zanja (known locally as the "Sankee") is a waterway which splinters to the southwest of Mill Creek's main channel north of the Crafton Hills, flowing through the heart of Redlands. In different reaches, the stream flows above and below ground, in concrete channels and along

natural bottomed channels, and possesses varying vegetation, wildlife, and habitat values. Restoration of the Zanja along part or all of its length would be anticipated to improve its habitat values where it flows above ground. The Zanja joins with other drainages, finally flowing into the Santa Ana River west of the Planning Area. (See Section 8.40, Drainage and Flooding.)

Although comprehensive biological mapping for the Planning Area has not been prepared, GP Figure 7.2 and GP Table 7.3 show and define areas of identified valued habitat, wildlife corridors, and potential riparian restoration, as identified by the State Department of Fish and Game (DFG) and local environmental groups. General locations of special status species are also shown, where information was available. This figure is not intended to serve as a substitute for an onsite biotic resources inventory for specific development projects, but rather as a general reference suggesting the types of species and habitats which may be present.

Guiding Policies: Biotic Resources

7.21a Minimize disruption of wildlife and valued habitat throughout the Planning Area.

Ranging from "common" to a legal status of Endangered, Redlands' wildlife species and habitats are valuable biotic resources, among which are several species unique to the region. Implementing policies designed to achieve their continued viability are specified below.

7.21b Preserve, protect, and enhance natural communities of special status.

Eight natural communities of special status have been identified within the Planning Area (1995) and are shown on GP Figure 7.2. These include Riversidean Alluvial Fan Sage Scrub, Southern Coast Live Oak Riparian Forest, Southern Sycamore Alder Riparian Woodland,

GP Figure 7.2, Biotic Resources
GP TABLE 7.3
RARE, THREATENED, OR ENDANGERED SPECIES and SPECIES OF SPECIAL STATUS WITHIN, ADJACENT TO, OR POSSIBLY PRESENT WITHIN THE PLANNING AREA[1]

Natural Communities

RAFSS	*Riversidean Alluvial Fan Sage Scrub*
SCLORF	*Southern Coast Live Oak Riparian Forest*
SRS	*Southern Riparian Scrub*
SSARW	*Southern Sycamore Alder Riparian Woodland*
SWS	*Southern Willow Scrub*
CLORF	*Canyon Live Oak Ravine Forest*
SRF	*Southern Riparian Forest*
SCWRF	*Southern Cottonwood Willow Riparian Forest*

Plants

Map ID 2	*Nevin's Barberry*

Map ID 3	*Santa Ana River Wooly Star*
Map ID 4	*Slender-horned Spineflower*
Map ID G	*Payson's Jewelflower*
Map ID J	*Parish's Bush Mallow*
Map ID K	*Perry's Spineflower*

Birds

Unknown	*Black-shouldered Kite*
Map ID A	*California Gnatcatcher*
Unknown	*Western Yellow Billed Cuckoo*
Map ID B	*Cooper's Hawk*
Unknown	*Ferruginous Hawk*
Map ID C	*Golden Eagle*
Map ID 1	*Least Bell's Vireo*
Unknown	*Long-eared Owl*
Map ID L	*Loggerhead Shrike*
Unknown	*Prairie Falcon*
Map ID I	*Tri-colored Blackbird*
Unknown	*Willow Flycatcher*
Unknown	*Yellow-breasted chat*

Mammals

Map ID D	*Los Angeles Pocket Mouse*
Map ID E	*Merriam's Kangaroo Rat*
Map ID 5	*Stephen's Kangaroo Rat*

Reptiles

Map ID F	*Orange-throated Whiptail*
Map ID H	*San Diego Horned Lizard*

[1] *Species without Map ID numbers have no known specific location but have been seen within the Planning Area.*

Southern Willow Scrub, Southern Riparian Scrub, Canyon Live Oak Ravine Forest, Southern Riparian Forest, and Southern Cottonwood Willow Riparian Forest. These communities are remnants of past vegetative complexes which were more widely distributed, and provide habitat to a number of native creatures.

7.21c Recognize the links between biotic resources in discrete locations throughout Redlands.

Although now divided by roadways and expanses of urban development, the remaining open space and undeveloped land within the Planning Area was once part of an interlinked regional ecosystem. The genetic flow between these areas persists, although at a greatly reduced level, and impacts on any portion of the system will affect the rest of the system. Environmental review for projects that will replace habitat with other uses should consider the impacts on seemingly remote sites as part of the cumulative impacts of a project, since study may show that remote sites are actually linked. The Master Biotic Management Plan is anticipated to document the ecosystem dynamics of the Planning Area.

7.21d Preserve, protect, and enhance wildlife corridors connecting the San Bernardino National Forest, Santa Ana River Wash, Crafton Hills, San Timoteo/Live Oak Canyons, the Badlands, and other open space areas.

Without corridors allowing movement between discrete habitat areas, it is likely that lack of genetic diversity over time would lead to the smaller, isolated habitat areas becoming devoid of wildlife, or inhabited by individual members of species in a weakened state with little potential for survival or adaptation. The maintenance and enhancement of these corridors includes implementation of undercrossings, as specified below in Policy 7.21j. General locations of known corridors are shown on GP Figure 7.2.

7.21e Preserve, restore, protect, and enhance riparian corridors throughout the Planning Area.

Riparian corridors not only serve as wildlife corridors, but also possess intrinsic habitat value and aesthetic appeal. Throughout California significant amounts of riparian vegetation have been lost to urbanization in the last century, although a move towards urban stream restoration is underway in the State, slowing the losses. Programs include liberating underground streams and vegetation plans, often coordinated with the provision of streamside trails. Grants are available through the Department of Water Resources' Urban Stream Restoration Program for projects which restore or enhance the aesthetic, recreational, fish, and wildlife values of waterways. Planning Area riparian corridor locations may be included in the Master Biotic Management Plan.

7.21f Where feasible, landscape public areas using native vegetation.

Native vegetation provides habitat for local species and tends to aid in water conservation, since native species are drought tolerant or resistant. Public areas include parkways, median strips, parks, and other City-owned or maintained green spaces. Revision of the City's Official Street Tree List is specified below, in Policy 7.21w.

Implementing Policies: Biotic Resources

7.21g Prepare a Master Biotic Management Plan, including an inventory of protected and common species, and species management plans, where relevant.

The General Plan specifies a general level of species protection based on available published information, and where habitats or locations have been mapped. The Plan and related MEA/EIR provide a point of departure for more detailed, area-specific studies, which could include site inventories and maps, and may require that consulting biologists perform further study to design management plans. Additional levels of detail could be provided specifying the hitherto unknown locations of protected and common species, wildlife corridors, riparian corridors and wetlands, and documenting the ecosystem dynamics of the Planning Area.

7.21h Require a biological assessment of any proposed project site where species or the habitat of species defined as sensitive or special status by the Department of Fish and Game or the U.S. Fish and Wildlife Service might be present.

Listings of sensitive and special status species change from year to year, but might include birds, animals, and plants such as the California Gnatcatcher, Least Bell's Vireo, San Diego Horned Lizard, Stephen's Kangaroo Rat, Nevin's Barberry, Parish's Bush Mallow and Payson's Jewelflower, among those special status species thought to be present within the Planning Area in 1991.

7.21i Require that proposed projects adjacent to, surrounding, or containing wetlands, riparian corridors, or wildlife corridors be subject to a site-specific analysis which will determine the appropriate size and configuration of a buffer zone.

The size and configuration of the buffer zone should be based on the characteristics and importance of the wetlands, riparian corridor, or wildlife corridor, and the proposed project, and determined in consultation with the Department of Fish and Game, U.S. Fish and Wildlife Service, and U.S. Army Corps of Engineers, as appropriate. The purpose of the buffer zone will be to ensure the long-term viability of the habitat area, and continued presence of wildlife.

7.21j Construct freeway and arterial street undercrossings where necessary after identification of and as a part of establishment and preservation of wildlife corridors.

To enable wildlife to move freely throughout the Planning Area, undercrossings beneath the freeway or major thoroughfares may be necessary. This is particularly evident between the Crafton Hills and San Timoteo/Live Oak canyons-Badlands area, which are separated by the I-10 Freeway. Undercrossings should be designed in consultation with biologists who understand the requirements of the species.

7.21k Enhance and restore the Zanja and tributary drainages as riparian corridors, where feasible, to provide habitat as well as recreational and aesthetic value.

The Zanja crosses the Planning Area in both underground and aboveground segments, with varying habitat value. Channel restoration with native vegetation would be expected to improve habitat.

7.21l Encourage the U.S. Army Corps of Engineers to design "soft" channel and sedimentation basins to provide habitat as well as recreational and aesthetic value.

A component of the Santa Ana Project is the construction of a 5-mile long concrete channel from San Timoteo Canyon to the Santa Ana Wash. An alternative natural channel would preserve existing wildlife corridors and provide linear parks. The natural channel also allows normal groundwater recharge.

7.21m Work with the Crafton Hills Conservancy to preserve, enhance, and maintain the Crafton Hills as an ecosystem.

Policy 8.50i within Section 8.50, Health and Safety Element, Geology, Seismicity, and Soils, specifies preservation of slopes greater than 30 percent as open space. The Conservancy is committed to habitat preservation in the Crafton Hills, as well as enhancement of open space and recreational values. The Crafton Hills may be an appropriate target for a vegetation management or enhancement program; the area contains remnants of past vegetative associations but is generally covered with introduced species. The cultivation of native species could enhance habitat value, and might decrease fire risk through the reduction of flammable grasses.

7.21n Coordinate open space and habitat preservation in San Timoteo and Live Oak canyons with Riverside County.

Although each is a cohesive geographic area unto itself, politically both San Timoteo and Live Oak canyons are bisected. Both canyons straddle the boundary between San Bernardino and Riverside counties. To achieve consistency in neighboring land uses, planning between the counties and the City of Redlands must be coordinated. Riverside County's Multiple Species Habitat Conservation Plan conceptually addresses the future of the area just to the south. The Badlands are proposed for inclusion in a reserve, which would stretch from the Riverside County - San Bernardino County border south to the San Jacinto Mountains. The proposed reserve includes upstream portions of San Timoteo Creek, which are identified as providing significant riparian habitats.

7.21o Coordinate with the City of Yucaipa on habitat preservation along Yucaipa Creek and in Live Oak Canyon throughout its length.

Live Oak Canyon contains special status Southern Coast Live Oak Riparian Forest, as well as other habitat values. The Yucaipa sewage treatment plant, upstream of Live Oak Canyon, is currently releasing treated wastewater into Yucaipa Creek, which contributes to the preservation of Live Oak Canyon's verdant habitat areas. There is some indication that Yucaipa may in the near future engage in a greater water recycling effort, and the San Bernardino Valley Municipal Water District notes that, if successful, this effort would be expected to diminish outflows through Live Oak and San Timoteo canyons. Reduced flows could have habitat impacts.

7.21p Work with the developers, biologists, and residents to implement the Sunset Hills Deer Management Plan in San Timoteo and Live Oak Canyon areas.

As a mitigation measure for approval of the Southeast Area Plan, preparation and implementation of a deer management plan was specified. The Sunset Hills Deer Management Plan was drafted to fulfill part of this requirement. Three conditions are described for retention of deer use within the Sunset Hills development: the Badlands deer population must persist into the indefinite future, deer must have suitable access to the area, and suitable deer habitat must be present within the development. These requirements suggest that the City should coordinate with Riverside County on land use within the Badlands, should identify and maintain wildlife corridors for deer movement, and should review development plans carefully to ensure that adequate open space within project areas is preserved.

7.21q Support the U.S. Army Corps of Engineers' efforts to establish a preserve for the Santa Ana River Wooly Star as mitigation for habitat anticipated to be lost as a result of construction of the Seven Oaks Dam, and work with concerned agencies and organizations to preserve the species in the Planning Area.

Construction of the Seven Oaks Dam is expected to reduce Wooly Star habitat, which is scattered throughout the Santa Ana River Wash. Environmental review documents prepared for the Seven Oaks Dam project identified several sites in the Wash north of Redlands that may be suitable for the establishment of a Wooly Star preserve. This silver-grey plant with its characteristic star-shaped flowers is unique to the area, and is considered Endangered by both the State and Federal governments.

7.21r Work with concerned agencies and organizations to preserve the Slender-horned Spineflower.

The Spineflower is considered a Federal and State Endangered Species, whose remaining known populations within the Planning Area are clustered around Orange Street north of Redlands, within the Santa Ana River Wash. According to the Scoping Project for the Santa Ana River Resource Management Plan (August 1988), there has never been a careful and thorough survey of the distribution of the Spineflower.

7.21s Coordinate aggregate resource extraction with habitat preservation and protection of plant and animal species.

Policy 7.42b specifies preparation and assured implementation of a rehabilitation plan for aggregate extraction as a condition of approval of mining. The rehabilitation plan should address protection of biotic resources.

7.21t Evaluate the habitat value of agricultural fields and groves prior to conversion to other uses; if habitat value is significant, consider a development plan which incorporates open space uses of similar value.

Although agricultural fields and groves are not "native" habitat, their structure and composition may mimic certain natural environments, some of which have been greatly reduced in area over the last century. A variety of displaced species thus forage or nest in these areas. For example, raptors, some of which are species of special status, are thought to hunt in agricultural fields, and Mule Deer and other mammals may browse in or pass through orchards.

7.21u Make information available to residents concerning the presence and condition of special status species.

Without a larger perspective, individuals may not understand that their actions can jeopardize the condition of a plant or animal species. For example, one of the greatest threats to the San Diego Horned Lizard -- a special status species known commonly as a "horned toad" -- is confinement by humans, benignly intending to keep the creature as a pet. A public information campaign could consist of informational handouts made available at City offices or through the County Museum.

7.21v Coordinate trails with preservation of habitat and protection of species sensitive to human intrusion.

Trails policies are specified in Section 7.11, and Policy 7.11m emphasizes a concern for preservation of natural vegetation and topography. The open space values which are attractive to trails users are often a result of the presence of wildlife and native vegetation, both of which may be sensitive to human disturbance. Planning for both values will ensure compatibility.

7.21w Expand the City's Official Street Tree List to incorporate native trees.

The current Official Street Tree List includes a number of species from the Eastern United States, Asia, South America, the Pacific Islands, and the Mediterranean. Only a few species, including the California Fan Palm, Knobcone Pine, and Modesto Ash are indigenous to the Western United States. As noted above in Policy 7.21f, native trees tend to tolerate drought, need less water than introduced species, and have a higher habitat value for native wildlife.

7.21x Explore opportunities to have nature displays along the Santa Ana River in conjunction with trails to provide environmental and habitat information.

7.22 Water Supply and Conservation

Entitlement to local water supplies includes surface water from Mill Creek and the Santa Ana River, and groundwater from wells throughout the Planning Area. As described in Section 8.20, contamination restricts the amount of groundwater available for potable use without treatment. Imported State Water Project (SWP) water is potentially available, although it is more costly than local sources and, as a regional political issue, is subject to continuing debate. Continued

use of SWP Water will in time degrade water quality within the basin and create problems with wastewater discharge. The southeast portions of the City are served by Western Heights Water Company.

The long-term water supply for the City -- and for the region -- is not secured. An updated City of Redlands Water Master Plan will examine the long-term demand for, and availability of, local ground and surface waters and SWP supplies. Cumulative development in Southern California has far exceeded the availability of local water supplies, and has increased reliance on imported water. The availability of SWP water over the long-term depends in part on environmental and political variables which are not under the City of Redlands' direct control. Conservation and cooperation on a regional basis will be the key to the future quality of life.

In 1991, the fifth consecutive year of lower-than-normal rainfall in California, municipalities throughout the State implemented water conservation programs. Conservation measures, such as those described in Ordinance No. 2151, Water Conservation Plan, are intended to decrease consumption and allow existing water resources to go further. While many voluntary conservation measures depend on changes in individual behavior, larger organized efforts backed by investment -- such as construction of infrastructure to facilitate the use of reclaimed wastewater and non-potable water for irrigation of landscaping and agriculture -- can lead to substantial conservation of water resources.

Guiding Policy: Water Supply and Conservation

7.22a Minimize dependence on imported water by increasing entitlement in local surface sources, using wise groundwater management practices, conservation measures, and the use of reclaimed wastewater and nonpotable water for irrigation of landscaping and agriculture, where feasible.

The availability of imported State Water Project water over the long-term depends in part on environmental and political variables which are not under the City of Redlands' direct control. To ensure water service to all parts of the Planning Area, an emphasis must be placed on the use of local water supplies.

7.22b The City of Redlands overlies a portion of the Bunker Hill Groundwater Basin. This Basin contains in excess of 3 million acre feet of water. This local supply source must be cleaned up, used to its full potential, and protected from outside interests. This requires the cooperation of all agencies within the Basin.

7.22c The City of Redlands recognizes that the water sources that constitute the water supply of the City of Redlands are a limited and renewable resource subject to increasing demands; that the conservation and efficient use of urban water supplies are of statewide concern; but that planning for that use and the implementation of those plans can best be accomplished at the local level.

7.22d The City of Redlands believes it is in the best interest of its citizens to conserve the highest quality of water reasonably available to it for domestic use. Effort by its water users to achieve water conservation and efficient use of water will produce a sustainable lifestyle consistent with Redlands' unique heritage and community goals.

Implementing Policies: Water Supply and Conservation

7.22e Update the City of Redlands' Water Master Plan, including an assessment of regional demand and availability of water resources through buildout, and a comprehensive groundwater management program.

The City's 1981 Water Master Plan, updated in 1984, needs revision as a result of recent and planned population growth and development. The Water Master Plan assumed a population of about 80,000 in Redlands in the year 2000. Current 1995 City population is about 67,000. The Water Master Plan should include a component which studies groundwater issues and implements a comprehensive groundwater management program, as recommended by the Redlands 2000 report.

7.22f If the City's updated Water Master Plan shows water supply to be inadequate, increase supply and reduce demand or curtail development until adequate supplies are secured.

Priority would be given to increasing water supply and reducing water demand. Restrictions could be universal, with no new service connections throughout the Planning Area, or restrictions could be area-specific, to prevent costly infrastructure expansion and discourage growth in yet-unserved areas, until new supplies are developed.

7.22g Work with the Bear Valley Mutual Water Company, San Bernardino Valley Municipal Water District, and Western Heights Water Company to implement water conservation measures as specified in Redlands' Water Conservation Plan, Ordinance No. 2151.

An April 1991 resolution adopted by the San Bernardino Valley Municipal Water District (SBVMWD) requires Redlands and other District customers to establish and maintain a water conservation program as a prerequisite to continued use of State Water Project water. Redlands Water Conservation Plan, Ordinance No. 2151 was adopted pursuant to City's Urban Water Management Plan and State laws. The ordinance contains four stages of conservation, from voluntary conservation measures to different levels of mandatory compliance. The use of reclaimed wastewater is indirectly encouraged by exempting the use of reclaimed wastewater for golf course irrigation from irrigation restrictions. The most extreme stage of the Water Conservation Plan prohibits the issuance of new service connections and meters.

7.22h Coordinate with the Western Heights Water Company, East Valley Resource Conservation District, and SBVMWD to educate the public and encourage participation in voluntary water conservation measures.

The availability of information and a sense of participation in a larger cooperative effort can lead to significant changes in individual behavior.

5.3.3 Emergency Services

GENERAL SITUATION

Floods are generally classed as either slow-rise or flash floods. Slow-rise floods may be preceded by a warning time lasting from hours, to days, or possibly weeks. Evacuation and sandbagging for a slow rise flood may lessen flood related damage. Conversely, flash floods are the most difficult to prepare for due to the extremely short warning time, if available at all. Flash flood warnings usually require immediate evacuation within the hour. On some occasions in the desert areas, adequate warning may be impossible.

Once flooding begins, personnel will be needed to assist in rescuing persons trapped by flood waters, securing utilities, cordoning off flood areas, and controlling traffic. These actions may overtax local agencies, and additional personnel and resources may be required. It is anticipated that existing mutual aid resources would be used as necessary to augment local resources.

SPECIFIC SITUATION

Areas subject to flooding in Redlands are adjacent to the Santa Ana River that borders the city on the north. The City of Redlands Department of Public Works monitors this river and most likely will afford a degree of advances warning for emergency responders.

The topography of the City varies. Areas subject to flooding drain either naturally into flood controls, rivers, washes or creeks. Most can handle normal flows.

EMERGENCY READINESS STAGES

Flood in the special risk areas can occur rapidly or slowly depending on the heaviness and severity of rainfall. Emergency preparedness will be based on four stages of response actions.

STAGE 1 (Watch Stage)
Light to moderate rain

STAGE II
Moderate to heavy rain

City Manager's Office notified. Operational assignment will be based on City Manager's decision as to hazard.

STAGE III

Continuation of heavy rain. High threat of damage.

City Manager/Director of Emergency Service /in charge and Emergency Services Battalion Chief notified.

STAGE IV

Emergency operations. Threat to private property. City Manager advised. Limited local emergency declared.

STAGE V

Heavy damage potential beyond City control. Local emergency declared.

STAGE VI

Damage beyond local resources. Governor's declaration. State of Emergency.

STAGE VII

Damage beyond State resources. Presidential declaration.

EVACUATION ROUTES

It is expected that all major streets will be open. As such, evacuation should be easily facilitated. Other pertinent information relating to evacuation operations are in **Part Two, Operations Section.**

EMERGENCY RESPONSE ACTIONS

Emergency response actions applicable to all common hazards are presented in the Checklist Actions in **Part Two of this Plan**.

Attachment 1 - Flood Hazard Map **(CPG-16a)**

FLOODING - SANTA ANA RIVER BASIN

BACKGROUND

The 3,200 square mile Santa Ana River Basin contains the largest river system in southern California. Bounding the basin on the north is the Mojave River Basin; on the east, the Whitewater River Basin; and on the south, the Santa Margarita River Basin. The Santa Ana Mountains and Chino Hills bisect the drainage area separating the upper and lower basin. In the upper basin, in San Bernardino and Riverside counties, mountains and hills occupy about 1,100 square miles, with elevations ranging from 11,485 feet at San Gorgonio Mountain and 10,804 feet at San Jacinto Peak to 4,680 feet at Santiago Peak. In the lower basin, in Orange County, the high Santa Ana Mountains (over 5,000 feet) stand in sharp contrast to the lower rolling Chino Hills (1,780 feet). The valley in the lower basin occupies about 1,300 square miles and the

coastal plain about 70 square miles. The relatively flat coastal plan areas are mainly committed to urban use, and any remaining open spaces are few in number and small in size. Despite the relatively low agricultural productivity of native soils, the optimal climatic conditions and extensive irrigation and fertilization practices encourage high agricultural production in the region.

None of the segments of the Santa Ana River are considered to be wild or scenic Rivers.

The Santa Ana River and its tributaries drain the southern portions of the eastern San Gabriel Mountains and the southern region of the San Bernardino Mountains. From the headwaters near Big Bear Lake in the San Bernardino Mountains, the flows descend into the San Bernardino valley and recharge the largest underground water basin in the region, the Upper Santa Ana River Basin. The Redlands area belongs to the Santa Ana Watershed. From its origin in the San Bernardino Mountains the rivers flows through the northern part of Redlands to the Prado Dam and Reservoir in Corona, the Santa Ana River mostly follows a natural course - progressively wide and rocky, sandy and narrow, and wide and shallow. Between San Bernardino and Riverside, the river course is partly controlled by levees to protect suburban, industrial and other land uses.

Floods are part of the history of the Santa Ana River. These floods occurred in magnitude incomprehensible to those who have not witnessed their destruction. Little information exists regarding the magnitude of floods prior to 1850. Recorded data from 1897 to the present shows that medium to large winter floods occurred in 1903, 1910, 1914, 1916, 1921, 1922, 1927, 1938, 1943, 1965, 1966, 1969, 1976, and 1980. Although not much information is available on the flood of 1862, evidence suggests that after 15 days of continuous rain this flood broke loose from the Santa Ana River on January 22 and brought destruction and desolation to everything in its path. The flood□s peak discharge was estimated in recent decades, on the basis of historical notations on highest water levels, at 327,000 cubic feet per second at Riverside Narrows.

The largest recorded flood in the 20th century in the Santa Ana River occurred in March 1938. It was about a 40-year frequency flood.

The next major flood on the Santa Ana River was in January and February 1969. This flood transpired after the last of a series of storms, which climaxed more than a month of extremely heavy, recurring rainfall. The rains were heaviest in the mountains where one station reported more than 10 inches of rain. The peak discharge of runoff reached 36,000 cubic feet per second at Riverside Narrows. Flooding in 1969 led to the declaration of San Bernardino as a National Disaster Area. This was a 40 year frequency flood. Damages from this flood were greater than the 1938 flood, mainly due to increased development.

GENERAL SITUATION

The completed Seven Oaks Dam is a single purpose flood control project constructed by the U. S. Army Corps of Engineers, Los Angeles District. The project is located on the Santa Ana River in the upper Santa Ana Canyon about 8 miles (13 km) northeast of the City of Redlands, in

San Bernardino County. Authorization for the project is contained in the Water Resources Development Act of 1986. The dam is built to withstand an 8.0 magnitude (8M) earthquake.

The project is planned to operate in tandem with Prado Dam, also located on the Santa Ana River 40.3 miles downstream, to provide flood protection to Orange County. During the early part of each flood season, runoff will be stored behind the dam in order to build a debris pool to protect the outlet works. Small releases will be made on a continual basis in order to maintain the downstream water supply. During a flood, Seven Oaks Dam will store water destined for Prado Dam for as long as the reservoir pool at Prado Dam is rising. When the flood threat at Prado Dam has passed, Seven Oaks will begin to release its stored flood water at a rate which does not exceed the downstream channel capacity. At the end of each flood season, the reservoir at Seven Oaks will be gradually drained and the Santa Ana River will flow through the project unhindered. The effect of the dam will only **minimize** the 200 year flood in Redlands.

COUNTY RESPONSE

The Department of Public Works Emergency Response Plan involves numerous stages of response for affected County Departments, cities and agencies. Prioritized warning and alerting stages will be activated according to established procedures.

EVACUATION ROUTES

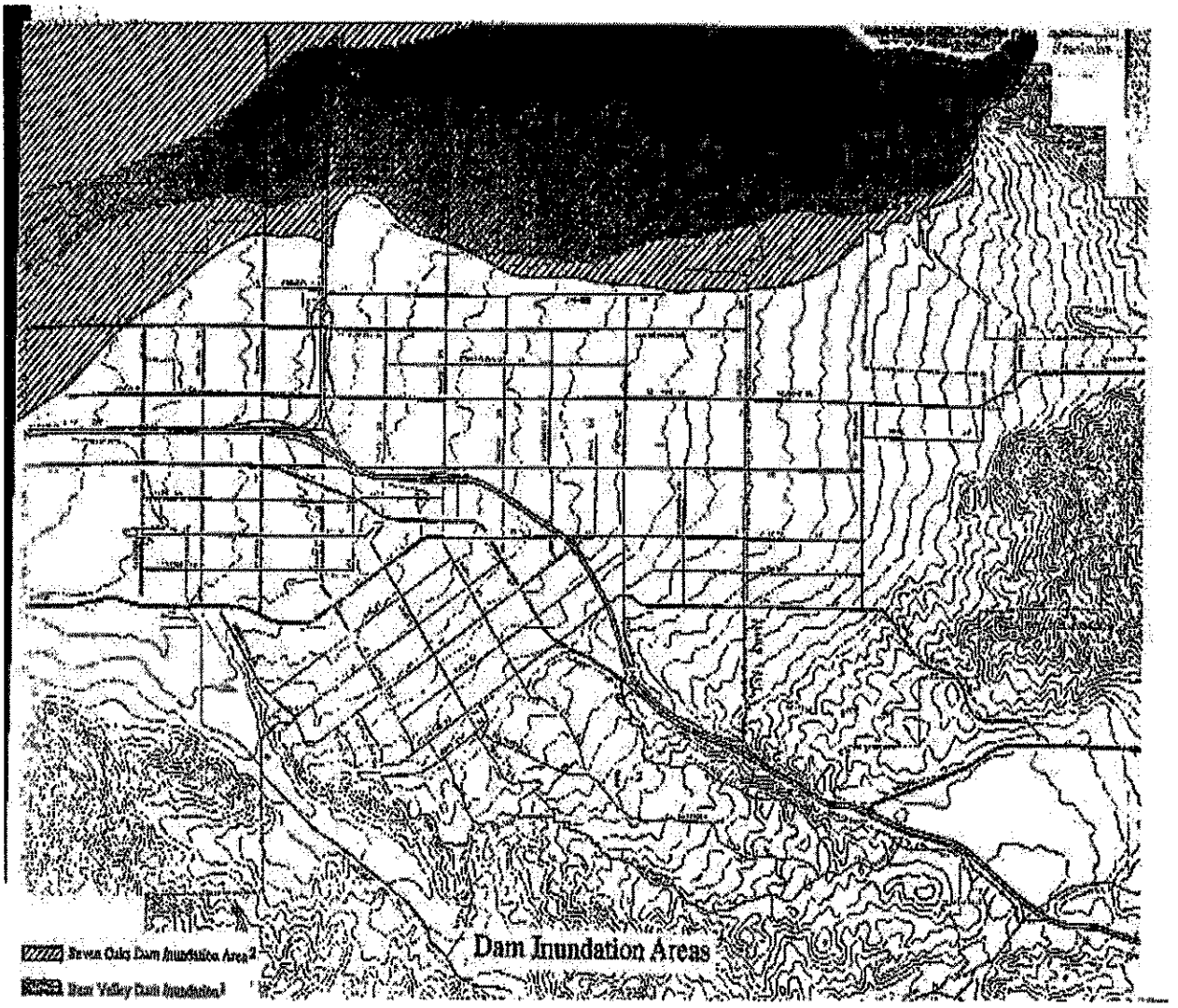
Other pertinent information relating to evacuation operations are in **Part Two, Operations Section.**

EMERGENCY RESPONSE ACTIONS

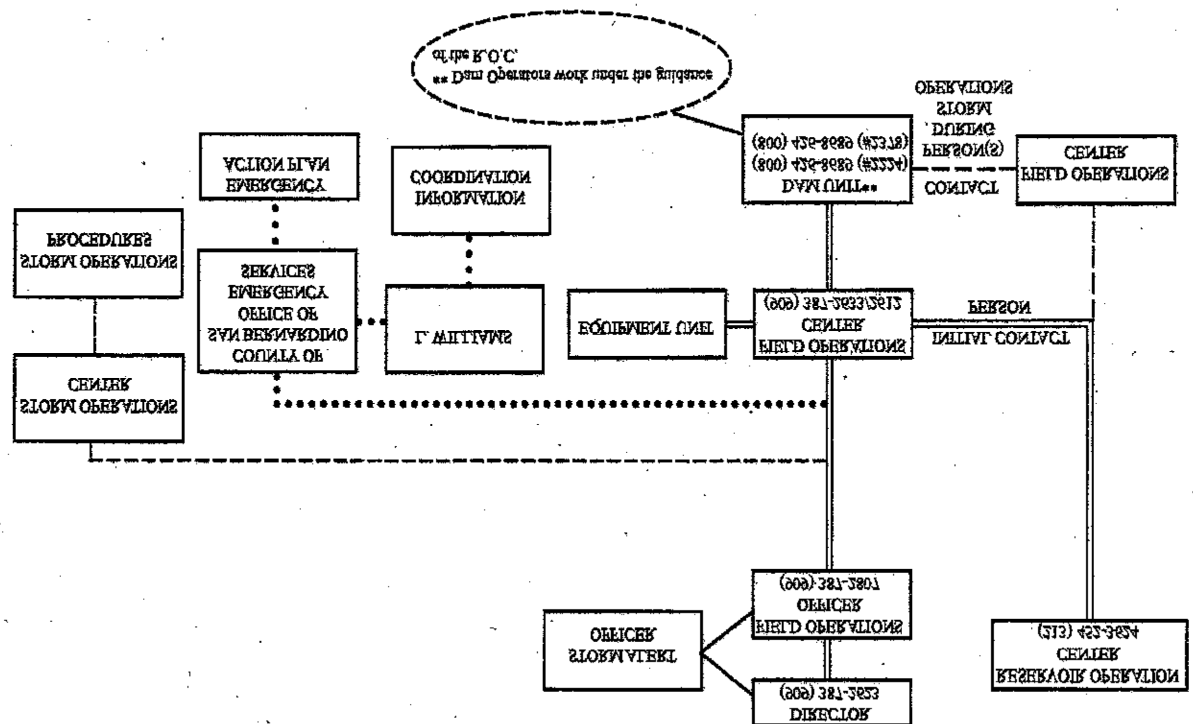
Emergency response actions applicable to all common hazards are presented in the **Checklist Actions in Part Two of this Plan.**

Attachment 1 - 200-Year Flood Boundary Map (Evacuation Area) **(CPG-16a)**
Attachment 2 - Seven Oaks Dam Operations Organizational Chart

DAM INUNDATION AREAS



SEVEN OAKS DAM OPERATIONS
ORGANIZATIONAL CHART



COUNTY OF SAN BERNARDINO
DEPARTMENT OF TRANSPORTATION/FLOOD CONTROL\SURVEYOR
SEVEN OAKS DAM OPERATIONS

GENERAL SITUATION

Portions of the City of Redlands are prone to urban flooding, also sometimes referred to as ponding, due to debris accumulation on storm drains and in flood control channels, over burdened pumping stations and drainage systems. Low-lying areas of the City are particularly susceptible to urban flooding.

Flood control channels are at risk of overflowing their banks during times of heavy rainfall and reservoir water release, specifically the Zanja Canal which runs east to west through the length of City, and the Santa Ana River, which runs along the north side of the City. The County of San Bernardino Flood Control is responsible for notifying the City at the onset of planned water releases.

SPECIFIC SITUATION

There are several locations in the City of Redlands where urban flooding could occur. Each of these locations has either the Zanja or channels and culverts which is adequate to address drain runoff. In the event one of these locations is unable to handle the cubic feet per second, urban flooding would occur at low within the downtown business district, Redlands Blvd. And several primary intersections within the city. The problem areas are considered to be a hazard only to their specific location and are not expected to threaten or endanger the lives of persons in the surrounding areas. The locations are:

- Central Avenue and 9th street channel overpass
- University and Sylvan channel overpass
- Judson and Citrus Avenue
- Dearborn Street channel overpass

Health hazards could present themselves to residential dwellings and businesses in the affected areas if proper flood clean-up actions are not conducted immediately. Contamination due to flooded sewage systems poses the greatest risk to health and safety of persons in the affected areas.

EMERGENCY READINESS STAGES

Flooding in the identified risk areas can occur rapidly or slowly depending on the heaviness and severity of rainfall. Emergency preparedness will be based on four stages of response actions.

Stage I (Watch Stage)
Light to moderate rain for indefinite period. All field units (Public Works, Police, Fire Depts., etc.) are to review their procedures for flood incidents.

Stage II
Moderate to heavy rain expected for next four (4) to six (6) hours. Public information on location of sand bags, sand and flood clean-ups kits to be prepared and distributed to appropriate departments, activation of City Flood Response Teams, activation of City Emergency Communications Group.

Stage III (Advisory Stage)
Continuation of heavy rain over next six (6) to twelve (12) hours. Identified risk areas should be closed to traffic. Public information to be distributed to residents and businesses in affected areas by all available field units, Flood Response Teams coordinate sandbag distribution plan for business district.

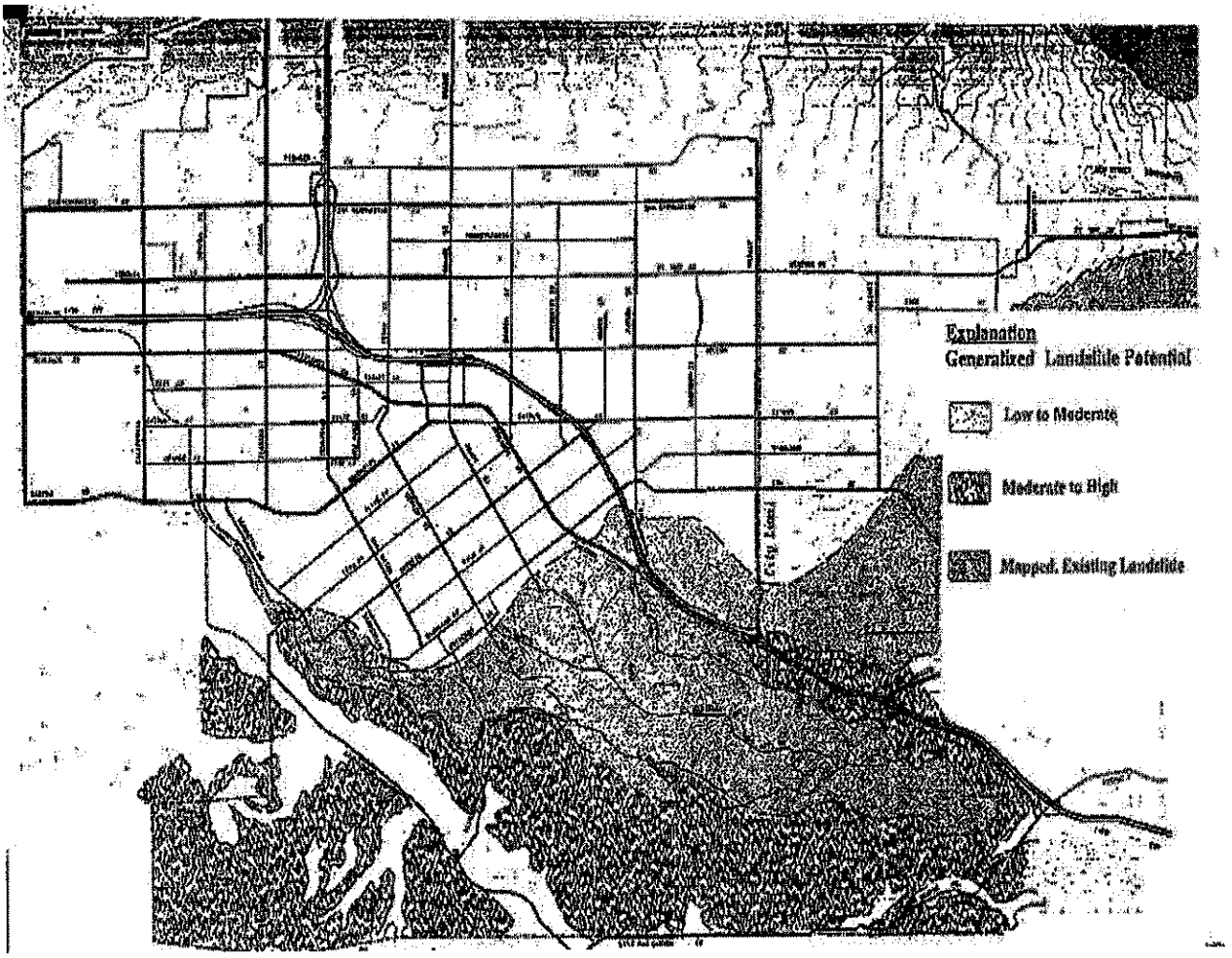
Stage IV
Safety/Health threat to private property and persons. Areas should be evacuated should flooding constitute a safety or health hazard.

EVACUATION ROUTES

It is expected that most streets will remain open. Should it become necessary, evacuations should be easily facilitated. Other pertinent information relating to evacuation operations are in **Part Two, Operations Section.**

EMERGENCY RESPONSE ACTIONS
Emergency response actions applicable to all common hazards are presented in the **Checklist Actions in Part Two of this Plan.**

Urban Flooding Hazard Map (CPG-16a)



DAM FAILURE

GENERAL SITUATION

Dam failures can result from a number of natural or manmade causes such as earthquakes, erosion of the face or foundation, improper sitting, rapidly rising flood waters, and structural/design flaws.

There are three general types of dams: earth and rock fill, concrete arch or hydraulic fill, and concrete gravity. Each of these types of dams has different failure characteristics. The earth/rock fill dam will fail gradually due to erosion of the breach; a flood wave will build gradually to a peak and then decline until the reservoir is empty. A concrete arch of hydraulic fill dam will fail almost instantaneously; thus a very rapid build-up to a peak and then a gradual decline. A concrete gravity dam will fail somewhere in between instantaneous and gradual, with corresponding build-up of flood wave.

In addition to the above mentioned characteristics, warning ability is generally determined by the frequency of inspections for structural integrity, the flood wave arrival time (the time it takes for the flood wave to reach its maximum distance of inundation), or the ability to notify persons downstream and their ability to evacuate.

The existence and frequency of updating and exercising an evacuation plan that is site-specific assists in warning and evacuation functions.

A dam failure will cause loss of life, damage to property, and other ensuing hazards, as well as the displacement of persons residing in the inundation path. Damage to electric generating facilities and transmission lines could also impact life support systems in communities outside the immediate hazard areas.

A catastrophic dam failure, depending on size of dam and population downstream, could exceed the response capability of local communities. Damage control and disaster relief support would be required from other local governmental and private organizations, and from the state and federal governments.

Mass evacuations of the inundation areas would be essential to save lives. If warning time should permit. Extensive search and rescue operations may be required to assist trapped or injured persons. Emergency medical care, flood, and temporary shelter would be required for injured or displaced persons. Identification and burial of many dead persons would pose difficult problems; public health would be a major concern. Many families would be separated, particularly if the failure should occur during working hours, and a personal inquiry or locator system would be essential.

These and other emergency operations could be seriously hampered by the loss of communications, damage to transportation routes, and the disruption of public utilities and other essential services.

Government assistance could be required and may continue for an extended period. These efforts would be required to remove debris and clear roadways, demolish unsafe structures, assist in re-establishing public services and utilities, and provide continuing care and welfare for the affected population including, as required, temporary housing for displaced persons.

SPECIFIC SITUATION

There are two dams close to, and one wash in the City of Redlands with known populations in their respective inundation areas. They are: the Big Bear Dam, the Seven Oaks Dam, and the Santa Ana Wash.

Of prime concern is the failure of the Big Bear and Seven Oaks Dam. The Big Bear facility is owned by the Bear Valley Municipal Water District. The flood waters from these bodies of water would affect northeast Redlands and, if failure or flooding should occur, could inundate portions of the city.

Only Big Bear Dam has concrete face to prevent wash action. Big Bear Lake could contain a maximum of 74,260 acre feet of water. It has 2 to 3 feet of freeboard and its spill elevation is 70

INFORMATION ABOUT THE DAM SITES

Note: Description of inundation boundaries are general in nature and do not allow for recent construction or grading.

Description:	**Big Bear**	Dam #1003-003	
Dam Owner:	Bear Valley Mun. Water	Natl. ID CA00798	
Emer. Contact:	Couen Cowenberg	Ph #: 909-275-1277	
Downstream Dams:			
Stream:		Year retrofitted:	1994
Type:	Concrete	Crest elevation:	6146.0
Storage:	74,260 acre feet	Crest length:	
Drainage area:		Height: 72 ft	
T/B 13/D/6	Lat	Lon	
Description:	**Seven Oaks**	Contract #DACW-09-94-C-0021	
Dam Owner:	Bear Valley Mun. Water	Natl. ID CA00802	
Emer. Contact:	DeDee	Ph #: 909-794-6860	
Downstream dams:	None		

Stream:	Santa Ana River	Year completed:	1999
Type:	Earth	Crest elevation:	2610.0
Storage:	145,600 acre feet	Crest length:	2630
Drainage area: 177 sq. miles		Height: 550 ft	

T/B 14/B/3 Lat 1743500 Lon 711,000

Downstream dams: None

EMERGENCY RESPONSE ACTIONS

Emergency response actions applicable to all common hazards are presented in the **Checklist Actions in Part Two of this Plan.**

EVACUATION ROUTES

Pertinent information relating to evacuation operations are included in **Part Two, Operations Section.**

NOTES ABOUT THE INUNDATION AREA INFORMATION

Note 1: "Key Facilities" are those facilities which are essential to public safety, such as police and/or fire stations, public utility buildings, etc.

Note 2: "Unique Facilities" are those facilities whose population could require relocation, such as schools, medical and/or correctional facilities, etc.

Note 3: All telephone numbers are 909 area code unless otherwise indicated.

Note 4: Estimated population densities for areas affected by potential dam inundation:

Urban	3100/square mile
Suburban	2000/square mile
Rural	500/square mile
Open Areas	50/square mile

Note 5: Descriptions of arrival times and potential impact of the flood wave are general in nature and are in no way meant to be specific for any areas. The subjective analysis is based on information provided on the respective inundation maps and does not allow for subsequent construction or grading. Peak flows and times, flood times and de-flood times were not consistently provided for all sites. Therefore specific damage analysis is considered beyond the purview of this document. Times are expressed in total minutes since dam failure (T+xx).

NOTES ABOUT RESPONSE ACTIVITIES INFORMATION

Note 1: Because of the potential for significant variations in the traffic patterns on the road system, the direction of travel for the evacuation routes will be determined at the time of an event.

Note 2: It is the intention of the San Bernardino County Chapter of the American Red Cross to make use of available public school facilities in the event shelters are needed. Facility capacities will be determined by the high school facility and coordinated with the American Red Cross at time of need.

Note 3: For County support of Imminent/Actual Dam Failure operations, refer to **Part One, of the County Plan.**

SEVEN OAKS DAM

Note:Description of inundation boundaries are general in nature and do not allow for recent construction or grading.

Description:	**Seven Oaks**	Contract #DACW-09-94-C-0021	
Dam Owner:	Bear Valley Mun. Water	Natl. ID CA00802	
Emer. Contact:	DeDee	Ph #: 909-794-6860	
Downstream dams:	None		
Stream:	Santa Ana River	Year completed:	1999
Type:	Earth	Crest elevation:	2610.0
Storage:	145,600 acre feet	Crest length:	2630
Drainage area: 177 sq. miles		Height: 550 ft	

T/B 14/B/3 Lat 1743500 Lon 711,000

Downstream dams: None

Inundation Area Description
Failure of Seven Oaks dam will flow across the Santa Ana River to the north of Redlands. Pioneer Avenue at Judson, Church and Orange will receive heavy flooding. Inundation passes under Orange Street, the 30 Freeway, and Alabama surface crossing will be catastrophic. The line proceeds directly west to cause destruction of the City of Redlands Landfill located directly next to the Santa Ana River.

Estimated Number of People Threatened: 3000

Names, Addresses, and Phone Numbers of Key Facilities Affected
City Fire Station #263
2 West Pennsylvania 798-7696

Names, Addresses, and Phone Numbers of Unique Facilities Affected
Church of Jesus Christ of Latter-Day Saints 1st Ward
1021 East Pioneer 307-1503

Description of Warning Activation
Warning will depend on the type of failure. The Seven Oaks Dam normally contains little or no water. Failure under these conditions would not cause any inundation problems. If heavy rains have caused the Dam to be at or near capacity, then affected areas would be advised of any pending problems via the print and broadcast media. With a heightened level of concern, Redlands Police and Fire Departments would conduct neighborhood notifications.

List of Traffic Control Points and the Responsible Agencies
Redlands Police Department:

Pioneer at Church
Pioneer at Orange Madison
Pioneer at Judson
Pioneer at Texas
Sylvan at Judson
Citrus at Judson
Sylvan at Cook
Citrus and Cook
University at Sylvan
Church at Central
8th at Central

List of Area Security Barricade Locations and Responsible Agencies
City of Redlands
1270 West Park Avenue 798-7655

Mass Care Facility Locations
Arlington High School TB 715/B/7
2951 Jackson 788-7240

1. Redlands High School
840 East Citrus Ave.
(909) 307-5500

2. Redlands East Valley High School
31000 Colton Ave
(909) 307-5500

3. Cope Middle School
1000 West Cypress Ave.
(909) 307-5420

4. Moore Middle School
1550 East Highland Ave.
(909) 307-5440

5. Orangewood High School
515 Texas St.
(909) 307-5380

6. Lugonia Elementary School
202 East Pennsylvania Ave.
(909) 307-5560

7. Franklin Elementary School
850 East Colton Ave.
(909) 307-5530

8. Kingsbury Elementary School
600 Cajon St.
(909) 307-5550

9. Smiley Elementary School
1210 West Cypress Ave.
(909) 307-5580

10. McKinley Elementary School
645 West Olive Ave.
(909) 307-5570

11. Crafton Elementary School
311 North Wabash
(909) 794-8600

12. Mariposa Elementary School
30800 Palo Alto Dr.
(909) 794-8620

13. Kimberly Elementary School
301 West South
(909) 307-5540

14. Mentone Elementary School
1320 Crafton Ave.
(909) 794-8610

15. Clement Middle School
501 East Pennsylvania Ave
(909) 307-5400

Description of Any Special Search and Rescue Consideration
None projected.

5.3.4 Structural Projects

Structural projects have been exhaustively described in previous sections of this document, specifically in Section 5.1, Community Capability Assessment.

5.3.5 Public Information

The strong Nexus for Redlands' flood programs is described in the Goals Section of this Plan, specifically in Section 5.2, Mitigation Goals.

SECTION 6

ACTION PLAN

Section 6 – Action Plan

h. Draft an action plan (Maximum credit: 60 points). The action plan specifies those activities appropriate to the community's resources, flood hazard, and vulnerable properties. For each recommendation, the action plan must identify who does what, when it will be done, and how it will be financed.

The credit for this step is based on what is included in the action plan. Credit is provided for a recommendation on floodplain regulations, provided it recommends a regulatory standard that exceeds the minimum requirements of the NFIP.

1. 10, if the action plan includes recommendations for activities from two of the six categories credited in step 511.g.

2. 20, if the action plan includes recommendations for activities from three of the six categories credited in step 511.g

3. 30, if the action plan includes recommendations for activities from four of the six categories credited in step 511.g.

4. 40, if the action plan includes recommendations for activities from five of the six categories credited in step 511.g.

5. 10 additional points are provided if the action plan establishes post-disaster mitigation policies and procedures.

6. 10 additional points are provided if the action plan's recommended natural resource protection activities include the recommendations from its community-wide Habitat Conservation Plan. This credit is subject to acceptance of the plan by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service.

SUB-TOTAL ____ POINTS

This section identifies the Proposed Projects in the community.

The prioritization of all the mitigation projects was accomplished through meetings with the Local Hazard Mitigation Planning Committee based on findings and recommendations from Department Head staff level of the City of Redlands, the San Bernardino County Flood Control District, and the Planning Department level staff, and representatives of the San Bernardino County Fire Office of Emergency Services, Redlands Unified School District, and the University of Redlands.

The mitigation action/projects were prioritized based on the following:

- Availability of Grant Funding
- Projected Development Impact Fees
- General Fund Resources
- Any potential future legislation.

6.1 Structural:

Flood Mitigation No. 1: Crafton Detention Basin

Public Works Department project proposes a land acquisition of a 38-acre parcel located on the north side of Colton Avenue between Walnut and Opal Streets and construction of a detention basin to provide protection in the 100-year flood zone.

- Status: Proposed
- Completion Date: N/A
- Local Priority: High
- Longitude/Latitude: -117.166626/34.016094
- Total Cost: $25 Million
- Funding Description: County Flood Control Zone 3 Funding

Flood Mitigation No. 2: Regional Drain System

This public works department project proposes to construct an adequate sized storm regional drain system, approximately 7,500 feet in length in the reserve storm drain easement area parallel to an area north of Redlands Boulevard through downtown Redlands to handle a minimum of a 100-year storm. This storm drain system shall include all appurtenant structures to mitigate street and local flooding.

- Status: Proposed
- Completion Date: N/A
- Local Priority High
- Longitude/Latitude: -117.166626/34.016094
- Total Cost: $1.5 Million
- Funding Description: County Flood Control Zone 3 Funding
  Redlands Redevelopment Agency
  Development Impact Fees

Flood Mitigation No. 3: **City Creek at Alabama Street**

This public works department project proposes to provide multi-jurisdictional support to the cities of San Bernardino and Highland, and to the County San Bernardino to design and construct an all-weather crossing (bridge) on Alabama Street at the City Creek.

- Status: Proposed
- Completion Date: N/A
- Local Priority: High
- Longitude/Latitude:
- Total Cost: $12 Million
- Funding Description: Federal Highway Administration Funds.
  HBRR Funds
  Other significant financial support systems.

Flood Mitigation No. 4: **Storm Drain Construction Project**

This public works department project proposes to construct an adequate sized storm drain system, approximately 3,000 feet in length in Church Street between Pennsylvania Avenue and the Santa Ana River, to handle a minimum of a 50-year storm. Said storm drain system shall include all appurtenant structures to mitigate street and local flooding.

- Status: Proposed
- Completion Date: N/A
- Local Priority Med
- Longitude/Latitude:
- Total Cost: $3 Million
- Funding Description: No Local Funding Source Available.

Flood Mitigation No. 5: **Storm Drain Construction Project**

This public works department project proposes to construct an adequate sized storm drain system, approximately 7,000 feet in length in Judson Street between Brockton Avenue and the Santa Ana River, to handle a minimum of a 50-year storm. Said storm drain system shall include all appurtenant structures to mitigate street and local flooding.

- Status: Proposed
- Completion Date: N/A
- Local Priority Med
- Longitude/Latitude:
- Total Cost: $3 Million
- Funding Description: No Local Funding Source Available.

Flood Mitigation No. 6: **Storm Drain Construction Project**

This public works department project proposes to construct an adequate sized storm regional drain system, approximately 11,000 feet in length in Lugonia Avenue between Alabama Street and the Mission Channel, to handle a minimum of a 50-year storm. Said storm drain system shall include all appurtenant structures to mitigate street and local flooding.

- Status: Proposed
- Completion Date: N/A
- Local Priority Med
- Longitude/Latitude:
- Total Cost: $4.3 Million
- Funding Description: No Local Funding Source Available.

Flood Mitigation No. 7: **San Timoteo Canyon**

This public works department project proposes to construct infrastructure improvements, including but not limited to, shoulder widening, ditches, culverts and berms along the entire length of roadway within City of Redlands City Limits to mitigate impacts of floodwater over San Timoteo Canyon Road.

- Status: Proposed
- Completion Date: N/A
- Local Priority High
- Longitude/Latitude: -117.1051.362350/34.042.488336
- Total Cost: $2.5 Million
- Funding Description: Federal Highway Administration Funds

6.2 National Flood Insurance Program/Community Rating System

Flood Mitigation No. 1: NFIP/CRS This program is currently in process.

Encourage citizen property owners to secure flood insurance, and from a community standpoint, to qualify for premium reductions from the National Flood Insurance Program/Community Rating System (CRS) in support of the City's participation in The National Flood Insurance Program. All Development Departments.

6.3 Public Education

Flood Mitigation No. 2: Public Education This effort is currently in process.

This Fire department project continues multihazard public education programs through the Pre-disaster Mitigation Grant received from FEMA.

- Annually publicize map information to community. Building and Safety Department

- Conduct Outreach Projects. Redlands Fire Department
    - Community-wide flood safety publications
    - Notices to property owners in Special Flood Hazard Areas
    - Develop annual event, e.g. "Flood Awareness Week"
    - Public Information Program that:
        - Describes the local flood hazard;
        - Explains flood safety;
        - Basic facts about flood insurance;
        - Property protection measures;
        - Natural and beneficial floodplain functions;
        - Map of the local flood hazard;
        - Flood warning system information;
        - Floodplain development permit requirements;
        - Substantial improvement requirements;
        - Drainage system maintenance;
        - Flood threat recognition system

- Planning, Codes and Standards: Community Development Department

    - Develop higher regulatory standards;
    - Improve access, quality, and/or ease of updating flood and FIRM data (e.g. Geographic Information System or other digitized mapping system or a database management program for parcel records);
    - Floodplain Management Planning (CRS);
    - Flood Protection planning to protect to more than the 25-year flood level;
    - Drainage system maintenance program;
    - Promote levee safety per 44 CFR 65.10.

- Public Information Activities: All Development Departments, A. K. Smiley Library
    - Map Information
    - Outreach projects
    - Real estate disclosure
    - Library
    - Technical assistance
    - Environmental education

- Non-structural: Building and Safety Department

- Promote retrofit of buildings so that they suffer no or minimal damage when flooded, e.g. elevating buildings above flood levels;

- Construct small flood control projects that keep flood waters from reaching the buildings or lower the level of flood waters, e.g. barriers, channel modifications, diversions, storm sewer improvements; small reservoirs including retention and detention basins.

- Emergency Services Measures: Redlands Fire Department

    - Flood warning
    - Flood response
    - Critical facilities protection
    - Health and safety maintenance

6.4 Mitigation Action/Projects of the Redlands Unified School District

As a Multi-Jurisdictional Partner of the City of Redlands Local Hazard Mitigation Committee, the Redlands Unified School District has a broad spectrum of on-going and proposed mitigation action/projects for all facilities within the School District. Their goals and projects were developed for mitigation of fires, flood and earthquake disasters. The following document hyperlinked below identifies in detail all proposed mitigation measures for the City of Redlands Unified School District, and the methodology of each, including funding source.

- *Associated Files*
  FileTitle: RUSD Mitigation Spreadsheet
  File Description: This file lists all proposed mitigation measures for the Redlands Unified School District.
  Uploaded: 7/27/2004

6.5 Mitigation Actions/University of Redlands

As a Multi-Jurisdictional Partner of the City of Redlands Local Hazard Mitigation Committee, the University of Redlands has a broad spectrum of on-going and proposed mitigation action/projects for all facilities that comprise their campus. Population of this facility is estimated at approximately 3000 per day. The University has developed goals and projects for mitigation of fires, flood and earthquake disasters. The following document hyperlinked below identifies in detail all proposed mitigation measures for the University of Redlands, located in the City of Redlands, and the methodology for each, including funding source.

- Associated Files

File Title: Mitigation Plan Documents - UR
File Description: This document details mitigation measures proposed by the University of Redlands to mitigate the impact of fire, flood and earthquake disasters.
Uploaded: 7/27/2004

6.6 Pre- and Post-Disaster Mitigation Policies and Procedures

Pre-Disaster Mitigation Policies

The City of Redlands supports pre-disaster mitigation, through its various codes and standards and policies and procedures. Examples may be found in our:

6.1.1 Development Codes
6.1.2 General Plan, Specific Plans, and Master Plans;
6.1.3 Standard requirements for all developers who construct residential or commercial buildings in floodprone areas;
6.1.4 Floodplain surveys and studies; and
6.1.5 Defining and prioritizing mitigation strategies appearing in this plan and the Multi-hazard/Multijurisdictional Mitigation Plan;

Pre-Disaster Mitigation Procedures

6.1.6 Pending adoption of the International Building Code;
6.1.7 Insure that goals and objectives within development plans are sufficient and/or exceed requirements;
6.1.8 Establish specific mitigation requirements for those properties who construct in flood-prone areas;
6.1.9 Continue to coordinate with adjoining agencies to lessen risks by following up with their developing risks and abatement strategies; and
6.1.10 Apply for Pre-Disaster Mitigation grants for those projects specified in the flood plan.

Post Disaster Mitigation Policies

Following a serious flood event, or other hazards we experience in our community, the City has always made it a policy to develop a mitigation program or to request additional funding to develop a mitigation measure that will help to insure that the damaged area will not be repetitive in future disasters.

SECTION 7

PLAN ADOPTION

i. Adopt the plan (Maximum credit: 2 points) The 2 credit points for this step are provided if the plan and later amendments are officially adopted by the community's governing body. REFERENCE: Attachment … 2 POINTS SUB-TOTAL 2 POINTS

Section 7 - Plan Adoption

7.1 Resolution Adopting Floodplain Mitigation Plan

This plan was adopted by Resolution No. 6729 of the City of Redlands, City Council on July 1, 2008.

SECTION 8

PLAN MAINTENANCE

j. Implement, evaluate, and revise (Maximum credit: 10 points) The credit for this step is the total of the following points based on how the community monitors and evaluates its plan.

1. 2, if the community has procedures for monitoring implementation, reviewing progress, and recommending revisions to the plan in an annual evaluation report. The report must be submitted to the governing body, released to the media and made available to the public.

REFERENCE PAGE 116-117 2 POINTS

2. 8, if the evaluation report is prepared by the same planning committee that prepared the plan.

REFERENCE PAGE 116-117 8 POINTS

To maintain this credit, the community must submit a copy of its annual evaluation report with its recertification each year.

SUB-TOTAL 10 POINTS

Section 8. Plan Maintenance: Monitoring, Evaluating and Maintaining the Plan

8.1 Description of Plan Maintenance Procedures

8.1.1 City of Redlands Disaster Council/Local Hazard Mitigation Planning Team (Flood Plan Subcommittee is a part of this group) will meet on a quarterly basis to monitor and review plan implementation.

8.1.2 City Council will review the plan on an annual basis as part of the recertification.

8.1.3 Changes and updates will be entered into the Plan as they occur.

8.1.4 Every 2 years the planning team will meet to revise and update the overall plan.

8.1.5 With updates completed, the plan will be reviewed by the Disaster Council and submitted per FEMA requirements to FEMA, every 5 years.

PROMULGATION AUTHORITY – SIGNATURE PAGE

Approved by:

Signature: _____ Date: 7/15/08
Name: Jon Harrison
Title: Mayor

Signature: _____ Date: 7-15-08
Name: Pat Gilbreath
Title: Mayor Pro Tem

Signature: _____ Date: 7/15/08
Name: Pete Aguilar
Title: Councilmember

Signature: _____ Date: 7-15-08
Name: Mick Gallagher
Title: Councilmember

Signature: _____ Date: 7/15/08
Name: Jerry Bean
Title: Councilmember

Signature: _____ Date: 7/15/08
Name: Nabar Enrique Martinez
Title: City Manager

Signature: _____ Date: 7/15/08
Name: Mary Petite
Title: Administrative Analyst