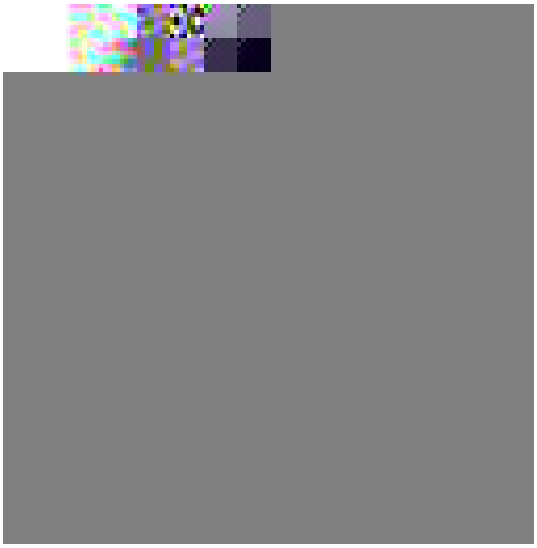
EL DORADO COUNTY

Multi-Jurisdiction Hazard Mitigation Plan



November 2004

TABLE OF CONTENTS

APPENDICES

INTRODUCTION

This section provides a general introduction to the El Dorado County Hazard Mitigation Plan. It is broken down into the following six sections:

A. Background

B. Purpose

C. Scope

D. Authority

E. Participants in the Planning Process

F. Description of the Planning Process

A. BACKGROUND

The occurrence of natural hazards in any environment is inevitable and unavoidable. However, through HAZARD MITIGATION PLANNING, we can reduce some of the severity of the consequences of naturally occurring disasters.

HAZARD MITIGATION PLANNING is a term used for reducing the losses sustained by people and property during a disaster. It includes both structural measures, such as protecting buildings and infrastructure from the forces of wind and water, and non-structural measures, such as natural resource protection and wise floodplain management. These activities can target existing development, or seek to protect future development by avoiding any new hazardous construction. The most effective measures are those which are implemented at the local government level, where regulations and control of development usually take place. A plan which takes measures to reduce present and future vulnerability to unpredictable disasters is the surest way to safeguard a community before, during, and after a disaster. A mitigation plan has the potential to produce long-term and recurring benefits by breaking the repetitive cycle of disaster loss. A core assumption of mitigation is that current dollars invested in mitigation practices will significantly reduce the demand for future dollars by lessening the amount needed for emergency recovery, repair and construction. Further, these mitigation practices will enable local residents, businesses and industries to re-establish themselves in the wake of a disaster, getting the community economy back on track sooner, and with less interruption. Mitigation planning will also lead to benefits that go beyond solely reducing hazards vulnerability. Measures such as the acquisition or regulation of land in known hazard areas can help achieve multiple community goals, such as preserving open space, maintaining environmental health and natural features, and enhancing recreational opportunities.

With the primary goals of protecting County citizens and their property from the consequences of hazards, and making a commitment to following sound development decisions, El Dorado County has undertaken this task of developing this first MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN. We believe that hazard mitigation offers us many benefits such as: saving money, speeding recovery following disasters, reducing future vulnerability through wise development/redevelopment, expediting both pre-disaster, and post-disaster grant funding, and, demonstrating the County's firm commitment to improving community health and safety.

This Plan will be a living document with implementation and evaluation procedures included to help achieve meaningful objectives and successful outcomes. Initially, this plan serves the jurisdictions of the general County of El Dorado, and specifically, the City of Placerville and the City of South Lake Tahoe, El Dorado Irrigation District, and Sacramento Metropolitan Utilities District (SMUD - Sacramento County borders, and has some lands belonging to SMUD that are within the County of El Dorado's jurisdiction). Updated versions of this plan may include other entities, as our goal is to broaden the multi-jurisdictional nature of this plan.

El Dorado County has a population of _____, and is one of the original 27 counties in California. It is located in a region of California that is particularly vulnerable to the effects of a range of natural hazards. These hazards daily threaten the life and safety of County residents, and have the potential to damage or destroy both public and private property and disrupt the local economy and overall quality of life. The County government, its residents and businesses have in fact suffered disaster losses of over $_____ in past years that resulted in significant property damage and the loss of life. To date, El Dorado County has received $ _____ in hazard mitigation funds.

El Dorado County has an established commitment to reducing the potential for future disaster losses. With the majority of the County land area owned or controlled by Federal agencies, there is a large amount of development within or proximate to the public forests. Development in proximity to the higher elevations, steeper slopes, and within the wild land/urban interface places structures and residents close to fire prone lands, and far from fire protection units, water supplies and other services. There are numerous successful efforts to work with private land owners and public agencies to reduce the potential for catastrophic fires and aid evacuation planning. There are also a significant number of policies and programs identified in the El Dorado County General Plan to carefully plan development projects in light of the hazards, and promote safe, thoughtful growth.

This Plan not only recommends localized solutions to reduce existing vulnerability, such as fuel reductions and fire break projects, but also takes other actions such as establishing government policies on community growth and development, incentives for natural resource protection, and public awareness and outreach activities.

B. PURPOSE

The purpose of this Plan is:

- To protect life, safety and property by reducing the potential for future damages and economic losses that result form natural hazards;
- To qualify for additional grant funding, in both the pre-disaster and post-disaster environment:
- To speed recovery and redevelopment following future disaster events;
- To demonstrate a firm local commitment to hazard mitigation principles; and
- To comply with both State and Federal legislative requirement for local hazard mitigation plans.

C. SCOPE

This Plan will be maintained to fully address the hazards determined to be "high risk" and "moderate risk."

The geographic scope of the Plan includes all unincorporated areas of El Dorado County, the Cities of Placerville, and South Lake Tahoe, as well as the area encompassed by the boundaries of all of the participating jurisdictions. As a multi-jurisdictional Plan, each of the participating agencies will also address specific or unique hazards to their jurisdiction in an appendix to the overall P

D. AUTHORITY

This Plan has been adopted by the El Dorado County Board of Supervisors. This Plan has been developed to be in accordance with current rules and regulations governing local hazard mitigation plans. The Plan shall be routinely monitored to maintain compliance with the Robert T. Stafford Disaster Relief and Emergency Assistance Act as amended by the Disaster Mitigation Act of 2000 (Public Law 106-390-October 30, 2004); and all related laws and regulations.

E. PARTICIPANTS IN THE PLANNING PROCESS

The participants in the development of this Plan are listed in the following table.

NAME	AGENCY/JURISDICTION
Bill Carey	El Dorado County Building Department
Tom Celio	El Dorado County Department of Transportation
Steven Hust	El Dorado County Planning Department
Captain George Nielsen	City of Placerville – Police Chief
Mike Chandler	City of South Lake Tahoe – Fire Chief
Sgt. Marty Hackett	Sheriff's Office of Emergency Services
Deputy Scott Stewart	Sheriff's Office of Emergency Services
Captain Mike Scott	City of Placerville – Police Department
	El Dorado Irrigation District
	Sacramento Metropolitan Utilities District

F. DESCRIPTION OF THE PLANNING PROCESS

El Dorado County utilized the process recommended by the California Office of Emergency Services (OES) to develop this Plan. Following is the steps that were undertaken:

1. Hazard Identification and Analysis

2. Vulnerability/Risk Assessments

3. Mitigation Capabilities Assessment

4. Mitigation Strategy

5. Mitigation Action Plan, Implementation and Plan Maintenance

Step 1, *Hazard Identification and Analysis,* describes and analyzes the natural hazards present in El Dorado County that can threaten human life and damage property. It includes historical data on past hazard occurrences, and establishes hazard profiles.

I. INTRODUCTION

This section provides a general introduction to the El Dorado County Hazard Mitigation Plan. It is broken down into the following six sections:

A. Background

B. Purpose

C. Scope

D. Authority

E. Participants in the Planning Process

F. Description of the Planning Process

A. BACKGROUND

Natural hazards, such as floods, tornadoes and hurricanes, are a part of the world around us. Their occurrence is natural and inevitable, and there is little we can do to control their force and intensity. However, through *hazard mitigation planning*, we can control what comes afterward. By minimizing the impact of natural hazards upon our built environment, we can prevent such events from resulting in disasters.

"**Hazard mitigation**" is simply a technical term for reducing risks to people and property from natural hazards. It includes both structural measures, such as protecting buildings and infrastructure from the forces of wind and water, and non-structural measures, such as natural resource protection and wise floodplain management. These activities can target existing development or seek to protect future development by avoiding any new hazardous construction. It is widely accepted that the most effective mitigation measures are implemented at the local government level, where decisions on the regulation and control of development are ultimately made.

The easiest way a community can get serious about hazard mitigation is through the development and adoption of a local **hazard mitigation plan**. A mitigation plan will ensure that measures to reduce the present and future vulnerability of a community are thoroughly considered before, during, and after the next disaster strikes.

Mitigation planning offers many benefits that include:

- saving lives and property;
- saving money;
- speeding recovery following disasters;
- reducing future vulnerability through wise development / redevelopment;
- expediting both pre-disaster and post-disaster grant funding; and
- demonstrating a firm commitment to improving community health and safety.

Recently, both the State of California and the U.S. Congress made the development of a hazard mitigation plan a specific eligibility requirement for any local government applying for mitigation grant funding. Communities with an adopted plan will therefore become "pre-positioned" and more apt to receive any available mitigation funds. This requirement also

applies to all forms of “local government” which has been defined by the Federal Emergency Management Administration (FEMA) to include counties, cities, school districts, special districts, Indian tribes, and other small and large governmental entities. Based on that broad requirement, the State Office of Emergency Services (OES) and FEMA have encouraged multi- jurisdictional hazard mitigation plans, and this plan has bee designed to serve a multi-jurisdictional function. Besides the County of El Dorado, this plan serves the jurisdictions of the Cities of South Lake Tahoe and Placerville, El Dorado Irrigation District, El Dorado County Office of Education, Los Rios Community College District . Later versions of this plan may also include other jurisdictions, because broadening the multi-jurisdictional function is the intention of El Dorado County.

Mitigation planning has the potential to produce long-term and recurring benefits by breaking the repetitive cycle of disaster loss. A core assumption of mitigation is that current dollars invested in mitigation practices will significantly reduce the demand for future dollars by lessening the amount needed for emergency recovery, repair and reconstruction. Further, these mitigation practices will enable local residents, businesses and industries to re-establish themselves in the wake of a disaster, getting the community economy back on track sooner and with less interruption.

Mitigation planning will also lead to benefits that go beyond solely reducing hazard vulnerability. Measures such as the acquisition or regulation of land in known hazard areas can help achieve multiple community goals, such as preserving open space, maintaining environmental health and natural features, and enhancing recreational opportunities.

El Dorado County, with a population of 168,822 persons, is located in a region of California that is particularly vulnerable to the effects of a range of natural hazards. These hazards threaten the life and safety of County residents, and have the potential to damage or destroy both public and private property and disrupt the local economy and overall quality of life. The County government, its residents and businesses have in fact suffered disaster losses in years past that resulted in significant property damage and the loss of life.

El Dorado County has an established commitment to reducing the potential for future disaster losses. With the majority of the County land area owned or controlled by Federal agencies, there is a large amount of development within or proximate to the public forests. Development in proximity to the higher elevations, steeper slopes, and within the wildland/urban interface places structures and residents close to fire prone lands, and far from fire protection units, water supplies and other services. There are numerous successful efforts to work with private landowners and public agencies to reduce the potential for catastrophic fires and aid evacuation planning. There are also a significant number of policies and programs identified in the El Dorado County General Plan to carefully plan development projects in light of the hazards, and promote safe, thoughtful growth.

In an effort to sustain this local commitment to hazard mitigation, El Dorado County has prepared this first version of a Hazard Mitigation Plan (2004). At its most inner core, the Plan recommends specific actions to combat the forces of nature and protect its residents from hazard losses. These actions go beyond simply recommending localized solutions to reduce existing vulnerability, such as fuel reductions and fire break projects. Local policies on community growth and development, incentives for natural resource protection, and public awareness and outreach activities are examples of other actions considered to

reduce El Dorado County's future vulnerability to natural hazards. The Plan has been designed to be a living document with implementation and evaluation procedures included to help achieve meaningful objectives and successful outcomes.

B. PURPOSE

The purpose of this Hazard Mitigation Plan is:

- To protect life, safety and property by reducing the potential for future damages and economic losses that result from natural hazards;
- To qualify for additional grant funding, in both the pre-disaster and post-disaster environment;
- To speed recovery and redevelopment following future disaster events;
- To demonstrate a firm local commitment to hazard mitigation principles; and
- To comply with both state and federal legislative requirements for local hazard mitigation plans.

C. SCOPE

This Hazard Mitigation Plan will be maintained to fully address the hazards determined to be "high risk" and "moderate risk." Other hazards will be considered, but are not required to be fully addressed within this Plan.

The geographic scope for the Hazard Mitigation Plan includes all unincorporated areas of El Dorado County, as well as the area encompassed by the boundaries of all of the participating jurisdictions. As a multi-jurisdictional plan, each of the participating agencies will also address specific or unique hazards to their jurisdiction in an appendix to the overall plan.

D. AUTHORITY

This Hazard Mitigation Plan has been adopted by the El Dorado County Board of Supervisors. This Plan has been developed to be in accordance with current rules and regulations governing local hazard mitigation plans. The Plan shall be routinely monitored to maintain compliance with the Robert T. Stafford Disaster Relief and Emergency Assistance Act as amended by the Disaster Mitigation Act of 2000 (Public Law 106-390 – October 30, 2000); and all related laws and regulations.

E. PARTICIPANTS IN THE PLANNING PROCESS

The participants in the development of this Hazard Mitigation Plan included the persons listed in the following table, who have participated in or attended meetings of the El Dorado County *Mitigation Plan Advisory Committee*. Those who are acting as the principal representatives of the participating jurisdictions are noted with an asterisk.

Name	**Agency /Community**
Bill Carey *	El Dorado County Building Department
Tom Celio *	El Dorado County Department of Transportation
Steven Hust *	El Dorado County Planning Department
Chief George Nielsen*	City of Placerville – Police Department
Captain Mike Scott	City of Placerville – Police Department
Mike Chandler *	City of South Lake Tahoe – Fire Department
Sgt. Marty Hackett	Sheriff's Office of Emergency Services
Deputy Scott Stewart *	Sheriff's Office of Emergency Services
Mike Bristow *	El Dorado Irrigation District
Selby Mohr *`	Sacramento Municipal Utilities District
Jim Wassner	El Dorado County Building Department
Richard Englefield	El Dorado County Fire Safe Council
Joe Molhoek	United States Forest Service
Suzi Todd	California Department of Forestry – Pioneer Fire Dist.
Gene Murphy	Consulting Forester
Vicky Yorty *	El Dorado County Fire Safe Council
Kathy Daniels *	El Dorado County Office of Education
Allan Jaeger	Golden West Community Services District
Kathy Daniels	El Dorado County Office of Education
Debbie Turner	Los Rios Community College District

F. DESCRIPTION OF THE PLANNING PROCESS

El Dorado County utilized the process recommended by the California Office of Emergency Services (OES) to develop this Hazard Mitigation Plan. In short, the process included the following steps, listed in the order in which they were undertaken:

1. Hazard Identification and Analysis
2. Community Vulnerability Assessment
3. Mitigation Capabilities Assessment
4. Mitigation Strategy
5. Mitigation Action Plan and Implementation Program

Step 1, the *Hazard Identification and Analysis,* describes and analyzes the natural hazards present in El Dorado County that can threaten human life and damage property. It includes historical data on past hazard occurrences, and establishes hazard profiles.

Step 2, the *Community Vulnerability Assessment,* was completed predominantly through investigative research along with the use of geographic information system (GIS) technology and best available data. It includes tabular and narrative descriptions on community characteristics, such as El Dorado County's geographic, economic and demographic profiles, and discusses future development trends and implications for hazard vulnerability. To graphically depict hazard vulnerability, this section also includes community vulnerability assessment maps. Also included is a qualitative risk index based upon hazard frequency, magnitude and impact. Conclusions of both the quantitative and qualitative nature of risk and vulnerability form the basic foundation for concentrating and prioritizing mitigation efforts.

Step 3, the *Mitigation Capabilities Assessment,* provides a comprehensive examination of El Dorado County's capacity to implement meaningful mitigation strategies, and identifies existing opportunities for program enhancement. Capabilities addressed in this section include staff and organizational capability, technical capability, policy and program capability, fiscal capability, legal authority and political willpower. The purpose of this assessment is to identify any existing gaps, weaknesses or conflicts in local programs/activities that may hinder mitigation efforts, or to identify those local activities that can be built upon in establishing a successful community hazard mitigation program.

The conclusion of these three background studies results in the formation of community goal statements (Step 4) and sets the stage for developing, adopting and implementing a meaningful Hazard Mitigation Strategy (Step 5) for El Dorado County. These two steps help make the Plan strategic and functional for implementation purposes, and ultimately are the "action" components of the plan. Following the completion of Step 5, El Dorado County concentrated on designing measures to ensure the Plan's ultimate implementation, and adopted evaluation and enhancement procedures to ensure the Plan is routinely updated.

Meetings

Initial training of key County staff members took place in May 2004, followed by a meeting of County staff to assign principal roles and responsibilities. Another pre-planning meeting

took place between the County OES, Planning, Building, Department of Transportation, El Dorado Irrigation, Environmental Management, and City of Placerville staff members on May 13, 2004, where the initial scheduling of events was discussed, resulting in assignments being set:

1. May 13, 2004: Initial meeting of all interested jurisdictions, agencies, and public. Invitations were mailed to all known forms of "local government" in the County, plus all known interested agencies or parties.

   Subject: Introduction of the need for a local hazard mitigation plan, outline of the requirements necessary to gain approval of such a plan, and an invitation to all local government jurisdictions in the County to participate in a multi-jurisdiction plan. Assignments were made to various agencies for submitting drafts of each type of disaster handled by that agency at the end of August.

2. May, June, July 2004: Placed ads in all local newspapers requesting public input on hazard mitigation plan. Also, set up an e-mail address for the public to give input.

   Subject: Requesting public input on impact of local hazards such as wildfires, winter storms, earthquakes, dam failures and land slides, concerns, and measures that should be taken to prevent or lessen the effect.

3. August 31, 2004: An open meeting for all participating jurisdictions as well as interested parties.

   Subject: Discussed draft Plan submitted by the County agencies. The initial submission to be forwarded with the first portion of the draft plan to State OES is scheduled for the end of November.

4. El Dorado County Board of Supervisors adopted the Multi-Jurisdictional Hazard Mitigation Plan on Tuesday March 29, 2005. Jurisdictions participating in the development of the plan are:

El Dorado County Building Department
El Dorado County Department of Transportation
El Dorado County Planning Department
City of Placerville – Police Department
City of South Lake Tahoe – Fire Department
Sheriff's Office of Emergency Services
El Dorado Irrigation District
Sacramento Municipal Utilities District*
El Dorado County Fire Safe Council
United States Forest Service
California Department of Forestry – Pioneer Fire Dist.
Consulting Forester
El Dorado County Office of Education
Golden West Community Services District
Los Rios Community College District**

* Sacramento Municipal Utilities District was involved in the planning meetings; however, since they are located in Sacramento County, their information is provided to document the facilities that they have in El Dorado County. They are not included as a participant in this Hazard Mitigation Plan.

** Los Rios Community College District is located in Sacramento County, and is included in that Plan. Their information is included in this Plan since they own a facility in El Dorado County. They are not included as a participant in this Plan.

II Hazard Identification and Analysis

The United States and its communities are vulnerable to a wide array of natural hazards that threaten life and property. Due to the geographic characteristics of each location, not all of the typical hazards that may affect other parts of the United States, or even California, are a threat in El Dorado County. This Section will address all of the typical hazards that can be encountered throughout much of the United States, but only in detail for those that truly present a threat to El Dorado County's transportation infrastructure. Each of the primary hazards will be addressed first from a general, national perspective, followed by a local perspective. Where available, historical records will be used to help identify risk. Other analytical tools will also be used, whenever those are available. This section also provides maps that illustrate the location and spatial extent for those hazards within El Dorado County that have a recognizable geographic boundary (i.e., hazards that are known to occur in particular areas such as the 100-year floodplain). For those hazards not confined to a particular geographic area (such as earthquakes and storms), general information on their applicable intensity across the entire jurisdiction is provided.

This section provides a treatment for all of the typical natural hazards included on the list below. For each hazard, the general nature of the hazard will first be discussed, followed by a treatment of the local nature of that hazard. If that hazard is found in El Dorado County, and has the potential to affect the County's transportation infrastructure, then that treatment will be extensive, and include an assessment of the location and spatial extent of the event as well as best available data regarding the impact on the County.

- **Floods**
- **Dam/Levee Failure**
- **Stormwater**
- **Earthquakes, Sinkholes and Landslides**
- **Winter Storms**
- **Volcano**
- **Drought/Extreme Heat**
- **Erosion**
- **Severe Thunderstorms and Tornadoes**
- **Avalanche**
- **Wildfire**

Floods

General Description of Flooding Hazard from National Perspective

Flooding is the most frequent and costly natural hazard in the United States, a hazard that has caused more than 10,000 deaths since 1900. Approximately 90 percent of presidentially declared disasters result from natural hazard events with flooding as a major component.

Floods are generally the result of excessive precipitation, and can be classified under two categories: general floods, precipitation over a given river basin for a long period of time; and flash floods, the product of heavy localized precipitation in a short time period over a given location. The severity of a flooding event is determined by the following: a combination of stream and river basin topography and physical geography; precipitation and weather patterns; recent soil moisture conditions; and the degree of vegetative clearing.

General floods are usually long-term events that may last for several days. The primary types of general flooding include riverine, coastal, and urban flooding. Riverine flooding is a function of excessive precipitation levels and water runoff volumes within the watershed of a stream or river. Coastal flooding is typically a result of storm surge, wind-driven waves, and heavy rainfall produced by hurricanes, tropical storms, nor'easters, and other large coastal storms. Urban flooding occurs where man-made development has obstructed the natural flow of water and decreased the ability of natural groundcover to absorb and retain surface water runoff.

Entire communities lie underwater for days—and in some cases weeks—as a result of Hurricane Floyd, which impacted the East Coast in September 1999

Most flash flooding is caused by slow-moving thunderstorms in a local area or by heavy rains associated with hurricanes and tropical storms. However, flash flooding events can also occur from accelerated snow melt due to heavy rains, a dam or levee failure within minutes or hours of heavy amounts of rainfall, or from a sudden release of water held by an ice jam. Although flash flooding occurs often along mountain streams, it is also common in urbanized areas where much of the ground is covered by impervious surfaces. Flash flood waters move at very high speeds—"walls" of water can reach heights of 10 to 20 feet. Flash flood waters and the accompanying debris can uproot trees, roll boulders, destroy buildings, and obliterate bridges and roads.

The periodic flooding of lands adjacent to rivers, streams, and shorelines (land known as floodplain) is a natural and inevitable occurrence that can be expected to take place based upon established recurrence intervals. The recurrence interval of a flood is defined as the average time interval, in years, expected between a flood event of a particular magnitude and an equal or larger flood. Flood magnitude increases with increasing recurrence interval.

Floodplains are designated by the frequency of the flood that is large enough to cover them. For example, the 10-year floodplain will be covered by the 10-year flood and the 100-year floodplain by the 100-year flood. Flood frequencies such as the 100-year flood are determined by plotting a graph of the size of all known floods for an area and determining how often floods of a particular size occur. Another way of expressing the flood frequency is the chance of occurrence in a given year, which is the percentage of the probability of flooding each year. For example, the 100-year flood has a 1 percent chance of occurring in any given year. Table 11-1 shows flood damage values by fiscal year from a national perspective.

Table 11-1. National Flood Damage by Fiscal Year (October-September)

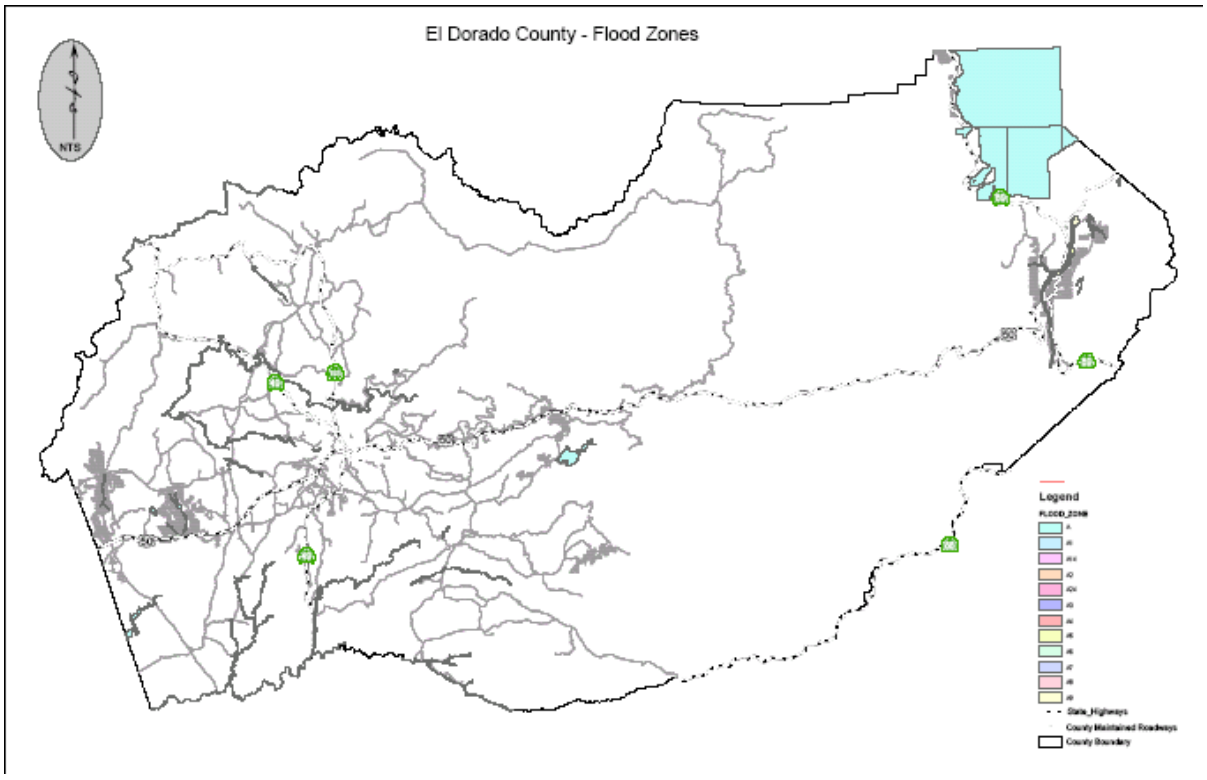
Fiscal Year	Damage (Thousands of Current Dollars)	Implicit Price Deflator	Damage (Millions Of 1995 Dollars)	U.S. Population (Millions)	Damage Per Capita (1995 Dollars)
1960	111,168	0.22620	491	180.671	2.72
1961	147,680	0.22875	646	183.691	3.51
1962	86,574	0.23180	373	186.538	2.00
1963	179,496	0.23445	766	189.242	4.05
1964	194,512	0.23792	818	191.889	4.26
1965	1,221,903	0.24241	5041	194.303	25.94
1966	116,645	0.24934	468	196.560	2.38
1967	291,823	0.25698	1136	198.712	5.71
1968	443,251	0.26809	1653	200.706	8.24
1969	889,135	0.28124	3161	202.677	15.60
1970	173,803	0.29623	587	205.052	2.86
1971	323,427	0.31111	1040	207.661	5.01
1972	4,442,992	0.32436	13698	209.896	65.26
1973	1,805,284	0.34251	5271	211.909	24.87
1974	692,832	0.37329	1856	213.854	8.68
1975	1,348,834	0.40805	3306	215.973	15.31
1976	1,054,790	0.43119	2446	218.035	11.22
1977	988,350	0.45892	2154	220.239	9.78
1978	1,028,970	0.49164	2093	222.585	9.40
1979	3,626,030	0.53262	6808	225.055	30.25
1980	No data	0.58145	0	227.225	0.00
1981	No data	0.63578	0	229.466	0.00
1982	No data	0.67533	0	231.664	0.00
1983	3,693,572	0.70214	5260	233.792	22.50
1984	3,540,770	0.72824	4862	235.825	20.62
1985	379,303	0.75117	505	237.924	2.12
1986	5,939,994	0.76769	7737	240.133	32.22
1987	1,442,349	0.79083	1824	242.289	7.53
1988	214,297	0.81764	262	244.499	1.07
1989	1,080,814	0.84883	1273	246.819	5.16
1990	1,636,366	0.88186	1856	249.464	7.44
1991	1,698,765	0.91397	1859	252.153	7.37
1992	672,635	0.93619	718	255.030	2.82
1993	16,364,710	0.95872	17069	257.783	66.22
1994	1,120,149	0.97870	1145	260.327	4.40
1995	5,110,714	1.00000	5111	262.803	19.45
1996	6,121,753	1.01937	6005	265.229	22.64
1997	8,934,923	1.03925	8597	267.784	32.11
1998	2,465,048	1.05199	2343	270.248	8.67
1999	5,450,375	1.06718	5107	272.691	18.73
2000	1,336,744	1.08960	1227	282.125	4.35
2001	7,158,700	1.11539	6418	284.797	22.54

Source: National Weather Service

Flood Hazard in El Dorado County

El Dorado County's flood potential is strongly affected by the physical geography of the County. Located on the western slope of the Sierra Nevada and in an area of moderate

seasonal rainfall, the runoff characteristics of the watersheds strongly determine the possibility of flooding. The western areas of the county are made up mostly of rolling foothills. The eastern areas of the County are at higher elevations. The city of Placerville, the County Seat, is at about 2,000 feet above sea level, while the city of South Lake Tahoe is at about 6,500 feet elevation. Some mountain peaks in El Dorado County reach in excess of 10,000 feet. The elevation range for the County is 200 to 10,881 feet above sea level. Due to the elevation of much of the watersheds of El Dorado County, much of the precipitation is in the form of snowfall, which melts over a long duration with snow prevailing at the higher elevations long into the summer. The overall slope of the watersheds is relatively steep, and most of the higher elevations of the County is owned or controlled by Federal agencies, and therefore not subject to private ownership or development. The seven watersheds that form El Dorado County are Lake Tahoe, the upper Carson River, lower American River, North & South Forks of the American River, the upper Mokelumne River and the upper Cosumnes River. Most are dammed in the lower elevations along much of the streamcourses, and are mostly contained within government or special district ownership. Therefore, except for a few tributaries, the larger rivers and the immediate environs are not in areas where much private development can occur. In addition, due to the overall gradient of the streams and rivers, they reside within relatively steep canyons or valleys, where very little floodplain has been formed. The Federal Emergency Management Agency (FEMA) has published Flood Information Rate Maps (FIRM), which are available to local jurisdictions to indicate where modeling has shown the 100-year floodplains to be. The following graphic, Figure 11-2 indicates where the 100-year floodplains exist in El Dorado County.



There have been examples of localized flash flooding, particularly where development has occurred in the watersheds without adequate improvement of drainage systems to

accommodate the reduced infiltration and increased runoff that usually results. This typically occurs in the urbanized areas where there has been minor floodplain formation, or where natural runoff is blocked by inadequate culverts or other obstacles. These flash flooding events are directly related to significant rainfall events, usually during the winter or spring rainy season. Therefore, all further discussion of localized or flash flooding will be addressed under the heading of "storms" rather than floods.

Dam/Levee Failure

General Description of Dam/Levee Hazard from National Perspective

Worldwide interest in dam and levee safety has risen significantly in recent years. Aging infrastructure, new hydrologic information, and population growth in floodplain areas downstream from dams and near levees have resulted in an increased emphasis on safety, operation and maintenance.

There are about 80,000 dams in the United States today, the majority of which are privately owned. Other owners include state and local authorities, public utilities, and federal agencies. The benefits of dams are numerous: they provide water for drinking, navigation, and agricultural irrigation. Dams also provide hydroelectric power, create lakes for fishing and recreation, and save lives by preventing or reducing floods.

Dam failure can result from natural events, human-induced events, or a combination of the two. Failures due to natural events such as hurricanes, earthquakes or landslides are significant because there is generally little or no advance warning. The most common cause of dam failure is prolonged rainfall that produces flooding.

Though dams have many benefits, they also can pose a risk to communities if not designed, operated, and maintained properly. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and great property damage if development exists downstream of the dam. If a levee breaks, scores of properties are quickly submerged in floodwaters and residents may become trapped by this rapidly rising water. The failure of dams and levees has the potential to place large numbers of people and great amounts of property in harm's way.

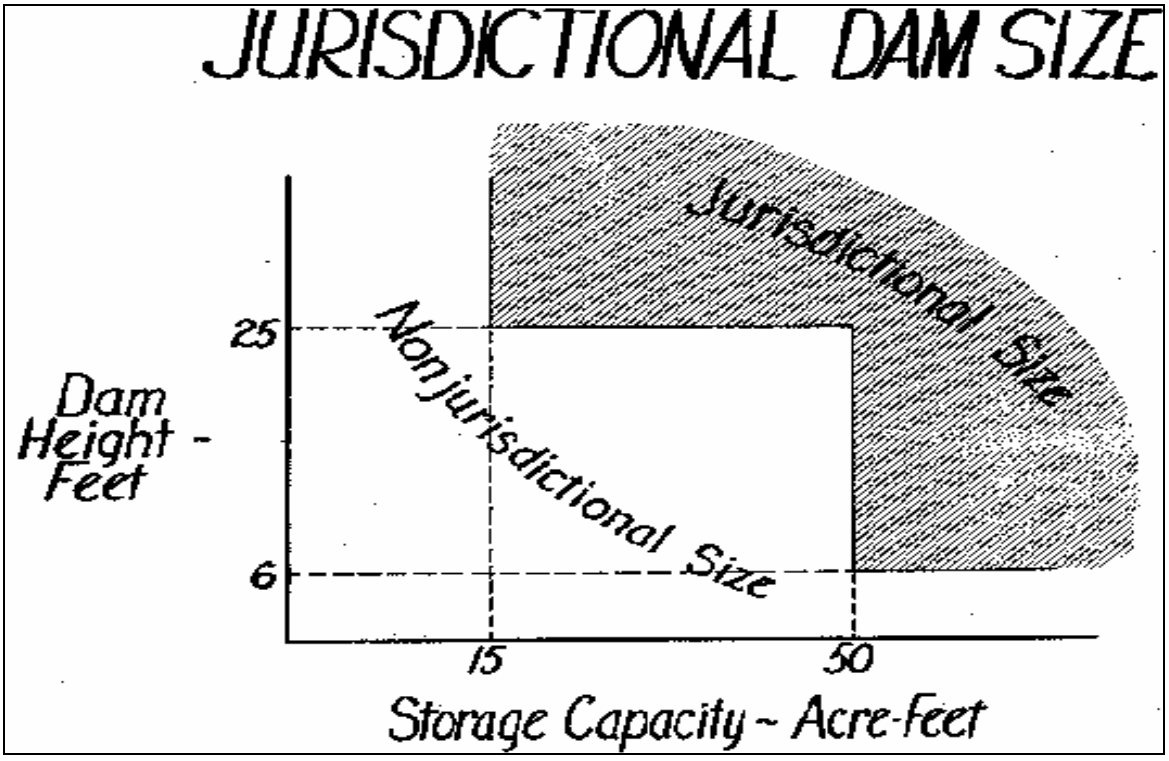
Dam/Levee Failure Hazard in El Dorado County

El Dorado County has a significant number of large and small dam structures with impoundments, but no levees. Therefore, only the potential for dam failure will be considered further.

There is an historical record since the Gold Rush days of the mid 19th Century of the construction and use of dams as water reservoirs. During the Gold Rush, the water was used primary to wash placer gold deposits from the stream sediments, particularly during the

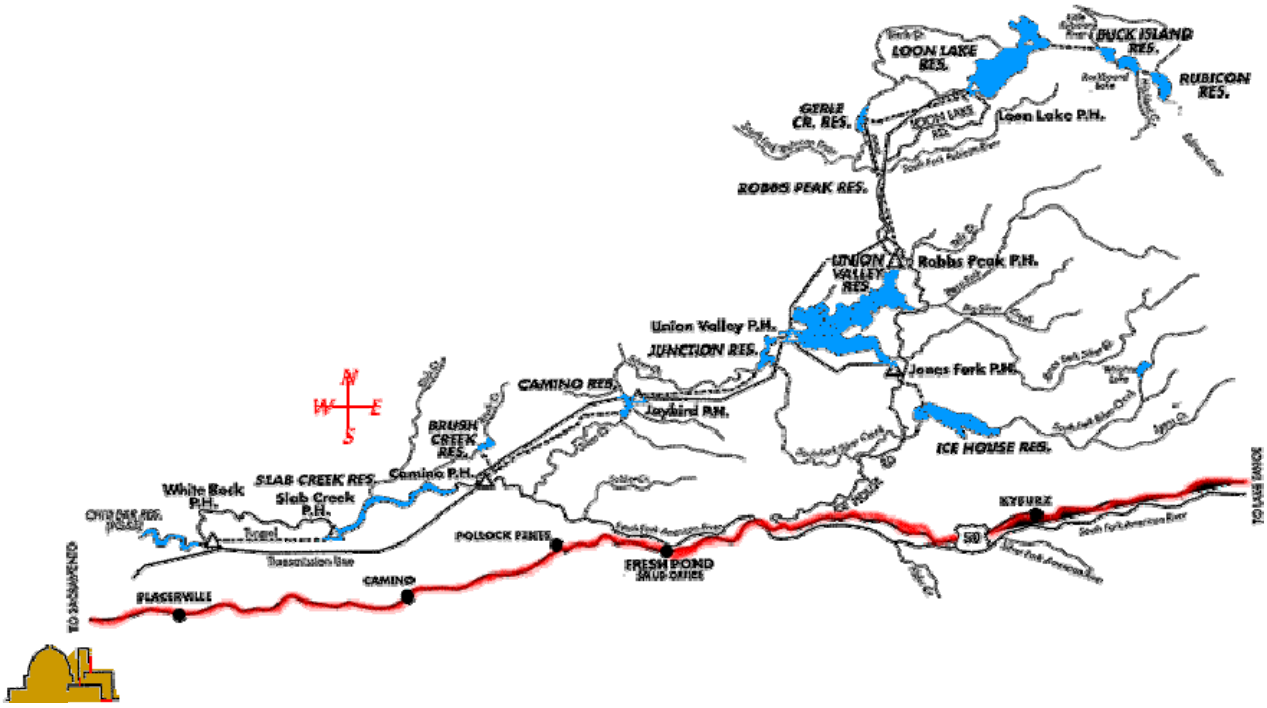
summer months in the lower elevations when surface water was not normally available. Many of the dams were constructed of logs and other primitive construction, and there were failures of some of the impoundments with castastrophic results including loss of lives and property. Although remnants of the miners' water delivery system of canals and reservoirs are still in service, all of the impoundments have been subjected to modern engineering and regulation, and are no more prone to failure than any other dam and impoundment. The State Division of Safety of Dams regulates the construction, maintenance, and overall safety of all substantial impoundments that meet the minimum jurisdictional size threshold. The following graphic, Figure 11-3 shows the jurisdictional size:

Figure 11-3. Chart Indicating Jurisdictional Dam Size



There are a significant number of dams in El Dorado County. These range from dams creating large reservoirs intended to provide sources for irrigation, water supply, or power generation, to smaller impoundments which are part of water distribution or treatment systems or intended to provide a recreational amenity for visitors or residents. The following Figure 11-4 shows the distribution of all of the larger impoundments found in El Dorado County and many of the smaller dams as well.

Figure 11-4 Location of :Larger Impoundments in El Dorado County



The modern design standards for dams include significant safety factors that make dam failure a very low risk.

Flood/Dam Failure and Inundation Hazard in El Dorado County

Flood hazards that may occur in El Dorado County include flooding caused by precipitation, dam failure, and seismic activities. Flooding hazards associated with the increase in development are discussed in this subsection. A flood has many implications for public safety. Hazards and damage caused by flooding includes loss of life, displacement or complete destruction of buildings, siltation, temporary loss of utilities, road and bridge damage resulting in transportation slowdowns, loss of goods and services, and the threat of waterborne diseases. Additionally, significant private and public costs are associated with flooding, particularly in urban areas.

In this subsection, the proposed policies and existing regulations are assessed for their effect on reducing impacts related to flooding and seiches. The land use map for the General Plan were evaluated for the maximum land use density allowed within the 100-year floodplain and dam inundation areas, and the resulting potential for flood hazards area assessed in consideration with the General Plan policies and existing laws, regulations, and programs. The existing conditions, including existing laws, regulations, and programs, are discussed below.

Physical Environment

Flooding

Flood hazards can result from intense rain, snowmelt, cloudbursts, or a combination of the three, or from failure of a water impoundment structure, such as a dam. Floods from rainstorms generally occur between November and April and are characterized by high peak flows of moderate duration. Snowmelt floods combined with rain have larger volumes and last longer than rain flooding.

Flood-Prone Areas

Because of a lack of extensive low-lying areas and a great deal of upland areas, the majority of El Dorado County is not subject to flooding. The primary flood-prone areas on the west slope of the County are the following: South Fork, American River from Kyburz to Riverton and below Chili Bar Dam; Coloma Canyon Creek between Greenwood and Garden Valley; Weber Creek from Placerville to the American River, including Cold Springs, Dry; Creek, and Spring Creek tributaries; Shingle Creek from Shingle Springs to the Amador County line; Deer Creek from Cameron Park to Sacramento County line; Big Canyon Creek from El Dorado to the Cosumnes River, including the Slate, Little; Indian, and French Creek tributaries; New York Creek; Middle Fork of the Cosumnes River within the Somerset-Fairplay vicinity, and its confluence with the North Fork of the Cosumnes River; Cedar Creek from Omo Ranch to the Cosumnes River (FEMA 1996; Maurer, pers. comm., 2003)

Flood Control

Historically, the emphasis for flood management in California has been to control the flow of water. These types of flood control projects have included the construction of reservoirs in upstream areas to retain and gradually release water, the construction of levees to confine water to the channel or designated area, the improvement of channels to increase their water carrying capacity, and the establishment of bypasses or diversions.

There are no dams dedicated to flood control on the west slope or in the Lake Tahoe Basin. All existing reservoirs in El Dorado County are operated for power generation or water storage, not flood control purposes. There is only one known levee in El Dorado County (in El Dorado Hills near Carson Creek). However, this levee is privately owned and it is unknown whether this levee is certified for flood control purposes.

Dam Failure

A dam failure can occur as the result of an earthquake, as an isolated incident because of structural instability, or during heavy runoff that exceeds spillway design capacity. According to the California Department of Water Resources (DWR), El Dorado County does not have a history of major dam failure. Nine dams located within the County have been identified as having the potential of inundating habitable portions of the County in the unlikely event of dam failure. These nine dams are Echo Lake Dam (El Dorado Irrigation District [EID]), Union Valley Dam (Sacramento Municipal Utility District [SMUD]), Ice House Dam (SMUD), Chili Bar Reservoir (Pacific Gas and Electric Company [PG&E]), Stumpy Meadows Dam (Georgetown Divide Public Utility District [GDPUD]), Weber Creek Dam (EID), Slab Creek Dam (SMUD), Loon Lake Auxiliary Dam (SMUD), and Blakely Dam (EID). In addition to these nine dams, the Caples Lake Dam (EID) and the Cameron Park Lake/Warren Hollister Dam (EID) have been identified by the County as having considerable

potential to inundate inhabited areas in the unlikely event of dam failure. The maps showing the locations and inundation areas of these dams can be found at the County Office of Emergency Services.

Seiche

A seiche is an earthquake-generated wave in an enclosed body of water, such as a lake, reservoir, or bay. A small (0.4-foot) wave surge was reported in Lake Tahoe during the 1966 Truckee earthquake, which had a Richter Scale magnitude of between 6.0 and 6.9.

Regulatory/Planning Environment

Federal Regulations

National Flood Insurance Act (1968)

The National Flood Insurance Act established the National Flood Insurance Program (NFIP), a federal program administered by FEMA. The NFIP enables property owners in participating communities to purchase insurance as protection against flood losses in exchange for state and community floodplain management regulations that reduce future flood damages. Participation in the NFIP is based on an agreement between communities and the federal government.

National Dam Safety Program Act (1972)

The National Dam Safety Program was established in 1972 and is administered by FEMA. The primary purpose of the program is to provide financial assistance to the states for strengthening their dam safety programs.

Dam Safety and Security Act (2002)

The Dam Safety and Security Act was enacted to assist states in improving their dam safety programs, to support increased technical training for state dam safety engineers and technicians, to provide funding for dam safety research, and to maintain the National Inventory of Dams (ASDSO 2003).

State Regulation

Dam Safety Act

The Dam Safety Act was passed to establish procedures for emergency evacuation and control of populated areas below dams. The Dam Safety Act provides for the development of inundation maps by dam owners, map approval by OES, and development of emergency procedures by local governments to evacuate and control the risk areas. Emergency regulations to implement the Dam Safety Act became effective on April 2, 2002. These regulations require owners of state jurisdictional dams to file inundation maps and studies, and they include provisions for noncompliance that may include referral of the matter to the office of the Attorney General (EDCOES 2002).

County Ordinance and Plan

Flood Damage Prevention Ordinance (1986)

The County has enacted a floodplain ordinance that is compatible with FEMA guidelines in order to regulate development within the 100-year floodplain. This ordinance is applied in conjunction with the County's Zoning Ordinance. Under the Flood Damage Prevention Ordinance, development within the 100-year floodplain may occur; however, certain engineering and zoning standards apply in order to reduce injury and loss of life, to reduce structural damage caused by flooding, and to reduce public expenditures for additional flood control structures. Development within the floodway is also prevented unless no increase in flood elevation would result from the development.

Multi-Hazard Functional Emergency Operations Plan (1993)

The County's Emergency Operations Plan contains dam failure plans for those dams that qualify for mapping. The individual dam facility plans located at the County Department of Emergency Services include a description of the dams, direction of flood waters, responsibilities and actions of individual jurisdictions, and evacuation plans. The Emergency Operations Plan also contains response plans for floods resulting from periods of high rainfall or rapid snowmelt, which can cause flooding in the 100-year floodplain.

Agencies and Organizations

Federal Agencies

Federal Emergency Management Agency

As discussed above, FEMA administers the NFIP. FEMA also prepares the Flood Insurance Rate Maps (FIRMs).

Floodplain Designation and Mapping

The boundary of the 100-year floodplain is the basic planning criterion used to demarcate unacceptable public safety hazards. The 100-year floodplain boundary defines the geographic area having a 1% chance of being flooded in any given year. All streams are subject to areas within the 100-year flow and therefore, have a 100-year floodplain. However, many minor and intermittent streams do not have current FIRMs. Outside these boundaries, the degree of flooding risk is not considered sufficient to justify the imposition of floodplain management regulations. Some level of regulation is desired to protect public health, safety, and welfare within the 100-year floodplain.

The 100-year floodplain is divided into a floodway and floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that should be kept free of development so that the 100-year flood can pass through without an obstruction that would result in substantial increase in flood heights. Development within the floodway reduces the channel's floodwater carrying capacity, increases flood heights, and increases flood hazards beyond the border of the floodway. As a minimum standard, FEMA limits any increase in flood heights within the floodway to 1.0 foot or less provided that hazardous water velocities do not result from the increase in flood height.

The area between the floodway and the boundary of the 100-year floodplain is termed the floodway fringe and encompasses the portion of the floodplain that could be used for development without increasing the surface elevation of the 100-year flood more than 1.0 foot at any point.

Different development standards may be formulated for the floodway and the floodway fringe. These standards have two functions. First, they are designed to minimize loss of life and property damage by controlling the types of land uses permitted and by prescribing certain construction methods. Second, they are intended to preserve the ability of the floodway to discharge the 100-year flood. Failure of floodplain regulations to recognize this latter function by prohibiting encroachment of the floodway would result in an increase in the geographic area of the 100-year floodplain.

National Flood Insurance Program

El Dorado County is a participant in the NFIP, and, as required, the County has implemented an ordinance for 100-year flood protection. The U.S. Army Corps of Engineers (USACE), under contract to FEMA, prepared a flood insurance study report and a series of FIRMs that depict the location of the calculated 100-year flood, flood elevations, floodways, 500-year flood boundaries, and flood insurance rate zones. The most current land use information available at the time of the FIRM preparation, such as land use designation, are typically used to determine the maximum development density potential, which is used to estimate the peak flow and model the flood elevation.

The latest FIRM for El Dorado County was completed in 1995. The County participates in the NFIP by reviewing specific development proposals to ensure that structures that may be in a 100-year floodplain are protected from flood damages and that any changes in the floodplain do not cause unacceptable increases in the elevation of the 100-year water surface.

U.S. Army Corps of Engineers

The USACE assists FEMA in providing emergency response for floods. The USACE also inspects and inventories dams throughout the United States in its National Inventory of Dams.

National Inventory of Dams

The National Inventory of Dams currently includes information on approximately 77,000 dams throughout the United States that fit the following criteria: High Hazard Potential class dam; Medium[1] Hazard Potential class dam; Low Hazard Potential class dam that exceeds 25 feet in height and 15 acre-feet (af) storage; and Low Hazard Potential class dam that exceeds 50 af storage and 6 feet height.

Currently there are 59 dams in El Dorado County that are listed in the National Inventory of Dams. Of these, nine dams in the County are classified as High Hazard Potential and 35 dams are classified Medium Hazard Potential. This does not suggest dams will fail; only that if they do they could result in inundation hazards. In addition, one dam in Amador County classified as a High Hazard Potential class dam may inundate inhabitants in El Dorado

County in the unlikely event of a dam failure.

State Agency

California Department of Water Resources Division of Dam Safety

The principal goal of the DWR Division of Dam Safety is to avoid dam failure and thus prevent loss of life and destruction of property. Finnon Dam has been identified by the Division of Dam Safety as potentially susceptible to damage from a seismic event because of its hydraulic fill construction method. After the San Fernando Earthquake of 1971, all dams of this construction type were flagged for review and inspection.

Regional Agencies

American River Authority

The American River Authority was established through a Joint Powers Agreement, made and entered into on June 8, 1982, between the County, Placer County, the El Dorado County Water Agency (EDCWA), and Placer County Water Agency. A Board of Directors conducts the business of the American River Authority. The purpose of the American River Authority Joint Powers Agreement is to study all water development project opportunities on the American River between Placer County Water Agency's Middle Fork American River Project and Folsom Lake. Collectively, the efforts described above comprise what is referred to as the American River Project.

Local Organizations and Agency

El Dorado County Sheriff Office of Emergency Services

The County's Office of Emergency Services, which is managed by the County Sheriff's Office, collaborates with the County's fire districts, emergency medical services agency, hospitals, schools, and public and private agencies to prepare, update, and implement the County's Emergency Operations Plan, which includes emergency response plans for flood and dam failure events. The County Office of Emergency Services also maintains emergency plans for dams that are prepared by utility companies (EDCOES 1994).

El Dorado County Department of Transportation

As a part of the County Department of Transportation's ongoing program to develop a Capital Improvement Program (CIP) for drainage infrastructure, FEMA mapping has been updated for four specific drainages in the County: Deer Creek in Cameron Park, New York Creek in El Dorado Hills, Carson Creek in the El Dorado Hills Business Park, and the El Dorado Townsite. These drainage studies help to identify potential flood-prone areas and may be used to refine FEMA maps during subsequent FIRM updates.

South Fork of the American River Watershed Group

The mission of the South Fork of the American River Watershed Group is to protect and improve the health and condition of the South Fork of the American River watershed through stewardship and education to a measurable extent. With assistance from the County and

Georgetown Divide Resource Conservation District, the group will coordinate with federal, state, and local government agencies, neighboring watershed groups, local community organizations, and private individuals to develop a Watershed Management Plan and Stewardship Strategy for the watershed (SFARWG 2002).

Cosumnes River Task Force

The primary purpose of the Cosumnes River Task Force is to develop a Coordinated Resource Management Plan that stakeholders can use as a guide to identify resource concerns, plan and implement improvements, and collaborate on common goals to improve watershed health and flood management (CRTF 2002).

STORMWATER SYSTEMS

Physical Environment

Drainage Basins

The west slope of El Dorado County contains three major watersheds, each of which drains into one of these major rivers: the Middle Fork American River, the South Fork American River, and the Cosumnes River. These watersheds are further divided into smaller drainage basins that feed the tributaries of these three major rivers. Developed drainage infrastructure exists in many of the drainage basins, particularly in the following nine drainage basins (Spiegelberg, pers. comm., 2003): Coloma Canyon between Greenwood and Garden Valley (7.5 square miles); Finnon Reservoir drainage (4 square miles); Weber Creek from the Pollock Pines area to the American River, including the Cold Springs, Dry Creek, and Spring Creek tributaries (40 square miles); Deer Creek from Cameron Park to the Sacramento County line (72 square miles); Big Canyon Creek from El Dorado to the Cosumnes River, including the Slate, Little Indian, and French Creek tributaries (36 square miles); Middle Fork of the Cosumnes River within the Somerset/Fairplay vicinity (23 square miles); Cedar Creek from Omo Ranch to the Cosumnes River (37 square miles); Jenkinson Reservoir drainage (18 square miles); New York Creek (2.6 square miles); and Allegheny Creek (1.9 square miles).

Stormwater Hazards

Flooding is the primary hazard related to stormwater runoff. Urban development generally increases the amount of impervious surfaces. When rainfall or snowmelt exceeds the ground infiltration rate (i.e., the ability of the ground to absorb water), stormwater runs off and collects in drainage facilities, which may be in the form of roadways, storm drains, and natural creeks and rivers. The net effects of additional impervious surfaces are increases in the flow rate and volume of water in the drainage channels during and after a storm event. When the volume of water exceeds the capacity of the drainage channel to convey water, flooding can result. Hazards associated with localized flooding include the overtopping of roadways, inundation of areas near the drainage channels, and structural damage. Stormwater runoff may also contribute to regional flooding.

Other problems connected with increased stormwater runoff include erosion, sedimentation, and degradation of water quality. Stormwater can become polluted by eroded soil, pesticides, paint, fertilizers, animal waste, litter, oil and other automotive fluids, and

household chemicals. Increased stormwater runoff can increase erosion and facilitate the movement of pollutants and soils into bodies of water. Increased sedimentation may be a detriment to aquatic wildlife habitats, and the use of downstream water bodies for beneficial uses (e.g., recreation, irrigation, water consumption) may be impaired (EMD 2002a).

Regulatory/Planning Environment

Federal Programs

National Flood Insurance Program

El Dorado County participates in the National Flood Insurance Program (NFIP), a federal program administered by the Federal Emergency Management Agency (FEMA). Under the NFIP, the County is required to regulate for 100-year flood protection. A 100-year flood is considered a severe flood with a reasonable possibility of occurrence for purposes of land use planning, property protection, and human safety. The U.S. Army Corps of Engineers (USACE), under contract to FEMA, prepared a flood insurance study report and a series of Flood Insurance Rate Maps (FIRMs) for numerous county waterways. The study and maps depict the location of calculated 100-year flood zones, flood elevations, floodways, 500-year flood boundaries, and flood insurance rate zones. The County participates in the NFIP by reviewing specific development proposals to ensure that structures that may be in a 100-year floodplain are protected from flood damage and that any changes in the floodplain do not cause unacceptable increases in the elevation of the 100-year water surface (HDR Engineering 1995).

National Pollutant Discharge Elimination System

The National Pollutant Discharge Elimination System (NPDES) permit program was established by the Clean Water Act of 1972 to regulate municipal and industrial discharges to surface waters of the United States. The discharge of wastewater to surface waters is prohibited unless an NPDES permit allowing that discharge has been issued. The NPDES permit program is overseen by the U.S. Environmental Protection Agency's (EPA's) stormwater program; the State of California is authorized to administer the NPDES program within California. Starting in 1990, Phase I of EPA's stormwater program required NPDES permits for stormwater runoff from all of the following (EPA 2002): "medium" and "large" municipal separate storm sewer systems (MS4s) generally serving populations of 100,000 or greater and denoted by EPA as MS4s; construction activity disturbing 5 acres of land or greater, and ten categories of industrial activity.

Phase II of the NPDES permit program is the next step in EPA's effort to protect water resources from polluted stormwater runoff. The Phase II program expands the Phase I program by requiring smaller operators of MS4s in urbanized areas and operators of small construction sites, through the use of NPDES permits, to implement programs and practices to control polluted stormwater runoff (EPA 2002). The County has submitted an application for the NPDES Phase II permit and expects to obtain a permit in the near future.

State Regulations

Subdivision Map Act (1907)

One of the powers granted to local jurisdictions by the Subdivision Map Act is the authority to impose drainage improvements or drainage fees and assessments. Specifically, local urisdictions may require the provision of drainage facilities, proper grading and erosion control, dedication of land for drainage easements, or payment of fees needed for construction of drainage improvements. The types and applicable standards of the improvements may be specified in the local ordinance.

El Dorado County Regulation and Programs

County Grading, Erosion, and Sediment Control Ordinance

The County Grading, Erosion, and Sediment Control Ordinance (Grading Ordinance) (Chapter 15.14 of the County Code) establishes provisions for public safety and environmental protection associated with grading activities on private property. Section 15.14.090 of the Grading Ordinance, which has incorporated the recommended standards for drainage Best Management Practices (BMPs) from the High Sierra Resource Conservation and Development Council BMP guidelines handbook, prohibits grading activities that would cause flooding where it would not otherwise occur or would aggravate existing flooding conditions. The Grading Ordinance also requires all drainage facilities, aside from those in subdivisions that are regulated by the County's Subdivision Ordinance, be approved by the County Department of Transportation. Pursuant to the ordinance, the design of the drainage facilities in the County must comply with the County of El Dorado Drainage Manual, as described below.

El Dorado County Subdivision Ordinance

The County's Subdivision Ordinance (El Dorado County Code Title 16) requires the submission of drainage plans prior to the approval of tentative maps for proposed subdivision projects. The drainage plans must include an analysis of upstream, onsite, and downstream facilities and pertinent details, and details of any necessary offsite drainage facilities. The tentative map must include data on the location and size of proposed drainage structures. In addition, drainage culverts consistent with the drainage plan may be required in all existing drainage courses, including roads.

El Dorado County Department of Transportation Drainage Program

The County Department of Transportation has an ongoing drainage program with a goal of developing a Capital Improvement Program and funding mechanism for the construction of essential drainage infrastructure and to repair and/or replace inadequate drainage facilities throughout the county. The first phase of the drainage program, development of standard procedures for drainage system designs, was completed with the adoption of the *County of El Dorado Drainage Manual* in 1995.

The second phase of the drainage program involves updating FEMA mapping of four specific drainage basins in the county: Deer Creek in Cameron Park, New York Creek in El Dorado Hills, Carson Creek in the El Dorado Hills Business Park, and the El Dorado Townsite. Three of these basin studies have been completed and are discussed below. These basin studies provide area-specific analysis and identify areas where drainage improvements are required. The third phase of the drainage program is the development of funding mechanisms to address drainage problems in the study areas. With funding

mechanisms in place, capital improvement and maintenance programs can be implemented. The capital improvement program may establish methods of prioritizing existing and future drainage deficiencies and requirements with respect to potential damage, risk, and cost.

County of El Dorado Design and Improvement Standards Manual

The County's Design and Improvement Standards Manual was adopted in 1990 and provides required erosion and sediment control measures that are applicable to subdivisions, roadways, and other types of developments.

County of El Dorado Drainage Manual

The *County of El Dorado Drainage Manual* provides standard procedures for future designs of drainage improvements. The Drainage Manual supercedes the stormwater drainage system design standards in the County's *Design Improvements Standards Manual*. The Drainage Manual requires that a hydrologic and hydraulic analysis be submitted for all proposed drainage facilities. The analysis must include an introduction/background, location map/description, catchment description/delineation, hydrologic analysis, hydraulic and structural analysis, risk assessment/impacts discussion, unusual or special conditions, conclusions, and technical appendices. This analysis is usually required on projects undergoing discretionary review. However, under the Building Code and Grading Ordinance, the County also reviews ministerial development, including required drainage plans, to ensure that appropriate runoff design and controls are in place.

Drainage Basin Studies

Three regional drainage studies have been completed on the west slope. A study of the El Dorado townsite has not been completed.

Carson Creek Regional Drainage Study

The *Final Report of the Carson Creek Regional Drainage Study* (Bottorff 1996) was completed in 1996 for the 15-square-mile Carson Creek watershed, most of which is located in the southwestern portion of El Dorado County. The purpose of this drainage study is to provide a unified plan for stormwater management in the El Dorado County portion of the watershed. The study recognizes the drainage needs of individual projects, assesses the impacts of the proposed drainage improvements on the entire catchment area, and satisfies the requirements of the *County of El Dorado Drainage Manual*.

The Carson Creek Regional Drainage Study uses results from previous drainage studies within the watershed, as well as land use information and drainage improvements included in the previous studies, to develop a regional drainage model. The drainage study was based on the maximum development allowed by the 1996 General Plan, and development projects that were proposed at that time. The study assumes that the portion of the watershed in Sacramento County would remain as open space. The study concluded that runoff for the 100-year storm would result in minor downstream impacts in Sacramento County and that the increase in existing flood inundation areas would be negligible. The study recommended that future drainage improvements be designed and analyzed in context of the regional drainage model. Specific drainage improvements, such as culvert upgrades, channel improvements, and construction of a regional detention storage facility

were also recommended. (Bottorff 1996.)

New York Creek Basin Drainage Study

The New York Creek Basin Drainage Study (Ensign & Buckley 1995) analyzes the watershed of New York Creek and its Governor Drive tributary. Assumptions for future land uses within the watershed were based on data from the El Dorado Hills Specific Plan and the El Dorado Hills/Salmon Falls Area Plan. The study concluded that in order to minimize the overtopping of roadways during the 100-year peak flow condition, improvements would be required at eight roadway crossings across New York Creek and the Governor Drive tributary. Even with the construction of these improvements and regular maintenance activities (e.g., channel clearing), flooding and overtopping may occur at roadway crossings. This drainage study also included cost estimates for the recommended improvements.

Cameron Park Drainage Study

The Cameron Park Drainage Study analyzed the flooding potential of a 72-square-mile area in the upper reaches of Deer Creek in order to identify drainage channel improvements. The option of using detention to reduce peak flow was not analyzed. The General Plan land use map available during the preparation of the drainage study in 1995 was the source of future land use data in the Cameron Park Drainage Study, the hydrologic and hydraulic analyses of which were based on the full buildout of the watershed consistent with the land use designations. The study concluded that 16 roadway crossings at the buildout of the 1995 draft General Plan may experience overtopping during a 100-year storm event if culvert or detention improvements were not implemented. The study included recommended culvert improvements while also recommending further studies regarding using detention to reduce the peak flow. This drainage study also included cost estimates for the recommended culvert improvements (Psomas and Associates 1995). In practice, the potential for flooding may be less than identified by the study. The drainage study was based on the draft General Plan in 1995, which was similar to the 1996 General Plan. Discretionary developments in the study area subsequent to the drainage study have constructed detention improvements as required by the County's Drainage Manual (Pesses, pers. comm., 2003). Furthermore, some of the projects in the drainage study area have been built at lower densities than the maximum allowed, thereby decreasing the potential for flooding conditions (Spiegelberg, pers. comm., 2003).

El Dorado County Special Districts

California Government Code §25210 allows for the formation of county service areas in unincorporated areas, providing an alternative method of furnishing extended governmental services and the levy of taxes to pay for the extended services. The County has established Drainage Zones of Benefit, as well as Road and Drainage Zones of Benefit, that are managed by the County's General Services Department for the purpose of generating funding for the construction of community drainage facilities.

Worldwide interest in dam and levee safety has risen significantly in recent years. Aging infrastructure, new hydrologic information, and population growth in floodplain areas downstream from dams and near levees have resulted in an increased emphasis on safety, operation and maintenance.

Earthquakes, Sinkholes and Landslides

Earthquake

General Description of Earthquake Hazard from National Perspective

An earthquake is the motion or trembling of the ground produced by sudden displacement of rock in the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of caverns. Earthquakes can affect hundreds of thousands of square miles; cause damage to property measured in the tens of billions of dollars, result in loss of life and injury to hundreds of thousands of persons, and disrupt the social and economic functioning of the affected area.

Most property damage and earthquake-related deaths are caused by the failure and collapse of structures due to ground shaking. The level of damage depends upon the amplitude and duration of the shaking, which are directly related to the earthquake size, distance from the fault, site and regional geology. Other damaging earthquake effects include landslides, the down-slope movement of soil and rock (mountain regions and along hillsides), and liquefaction, in which ground soil loses the ability to resist shear and flows much like quick sand. In the case of liquefaction, anything relying on the substrata for support can shift, tilt, rupture, or collapse.

Most earthquakes are caused by the release of stresses accumulated as a result of the rupture of rocks along opposing fault planes in the Earth's outer crust. These fault planes are typically found along borders of the Earth's ten tectonic plates. These plate borders generally follow the outlines of the continents, with the North American plate following the continental border with the Pacific Ocean in the west, but following the mid-Atlantic trench in the east. As earthquakes occurring in the mid-Atlantic trench usually pose little danger to humans, the greatest earthquake threat in North America is along the Pacific Coast.

The areas of greatest tectonic instability occur at the perimeters of the slowly moving plates, as these locations are subjected to the greatest strains from plates traveling in opposite directions and at different speeds. Deformation along plate boundaries causes strain in the rock and the consequent buildup of stored energy. When the built-up stress exceeds the rocks' strength, a rupture occurs. The rock on both sides of the fracture is snapped, releasing the stored energy and producing seismic waves, generating an earthquake.

Earthquakes are measured in terms of their magnitude and intensity. Magnitude is measured using the Richter Scale, an open-ended logarithmic scale that describes the energy release of an earthquake through a measure of shock wave amplitude (see Table 11-5 below). Each unit increase in magnitude on the Richter Scale corresponds to a ten-fold increase in wave amplitude, or a 32-fold increase in energy. Intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale based on direct and indirect measurements of seismic effects. The scale levels are typically described using roman numerals, with a I corresponding to imperceptible (instrumental) events, IV corresponding to moderate (felt by people awake), to XII for catastrophic (total destruction). A detailed description of the Modified Mercalli Intensity Scale of earthquake intensity and its correspondence to the Richter Scale is given in Table 11-6.

Table 11-5. Richter Scale

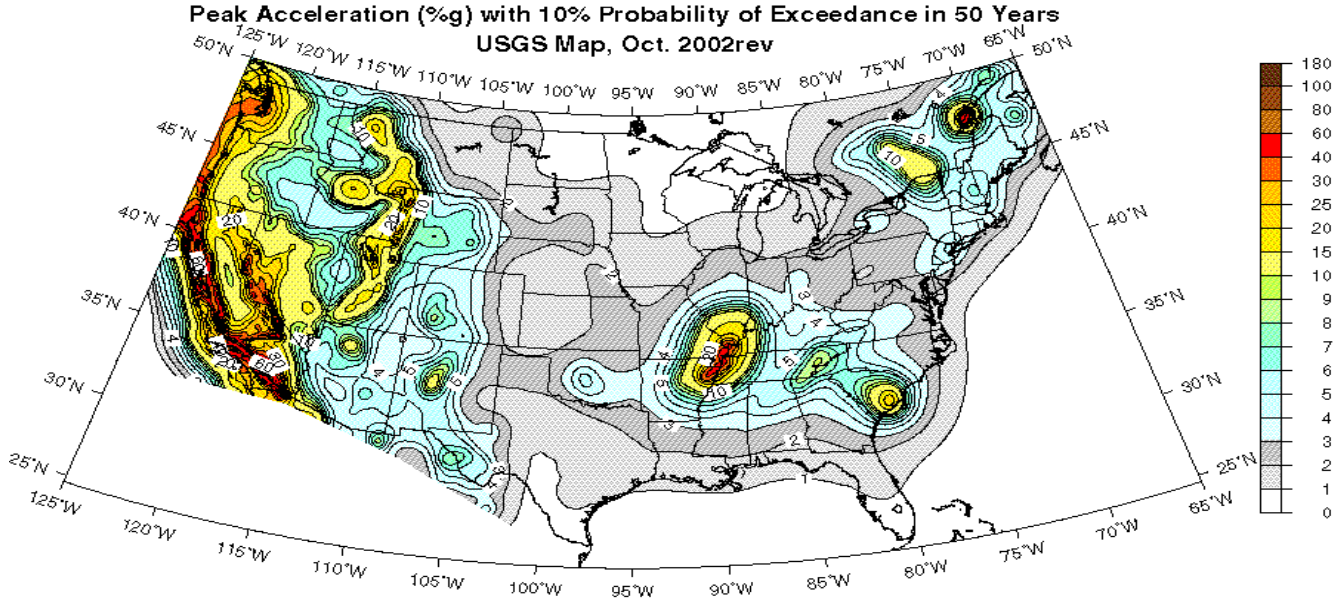
Richter Magnitudes	Earthquake Effects
Less than 3.5	Generally not felt, but recorded.
3.5-5.4	Often felt, but rarely causes damage.
Under 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1-6.9	Can be destructive in areas up to about 100 kilometers across where people live.
7.0-7.9	Major earthquake. Can cause serious damage over larger areas.
8 or greater	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Table 11-6. Modified Mercalli Intensity Scale for Earthquakes

Scale	Intensity	Description of Effects	Corresponding Richter Scale Magnitude
I	Instrumental	Detected only on seismographs	
II	Feeble	Some people feel it	<4.2
III	Slight	Felt by people resting; like a truck rumbling by	
IV	Moderate	Felt by people walking	
V	Slightly Strong	Sleepers awake; church bells ring	<4.8
VI	Strong	Trees sway; suspended objects swing, objects fall off shelves	<5.4
VII	Very Strong	Mild Alarm; walls crack; plaster falls	<6.1
VIII	Destructive	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged	
IX	Ruinous	Some houses collapse; ground cracks; pipes break open	<6.9
X	Disastrous	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread	<7.3
XI	Very Disastrous	Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards	<8.1
XII	Catastrophic	Total destruction; trees fall; ground rises and falls in waves	>8.1

Figure 11-7 shows the probability that ground motion will reach a certain level during an earthquake. The data show peak horizontal ground acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 10 percent probability of exceedance in 50 years. The map was compiled by the U.S. Geological Survey (USGS) Geologic Hazards Team, which conducts global investigations of earthquake, geomagnetic, and landslide hazards.

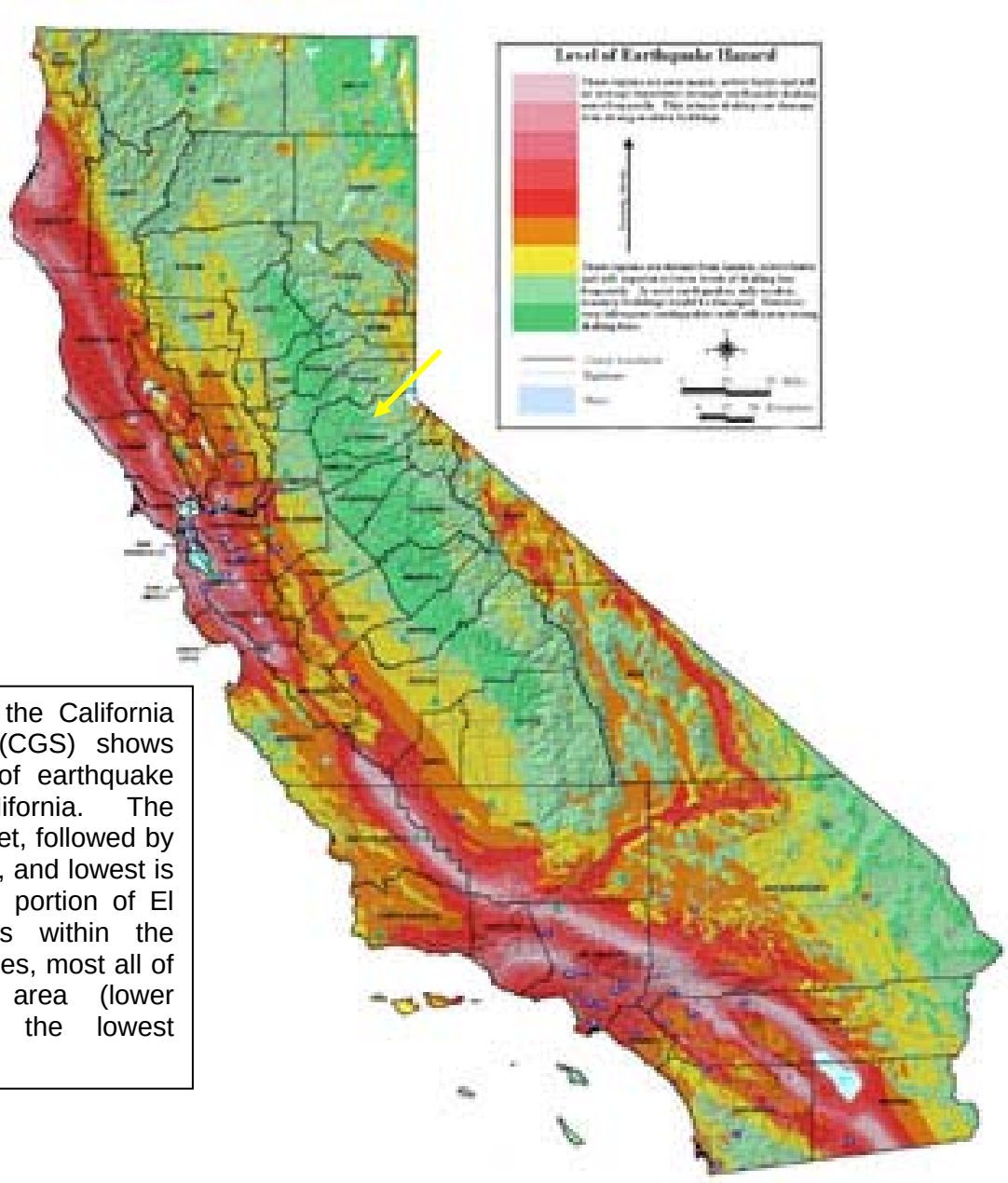
Figure II-7. Peak Acceleration with 10 Percent Probability of Exceedance in 50 Years (Nationwide)



Earthquake Hazard in El Dorado County

The above graphic from the USGS shows that the west coast in general, and California in particular, has an elevated level of risk from earthquake. As demonstrated by the following graphic, Figure 11-8, El Dorado County is one of the lowest risk areas in the State.

Figure 11-8. Level of Earthquake Hazard (California)[1]



This graphic from the California Geologic Survey (CGS) shows the relative level of earthquake hazard within California. The highest level is violet, followed by red, orange, yellow, and lowest is green. The major portion of El Dorado County is within the lowest two categories, most all of the developable area (lower elevation) is in the lowest category.

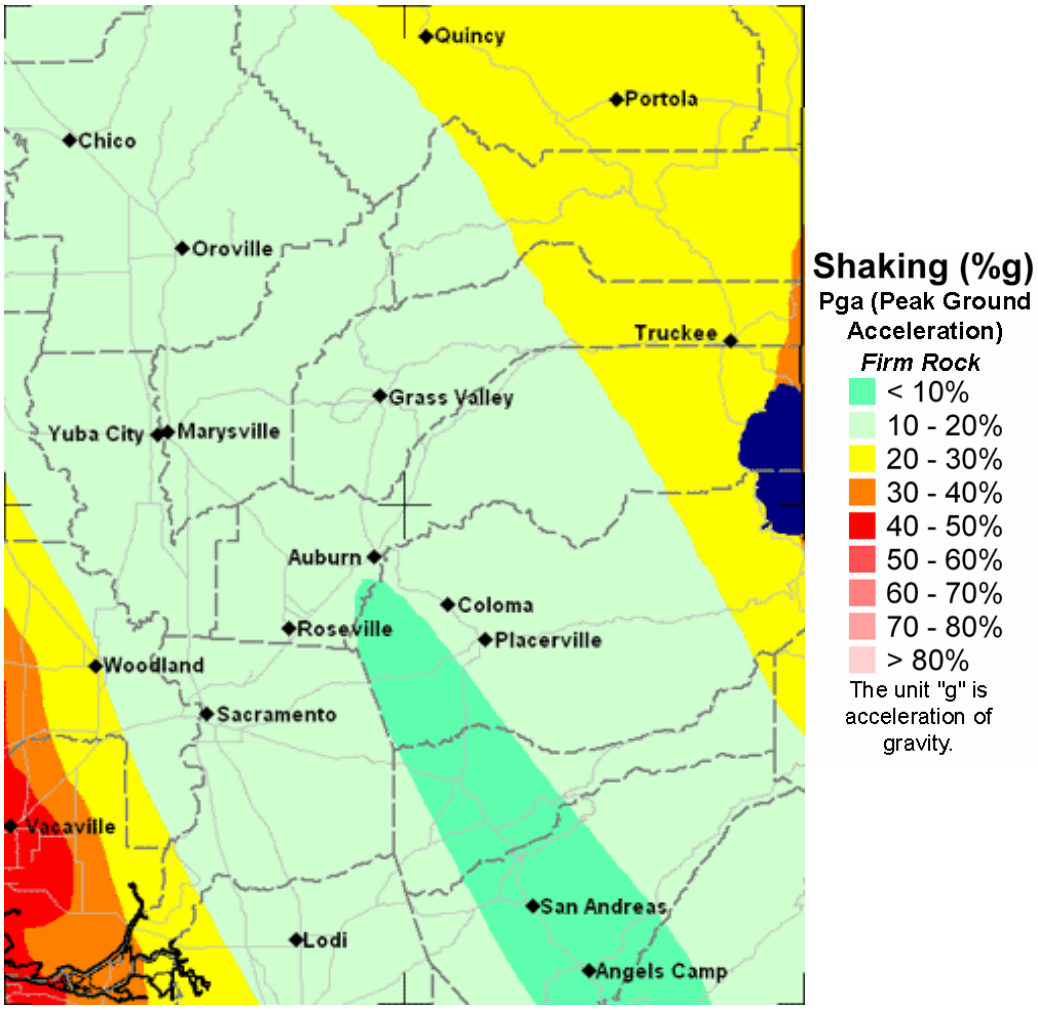


Figure 11-9 Peak Acceleration with 10 Percent Probability of Exceedance in 50 Years (El Dorado County and Vicinity)

The preceding graphic, Figure 11-9, gives a closer look at the El Dorado County area, and shows that the predicted peak acceleration for the developable portion of the County does not exceed 20% of gravity, which puts the County in the lowest potential for the State.

The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. This state law was a direct result of the 1971 San Fernando Earthquake, which was associated with extensive surface fault ruptures that damaged numerous homes, commercial buildings, and other structures. Surface rupture is the most easily avoided seismic hazard.

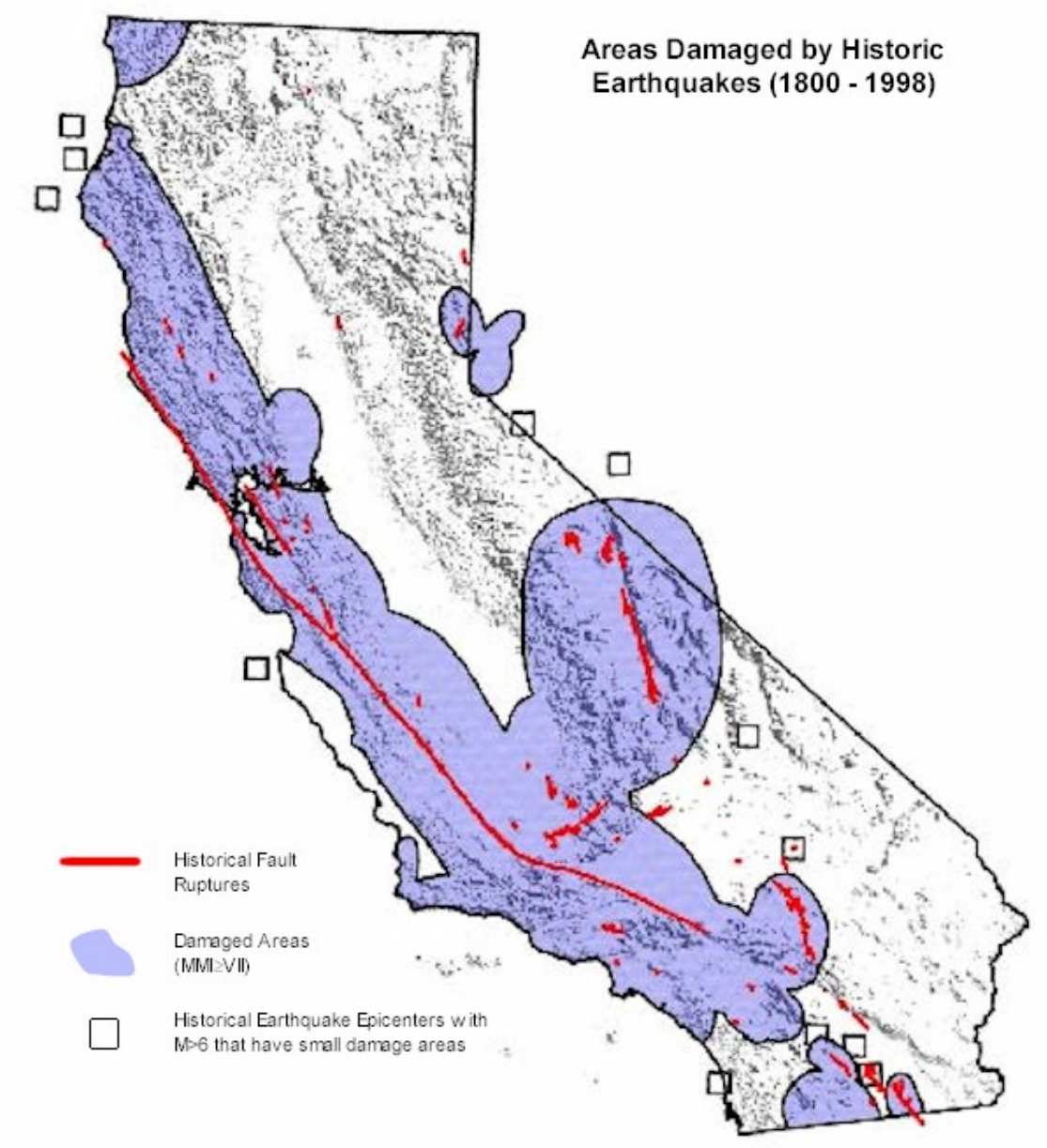
The Alquist-Priolo Earthquake Fault Zoning Act's main purpose is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The Act only addresses the hazard of surface fault rupture and is not directed toward other earthquake hazards. The Seismic Hazards Mapping Act, passed in 1990, addresses non-surface fault rupture earthquake hazards, including liquefaction and seismically induced landslides.

The law requires the State Geologist to establish regulatory zones (known as Earthquake Fault Zones) around the surface traces of active faults and to issue appropriate maps. The maps are distributed to all affected cities, counties, and state agencies for their use in

planning and controlling new or renewed construction. That list does not include El Dorado County, due to its location being relatively distant from any known faults that meet the criteria of the mapping program. There is one fault zone on land under the County's jurisdiction, the Rescue Lineament Bear Mountain fault zone. This fault zone cuts across the western end of the County trending north to south. However, there has been no appreciable movement in this fault and no record of damages sustained.

The following graphics (Figure 11-10 and Figure 11-11) demonstrate the minimum number of times during the period 1800 to 1999 that various areas of the state have been subject to damaging shaking from earthquakes. El Dorado County lies within the portion of the State that has no record of damaging shaking events during that period.

Figure 11-10. Number of Times Areas of the State has Experienced Significantly Damaging Earthquakes



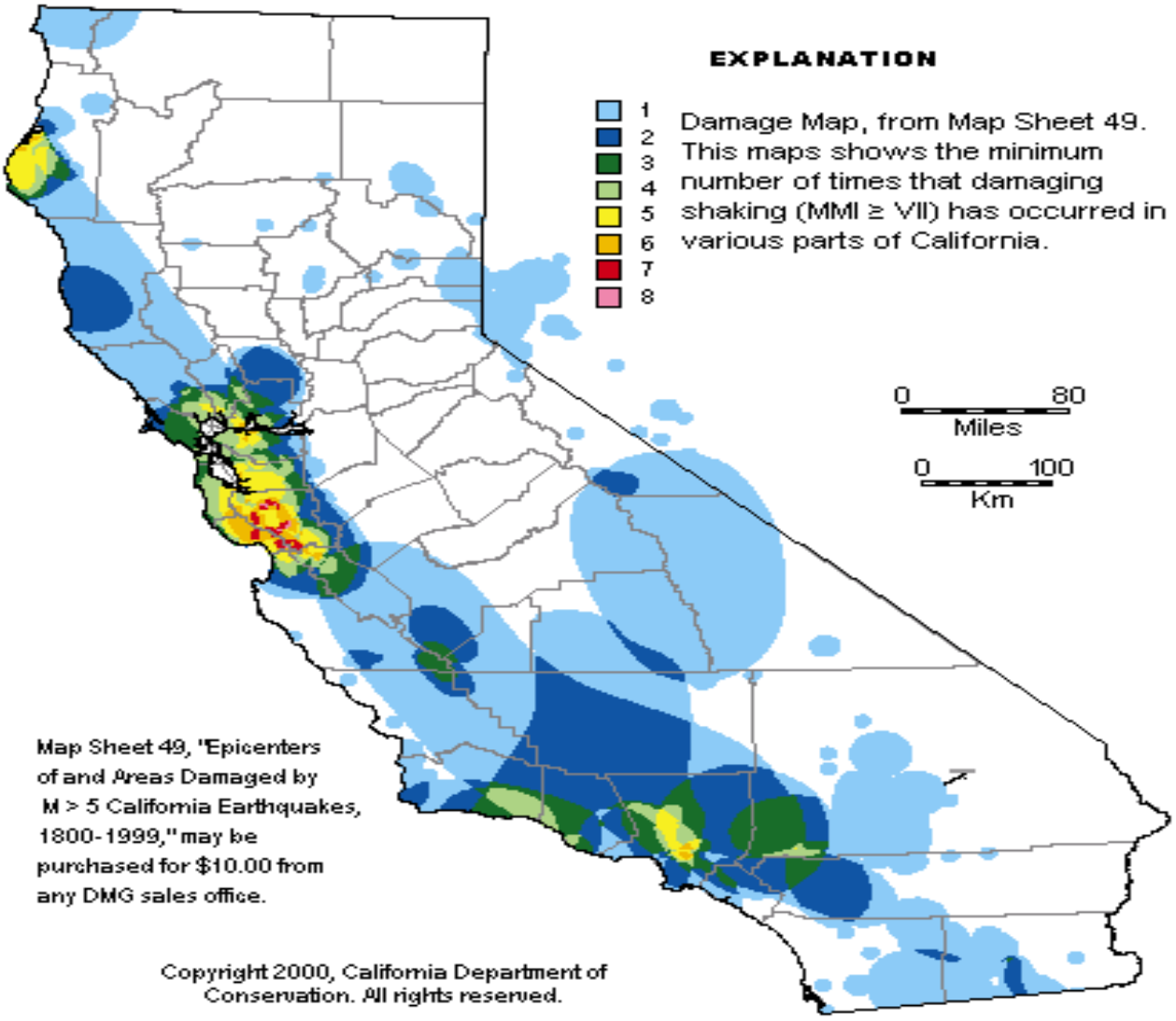


Figure 11-11 (Above) Epicenters of and Areas Damaged by M>5 California Earthquakes, 1800-1999

Sinkholes

General Description of Sinkhole Hazard from National Perspective

Sinkholes are a natural and common geologic feature in areas with underlying limestone and other rock types that are soluble in natural water. Most limestone is porous, allowing the acidic water of rain to percolate through their strata, dissolving some limestone and carrying it away in solution. Over time, this persistent erosional process can create extensive underground voids and drainage systems in much of the carbonate rocks. Collapse of overlying sediments into the underground cavities produces sinkholes.

The three general types of sinkholes are: subsidence, solution and collapse. Collapse sinkholes are most common in areas where the overburden (the sediments and water contained in the unsaturated zone, surficial aquifer system, and the confining layer above an aquifer) is thick, but the confining layer is breached or absent. Collapse sinkholes can form with little warning and leave behind a deep, steep sided hole. Subsidence sinkholes form gradually where the overburden is thin and only a veneer of sediments is overlying the limestone. Solution sinkholes form where no overburden is present and the limestone is exposed at land surface.

Sinkholes occur in many shapes, from steep-walled holes to bowl or cone shaped depressions. Sinkholes are dramatic because the land generally stays intact for a while until the underground spaces get too big. If there is not enough support for the land above the spaces, then a sudden collapse of the land surface can occur. Under natural conditions, sinkholes form slowly and expand gradually. However, human activities such as dredging, constructing reservoirs, diverting surface water, and pumping groundwater can accelerate the rate of sinkhole expansions, resulting in the abrupt formation of collapse sinkholes.

Although a sinkhole can form without warning, specific signs can signal potential development:

- Slumping or falling fence posts, trees, or foundations;
- Sudden formation of small ponds;
- Wilting vegetation;
- Discolored well water; and/or
- Structural cracks in walls or floors.

Collapses, such as the sudden formation of sinkholes, may destroy buildings, roads, and utilities.

Sinkhole formation is aggravated and accelerated by urbanization. Development increases water usage, alters drainage pathways, overloads the ground surface, and redistributes soil. According to FEMA, the number of human-induced sinkholes has doubled since 1930 and insurance claims for damages as a result of sinkholes has increased 1,200 percent from 1987 to 1991, costing nearly $100 million.

Sinkhole Hazard in El Dorado County

Sinkholes in El Dorado County could be of natural or man-made origin. The naturally occurring sinkholes could be a result of solution of limestone or related carbonate bedrock, resulting in the formation of sinkholes.

There is some geologic expression of carbonate bedrock and formation of solution holes or caverns in El Dorado County. A large amount of the area was subject to hydraulic mining techniques of the 19th Century, which blasted the soil from the bedrock in a attempt to extract placer gold. Much of the area was affected by the hydraulic mining, resulting in a difficult landscape of large boulders or outcrops surrounded by depressions. The elevation of the remaining surface can vary as much as 20 feet over a few feet of horizontal distance. Development has been difficult in these areas, as initial land leveling can be expensive to

create a buildable area. Although development has occurred in these parts of the County, there have not been any documented instances of sinkholes or other karst features developing or causing any significant damage.

Man-made “sinkholes” can be from subsidence due to previous deep mining activity. Gold mining in the past has resulted in tunnels, stopes (large underground rooms excavated to extract the gold ore, usually backfilled with waste as other areas of the same underground complex are excavated), and shafts, which can cause depressions or holes to develop on the ground surface. The primary area affected by underground mining is the Mother Lode area and smaller gold ore deposits have been mined in several other smaller areas of the County.

Landslides

General Description of Landslide Hazard from National Perspective

A landslide is the downward and outward movement of slope-forming soil, rock, and vegetation, which is driven by gravity. Landslides may be triggered by both natural and human-caused changes in the environment, including heavy rain, rapid snow melt, steepening of slopes due to construction or erosion, earthquakes, volcanic eruptions, and changes in groundwater levels.

There are several types of landslides: rock falls, rock topple, slides, and flows. Rock falls are rapid movements of bedrock, which result in bouncing or rolling. A topple is a section or block of rock that rotates or tilts before falling to the slope below. Slides are movements of soil or rock along a distinct surface of rupture, which separates the slide material from the more stable underlying material. Mudflows, sometimes referred to as mudslides, mudflows, lahars or debris avalanches, are fast-moving rivers of rock, earth, and other debris saturated with water. They develop when water rapidly accumulates in the ground, such as heavy rainfall or rapid snowmelt, changing the soil into a flowing river of mud or "slurry." Slurry can flow rapidly down slopes or through channels, and can strike with little or no warning at avalanche speeds. Slurry can travel several miles from its source, growing in size as it picks up trees, cars, and other materials along the way. As the flows reach flatter ground, the mudflow spreads over a broad area where it can accumulate in thick deposits.

Landslides are typically associated with periods of heavy rainfall or rapid snow melt and tend to worsen the effects of flooding that often accompany these events. In areas burned by forest and brush fires, a lower threshold of precipitation may initiate landslides. Some landslides move slowly and cause damage gradually, whereas others move so rapidly that they can destroy property and take lives suddenly and unexpectedly.

Landslides can damage or destroy roads, railroads, pipelines, electrical and telephone lines, mines, oil wells, buildings, canals, sewers, bridges, dams, seaports, airports, forests, parks, and farms.

Among the most destructive types of debris flows are those that accompany volcanic eruptions. A spectacular example in the

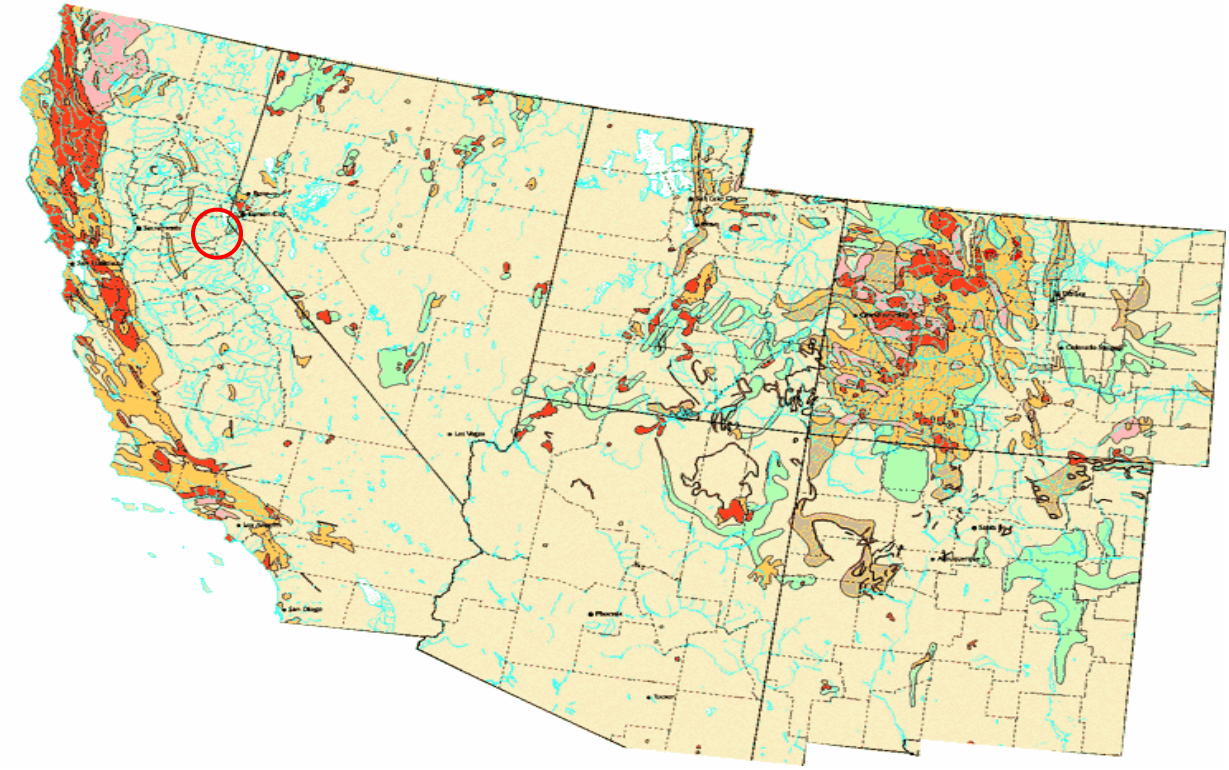
United States was a massive debris flow resulting from the 1980 eruptions of Mount St. Helens, Washington. Areas near the bases of many volcanoes in the Cascade Mountain Range of California, Oregon and Washington are at risk from the same types of flows during future volcanic eruptions.

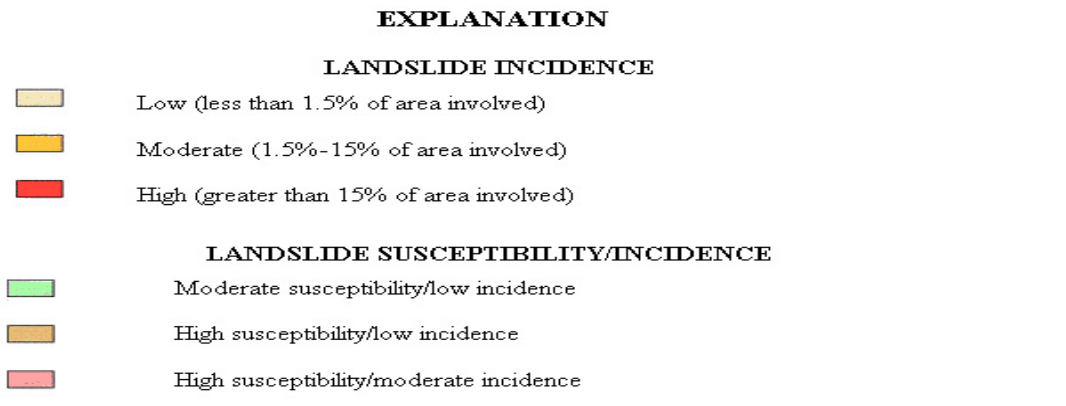
Areas that are generally prone to landslide hazards include previous landslide areas, the bases of steep slopes, the bases of drainage channels, and developed hillsides where leach-field septic systems are used. Areas that are typically considered safe from landslides include areas that have not moved in the past, relatively flat-lying areas away from sudden changes in slope, and areas at the top or along ridges which are set back from the tops of slopes.

In the United States, it is estimated that landslides cause up to $2 billion in damages and from 25 to 50 deaths annually. Globally, landslides cause billions of dollars in damage and thousands of deaths and injuries each year.

Figure 11-12 delineates areas where large numbers of landslides have occurred and areas which are susceptible to landsliding in the southwestern United States. This map layer is provided in the U.S. Geological Survey Professional Paper 1183. The red circle on the image was added to identify the location of El Dorado County on the relatively small-scale map.

Figure 11-12. Landslide Overview Map of the Southwestern United States





Susceptibility not indicated where same or lower than incidence. Susceptibility to landsliding was defined as the probable degree of response of [the areal] rocks and soils to natural or artificial cutting or loading of slopes, or to anomalously high precipitation. High, moderate, and low susceptibility are delimited by the same percentages used in classifying the incidence of landsliding. Some generalization was necessary at this scale, and several small areas of high incidence and susceptibility were slightly exaggerated.

Landslide Hazard in El Dorado County

The topography of El Dorado County displays a wide range of landforms ranging from vertical cliffs to gently undulating foothills. Combined with often times complex underlying geology that gives rise to a wide range of surficial soil types, native topography can provide a challenging environment for safe development.

In general, the greater the existing slope the greater the overall threat of landslide. The El Dorado County Geohazards Maps indicate general areas of the developable properties that have slopes in excess of 30%. It is to be expected that areas of greater than 30% slope will exist outside the delineated areas as will areas of less than 30% slope exist inside the delineated areas due to constraints imposed by the general nature of the USGS topographic maps that were used in the compilation of slopes. Local mapping of project areas is recommended in conjunction with geologic interpretation prior to the development of slopes in excess of 30%.

The diverse geology of El Dorado County includes areas underlain by serpentine. This generic rock type is particularly prone to slope failure as evidenced by native slope failures and failure of man-made slopes such as those experienced along the Highway 50 Corridor in the vicinity between Riverton and Strawberry. Slope failure of the steep slopes along the American River have littered the adjacent slopes with boulders and other debris. Typically limited to the slopes along the upper American River, development in this area should be done only after carefully considering appropriate setbacks from the break point where the topography dramatically changes. It is important to note that slope failure along Highway 50, as evidenced in January of 1997 even though within the boundaries of El Dorado County fell under Caltrans jurisdiction.

Downslope development on relatively flat land at the base of steep cliffs should occur only after the potential for rockfall is evaluated. Surface mapping of rock exposures along with observation of conditions in the local area of a project assists in the determination of site-specific areas subject to rockfall damage.

The above discussion concerning areas with potential landslide hazard is limited to certain areas near cliff-like features or on very steep slopes, none of which are often subject to development. There have been reported incidents of landslides and general slope failure in isolated portions of the County, but this is a very uncommon occurrence with no defined history of significant damages. Although the above discussion shows that portions of the privately owned and potentially developable land of El Dorado County can include areas where landslide could occur, it is not common to most areas. Overall, the hazard is much less than can be expected to occur in much of the more densely developed portions of the State (see Figure 11-12), where the geologic conditions are much more prone to landslide and general instability.

General Description of Winter Storm Hazard from National Perspective

A winter storm can range from a moderate snow over a period of a few hours to blizzard conditions with blinding wind-driven snow that lasts for several days. Some winter storms may be large enough to affect several states, while others may affect only a single community. Many winter storms are accompanied by low temperatures and heavy and/or blowing snow, which can severely impair visibility.

Winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Sleet – raindrops that freeze into ice pellets before reaching the ground – usually bounce when hitting a surface and do not stick to objects; however, sleet can accumulate like snow and cause a hazard to motorists. Freezing rain is rain that falls onto a surface with a temperature below freezing, forming a glaze of ice. Even small accumulations of freezing rain can cause a significant hazard, especially on power lines and trees. An ice storm occurs when freezing rain falls and freezes immediately upon impact. Communications and power can be disrupted for days, and even small accumulations of ice may cause extreme hazards to motorists and pedestrians.

A heavy layer of ice was more weight than this tree in Kansas City, Missouri could withstand during a January 2002 ice storm that swept through the region, bringing down trees, power lines and telephone lines.

A freeze is weather marked by long periods of sustained low temperatures, especially when below the freezing point (zero degrees Celsius or thirty-two degrees Fahrenheit). Agricultural production is seriously affected when temperatures remain below the freezing point.

Winter Storm Hazard in El Dorado County

El Dorado County is subject to a variety of winter or seasonal storm hazards due to the elevation changes in different parts of the County. Typical storms associated with the rainy season (late fall, winter, early spring) cause different problems depending on elevation. A warm storm with relatively mild temperatures usually brings rain to the lower

elevations, and snow to the higher elevations. Often the “snow line” is above 3,000 feet above sea level, and a smaller percentage of the County population is directly affected by the snow and freezing conditions. However, meteorological conditions can be different, and can change radically during an actual storm event, resulting in snowfall down to 1,000 foot elevation, affecting a much greater range of the County’s population. As a tourist destination, low snowfall events also greatly affect the transitory tourist population or day visitors to the County, many of whom are ill prepared for winter weather. Cold storms can also be accompanied by freezing rain and wet heavy snow, making driving treacherous and causing more infrastructure damage with felled trees and powerlines. Some storms deposit significant amounts of rainfall in a small geographic area where the ditches, creeks and bridges are overwhelmed by the runoff. Storms can also be associated with strong pressure changes with resultant winds that bring down trees unable to support themselves in saturated soils.

Damage-causing storms can occur during any time of year, but usually occur during the rainy season, which generally runs from mid-fall through spring. Snow at the lower elevations can occur during the entire rainy season, but more frequently occurs in winter and early spring. A summertime monsoon flow of tropical moisture can bring thunderstorms to the high elevations in the extreme east and northeast of the County, but seldom brings any significant rainfall to the lower elevations.

Storm-related damage to properties and infrastructure varies depending on the nature of the storm. Intense localized rainfall causes washouts of roadways and bridge damage, or localized flooding of structures that lack the storm-drain capacity to remove the water. Snowfall and freezing rain can temporarily paralyze transportation, but also result in power distribution damage and power outages that can take extended periods to restore. Heavy snow and ice can fell trees that block roadways., Snowfall and felled trees are more likely to cause significant damage in the higher elevations of El Dorado County, but localized flooding from intense rainfall can occur anywhere.

Volcano

General Description of Volcano Hazard from National Perspective

Over 75 percent of the Earth's surface above and below sea level, including the seafloors and some mountains, originated from volcanic eruption. Emissions from these volcanoes formed the Earth's oceans and atmosphere. Volcanoes can also cause tsunamis, earthquakes, and dangerous flooding.

Volcanoes are vents in the Earth’s crust that emit molten rock and steam. They are evidence that the physical makeup of our planet is ever-changing. Volcanoes are relatively site specific, but the molten rock, steam, and other gases they release can have an impact on much larger areas.

The May 18, 1980 eruption of Mount Saint Helens created an eruptive cloud that rose to an altitude of more than 12 miles in 10 minutes. Nearly 550 million tons of ash fell over a 22,000 square mile area.

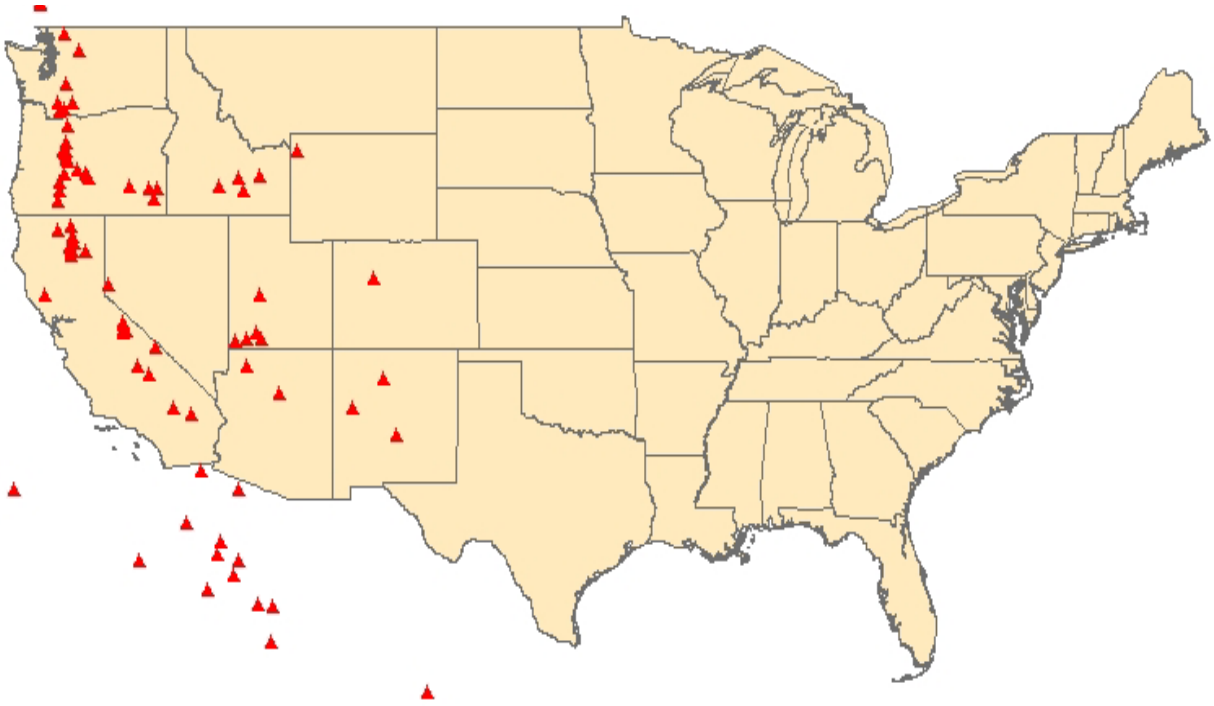
Lahar is the mudflow of debris and water caused by a volcano. It is also known as debris flow or volcanic mudflow. Lahar is most often triggered by rainfall washing down the debris from the slopes of volcanoes. However, lahar flows can also be triggered by rapidly melting snow and ice, debris avalanches and breakouts of lakes that were dammed by volcanic debris.

Tephra is the general term used to describe the ash and other materials that are released into the air after a volcanic eruption. Tephra ranges in size from fine powder to larger rock-sized particles. Volcanic ash can contaminate water supplies, cause electrical storms, collapse roofs and can affect people hundreds of miles away.

Volcanic explosions which are directed sideways are called lateral blasts. Lateral blasts can throw large pieces of rock at very high speeds for several miles. These explosions can kill by impact, burial or heat and may have enough force to knock down entire forests of trees. The majority of deaths attributed to the Mount St. Helens volcano eruption in 1980 were a result of lateral blast and tree blow-down.

There are more than 500 active volcanoes in the world. More than half of these volcanoes are part of the "Ring of Fire," a region that encircles the Pacific Ocean. More than 50 volcanoes in the United States have erupted one or more times in the past 200 years. The most volcanically active regions of the nation are in Alaska, Hawaii, California, Oregon, and Washington (Figure 11-13). The danger area around a volcano covers approximately a 20-mile radius. Some danger may exist 100 miles or more from a volcano.

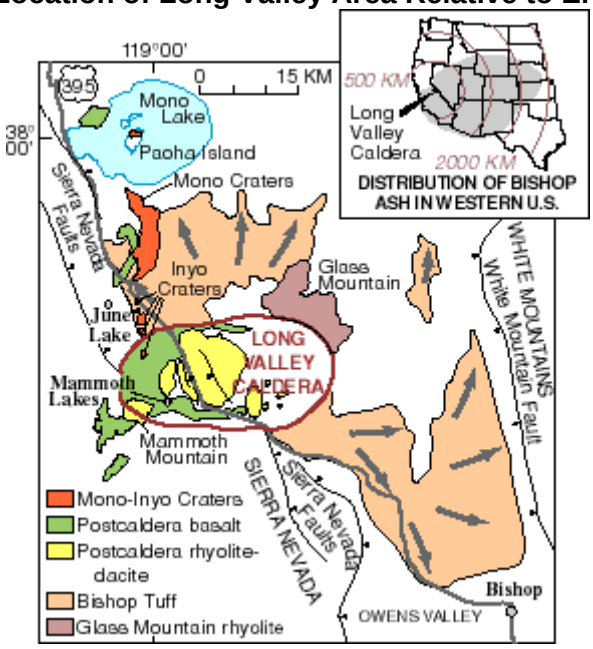
Figure 11-13. Known Volcano Locations in the United States



Volcano Hazard in El Dorado County

The volcano hazard of El Dorado County is presented by the relative proximity to the Long Valley Volcanic Field. As shown in Figure 11-14 the extreme northwest corner of the Long Valley area reaches the most extreme southeastern corner of El Dorado County.

Figure 11-14. Location of Long Valley Area Relative to El Dorado County



The Long Valley Caldera was formed by a catastrophic eruption about 730,000 years ago. Most of the major landforms of the complex were created then or soon thereafter, associated with a major eruption of ash and subsequently lava flows. Most of the more recent events were of a smaller scale, and some did result in ash events that affected areas to the east of the complex. Tephra, or ash falling from the sky after volcanic events, can cause impacts ranging from inconvenience to equipment failure and large-scale property and agricultural losses, depending on the amount of ash being deposited and the duration of the event. The movement of ash is subject to the normal jet stream effects of air masses moving in general from west to east. This reduces the risk of a significant ash event from affecting El Dorado County.

Drought/Extreme Heat

Over the past 150 years, conditions of drought/extreme heat in El Dorado County have caused significant crop loss. Various apple orchards and wineries have been impacted by these adverse weather conditions. A recent El Dorado County Crop Report states the following on the impact of the weather on agriculture.

"The El Dorado County gross crop value for 2003 was $42.7 million, a 12.5% decrease from the 2002 values. The decline in value was caused by many factors including an 8% decrease in timber sales and a 22% decrease in fruit and nut sales. Adverse weather conditions during bloom set greatly contributed to the lower fruit and nut value.

Reported wine grape acreage increased by nearly 9% over 2002. The adverse weather in the spring also affected the wine grape crop. This resulted in a 2.5% decrease in production from the previous year. In addition, the average price paid per ton dropped by 4.5."

Historically, El Dorado County has been included in disaster declarations for drought in 2002, 2003, 2004, and 2005. The County Agriculture Department is currently determining the cost of the crop losses in the recent years. The information will be included in updates to this Plan.

We are currently operating under a disaster declaration from the U.S. Small Business Administration for contiguous counties for agricultural losses caused by drought that occurred January 1, 2004, and continuing. Further analysis, and mitigation measures are currently under development. Updates to this plan, will include a complete analysis of this hazard at a future date.

Erosion

General Description of Erosion Hazard from National Perspective

Erosion is the gradual breakdown and movement of land due to both physical and chemical processes of water, wind and general meteorological conditions. Natural, or geologic, erosion has occurred since the Earth's formation and continues at a very slow and uniform rate each year.

There are two types of soil erosion: wind erosion and water erosion. Wind erosion can cause significant soil loss. Winds blowing across sparsely vegetated or disturbed land can pick up soil particles and carry them through the air, thus displacing them. Water erosion can occur over land or in streams and channels. Water erosion that takes place over land may result from raindrops, shallow sheets of water flowing off the land, or shallow surface flow, which is concentrated in low spots. Stream channel erosion may occur as the volume and velocity of water flow increases enough to cause movement of the streambed and bank soils. Major storms such as hurricanes may cause significant erosion by combining high winds with heavy surf and storm surge to significantly impact the shoreline.

An area's potential for erosion is determined by four factors: soil characteristics, vegetative cover, climate or rainfall and topography. Soils composed of a large percentage of silt and fine sand are most susceptible to erosion. As the content of these soils increases in the level of clay and organic material, the potential for erosion decreases. Well-drained and well-graded gravels and gravel-sand mixtures are the least likely to erode. Coarse gravel soils are highly permeable and have a good capacity for absorption, which can prevent or delay the amount of surface runoff. Vegetative cover can be very helpful in controlling erosion by shielding the soil surface from falling rain, absorbing water from the soil and slowing the velocity of runoff. Runoff is also affected by the topography of the area including size, shape and slope. The greater the slope length and gradient, the more potential an area has for erosion. Climate can affect the amount of runoff, especially the frequency, intensity and duration of rainfall and storms. When rainstorms are frequent, intense or of long duration, erosion risks are high. Seasonal changes in temperature and rainfall amounts define the period of highest erosion risk of the year.

During the past 20 years, the importance of erosion control has gained the increased attention of the public. Implementation of erosion control measures consistent with sound agricultural and construction operations is needed to minimize the adverse effects associated with increasing settling out of the soil particles due to water or wind. The increase in government regulatory programs and public concern has resulted in a wide range of erosion control products, techniques and analytical methodologies in the United States. The preferred method of erosion control in recent years has been the restoration of vegetation.

Erosion Hazard in El Dorado County

The soils in El Dorado County can be generally considered to be shallow. The diverse underlying geology along with agents of weathering such as erosion, soil chemistry, and cultural activities all play a part in the soil type. Clays exist both as a weathering product and as native sediments. Clays have the potential for expansion and contraction when they go through wet/dry cycles. Foundations based on clay soils have the potential for being affected by the associated changes in soil volumes over time. These phenomena can be most directly observed by areas of roadway failure that are commonly evidenced by repeated patching over the years (although patching is often due not only to clay soils but also to the presence of inadequate drainage of the subbase beneath the pavement).

When clay soils are noted as present in a development, the clays in areas of proposed roadways are tested for shrink/swell potential and the test results considered in the structural design.

Grading, either by natural agents such as erosion or the activities of man, has the potential for creating unstable slopes. Erosion control can be accomplished on critical slopes being affected by natural agents. Proper investigation of the soils underlying proposed areas of grading in conformance with the mandates of the Uniform Building Code can assist in delineating potential areas of concern and provide information to the project engineer which will allow for the design of remedial measures. Concurrent testing, in conformance with the recommendations of the Uniform Building Code and the project engineer can ensure a grading project has the highest possible potential for avoiding future problems with stability or erosion.

Erosion is a natural process where soil is removed by water, wind or gravity from one location to another. The process of removal and deposition changes the topography toward a condition of equilibrium. It is a natural process that when aided by man can result in undesirable consequences. Grading activities remove the natural vegetative cover that protects the soil from erosion agents. Grading plans should be accompanied by erosion control plans that have a specific time line for implementation.

The potential for erosion of soils increases as a function of the steepness of the slope. The areas in El Dorado County in excess of 30% are considered as having a high potential for erosion.

The vast majority of development in El Dorado County is not in proximity to cliff-like areas, nor has it often occurred on steep slopes in excess of 30%. Erosion problems are generally limited to restricted areas where grading has oversteepened slopes, or

deposited fill in areas where it has not stabilized or where improper grading practices have not included provisions to seed or otherwise protect fresh slopes from eroding. There have also been other examples of burned areas being eroded prior to reestablishment of vegetation to protect the slopes from degrading. Otherwise, compared to many areas of the State such as the coastal mountains, erosion has proven to be a modest hazard in El Dorado County.

Severe Thunderstorms and Tornadoes

General Description of Thunderstorm/Tornado Hazard from National Perspective

According to the National Weather Service, more than 100,000 thunderstorms occur each year, though only about 10 percent of these storms are classified as "severe." Although thunderstorms generally affect a small area when they occur, they are very dangerous because of their ability to generate tornadoes, hailstorms, strong winds, flash flooding, and damaging lightning. While thunderstorms can occur in all regions of the United States, they are most common in the central and southern states because atmospheric conditions in those regions are most ideal for generating these powerful storms.

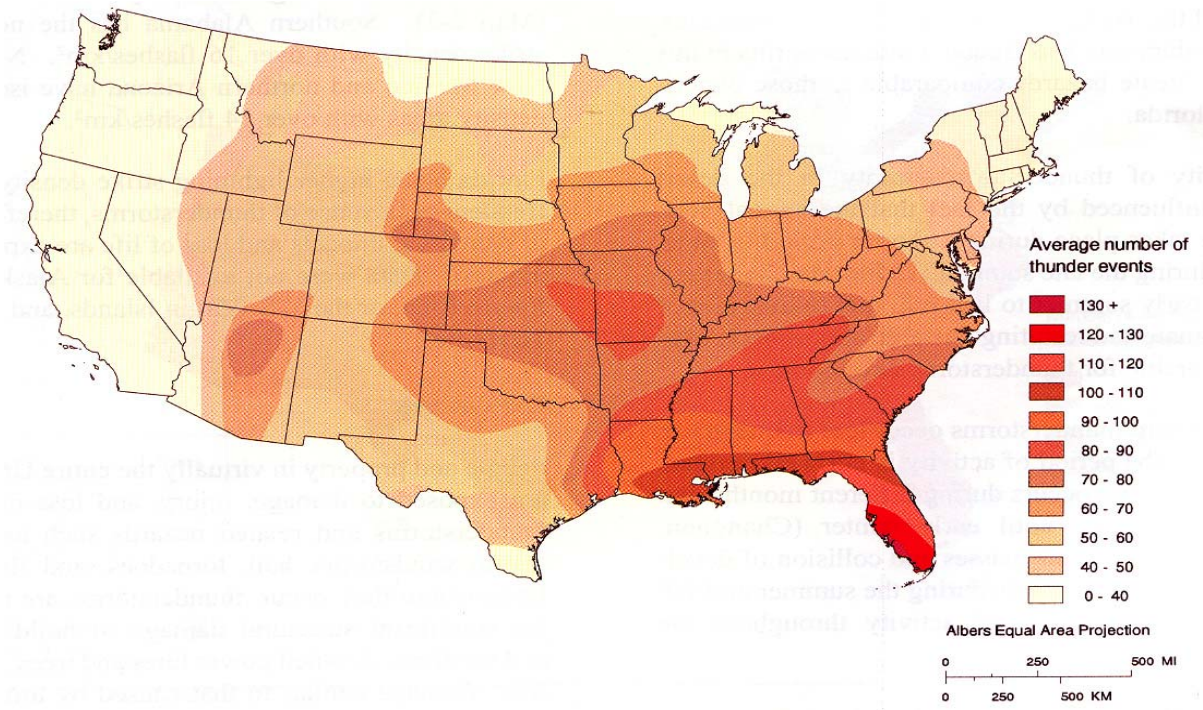
Multiple cloud-to-ground and cloud-to-cloud lightning strikes observed during a nighttime thunderstorm.

Thunderstorms are caused when air masses of varying temperatures meet. Rapidly rising warm moist air serves as the "engine" for thunderstorms. These storms can occur singularly, in lines or in clusters. They can move through an area very quickly or linger for several hours.

Lightning is a discharge of electrical energy resulting from the buildup of positive and negative charges within a thunderstorm, creating a "bolt" when the buildup of charges becomes strong enough. This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Lightning rapidly heats the sky as it flashes, but the surrounding air cools following the bolt. This rapid heating and cooling of the surrounding air causes thunder. On average, 89 people are killed each year by lightning strikes in the United States.

The National Weather Service collected data on the number days with thunderstorms, number and duration of thunder events and density of lightening strikes for the 30-year period from 1948 to 1977. The most significant of these data sets was the annual average number of thunder events, or storms that resulted in thunder, and it was used to create a map that follows as Figure 11-15.

Figure 11-15. Annual Average Number of Thunder Events



A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground.

The most comprehensively observed tornado in history, this tornado south of Dimmitt, Texas developed June 2, 1995 curving northward across Texas Highway 86 where it entirely removed 300 feet of asphalt from the road, tossing it more than 600 feet into an adjacent field.

Tornadoes are most often generated by thunderstorm activity (but sometimes result from hurricanes and other coastal storms) when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The damage caused by a tornado is a result of the high wind velocity and wind-blown debris, also accompanied by lightning or large hail. According to the National Weather Service, tornado wind speeds normally range from 40 to more than 300 miles per hour. The most violent tornadoes have rotating winds of 250 miles per hour or more and are capable of causing extreme destruction and turning normally harmless objects into deadly missiles.

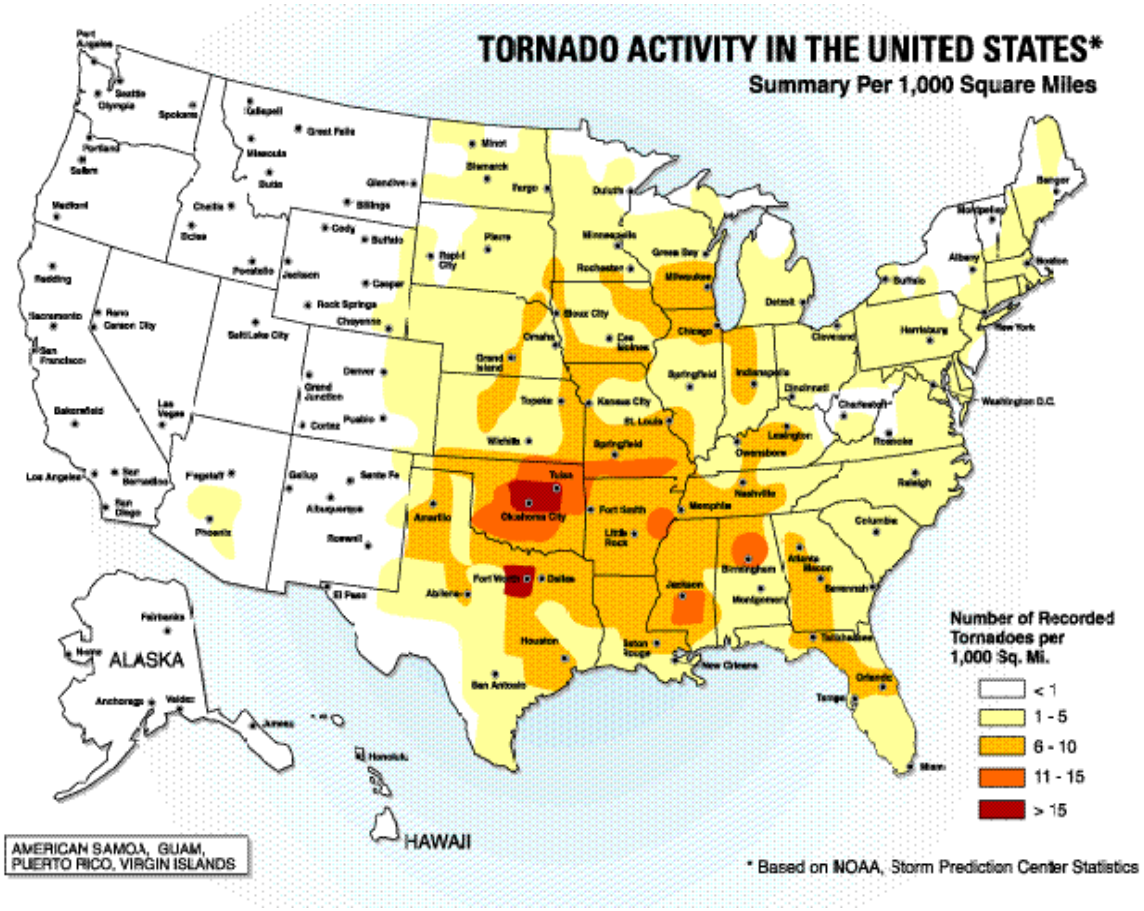
Each year, an average of over 800 tornadoes is reported nationwide, resulting in an average of 80 deaths and 1,500 injuries (National Oceanographic and Atmospheric Administration, 2002). They are more likely to occur during the spring and early summer months of March through June and can occur at any time of day, but are likely to form in the late afternoon and early evening. Most tornadoes are a few dozen yards wide and touch down briefly, but even small short-lived tornadoes can inflict tremendous damage. Highly destructive tornadoes may carve out a path over a mile wide and several miles long.

Waterspouts are weak tornadoes that form over warm water and are most common along the Gulf Coast and Southeastern states. Waterspouts occasionally move inland, becoming tornadoes that cause damage and injury. However, most waterspouts dissipate over the open water, causing threats only to marine and boating interests. Typically a waterspout is weak and short-lived and, because they are so common, most go unreported unless they cause damage.

The destruction caused by tornadoes ranges from light to inconceivable depending on the intensity, size, and duration of the storm. Typically, tornadoes cause the greatest damages to structures of light construction such as residential homes (particularly mobile homes) and tend to remain localized in impact.

According to the National Oceanographic and Atmospheric Administration (NOAA) Storm Prediction Center (SPC), the highest concentration of tornadoes in the United States has been in Oklahoma, Texas, Kansas and Florida respectively. Although the Great Plains region of the Central United States does favor the development of the largest and most dangerous tornadoes (earning the designation of “tornado alley”), Florida experiences the greatest number of tornadoes per square mile of all U.S. states (SPC, 2002). Figure 11-16. shows tornado activity in the United States based on the number of recorded tornadoes per 1,000 square miles.

Figure 11-16. Tornado Activity in the United States



The tornadoes associated with tropical cyclones are most frequent in September and October when the incidence of tropical storm systems is greatest. This type of tornado usually occurs around the perimeter of the storm, and most often to the right and ahead of the storm path or the storm center as it comes ashore. These tornadoes commonly occur as part of large outbreaks and generally move in an easterly direction.

Figure 11-17 shows how the frequency and strength of extreme windstorms vary across the United States. The map was produced by the Federal Emergency Management Agency and is based on 40 years of tornado history and over 100 years of hurricane history. Zone IV, the darkest area on the map, has experienced both the greatest number of tornadoes and the strongest tornadoes. As shown by the map key, wind speeds in Zone IV can be as high as 250 miles per hour.

Figure 11-17. Wind Zones in the United States

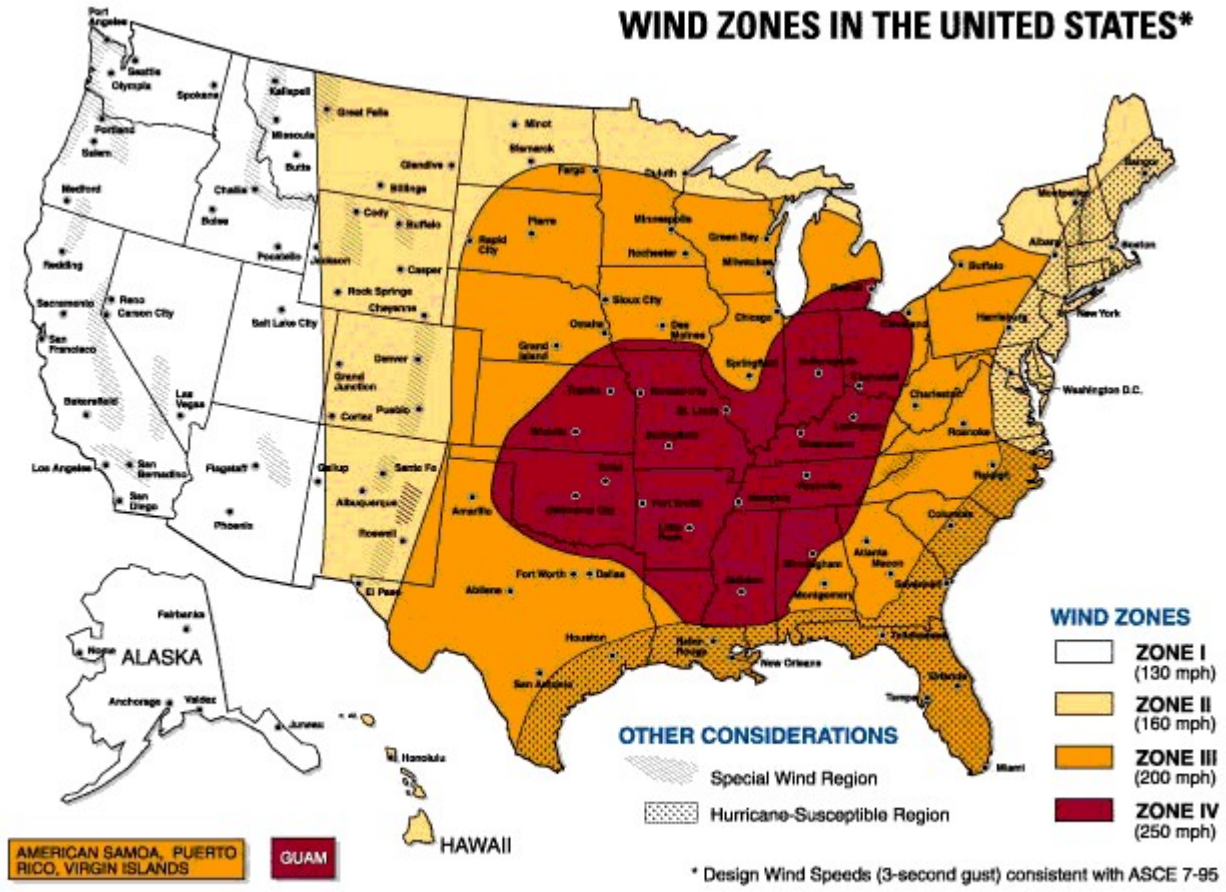


Figure I.2 Wind zones in the United States

Source: Federal Emergency Management Agency

Thunderstorm/Tornado Hazard in El Dorado County

As shown by the graphics in the section above, El Dorado County is not located in an area of these types of extreme meteorological events. With these types of wind and storm events associated with summer or fall warm air masses, El Dorado County and the surrounding regions have no history of hazards from these types of events. Strong winds, snow and ice associated with winter or winter season storms are considered in the "winter/seasonal storm" section, as are localized flooding as a result of thunderstorms or similar intense rainfall events. Because there is otherwise no history of damage from thunderstorms or tornadoes, there will be no further discussions related to these in this document.

Hurricanes and Tropical Storms

General Description of Hurricane / Tropical Storm Hazard from National Perspective

Hurricanes, tropical storms, nor'easters and typhoons, also classified as cyclones are any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise in the Northern Hemisphere (or clockwise in the Southern Hemisphere) and whose diameter averages 10 to 30 miles across. A tropical cyclone refers to any such circulation that develops over tropical waters. Tropical cyclones act as a "safety-valve," limiting the continued build-up of heat and energy in tropical regions by maintaining the atmospheric heat and moisture balance between the tropics and the pole-ward latitudes. The primary damaging forces associated with these storms are high-level sustained winds, heavy precipitation and tornadoes. Coastal areas are also vulnerable to the additional forces of storm surge, wind-driven waves and tidal flooding which can be more destructive than cyclone wind.

Wind and rain from Hurricane Lili damage road signs along I-10 in Louisiana on October 3, 2002

The key energy source for a tropical cyclone is the release of latent heat from the condensation of warm water. Their formation requires a low-pressure disturbance, warm sea surface temperature, rotational force from the spinning of the earth and the absence of wind shear in the lowest 50,000 feet of the atmosphere. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea and Gulf of Mexico during the official Atlantic hurricane season, which encompasses the months of June through November. The peak of the Atlantic hurricane season is in early to mid-September and the average number of storms that reach hurricane intensity per year in that basin is about six (6).

A storm surge is a large dome of water often 50 to 100 miles wide and rising anywhere from four to five feet in a Category 1 hurricane up to 20 feet in a Category 5 storm. The storm surge arrives ahead of the storm's actual landfall and the more intense the hurricane is, the sooner the surge arrives. Water rise can be very rapid, posing a serious threat to those who have not yet evacuated flood-prone areas. A storm surge is a wave that has outrun its generating source and become a long period swell. The surge is always highest in the right-front quadrant of the direction in which the hurricane is moving. As the storm approaches shore, the greatest storm surge will be to the north of the hurricane eye. Such a surge of high water topped by waves driven by hurricane force winds can be devastating to coastal regions, causing severe beach erosion and property damage along the immediate coast.

Storm surge heights, and associated waves, are dependent upon the shape of the continental shelf (narrow or wide) and the depth of the ocean bottom (bathymetry). A narrow shelf, or one that drops steeply from the shoreline and subsequently produces deep water close to the shoreline, tends to produce a lower surge but higher and more powerful storm waves.

Damage during hurricanes may also result from spawned tornadoes and inland flooding associated with heavy rainfall that usually accompanies these storms.

Hurricane Floyd brought a devastating 15 feet of storm surge that damaged or destroyed hundreds of houses along the ocean front of Long Beach on Oak Island, North Carolina in September 1999. A prime example of successful hazard mitigation, the elevated home (right) survived while the older, ground-level block foundation of the home on the left was crushed.

The National Oceanic and Atmospheric Administration's Hurricane Research Division has accumulated data from 1944 to 1999 that counts hits when a tropical storm or hurricane was within approximately 100 miles (165 km) of each location. That data show that all of the "named storms" make landfall in the southeastern or eastern United States, with none having significant effects on this part of the Country.

Hurricane/Tropical Storm Hazard in El Dorado County

Due to the nature of most hurricanes and tropical storms being a phenomenon of the southeastern/southern area of the United States, El Dorado County has never experienced major problems related to these hazards. There have been conditions related to tropical moisture originating from the more southerly parts of Pacific Ocean, known as "monsoons" or similar storms that bring humid air into the Sierra that can result in thunderstorms and intense rainfall. This could result in localized floods and those related hazards are discussed in the "Winter or Seasonal Storms" section of this document.

Avalanche

General Avalanche Hazard from National Perspective

In the United States, 514 avalanche fatalities have been reported in 15 states from 1950 to 1997. Each year, avalanches claim more than 150 lives worldwide, a number that has been increasing over the past few decades. Thousands more are caught in avalanches, partly buried or injured. One of the major reasons for increasing avalanche fatalities is the boom in mountain industries and recreation. Skiing, hiking and other winter sports draw millions of people to the mountains. To support these activities, more roads, buildings, and towns are forced into avalanche prone areas.

Although avalanches can occur on any slope given the right conditions, in the United States certain times of the year and certain locations are naturally more dangerous than others. Wintertime, particularly from December to April, is when most avalanches will

"run" (slide down a slope). However, avalanche fatalities have been recorded for every month of the year.

A large avalanche in North America might release 300,000 cubic yards of snow, the equivalent of 20 football fields filled 10 feet deep with snow. Slab avalanches are the most common and most deadly avalanches, where layers of a snowpack fail and slide down the slope. Since 1950, 235 people in the U.S. have been killed in slab avalanches.

Several factors may affect the likelihood of an avalanche, including weather, temperature, slope steepness, slope orientation (whether the slope is facing north or south), wind direction, terrain, vegetation and general snowpack conditions. Different combinations of these factors can create low, moderate or extreme avalanche conditions.

Avalanches are most likely to run either during or immediately after a storm where there has been significant snowfall. The 24 hours following a heavy snowstorm are the most critical. The extra weight of new snow alone can cause a slab to break off and fall down the slope. Snowfall amounts of one foot or more (frequent in mountainous areas) create the most hazardous situations, producing avalanches that are often large enough to block highways and cause major destruction. Snow amounts of six to twelve inches pose some threat, particularly to skiers and recreationists. Snow amounts less than six inches seldom produce avalanches.

Perhaps the most significant factor (but not the only one) is how the snowpack has developed over the season. Only the surface and maybe the top few layers of snow are visible, but layers of snow several feet deep may ultimately determine whether the slope will fail.

Snowpack conditions are extremely important because many layers of snow build up over the winter season. Each layer is built up under different weather conditions and will bond differently to the subsequent layers. Snowflakes, or snow crystals, within the snowpack eventually become more rounded due to melting/re-freezing and settlement. This metamorphism allows them to compress and generally form stronger bonds.

Between snows, the temperature may rise and melt the exposed surface layers, which when they re-freeze create a smoother, less stable surface for the next snowfall. Failure is much more likely to occur during or after the next few snowfalls. Rain between snows creates a slicker surface as well, and can weaken the bonds between snow layers.

Most avalanches occur on slopes between 30 and 45 degrees, but can occur on any slope angles given the right conditions. Very wet snow will be well lubricated with water, meaning it might avalanche on a slope of only 10 to 25 degrees

Avalanche Hazard in El Dorado County

Typically limited to the steeper slopes of the Sierra Nevada Mountains, the majority of the land in this "avalanche zone" is owned by the Federal Government. Private ownership development, when allowed, is done only after carefully considering appropriate setbacks from the known avalanche starting zones, tracks and runout zones. Generally the

roadways running through this “avalanche zone” are also privately owned and therefore not a significant hazard for El Dorado County.

The above discussion concerning areas with potential avalanche hazard is limited to certain areas along the Eastern edge of the County in the higher elevations. There have been reported incidents of avalanches in isolated portions of the County, but this is a very uncommon occurrence with no defined history of significant damages. Although the above discussion shows that small portions of privately owned and potentially developable land and therefore roads of El Dorado County can include areas where avalanche could occur, it is not common to most areas.

Avalanche control along the mountain passes of Highway 50, the main east-west roadway through El Dorado County, is a 24-hour a day, seven-day a week job for Caltrans from November, when the first snow normally falls, until Spring. Caltrans monitors slope conditions determining when any particular slope is ripe for avalanche. By triggering smaller, controlled avalanches, Caltrans reduce the potential for a large wall of snow cascading down onto the highway, trapping motorists and causing injuries or deaths. These controlled “mini” avalanches are triggered by a projectile fired into the suspect slope from a LoCAT, a compressed air launcher, sending the unstable snow down the slope where Caltrans teams wait to clear the highway.

Wildfire Hazards in El Dorado County

See section titled “Wildfire Protection Plan” submitted by the El Dorado County Fire Safe Council for a comprehensive discussion of this hazard.

EL DORADO COUNTY

WILDFIRE

PROTECTION PLAN

PREPARED BY

EL DORADO COUNTY

FIRE SAFE

COUNCIL

2004

RESOLUTION
OF THE
BOARD OF DIRECTORS
OF THE
EL DORADO COUNTY FIRE SAFE COUNCIL

RESOLVED,

The Board of Directors of the El Dorado County Fire Safe Council has reviewed and hereby adopts this El Dorado County Wildfire Protection Plan for the benefit of the County of El Dorado for the purpose of increasing wildfire safety for its citizens while reducing the risk of loss of life and property.

SO RESOLVED.

Executed this day of October, 2004 at Gold Hill, California

_____ _____
Chairman Director

_____ _____
Etc.

_____ _____

_____ _____

_____ _____

_____ _____

Table of Contents

I. Executive Summary

The EL Dorado County Wildfire Protection Plan provides an overview of local fire history, fire risks and hazards as well as past strategies. The Plan identifies specific fire protection problems and issues, lists Plan Goals and Strategic Action Plan Recommendations, identifies and lists communities for Fire Safe Planning, provides for formation of local community Fire Safe Councils, adopts a standard outline for Community Wildfire Protection Plans (CWPP), identifies the El Dorado County Fire Safe Council (EDCFSC) as a focal point for bringing citizens and protection agencies together to plan and accomplish fire safe measures, and establishes a public education role for the EDCFSC.

The Federal Register identified 17 Communities at Risk (CAR) in the county. The Land Use Map in the Draft El Dorado County General Plan identifies 33 Rural Centers. Theses Rural Centers and CAR compile the listings of communities for the EDCFSC to consider for funding. The National Fire Plan (NFP) and Healthy Forest Restoration Act (HFRA) of 2003 are providing the first funds to prepare CWPP and fuel reduction work for these communities.

The influx of people to El Dorado County and the building of homes in areas with hazardous fuels became alarming over 15 years ago. In response, El Dorado County initiated Fire Safe Planning for all new subdivisions and parcel splits. Over 150 Fire Safe plans were prepared by professionals and approved by the appropriate fire protection agencies since 1993. Major mitigation work was accomplished.

This Plan was prepared “in house” by members of the EDCFSC (Professional Foresters, California Department of Forestry and Fire Protection (CDF) and the Eldorado National Forest (ENF). Funding was provided by EDCFSC with National Fire Plan, Federal Forest Reserve and local funds.

This Plan is not a legal document, although the recommendations contained within the Plan carefully conform to the spirit and the letter of the NFP, HFRA, the State of California Fire Safe Plan and the Draft El Dorado County General Plan

II. Background – The Wildfire Threat in El Dorado County

El Dorado County has a Mediterranean type climate which features hot, dry summers and cool moist winters. The June – October dry season produces ideal conditions for wildfires. Annual plants die and perennial plants lose moisture and become highly flammable. Fires burning towards the end of the dry season are intense, resist suppression efforts and threaten lives, property and resources. Drought conditions intensify the wildfire danger. Two additional climatic conditions aggravate this already serious wildfire problem. Periodically, almost every year, the Pacific High Pressure System moves eastward over California and brings very hot, dry weather with low humidity. This "Heat Wave" can occur at any time during the dry season and wildfire can start easily and are difficult to extinguish. The other extreme weather condition, thankfully less frequent, usually occurs in the fall and sometimes in early winter, when north or east strong, dry winds subside from the Great Basin High (Foehn Winds). Under these conditions, a wildfire can quickly escape and create great damage before the winds stop blowing. The Oakland Hills Fire of 1991, which destroyed 3810 homes, burned under these conditions.

Each year, hundreds of homes are destroyed or damaged by wildland fires. El Dorado County is no exception from wildfire losses. In 1985 the Eight Mile Fire destroyed 14 homes and in 1992 The Cleveland Fire destroyed over 40 homes and claimed the lives of two aircraft pilots. People who live in, or plan to move into, an area where homes are intermixed with brush, grass, woodlands or forests may be in jeopardy and their lives may be at risk. Nobody may remember the last wildfire in any given area in the County, but history and tree ring analyses tell us that sooner or later, wildfires will occur. Few who have lived through a wildfire maintain their pre-fire attitudes. Those who have not been through a fire cannot imagine such an experience and are more or less convinced that it will not happen to them. Unfortunately, the control of wildfires is not an exact science. A wildfire responds to the weather, topography, and fuels in its environment. Under extreme burning conditions, the behavior of a wildfire can be so powerful and

unpredictable that fire protection agencies can only wait until conditions moderate before suppression actions can be taken.

To best understand the history of wildland fire in the Sierras, it is necessary to look at presettlement fire regimes. The Sierra Nevada Ecosystem Project, Volume 1, Assessment Summaries, 1996, Wildland Resource Report No. 36 – UC Davis, page 62, "Management Strategies" states the following:

> **"Ecological Functions of Fire**. Fire is a natural evolutionary force that has influenced Sierran ecosystems for millennia, influencing biodiversity, plant reproduction, vegetation development, insect outbreak and disease cycles, wildlife habitat relationships, soil functions and nutrient cycling, gene flow, selection, and, ultimately, sustainability."
>
> "Climatic variation plays an important role in influencing the patterns and severity; fires have been most extensive in periods of dry years."
>
> "In most lower-elevation oak woodland and conifer forest types of the Sierra Nevada, presettlement fires were frequent, collectively covered large areas, burned for months at a time, and, although primarily low to moderate in intensity, exhibited complex patterns of severity."
>
> "Fire suppression in concert with changing land-use practices has dramatically changed the fire regimes of the Sierra Nevada and thereby altered ecological structures and functions in Sierran plant communities."
>
> "**ASSESSMENT**: Fire represents both one of the greatest threats and one of the strongest allies in efforts to protect and sustain human and natural resources in the Sierra Nevada. Residents and visitors alike are well aware of the threats posed by summer wildfires. A growing density of homes and other structures coupled with the increased amount and continuity of fuels resulting from twentieth-century fire

> suppression have heightened concern about threats to life and property, as well as the health and long-term sustainability of forests, watersheds, and other natural resources. Yet fire has been an integral part of the Sierra Nevada of millennia, influencing the characteristics of ecosystems and landscapes. Today, state, federal, and local agencies put enormous resources into efforts to reduce fire occurrence while at the same time advocating the need to use fire to promote healthy ecosystems. The challenge we face is how to restore some aspects of a more natural fire regime while at the same time minimizing the threat wildfire poses to human and natural resources and values."

The Forty-Niners carried the early perception that the nation's forests and wild lands were obstacles to agriculture and settlement in California. For more than half a century following the Gold Rush, settlers, miners, stockman and others used El Dorado County rather harshly. Often land was abused through indiscriminate burning. Fires were deliberately set for a variety of purposes often raging out of control. The prevailing attitude regarding wildfires, however, was to save lives and protect property and let the wild lands take care of themselves. Wildfires continued in El Dorado County and elsewhere in the state until damages exceeded tolerable limits. This led to the establishment of the precursor of the California Department of Forestry and Fire Protection (CDF) in 1881 and the State Board of Forestry in1885, following the establishment of the Federal Timber Reserves (now the National Forests) and the U. S. Forest Service in 1905.

III. Introduction

Fire Safe planning is well developed in the County. The County Planning Department routinely requires a Fire Safe Plan for Tentative Maps and County Building Permits Conditions of Approval. Over 150 such plans have been developed and approved. California Public Resource Code #4291 which requires clearance of flammable vegetation from around structures has been enforced in some, but unfortunately not all, jurisdictions for over 20 years. Public Resource Code #4290 and Title 14 Regulations for Fire Prevention and for the provisions of Fire Support Infrastructure in State Responsibility Areas (SRA) have been enforced since 1993. County Amendments to the SRA Fire Safe Regulations were adopted in 1986 and revised in 1988, 1989, and 1990. A proposal to provide additional fire prevention information by revisions to the County of El Dorado Design and Improvement Standards Manual has been funded by the El Dorado County Prevention Officers Association and the EDCFSC.

The California Uniform Building and Uniform Fire Codes govern most aspects of fire safety relating to structures of all types and uses of all kinds and require actions to reduce the loss of life and property. There are no similar Fire Safe Requirements that integrate such codes with the threat of multiple exposures to fire in wildland fire situations. Community Fire Safe Planning must recognize the threats which accompany the urban-wild land intermix as wildfires may start in either and threaten both.

(Vicki, maybe picture here of fuels adjacent a home.)

IV. Purpose and Scope

A. Purpose

The El Dorado County Wildfire Protection Plan is the Council's strategy for reducing the damage and loss from wildfires by placing emphasis on what needs to be done before a wildfire starts. The Plan looks to reduce property losses, increase firefighter and residents safety and contribute to ecosystem health. The plan is a cooperative effort with the CDF and the ENF, agencies of El Dorado County, local Fire Protection Districts and the EDCFSC. The HFRA requires a CWPP be prepared for communities to secure financial support.

El Dorado County environment is a fire environment. The landscape evolved from fire and that is not going to change. It is the Council's hope that this Plan can help to mitigate future losses and promote proactive fire planning.

The Mission Statement of the Council is "The Mission of the EDCFSC is to protect the citizens of El Dorado County and their property from the effects of catastrophic wildfire through education, cooperation, innovation and action."

B. Scope

The Scope of this Plan is countywide and a wildfire plan and will encompass the following:

1. Lists CAR.

2. Provides education materials to the public for fire safety around homes and structural fire safe construction recommendations.

3. Encourages the development of community-based Fire Safe Councils.

4. Establishes the rationale for CAR and cooperation with the fire agencies, county government and local residents.

5. Identifies the EDCFSC as Grantee for federal and state funds to accomplish prescribed fire safe planning and fire mitigation work.

6. Provides specifics to the General Plan for adoption of Fire Safe policies and guidelines.

7. Recommends ordinances to address specific issues.

8. Provides the repository for all CWPPs.

9. Sets a standard format for CWPPs.

V. Problems and Issue

The combination of past uses and recent development has resulted in a dramatic change in fire regimes in the county. What was once was a frequent, low intensity fire regime has become an infrequent high intensity fire regime. Most fires are extinguished at small acreages because of aggressive fire suppression. Occasionally, however, drier windier conditions coupled with the altered fuel conditions; result in large, damaging wildfires. These conditions, coupled with the resident population in fire prone areas and lack of fire plan funding, will likely result in large structure losses and possibly loss of life.

A. Rural Centers are often poorly accessed with narrow, dead end roads with inadequate vegetative clearance along the roads.
B. There is inadequate attention to Fire Safe building codes.
C. Key county watersheds do not have necessary fuel treatment to protect them from catastrophic, high intensity fires.
D. Fuel reduction work must be maintained due to aggressive vegetation growth in most of the County.
E. There is no standard format for defining CAR.
F. CAR are not prioritized as to Values at Risk.
G. Many communities do not have Evacuation Plans.
H. Biomass removal is not economical.

(Old # VI ,Overview of Mission…..deleted)

VI. Goals of the EDCWPP

Overall Goal: Reduce the number, size, and intensity of wildfires in El Dorado County.

A. Work with County Planners and Supervisors to assure that Fire Safe concerns are heard and considered in the General Plan.

(new numbering below here)

B. Promote land and fire management practices that support wildfire mitigation measures while maintaining healthy native vegetation, wildlife, soil, water, and landscapes.

C. Provide assistance to communities to help homeowners protect their homes from wildfire.

D. Encourage and provide examples of high professional standards for wildfire protection planning and operations.

E. Support Legislation that promotes fire safety.

F. Provide information for communities preparing evacuation plans, and encourage them in doing so.

G. Use standardized formats for all documents pertaining to Community Wildfire Protection (CWPP) Planning.

H. Provide educational opportunities for communities and cooperating agencies.

I. Coordinate, Cooperate, and (if feasible) Collaborate with all Agencies, Districts, Departments, and Authorities involved in watershed, fuel reduction, evacuation route planning, and firefighting tasks.

J. Ensure long-term funding for local and EDCFSC activities, and for Council stability.

K. Continue to search for opportunities for biomass utilization.

L. Find ways to assist in the completion of final CWPP inspections of private developments.

M. Help communities with planning and implementation of Fire Safe practices.

N. To the extent feasible, address the fire safety needs of homes that are not a part of any established community.

O. Maintain a list of communities and areas known to meet criteria for Fire Safe participation, and work to expand it.

.

VII Strategic Action Plan Recommendations

The El Dorado Council will:

A.1 Provide Fire Safe information to El Dorado County for the General Plan, including drafts of new ordinances with periodic updates.

A.2 Offer assistance to ED County and the various Fire Protection Districts, for periodic reviews of the El Dorado County Wildfire Protection Plan (EDCWPP), and the Community Wildfire Protection Plans (CWPP).

B. Work with partners to develop and/or disseminate recommendations for low-impact maintenance of areas that have been fuel reduced, and for rehabilitation of disturbed areas.

C.1 Collaborate with District fire agencies in wildfire planning, protection, and prevention, consistent with land stewardship and environmental goals.

C.2 Provide communities and citizens with wildfire education experiences and materials, to improve understanding and motivate action.

C.3 Provide copies and explanations of the Articles of Defensible Space, from Title 14, to all Fire Safe stakeholders, e.g. homeowners, planners, associations, and fire-related agencies.

D.1 Have a standing Reminder that all new CWPPs are to be prepared by Professional Foresters with wildland fire experience, when RFP preparation is required by State Law.

D.2 Provide advice in designing projects so that natural and cultural values are considered and mitigated in Fire Safe operations and maintenance.

D.3 Be the repository for all CWPPs in the County and, to the extent possible, track progress of implementation on the ground.

E. Track relevant legislation, and support, oppose, or remain neutral as decided by the Board.

F. Adopt a Standard Operating Procedure that CWPP Evacuation Plan components must be approved by the CDF (in State Responsibility Areas,) and by local Fire Districts.

G. [Is there anything more to be said about Standardized formats?]

H.1 Work with local Fire Safe Councils and public agencies to develop Defensible Space Demonstration Areas with interpretive signage in communities, as part of public education.

H.2 In collaboration with all partners, continue to perform outreach and public education to communities as a primary means of achieving Fire Safe Goals through self-help.

I.1 Provide fire agencies with information that will encourage adoption of Fire Safe structural features.

I.2 Work with County and State OES, public law enforcement agencies, fire agencies and local Fire Safe Councils to develop evacuation plans for all communities.

I.3 Aid in preparation of a design manual for subdivision development.

I.4 Periodically review conditions on the ground, and plans for, areas formally designated as Open Space, with fire agencies having jurisdiction.

I.5 Advocate for yearly Fire Safe inspections of homes, for compliance with the Articles.

J. Assure financial stability of the EDFSC and associated Fire Safe Projects. Pursue all possible sources of funding and other compatible income-generating ideas.

K. Form a Biomass Utilization Committee made up of public and private partners to investigate opportunities and promote worthy biomass enterprises in the County.

L. Encourage and assist the County to conduct final inspections that bring private developments (parcels and subdivisions) into full compliance with CWPP provisions.

M. Coach communities in CWPP planning and implementation of Plan operations and mitigation measures.

N. Council provide time and expertise, as available, to review, understand, and seek options for addressing the issue of scattered homes.

O. Maintain and use current criteria for Communities at Risk, and help communities who want to participate.

VIII Communities with Fire Safe Plans (CWPP)

The following communities have current a Fire Safe Plan, Community Action Plan, Fuel Reduction Plan or Evacuation Plan

Fire Safe Plan	Community Action Plan	Fuel Reduction Plan	Evacuation Plan
Auburn Lake Trails	Grizzly Flats	Volcanoville	Auburn Lake Trails
Fallen Leaf		Mosquito	Grizzly Flats
Gold Ridge Forest			
Lake Valley			
Meeks Bay			
Mosquito			
Serrano			

See Matrix in Appendix for additional information and Appendix B for listings of Subdivisions with Fire Safe Plans.

(Vicki, how about a picture here of a home with good defensible space)

IX Communities with Fire Safe Councils

Local, community-based Fire Safe Councils are being organized throughout the County. As of August 2004, the following communities have local Fire Safe Councils:

Auburn Lake Trails	Mosquito/Swansboro
Cameron Park	Tahoe Basin
Grizzly Flats	Volcanoville

This list will be updated as new councils are formed

X .Guidelines for Listing Existing CAR, and Rural Centers for CWPP Preparation

A. Must have representative administrative structure (CSD, HOA, Fire Dept etc.)
B. On Federal Register as CAR and future updates
C. High risk for loss of life
D. High risk for loss of homes
E. Evacuation Plan needed
F. Fuel loading
G. Topography
H. High values at risk
I. History of fire ignitions
J. Poor road circulation (narrow and dead end roads)
K. Residents' Concern

XI. Communities at Risk, Community Regions, and Rural Centers

A. CAR

The following communities are identified in the Federal Register of August 17, 2001 entitled "Urban Wild Land Interface Communities within the Vicinity of Federal Lands that are at High Risk for Wildfire". Listed alphabetically.

A. Bass lake
B. Cameron Park
C. Coloma
D. Cool
E. Diamond Springs
F. El Dorado Hills
G. Georgetown
H. Gold Hill
I. Grizzly Flat
J. Latrobe
K. Omo Ranch
L. Outingdale
M. Placerville
N. Pleasant Valley
O. Pollock Pines
P. Shingle Springs
Q. Strawberry

The draft Land Use Map for El Dorado County General Plan identifies three types of Regions: Community Regions, Rural Centers, and Rural Regions.

B. Community Regions (All are also listed as CAR in the Federal Register)

Cameron Park
Camino/Pollock Pines
El Dorado/Diamond Springs
El Dorado Hills
Placerville (includes incorporated city)
Shingle Springs
South Lake Tahoe (includes incorporated city)

C. Rural Centers (Listed Alphabetically)

Auburn Lake Trails	Kelsey	Outingdale
Camino Heights	Kyburz	Phillips
Clarksville	Latrobe	Pilot Hill
Coloma	Little Norway	Pleasant Valley
Cool	Leoni Meadows	Quintette
Fairplay	Logtown	Rescue
Garden Valley	Lotus	Sandridge
Georgetown	Mosquito	Sierra Springs
Grey's Corner	Mt Aukum	Sly Park Hills
Grizzly Flats	Mt Ralston	Somerset
Gold Hill	Omo Ranch	Volcanoville
Gold Ridge Forest		

The geographic boundaries of the Rural Centers are displayed on a map in Appendix L.

D. Rural Regions

Rural Regions consist of the hundreds (if not thousands) of developments scattered throughout the County as the result of earlier activities or which were built to support services provided by schools, state highway and county road maintenance, Sacramento Municipal Utility District facilities and those of the El Dorado Irrigation District. Ski areas, resorts, restaurants, service stations and dozens of other service and recreation facilities are scattered throughout the county. The Eldorado National Forest has electronic sites, administrative sites and over 1,000 homes/cabins within the forest boundary. These Rural Regions are commonly referred to as "The Intermix".

.

All of the CAR on the Federal Register of August 17, 2001 were selected via a public process. A second new process is being considered to update the listings of communities. Other communities, centers, and rural areas were added by the California Department of Forestry and Fire Protection which fell within those zones identified as being High or Very High Fire Hazard Severity and by local Fire Protection Districts.

XII. Interim Process, for the Council, for Selecting of Communities for CWPP Preparation and Funding

The communities on the Federal Register and the communities named in the 2004 County General Plan as Rural Regions will compile the listings of communities for the EDCFSC Board of Directors to consider for CWPP funding. The Board will also consider, in the selection process, the Guidelines displayed in XI. and communities presentations to the Board.

In the near future on the completion of the South Fork of the American River Watershed Assessment (Appendix C), the ENF Fireshed Assessment (Appendix M, References) and El Dorado County Community Wildfire Protection Plan Community Ranking Criteria (Appendix D.) should be considered in ranking all communities in the County for future CWPP and funding

(Vicki, how about a picture here of the BOD at work)

XIII. Education, Cooperation, Innovation and Action Mission

To fulfill the Council's Mission of Education, Innovation, Cooperation and Action, the Council will continue the following:

A. Education – Fire Safe Calendars, County Fair Booth, Web Page, and Theater Adds, Brochures, Workshops, Community Presentations, etc.
B. Innovation – Promote Biomass Utilization (Bio Max Bio Power System), etc.
C. Action – Free Dooryard Chipping, Senior Assistance Program
D. Cooperation – Coordinate fire activities with the ENF, CDF, BLM, El Dorado County, local Fire Districts and other interested citizens. and organizations

XVI. Standard Outline and Checklist for CWPPs

In order to standardize the format for CWPP in the County all Plans will use the following Checklist as a guide. The Checklist is intended to provide communities and plan writers with a step by step guide to use in developing the CWPP. It addresses issues, what elements to considering assessing risks and priorities and how to develop mitigation plan to address those risks.

Step One: Convene decision makers

Form a core team made up of representatives from the appropriate local governments, local fire authorities, and state and federal agencies responsible for management

Step Two: Involve Federal Agencies

Identify and engage local representative of the ENF, CDF, BLM, and other management agencies as appropriate

Step Three: Engage Interested Parties

Contact and encourage active involvement in plan development from a broad range of interested organizations and stakeholders.

Step Four: Establish a Community Base Map

Work with partners to establish a base line map of the community that defines the Community WUI and displays inhabited areas at risk, forested areas that contain critical human infrastructure, and forest areas at risk for large scale fire disturbances.

Step Five: Develop a Community Hazard Assessment and Defensibility Analysis*

Work with partners to:

A. Describe potential fire spread (a function of the fuel complex, etc., using CDF and ENF Hazard Severity Zone determinations).

B. Describe protection capabilities, access, fire support infrastructure, and the potential for urban conflagration.

C. Determine First Run Damage Potential expressed in numbers of structures to be defended or likely to be lost.

Step Six: Develop a Community Risk Assessment

Work with partners to develop a community risk assessment that considers the risk of fire ignitions, homes, businesses, and essential infrastructure at risk, local preparedness capability and adequacy of evacuation routes, staging areas and firefighter safety. The ISO rating for the agency providing structural fire protection shall be considered here. Rate the level of risk for each factor and incorporate into the base map as appropriate.

Step Seven: Establish Community Priorities and Recommendations

Use the base map and community risk assessment to facilitate a collaborative community discussion that leads to the identification of local priorities for fuel treatment, reducing structural ignitability, and other issues of interest, such as improving fire response.

Step Eight: Develop an Action Plan and Assessment Strategy

Develop a detailed implementation strategy to accompany the Plan as well as monitoring plan that will ensure its long term success and maintenance.

Step Nine: Finalize Community CWPP

Finalize the CWPP and communicate the results to community and key partners

*See Hazard Assessment & Defensibility Analysis in Appendix E.

The Checklist is displayed in more detail in the Handbook for Wildland-Urban Interface Communities dated March 2004.

XV, Plan Updates

The Councils County Wildfire Protection Plan will be marked with continuous change, new activities and progress. The Council must periodically review the Plan with vigor and energy to update based on current information.

(Vicki, how about picture here on our chipping program?)

Appendix

(colored paper with word “Appendix” only

GLOSSARY OF TERMS

EL DORADO COUNTY COMMUNITY WILDFIRE PROTECTION PLAN

Activity Fuels: Fuels resulting from, or altered by, forestry practices such as timber harvest or thinning, as opposed to naturally created fuels.

Aerial Fuels: Standing and supported live and dead combustibles not in direct contact with the ground and consisting mainly of foliage, twigs, branches, stems, cones, bark, and vines.

Aspect: Cardinal direction toward which a slope faces.

Atmospheric Stability: The degree to which vertical motion in the atmosphere is enhanced or suppressed. Vertical motion and pollution dispersion are enhanced in an unstable atmosphere. Thunderstorms and active fire conditions are common in unstable atmospheric conditions.

Available fuels: That portion of the total fuel that would actually burn under various environmental conditions.

Burning Index (BI): An estimate of the potential difficulty of fire containment as it relates to the flame length at the head of the fire. A relative number related to the contribution that fire behavior makes to the amount or effort needed to contain a fire in a specified fuel type. Doubling the burning index indicates that twice the effort will be required to contain a fire in that fuel type as was previously required, providing all other parameters are held constant.

Chain: Unit of measure in land survey, equal to 66 feet (80 chains equals 1 mile), commonly used to report fire perimeters and other fireline distances. This unit is popular in fire management because of its convenience in calculating acreage (e.g., 10 square chains equals one acre).

Community Defense Zone (CDZ): An area around or within a community where fuels need to be modified to reduce risk to the community from wildland fire. It also reduces the chance of a fire spreading into the wildland from the community and enhances actions owners take on their property. (Status of the Sierra Nevada; Sierra Nevada Ecosystem Project; Final Report to Congress, Wildland Resources Center Report Number 40)

Compactness: Spacing between fuel particles.

Convection Column: The rising column of gases, smoke, fly ash, particulates, and other debris produced by a fire. The column has a strong vertical component indicating that buoyant forces override the ambient surface wind.

Crown Fire: A fire that advances from top to top of trees or shrubs more or less independent of a surface fire. Crown fires are sometimes classed as running or dependent to distinguish the degree of independence from the surface fire.

Dead Fuels: Fuels with no living tissue in which moisture content is governed almost entirely by absorption or evaporation of atmospheric moisture (relative humidity and precipitation.)

Defensible Fuel Profile Zone (DFPZ): A strategically located block or strip of land on which living and deal fuels need to be or have been treated to create a reasonably safe and effective working environment for suppression and prescribed fire operations. Also see Fuel Break. (Status of the Sierra Nevada; Sierra Nevada Ecosystem Project; Final Report to Congress, Wildland Resources Center Report Number 40)

Defensible Space: The area within the perimeter of a parcel, development, neighborhood or community where basic wildland fire protection practices and measures are implemented, providing the key point of defense from an approaching wildfire or defense against encroaching wildfires or escaping structure fires. The perimeter as used in this regulation is the area encompassing the parcel or parcels proposed for construction and/or development, excluding the physical structure itself. The area is characterized by the establishment and maintenance of emergency vehicle access, emergency water reserves, street names and building identification, and fuel modification measures.

Direct Protection Area (DPA): That area which, by law or pursuant to the terms of (this) agreement, is provided wildland fire protection by the State or by the Bureau. DPAs may include a mixture of state, federal, and Local Responsibility Areas (LRA). (Cooperative Protection Agreement between USDI/ Bureau of Indian Affairs and the State of California.)

Diurnal: Daily, especially pertaining to cyclic actions which are completed within 24 hours, and which recur every 24 hours, such as temperature, relative humidity, and wind.

Energy Release Component (ERC): A number related to the available energy (BTU) per unit area (square foot) within the flaming front at the head of a fire. (The National Fire-Danger Rating System (NFDRS) – 1978, USDA Forest Service General Technical Report INT-39)

Fine Fuels: Fast drying deal fuels, generally characterized by a comparatively high surface area-to-volume ration, which are less than ¼ inch in diameter and have a timelag of one hour or less. These fuels (grass, leaves, needles, etc.) ignite readily and are consumed rapidly by fire when dry.

Fire Behavior: The manner in which a fire reacts to the influence of fuel, weather, and topography.

Fire Danger Rating Area: Geographical area within which climate, fuel, and topography are relatively homogenous, hence fire danger can be assumed to be uniform.

Fire Safe: A combination of steps taken to provide an adequate level of protection of a structure from a wildland fire. (Fire Safe – Inside and Out)

Fire Use: The combination of wildland fire use and prescribed fire application to meet resource objectives. (Federal Wildland and Prescribed Fire Management Policy)

Fireline: The part of a control line that is scraped or dug to mineral soil. (Fireline Handbook, NWCG handbook #3)

Fireline Intensity: The rate of heat release per unit length of the fire front. The most commonly used units in current fire literature are Btu/sec/ft. (The National Fire-Danger Rating System (NFDRS) – 1978, USDA Forest Service General Technical Report INT-39)

Fuel Break: A wide strip or block of land on which the native vegetation has been permanently modified so that fires burning into it can more readily be extinguished. It may or may not have Fireline constructed in it prior to fire occurrence. Also, see Defensible Fuel Profile Zone. (Fireline Handbook, NWCG handbook #3)

Fuel Reduction Zone (FRZ): An area in which continuous, high hazard fuels need to be fragmented and broken up. The purpose of treatment within these areas is to reduce fuels, break up crown closure, and reduce fuel ladders, resulting in lower fire intensities. (Status of the Sierra Nevada; Sierra Nevada Ecosystem Project; Final Report to Congress, Wildland Resources Center Report Number 40)

Fuel Type: An identifiable association of fuel elements of distinctive species, form, size, arrangement, or other characteristics that will cause a predictable rate of fire spread or difficulty of control under specified weather conditions. (Fireline Handbook, NWCG handbook #3)

Hazard: A fuel complex defined by kind, arrangement, volume, condition, and location that forms a special threat of ignition or of suppression difficulty. (Fireline Handbook, NWCG handbook #3)

Hazard Reduction: Any treatment of a hazard that reduces the threat of ignition and spread of fire. (Fireline Handbook, NWCG handbook #3)

Initial Attack: An aggressive suppression action consistent with firefighter and public safety and values to be protected. (Federal Wildland and Prescribed Fire Management Policy)

Initial Attack (2): The control efforts taken by resources which are the first to arrive at the incident. (Fireline Handbook, NWCG handbook #3)

Ignition Component: A rating of the probability that a firebrand will cause a fire requiring suppression action. (The National Fire-Danger Rating System (NFDRS) – 1978, USDA Forest Service General Technical Report INT-39)

Prescribed Burning: Controlled application of fire to wildland fuels in either their natural or modified state, under specified environmental conditions which allow the fire to be confined to a predetermined area and at the same time to produce the intensity of heat and rate of spread

required to attain planned resource management objectives. (Fireline Handbook, NWCG handbook #3)

Prescribed Fire: any fire ignited by management actions to meet specific objectives. A written approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition. (Federal Wildland and Prescribed Fire Management Policy)

Prescription: Measurable criteria, which define conditions under which a prescribed fire may be ignited, guide selection of appropriate management responses, and indicate other required actions. Prescription criteria may include safety, economic, public health, environmental, geographic, administrative, social, or legal considerations. (Federal Wildland and Prescribed Fire Management Policy)

Rate of Spread (ROS): The relative activity of a fire in extending its horizontal dimensions. It is expressed as rate of increase of the total perimeter or the fire, as rate of forward spread of the fire front, or as rate of increase of area. Usually expressed as chains or acres per hour. (Fireline Handbook, NWCG handbook #3)

Resistance to Control (RTC): The relative difficulty of constructing and holding a control line as affected by resistance to line construction and by fire behavior. Also called "difficulty to control." (Fireline Handbook, NWCG handbook #3)

Risk: (1) The chance of a fire starting as determined by the presence of causative agents. (2) A causative agent. (3) Under the NFDRS system – a number related to the potential number of firebrands to which a given area will be exposed during the rating day. (Fireline Handbook, NWCG handbook #3)

Spread Component: A rating of the forward rate of spread of a head fire. (The National Fire-Danger Rating System (NFDRS) – 1978, USDA Forest Service General Technical Report INT-39)

SRA: State Responsibility Area for wildfire protection.

Wildland Fire: Any non-structure fire, other than prescribed fire, that occurs in the wildland. (Federal Wildland and Prescribed Fire Management Policy)

Wildland Fire Suppression: An appropriate management response to wildland fire that results in curtailment of fire spread and eliminates all identified threats from the particular fire. All wildland fire suppression activities provide for firefighter and public safety as the highest consideration, but minimizes loss of resource values, economic expenditures, and/or the use of critical firefighting resources. (Federal Wildland and Prescribed Fire Management Policy)

LIST OF ACRONY

El Dorado County

ACRONYM
ACPD
BEHAVE
BI
BLM
CAR
CDF
CDFG
CDZ
CEQA
CFP
CWPP
DFPZ
DPA
EA
EDCFSC
ENF
ERC
FDR
FRZ
GIS
GPS
HFRA
I-ZONE
LRA
NEPA
NFDRS
NFFL
NFP
NSAQMD
NWCG
RFZ
ROS

RTC
SC
SRA
USDA
USDI
USFS
VFD
WFSA
WGA
WUI

MS

Community Wildfire Protection Plan (CWPP)

DEFINITION OF ACRONYM
Air Pollution Control District
Fire Behavior Prediction and Fuel Modeling System
Burning Index
Bureau of Land Management, Department of the Interior
Communities At Risk
California Department of Forestry and Fire Protection
California Department of Fish and Game
Community Defense Zone
California Environmental Quality Act
California Fire Plan
Community Wildfire Protection Plan
Defensive Fuel Profile Zone
Direct Protection Area
Environmental Analysis
El Dorado County Fire Safe Council
Eldorado National Forest
Energy Release Component
Fire Danger Rating
Fuel Reduction Zone
Geographical Information System
Global Positioning System
Healthy Forest Restoration Act
The are or zone between fuel types-Interface, Intermix, or Intermingle
Local Responsibility Area
National Environmental Policy Act
National Fire Danger Rating System
Northern Forest Fire Lab (Fire Behavior Fuel Models)
National Fire Plan
Northern Sierra Air Quality Management District
National Wildfire Coordinating Group
Reduced Fuel Zone
Rate of Speed

Resistance to Control
Spread Component
State Responsibility Area
U.S. Department of Agriculture
U.S. Department of Interior
U.S. Forest Service
Volunteer Fire Department
Wildland Fire Situation Analysis
Western Governors Association
Wildland Urban Interface

Appendix A - Communities with Fire Safe Plans

El Dorado County Fire Safe Plans for Existing Communities

Index	Community Name	Location	Type of Plan(s)
1	Auburn Lake Trails	Cool Area	Fire Safe, Evacuation, Biomass
2	Grizzly Flat	Somerset	CAP, Evacuation, Biomass
3	Fallen Leaf	Lake Tahoe	Fire Safe (CWPP)
4	Gold Ridge Forest	Pollock Pines	Fire Safe
5	Lake Valley	Lake Tahoe	Fire Safe (CWPP)
6	Meeks Bay	Lake Tahoe	Fire Safe (CWPP)
7	Mosquito/Swansboro	Mosquito	Fire Safe
8	Serrano of El Dorado	EDH	Fire Safe
9	Volcanoville	No County	Fire Safe

Acres	Prepared By:	Date of Plan	Approved by:	Community At Risk (Y/N)
4000	Leisz & Murphy	June, 2003	CDF	Yes
1670	Leisz & Murphy	April, 2004	EDCFSC	Yes
	Harrell	April, 1997		Yes
	Davey	Febr., 2004	MVFD/FSC	Yes
3500	Leisz & Murphy	Jan., 2001	CDF, EDHFD	No
2000	Harrell	June, 2002		Yes

Remarks
1004 Lots, 950 homes
1235 Parcels, 500 homes
400 lots
all existing & future villages
400 5 acre lots

Appendix B - Subdivisions with Fire Safe Plans

El Dorado County Fire Safe Plans for Subdivisions

Index	Subdivision Name	Location	Copy of Plan	Plan Prepared By:	Plan Approved by:	Date of Plan	Status of Subdivision	Number of Lots	Acres	Remarks
1	Weatherstone	Placerville	EDCFPD	Leisz & Murphy		Mar-92	Failed	118	65	Now Eskaton Village
2	Sutter Oaks	Gold Hill	EDCFPD	Leisz & Murphy		Mar-92	Building out	25	156	
3	Camino Canyon	Camino	EDCFPD	Leisz & Murphy		Jun-95	Failed	73	300	
4	Cottonwood	Placerville	EDCFPD	Leisz & Murphy		Jul-93	Building out	214	49	
5	Cinnabar	South County	DSFPD	Leisz & Murphy		Jul-93	On hold		1100	5 Units, Unit E Fire Safe Plan complete
6	The Ranch	Shingle Springs	EDCFPD	Leisz & Murphy		Sep-93	Failed	27	27	
7	Camino Golf Course	Camino	EDCFPD	Leisz & Murphy		Jan-95			360	Golf course constructed and operational
8	Marble Valley	EDH	EDHFD	Leisz & Murphy	CDF,EDCFPD,EDH	Dec-96	On hold	398	2350	
9	Rolling Hills Estates	EDH	EDHFD	Leisz & Murphy	CDF, EDHFD	Apr-98	Built out	85	130	
10	The Promontory	EDH	EDHFD	Leisz & Murphy	CDF, EDHFD	Apr-98	Building out	85	130	Village 6 with 3 Amendments
11	Sawmill Creek	Shingle Springs	EDCFPD	Leisz & Murphy	CDF, EDCFPD	May-98	Failed	57	57	
12	Salmon Falls Preserve	Rescue	RFPD	Leisz & Murphy	CDF, RFPD	Jun-98	On hold	375	375	Supplement dated 11-10-98
13	Valley View	EDH	EDHFD	Leisz & Murphy	CDF, EDHFD	Aug-98	Building out	2840	2037	Specific Plan
14	The Promontory	EDH	EDHFD	Leisz & Murphy	CDF, EDHFD	Sep-98	Building out	607	600	Villages 1-5, Two Amendments
15	Watermark	EDH	EDHFD	Leisz & Murphy	CDF, EDHFD	Sep-98	Building out	32	32	
16	Eastwood Park	Shingle Springs	EDCFPD	Leisz & Murphy	CDF, EDCFPD	Feb-99	Built out	35	35	
17	Cameron Ridge Estates	Cameron Park	CPFD	Leisz & Murphy	CDF, CPFD	Mar-99	Built out	92	43	
18	Camino Vista	Camino	EDCFPD	Leisz & Murphy	CDF, EDCFPD	Jun-99	On hold	8	7	
19	Ridgeview West	EDH	EDHFD	Leisz & Murphy	CDF, EDHFD	Jun-99	Building out	56	118	
20	West Valley	EDH	EDHFD	Leisz & Murphy	CDF, EDHFD	Sep-99	Building out	1146	638	
21	Rancho Dorado	EDH	EDHFD	Leisz & Murphy	CDF, EDHFD	Jun-00	Abandoned	207	115	
22	Highland Village U-4	EDH	EDHFD	Leisz & Murphy	CDF, EDHFD	Jun-00	Built out	9	7	
23	Deerfield Estates	Diamond Springs	DSFD	Leisz & Murphy	CDF, DSFD	Jul-00	Building out	8	20	
24	Bedford Woods	City of Placerville	EDCFPD	Leisz & Murphy	EDCFPD	Jul-00	Building out	14	16	
25	Cameron Glen Estates	Cameron Park	CPFD	Leisz & Murphy	CDF, CPFD	Jun-01	Building out	82	13	
26	Cambridge Oaks	Shingle Springs	EDCFPD	Leisz & Murphy	CDF, EDCFPD	Jun-01	Building out	57	45	
27	Highland Village U-7	EDH	EDHFD	Leisz & Murphy	CDF, EDHFD	Jun-01	Building out	14	14	
28	Hollow Oak	EDH	EDHFD	Leisz & Murphy	CDF, EDHFD	Sep-01	On hold	101	40	
29	Francisco Oaks	EDH	EDHFD	Leisz & Murphy	CDF, EDHFD	Jun-02	Building out	67	39	
30	Euer Ranch	EDH	EDHFD	Leisz & Murphy	CDF, EDHFD	Jun-02		433	154	
31	Pioneer Place	Rescue	RFPD	Leisz & Murphy	CDF, RFPD	Jun-02		26	34	

32	Barnett Business Park	Shingle Springs	EDCFPD	Leisz & Murphy	CDF, EDCFPD	2004		9	21	Commercial Lots
33	Eskaton Village	City of Placerville	EDCFPD	Leisz & Murphy	EDCFPD	2004		113	64	Old Weatherstone
34	Placerville Estates	City of Placerville	EDCFPD	Leisz & Murphy	EDCFPD	2004		39	33	
35	The Pedrigal	EDH	EDHFD	R. Harrell	CDF, EDHFD	Dec-98	Building out	215	102	
36	The Cedars	Pollock Pines	EDCFPD	R. Harrell	CDF, EDCFPD	Apr-96	On hold	16	21	Formerly Quicksilver Estates
37	Starkes Grade Toll Station	Pollock Pines	EDCFPD	R. Harrell	CDF, EDCFPD	Apr-95	On hold	13	60	Unknown - Estates?
38	Redigeview East	EDH	EDHFD	R. Harrell	CDF, EDHFD	Nov-96	Built out	14	9	
39	Camino Heights	Camino	EDCFPD	R. Harrell	CDF, EDCFPD	Jun-98	Building out	7	4.35	
40	Estey Estates	City of Placerville	EDCFPD	R. Harrell	EDCFPD	Jul-02	Building out	17	15	
41	Fresh Pond	Fresh Pond	EDCFPD	R. Harrell	CDF, EDCFPD	Mar-95	On hold		46	Restraurant/motel & 10 residences
42	Southpoint Partners	EDH	EDHFD	R. Harrell	CDF, EDHFD	Apr-96	On hold	15	21	
43	Summit View Child Center	Pleasant Valley	EDCFPD	R. Harrell	CDF, EDCFPD	Feb-95	In use	1	5	Special use permit
44	Shingle Springs Rancheria	Shingle Springs	EDCFPD	R. Harrell	CDF, EDCFPD	Oct-96	Never submiited	40	60	Residences being constructed-Casino no
45										
46										
47										
48										
49										
50										

APPENDIX C - COMMUNITIES AT RISK, COMMUNITY REGIONS AND RURAL CENTERS

NUMERICAL RANKING FOR PREPARATION OF CWPP

Community Name	Representative Administrative Infrastructure	On Federal Register	High Risk to Loss ofLife	High Risk for loss of home	Evacuation Plan Needed	Fuel Loading	Topography	High Values At Risk	History of Fire Iginitions	Road Infra-structure	Residents' Concern
	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.	K.
Bass Lake	1		3	4	1	1	1	1	9	5	3
Cameron Park	10		5	7	7	6	4	10	8	4	5
Coloma	4		4	5	4	6	5	4	7	5	5
Cool	3		3	4	3	4	5	3	5	6	5
Diamond Springs/El Dorado	6		4	5	5	5	5	5	6	6	5
El Dorado Hills	10		4	5	5	5	5	10	9	4	6
Georgetown	8		5	6	6	7	6	8	7	7	7
Gold Hill	3		3	4	4	4	5	4	5	5	4
Latrobe	4		5	6	5	8	7	4	6	8	4
Omo Ranch	1		5	6	5	7	6	3	5	5	4
Ountingdale	2		6	7	6	8	8	2	4	7	8
Placerville	10		9	10	9	9	8	10	8	9	7
Pleasant Valley	3		6	7	6	7	7	7	6	8	7
Pollock Pines/Camion Complex	2		9	10	10	9	9	10	9	9	9
Shingle Springs	1		7	8	7	7	7	6	8	7	7
Strawberry	3		4	5	5	5	5	4	4	6	5
Auburn Lake Trails	10		8	8	9	8	8	10	6	8	10
Grizzly Flats	10		10	10	10	10	9	8	5	8	10
Gold Ridge Forest	5		8	9	8	9	9	8	6	7	7
Mosquito/Swansboro	10		10	10	10	10	9	8	7	8	10
Volcanoville	10		10	10	10	10	9	6	6	10	10
South Lake Tahoe & Vicinity	10		8	8	8	8	8	10	8	8	7
Logtown	5		7	7	9	8	7	5	5	10	6

Color Code - Peach= Communities Below 3 in first category (Infrastructure) need a Community Action Plan before a CWPP

Color Code - Green= Fire Safe Plan Completed or Community Action Plan with Evacuation Plan

RANKING OF TOP TEN COMMUNITIES FOR CWPP:

1.	Grizzly Flats and vicinity	90
2.	Placerville and immediate vicinity	89
3.	Logtown and immediate vicinity	69
4.	Georgetown and immediate vicinity	67
5.	Cameron Park and immediate vicinity	66
6.	El Dorado Hills and immediate vicinity	63
7.	Diamond Springs/El Dorado and immediate vicinity	52
8.	Coloma and immediate vicinity	49
9.	Cool and immediate vicinity	41
10.	Gold Hill and immediate vicinity	41

Numerical Ranking
29
66
49
41
52
63
67
41
57
47
58
89
64
86
65
46
85
90
76
92
91
83
69

IV Mitigation Objectives & Action Plan

Below are the goals and objectives for the County of El Dorado. All agencies participating in this Plan share the same identified hazards and risk analysis. No additional vulnerabilities exist for the other participating agencies.

The following jurisdictions have committed to the following individual actions, which do relate to the goals identified in the plan: El Dorado County Unincorporated area, and the El Dorado County Office of Education. Additionally, participating jurisdictions have identified specific goals and objectives and actions within their annex, but are also committed to the ones listed below.

Prioritizing Mitigation Measures

In order to identify which natural hazards pose the greatest threat, the Probability and Risk Assessments were scaled and quantified to provide an overall assessment of where the greatest threats from natural hazards lie. From this matrix, an initial measure of the identified natural hazards was calculated. This Probability/Risk Assessment Scoring Matrix provides a fundamentally sound, broad-based foundation from which to build more refined comprehension of natural hazard threats within the County in the future.

Natural Hazard Probability/Risk Assessment Scoring Matrix

SCALING	NATURAL HAZARD	PROBABILITY	RISK	TOTAL	THREAT
Very Low = 1	Dam Failure*	2	2	4	Very Low
Low = 2	Avalanche	2	1	3	
Moderate Low =3	Drought	4	3	7	
Moderate = 4	Earthquake	5	4	9	
Moderate/High = 5	Landslide	5	4	9	
High = 6	Flood	5	4	9	
Very High = 7	Severe Storm	4	3	7	
	Wildland Fire	6	5	11	Very High

*Probability/Risk can vary depending upon age and configuration

Mitigation Objectives

The following is a list of objectives developed in conjunction with the overall goals of this plan. Within each objective, one or more actions designed to facilitate the realization of the objective are identified. The objectives are sorted by specific natural hazards and are arranged in the order of priority identified in the Natural Hazard Rating Table. **The highest priority objectives and actions are listed first, with the lowest priority objectives and actions listed last.**

WILDLAND FIRES

Goals/Objective #1: Minimize the threat to lives and property posed by the possibility of wildland fire.
Action 1.1: Reduce fuel loading within identified areas subject to wildland fires.
Timeframe: On-going.
Funding: Funding required.
Staff: Individual property owners, ED County Fire Safe Council, the California Conservation Corp, U.S. Forest Service, and affected government agencies.
Action 1.2: Identify fire prone areas surrounding established facilities with strong potential for fires. Develop partnerships with County Fire and adjacent neighbors to institute weed/brush abatement.
Timeframe: On-going.
Funding: Funding required.
Staff: ED County's Fire Safe Council.

EARTHQUAKES

Goal/Objective #2: Minimize the threat to lives and property as a result of a possible earthquake within the El Dorado County region.
Action 2.1: Hire contract personnel to ensure the construction features of existing structures are seismically safe buildings and meet State Building and Fire Codes.
Timeframe: 2 years.
Funding: Funding required.
Staff: Building Department.
Action 2.2: Inspect all County buildings and, where applicable, upgrade structures to withstand earthquake events.
Timeframe: Ongoing.
Funding: Funding required.
Staff: Outside contract specialists
Action 2.3: Develop and distribute guide to earthquake preparedness techniques.
Timeframe: 1.5 years.
Funding: Funding required.
Staff: To be determined

FLOODS

Goal/Objective #3: Minimize the threat to lives and property posed by the possibility of flood
Action 3.1: Review recognized flood-prone areas and match to exposures of personnel, facilities and equipment.
Timeframe: 1 year.
Funding: No funding required at this time.
Staff: Planning Department.
Action 3.2: Ensure that all bridges within the jurisdiction are structurally safe from failure during peak flow scenarios.
Timeframe: 1 year.
Funding: Funding may be required.
Staff: Outside Support: County Fire; Public Works Department; California Department of Transportation.
Action 3.3: Stockpile pumps, sandbags and related equipment in order to ensure an adequate supply to combat erosion during flood events. Develop a quick response team.
Timeframe: Ongoing

LANDSLIDES

Goal/Objective #4: Reduce landslide events and overall soil erosion
Action 4.1: As part of road maintenance, inspect road cuts and fills for signs of slope failure. Stabilize slopes as necessary.
Timeframe: On-going.
Funding: Funding may be required.
Staff: Internal work crews
Action 4.2: Identify questionable hillsides. Construct "rock pens" and drill & anchor points, and provide cut and fill techniques for finished slopes at the angle of repose.
Timeframe: 3 years.
Funding: Funding required.
Staff: Internal and external support
Action 4.3: Work to identify grading ordinance, ensure that all disturbed slopes are re-vegetated after grading to reduce erosion potential while promoting slope stabilization.
Timeframe: On-going
Funding: Funding required

DROUGHT

Goal/Objective #5: Minimize the threat to property posed by the possibility of drought within El Dorado County.
Action 5.1: Develop and distribute a homeowner's guide to water conservation techniques.
Timeframe: 1 year.
Funding: Additional funding may be required.
Staff: Agriculture Dept.

SEVERE STORMS

Goal/Objective #6: Lessen storm related damage for all types of severe storms that impact County
Action 6.1: Review County ordinance to facilitate adequate snow storage and drainage easements. Correct as necessary.
Timeframe: 1 year.
Funding: Funding required.
Staff: Outside contractor
Staff: Internal/external

AVALANCHE

Goal/Objective #7: Improve techniques of informing the public on the level of avalanche danger within the County's backcountry regions in order to diminish the threat to lives and property posed by the potential for avalanche.
Action 7.1: Obtain equipment to monitor avalanche warning information systems that will inform and warn backcountry users of the current level of snow and rock avalanche danger.
Timeframe: 2 years.
Funding: Funding source required
Staff: Sheriff's Office.

Action 7.2: Construct “rock pens” and drill & anchor points, and provide cut and fill techniques for potential areas of concern.
Timeframe: 2 years.
Funding: Funding required.
Staff: Internal and external support
Action 7.3: Educate County personnel on cold weather survival, skis and snowshoe travel.
Timeframe: On-going.
Funding: Funding required.
Staff: Cold weather survival school and ski resort personnel.
Action 7.4: Train additional personnel in the safe operation of Snow Cat vehicles and become a “mutual aid” resource.
Funding: Funding required.

DAM FAILURE

Since dam failure is a low risk hazard for El Dorado County, therefore, there are no actions developed at this time. If this hazard becomes a higher risk, we will include actions for this hazard at a later update.

IMPLEMENTATION PROGRAM

A primary emphasis will be placed upon implementing actions that provide the highest cost-to-benefit ratio. Knowing that funding is an ever-present issue, all effort will be given to identify actions most beneficial to the citizens and property within the County. The greatest natural hazard threat to lives and property is wildland fire. Wildland fire is the highest-scoring natural hazard threat in the Natural Hazard Probability / Risk Assessment Scoring Matrix. Therefore, it is clearly indicated that mitigation actions focused toward reducing the threat of wildland fires in the County have the greatest cost-to-benefits ratios and will provide the greatest mitigative relief in everyone’s interest.

Additionally, we will:

(1) Maintain emergency response procedures and programs, including agreements with other local, state and federal agencies, to provide coordinated disaster response and programs to inform the public of emergency preparedness and response procedures.
RESPONSIBILITY: Sheriff’s Department (Office of Emergency Services), County Administrative Officer, Department of Transportation, Environmental Management, and General Services Department.

(2) Develop a program to collect, maintain, and update geological, seismic, avalanche, and other geological hazard information.
RESPONSIBILITY: Planning Department and Sheriff’s Department (Office of Emergency Services)

(3) Develop and adopt standards to protect against seismic and geologic hazards
RESPONSIBILTY: Planning Department, Building Department and Department of Transportation.

(4) Continue to participate in the Federal Flood Insurance Program, maintain flood hazard maps and other relevant floodplain data made available by other sources and revise or update this information as new information becomes available. In its review of applications for building permits, discretionary project applications, and capital improvement proposals, the County shall determine whether the proposed project is within the 100-year floodplain based on these data.

RESPONSIBILITY: Planning Department, Building Department, Department of Transportation and General Services Department.

(5) Review the Zoning Ordinance (Title 17 of the El Dorado County Code) to identify revisions that accomplish the following:

- Create an avalanche overlay zone
- Create a dam failure inundation overlay zone

RESPONSIBILITY: Planning Department

V: MONITORING, EVALUATING AND UPDATING THE PLAN

It has been suggested that the Local Hazard Mitigation Plan be reviewed when the General Plan is reviewed. The El Dorado County General Plan will not be reviewed until 2025. The following quote was taken from the El Dorado County General Plan;

"State planning law simply states that a jurisdiction shall "periodically review and revise, as necessary, the General Plan" (Government Code §65103[a]). Once adopted, the County expects the new General Plan to provide guidance through 2025, though regular review may reveal the need for periodic revisions. An exception is the Housing Element, which must be updated every five years pursuant to state law."

Our Plan will be reviewed every 5 years with the current disaster council and County OES personnel taking the lead, unless a significant event occurs causing change before then.

Disasters do not run on timetables, and when a major event occurs and responses are critiqued, plans have to be modified - "learning from our mistakes or changing with the times".

El Dorado County is fortunate to have one Sheriff Sergeant and two Sheriff's Deputies and one department analyst assigned to the Sheriff's Office of Emergency Services. It's important to note that the four people assigned to this unit are responsible for many aspects of public safety. Because this unit is all-encompassing the assigned personnel have the opportunity to interact with all facets of public safety including schools, hospitals and special districts. The El Dorado County Sheriff's OES division's primary responsibility is disaster management, mitigation and education. This unit also manages Homeland Security issues, the largest volunteer search and rescue team in California, workplace and school violence situations and special events. Because of the broad base of contacts, El Dorado County Sheriff OES personnel are constantly in tune to all the disaster needs, natural and man made, and all other related events in El Dorado County.

Any disaster or potential disaster information comes to Sheriff OES with little communication effort. Because of the relationships formed since the sheriff assumed command of County OES, information from all allied agencies in the county and from the state flows to the OES unit freely. In reference to monitoring and evaluating the plan, this can be a constant effort, since allied agencies within El Dorado County communicate on a regular basis the plan can be updated at anytime. All the agencies and departments involved in the process of writing this plan have very close day-to-day working relationships with Sheriff/OES. At any given time the data disk containing this plan can be updated. Some examples of Sheriff/OES involvement with allied agencies are; members of the Fire Chief's Association, members of the local disaster council, close allied relationships with Placerville and South Lake Tahoe Police, close allied relationships with all Federal, State and local fire districts, members of the Safe Schools Committee, close relationships with Barton and Marshall hospitals and a close working relationship with all public response agencies. In El Dorado County we have become

very interactive and user friendly resulting from an open door and open minds. Any agency in El Dorado County who has concerns about disaster mitigation does not have to wait X amount of years; changes and amendments can be made at any time, therefore, defining a living document.

Implementation Through Existing Programs

As of August of 2004 El Dorado County has adopted a General Plan that has been in the planning phase for many years. When this LHMP is finished it will become an annex to that plan. The El Dorado County Planning Department is very instrumental in the writing of this plan and very instrumental in the writing of the General Plan. In El Dorado County Wildland Fires are our most likely disaster scenarios. In reference to existing programs; The El Dorado County Fire Safe Council was adopted and formed by the County Board of Supervisors during 2003. This program is responsible for evaluating fire mitigation measures and implementing programs such as “defensible space”, clearing of unimproved parcels and the “chipper program”.

Other existing programs are implemented by the County Building Department in reference to building standards, which include earthquake mitigation. The County Department of Transportation has an existing program for clearing culverts and is the lead agency to distribute sand for sand bagging during storm run off. Two water agencies that operate in El Dorado County, El Dorado Irrigation District and the Sacramento Municipal Utility District, have very comprehensive plans that deal with mitigating water related incidents. This LHMP is built from these plans that are already in place. El Dorado County is fortunate to have a family of public safety professionals who work very close together. With the implementation of the California Standardized Emergency Management System (SEMS) all public safety agencies now work under these guidelines. Because of these relationships everybody in county government shares all individual agency plans.

Continued Public Involvement

El Dorado County government, at all levels, is involved with the public whenever any plan or any planning process is initiated. Every department from Transportation, Environmental Management, Building Department, Emergency Services and many others have response and operational plans that were prepared from a combination of professional planners, working members of the unit, supervisors and the public. El Dorado County is finishing the General Plan that had extensive public input. The LHMP will be no different than other plans. At anytime any citizen or citizens group can voice concerns to Sheriff/OES or any other governmental body to address mitigation issues. When the LHMP is complete it will be posted on the County Web Page under the OES/Homeland Security icon.

El Dorado County Office of Education

PURPOSE
On behalf of the El Dorado County Office of Education, and the fifteen school districts that we serve, this appendix serves as El Dorado County schools' participation in the El Dorado County Multi-Jurisdiction Hazard Mitigation Plan. The purpose of this Hazard Mitigation Plan is:

a. To protect people and structures by reducing the potential for future damage and economic losses that result from natural disasters;
b. To minimize the costs of disaster response and recovery;
c. To demonstrate a uniform commitment to hazard mitigation principles; and
d. To comply with both state and federal legislative requirements for local hazard mitigation plans.

Hazard mitigation is a plan of action designed to reduce or eliminate long-term risks, to our students and the school sites they attend.

SCOPE
El Dorado County is located just northeast of Sacramento and stretches from the foothills of El Dorado Hills and Folsom Lake, over the Sierra Mountains to Lake Tahoe. With elevations ranging from 200 feet to well over 10,000 feet, El Dorado County offers a unique natural splendor and environmental diversity. Seventy-eight percent of the population of 145,000 lives in unincorporated areas outside the city limits.

El Dorado County consists of 10,000 square miles of vastly diverse and rugged geography. In the heart of California's Gold Rush Country, the western slope borders Placer, Sacramento and Amador Counties. We are divided into eight rural population centers. Placerville is located near the center of the county. Pollock Pines and Camino are the largest populated communities to the east. Georgetown is the largest to the north. Pleasant Valley is the largest to the south; while Shingle Springs, Cameron Park and El Dorado Hills are the three main communities to the west. The western side of the county is the fastest growing area and the closest to the Sacramento metropolitan area.

In a world full of change and uncertainty, El Dorado County has recognized the need to pursue local and state support which is appropriate to maintain and provide safe schools throughout our county. El Dorado County is one of several

agencies that participate in the Local Disaster Planning Council which focuses on ensuring that our communities, including our students, are safe and taken care of.

PARTICIPANTS IN THE PLANNING PROCESS

Dr. Vicki L. Barber, County Superintendent of Schools, Francie Heim, Deputy Superintendent, Kathy Daniels, Facilities & Operations Supervisor, and Mary Turcotte, Director of Business Services.

During the planning stages, four natural hazards were addressed for El Dorado County:

1. Wild land fire
2. Flood
3. Dam failure
4. Earthquake

For El Dorado County, wild land fire is the largest concern. Several of our outlaying communities have one road in and out. If a wild land fire were to get out of control, evacuation of schools or homes would be a difficult task.

HAZARD ANALYSIS

The following chart is designed to address specific hazards that may affect our schools. In using this chart, we did four things:

1. Considered the location of school sites and their proximity to nearby critical infrastructure that could create a problem for the school.
2. Determine what the "chance of occurrence" is for the site using a scale from 1 -10 (10 being the greatest chance of occurrence).
3. Determine what the "effect" would be in a worst cast scenario using a scale from 1 -10 (10 being the greatest effect).
4. Prioritize the list based on conclusions using a scale of 1 – 5 (with 1 being the highest priority).

Planning Priority	Risk	Chance of Occurrence	Effect
1	Wild land Fire	10	Loss of Property/Lives
2	Flood	8	Loss of Property/Lives
3	Propane Spill	5	Loss of Property/Lives
4	Dam Failure	2	Loss of Property/Lives
5	Earthquake	2	Loss of Property/Lives

School Districts will work very closely with all other county agencies to ensure that all necessary measures are put into place to protect our students and schools to the best of our ability. This will include, but is not limited to:

1. Clearing brush and dry grass up to 100 yards away from any building.
2. Inspect our sites and surrounding areas when heavy rain has fallen to ensure that a floor or mud slide does not occur.
3. Have a plan in place to evacuate students and staff in the case of a hazardous material spill, dam failure or earthquake. In some cases, sheltering-in-place, may be the best option. Have a plan in place to ensure that staff is trained on how to safe-guard our children.

County-wide mitigation plans will assist all agencies in working together; however, schools can assess their own sites to ensure that all hazards are identified and mitigation measures can be put into place at each site.

Attached, please find worksheets that will assist each school in identifying their potential hazards.

SCHOOL GROUNDS HAZARD ASSESSMENT

This checklist will assist you in identifying hazards that exist on school property. Identifying these potential hazards will provide useful information for planning evacuation routes and assembly areas.

Hazard	Comments
<u>School Building:</u> □ Long, unsupported roof spans □ Large, window panes □ Heating & air conditioning units □ Overhangs □ Trees or shrubs that need pruning □ Other	
<u>Other Structures:</u> □ Unsecured portable structures □ Unsecured siding or roofing □ Incompatible chemical storage □ Inadequate ventilation □ Other fire hazards	

SCHOOL GROUNDS HAZARD ASSESSMENT (continued)

Hazard	Comments
<u>Playground:</u> □ Equipment in need of repair □ Rocks or material that could cause injury □ Fences in need of repair □ Exposed nails, screws, or bolts □ Other	
<u>School Grounds:</u> □ Trees or shrubs that present a fire hazard or an area for intruders to hide □ Streams in close proximity □ Electric wires □ Propane tanks □ Other	

BUILDING HAZARD ASSESSMENT

This checklist can be used to assess hazards throughout the school. Please remember to include shop areas, custodian closets, storage areas and gymnasiums.

Hazard	Comments
□ Toxic, corrosive, & flammable materials not stored to withstand falling & breaking.	
□ Hazardous materials located in areas that do not have warning signs	
□ Unsecured appliances (water heaters, microwaves, etc.)	
□ Unsecured fire extinguishers	
□ Unsecured filing cabinets	
□ Inadequately supported light fixtures	
□ Unanchored table lamps	
□ Unsecured athletic equipment	
□ Other	

I. Introduction

Purpose

The purpose of the City of Placerville Hazard Mitigation Plan is to provide a planning document that will assist City Officials, residents, and business owners in offsetting future costs by using lessons learned from past historical events and applying those lessons to future events.

Through the process of mitigation, the City of Placerville is prepared to take corrective steps to lessen the effects and costs of future events.

Scope

The City of Placerville Hazard Mitigation Plan addresses natural hazards which can and have occurred within the City of Placerville and areas that those natural hazards will influence.

Participants in the Planning Process

The following list represents all participates in the City level planning process.

Planning Department
Police Department
The Public

Description of the Planning Process

The City's planning process, consisted of the following meetings:

Initial meetings with Planning Department staff to discuss hazards, goals, mitigations, funding. Later meetings with the City Manager, Police Department and Public to gain input into the process. Final meetings were held to confirm results and seek approval before submittal. Anticipate approval from City Council in early May.

Development Trends

Development within the City of Placerville consists of new and infill projects in both the commercial and residential areas. New commercial development is concentrated to the south side of Placerville Drive and the Point View Drive area. New residential development is concentrated to the outlining areas of Placerville and is pushing towards the city limits mostly in the areas of Bedford Avenue, the Lumsden property off Wiltse Road, and the property south of Blairs Lane.

Development in the City of Placerville will have the following affects on anticipated hazards which will have the most potential impact on the City:

Wildfires: New development and current buildings within areas considered high fire dangers are subject to special review that addresses the issues of combustible wood frame buildings, fire retardant roof coverings and groundcover, and clearance around the structures to reduce the risk of fire damage.

Flooding: New development and current buildings within areas considered to be in the 100-year flood plane are subject to special review that addresses issues of flood proofing and channel improvements to reduce the risk of flood damage. Drainage and soil compaction are also considered in new developments.

Earthquake: New development and current buildings are subject to special review that addresses issues of strengthening, changing the use of, and ensure structurally soundness to reduce the risk of a seismically-induced ground failure and shaking.

High Potential Loss Properties
Critical Facilities and Hazmat Sites

1) **Governmental Facilities**
   - A) City Hall, 487 Main St.
   - B) Public Works/Corporation Yard, 3231 Big Cut Rd.
   - C) Town Hall, 549 Main St.
   - D) US Post Office, 3045 Sacramento St.
   - E) El Dorado County Fire Department Station 25, 3034 Sacramento St.
   - F) Placerville Police Department, 730 Main St.
   - G) Animal Control, 2301 Coolwater Creek Rd.
   - H) El Dorado County Government Offices, 360 Fair Ln. 330 Fair Ln.
   - I) Superior Court, 2850 Fairlane Ct.
   - J) Superior Court, 495 Main St.
   - K) District Attorneys Office, 515 Main St. and 520 Main St.
   - L) Fairgrounds, 100 Placerville Dr.
   - M) Probation Department, 471 Pierroz Rd.
   - N) Public Health, 931 Spring St.

O) Mental Health, 935 Spring St.
P) Library, 345 Fair Ln.
Q) Juvenile Hall, 299 Fair Ln.
R) County Jail, 300 Forni Rd.
S) Social Services, 3057 Briw Rd.
T) Chamber of Commerce, 542 Main St.
U) El Dorado County Sheriffs Office, 300 Fair Ln.
V) CHP, 3031 LoHi Way.
U) USFS, 100 Forni Rd.

2) Schools & Day Care Facilities

A) El Dorado High School, 561 Canal St.
B) Sierra Elementary School, 1100 Thompson Way.
C) 7Th Day Adventist School, 1900 Broadway Dr.
D) Schnell Elementary, 2871 Schnell School Rd.
E) Markahm Middle School, 2800 Moulton Dr.
F) Happy Kids Day Care, 2786 Coloma St.
G) Federated Church Preschool, 1031 Thompson Way.
H) First Friends Preschool, 3132 Sheridan St.
I) Montessori County Day School, 2771 Spear St.
J) Montessori of Placerville, 2776 Ray Lawyer Dr.
K) A Tutoring Place, 2979 Coloma St.
L) Mother Lode Union District Office, 3783 Forni Rd.
M) Placerville Union Elementary School District, 1032 Thompson Way.
N) Creative Kids, 2869 Cold Springs Rd.
O) Montessori Christian, 1139 Bush Ct.
P) Placerville Union School Transportation, 2871 Schnell School Rd.

3) Apartment Complexes

A) Carson Ridge Apts, 2838 & 2848 Schnell School Rd.
B) Cottonwood Sr. Apts, 2801 Clay St.
C) Cottonwood Apts, 3030 New Jersey, 2788 & 2766 Clay St.
D) Deerview Park Apts, 2880 Schnell School Rd.
E) Placer Village Apts, 2789 Ray Lawyer Dr.
F) Placerville Apts, 2684 Coloma Ct.
G) Ridgecrest Apts, 2684 Woodridge Ct.
H) Ridgeview Manor, 2980 Coloma St.
I) Sunrise Apts, 880 Conrad Ct.
J) Sunrise Garden Apts, 1400 Woodman Cir.
K) Tunnel St Senior Apts, 2880 Tunnel St.
L) Woodridge East Apts, 2811 Cold Springs Rd.

4) Senior Homes and Assisted Living

A) El Dorado Convalescent, 3280 Washington St.
B) Placerville Pines, 1040 Marshall Way
C) Sunshine Manor, 3112 Washington St.
D) Sierra Manor, 863 De Bernardi Ct.

**There are several other single family residences that house non-ambulatory residents. Snowline Hospice has a list of these residences.

5) Utilities

A) Hunt & Sons Inc., 2891 Mosquito Rd.
B) 76 Products, 1145 Broadway Ct.
C) Sierra Energy, 561 Placerville Dr.
D) Suburban Propane, 386 Placerville Dr.
E) El Dorado Irrigation District, 2890 Mosquito Rd.
F) City Sewer, 2300 Coolwater Creek Rd.
G) City Water Treatment Plant, 3499 Pardi Wy.

6) Commercial Complexes

A) Broadway Plaza, 1319 Broadway Dr.
B) County Fair, 47 Fair Ln.
C) Hangtown Village Square, 1200 Broadway Dr.
D) Discovery Plaza, 2885 Ray Lawyer Dr.
E) Venture Village, 2864 Ray Lawyer Dr.

Vulnerability to Hazards

Wildfires:

A wildfire is the most dangerous hazard that is likely to occur within the City of Placerville. The impact of a wildfire is great, with the potential to cause high number of deaths/injuries and/or property damage.

- Located at 1,866-foot elevation and heavily vegetated, the City of Placerville is classified as having a medium to high fire hazards. This places a majority of the City, including some business districts, at high risk.
- The identified areas of the City of Placerville that have been listed as a high risk for wildfire is everything south of Highway 50, Placerville Drive and Cold Springs.
- The likelihood that a wildfire would cause catastrophic damage is greatly influenced by fuel moisture, temperature, humidity, topography, wind and human behavior.
- Areas of thick vegetation are more prone to suffer from a wildfire.
- An insurance company estimates for reconstruction of a damaged home would be approximately $100.00 per square foot.
- Personal Property loss is generally based on 33% of the replacement value of the structure.
- There are approximately 500 residential structures in the City of Placerville listed in the high fire danger areas.
- The average size of those 500 structures is 1396 square feet per structure
- It is unlikely that all 500 structures would be lost in a single catastrophic fire, however if all 500 structures were lost, the cost to rebuild would be $69,800,000.
- The personal property loss for all 500 structures is estimated to be $23,034,000 based on the 33% of the replacement value of the house.

- Broadway business district, Main St business district and the Placerville Dr business district are all located in the high fire danger areas of the City of Placerville.
- The replacement costs of each business are approximately the same as replacement of each residential structure.

Flooding:
Flooding is the second most dangerous hazard likely to occur within the City of Placerville

- The City of Placerville does have identified 100 and 500 year flood zones.
- There is one stream that flows thru the City of Placerville, Hangtown Creek. There are 3 tributaries that feed Hangtown Creek, Hangtown Creek Tributary, Randolph Canyon and Cedar Ravine.
- The areas of greatest risk for flooding are:
    - All of Smith Flat in the City, Broadway west of Smith Flat to Main St, the entire length of Main St, Highway 50 from Bedford Ave to Placerville Dr off ramp, Placerville Dr from Highway 50 to Pierroz Rd, and Pierroz Rd, would be affected by Hangtown Creek.
    - Airport Rd, and Broadway from Airport Rd. to where it connects with Hangtown Creek at Smith Flat would be affected by Hangtown Creek Tributary.
    - Mosquito Rd from the City limits to Broadway where it connects with Hangtown Creek would be affected by Randolph Canyon
    - Cedar Ravine from the City limits to where it connects with Hangtown Creek at Main St would be affected by Cedar Ravine.
- An insurance company estimates for reconstruction of a damaged home or business would be approximately $100.00 per square foot.

Earthquake:
An earthquake is the third most dangerous hazard that is likely to occur within the City of Placerville.

- The Melones Fault does run thru the city limits of Placerville.
    - The Melones Fault runs from the north to the south and goes directly under the El Dorado County Superior Court house at 495 Main St.
- An insurance company estimates for reconstruction of a damaged or destroyed home or business would be $100.00 per square foot.

Conclusions on Hazard Risk

1. **Wildfires:** A wildfire is most likely to occur on an annual basis, the damaged caused by a wildfire could be wide spread with a catastrophic potential impact to the residents and visitors to the City of Placerville.
2. **Severe Winter Storm:** The City of Placerville has suffered from severe winter storms in the past. The effect from a Severe Winter Storm would be wide spread with a minimal risk to the residents and visitors.

3. **Flooding:** The City of Placerville does have listed 100 and 500 year flood planes, however the damage caused by flooding would be confined to small areas of the City. A flood does have the potential to cause large amounts of property damage however there is a minimal risk to the residents and visitors.
4. **Land Subsidence:** The City of Placerville has had instances of minor land subsidence, resulting from past mining activities. The damage caused from a land subsidence would be site specific and poses minimal risk to residents and visitors.
5. **Earthquake:** The City of Placerville has an identified fault zone running underneath the City. A substantial amount of time has passed since the last earthquake, however it should be expected that a remote chance exists that the City of Placerville could experience an earthquake.
6. **Drought-** The City of Placerville does not have a significant agricultural community within the city limits. Therefore the effects of a drought would cause minimal risk to the residence and visitors to the City. The effects of a drought would have a greater effect on wildfires (fuel moisture) and domestic water usage (landscaping).

IV. Mitigation Considerations

Mitigation Capabilities Assessment

INTRODUCTION

This portion of the Hazard Mitigation Plan assesses the City of Placerville's current capabilities to mitigate the effects of natural hazards which were identified and analyzed in; Section II (Hazard Identification and Analysis), and Section III (Community Vulnerability Assessment). The Mitigation Capabilities Assessment includes an examination of the following local government capabilities:

1. Staff & Organizational Capability
2. Technical Capability
3. Policy & Program Capability
4. Fiscal Capability
5. Legal Authority
6. Political Willpower

The purpose of conducting the capabilities assessment is to identify potential hazard mitigation opportunities all ready available to the City of Placerville

1. STAFF & ORGANIZATIONAL CAPABILITY

The City of Placerville is governed by an elected five member City Council who bear the responsibility of serving the people and improving the quality of life in the City. The City has a number of professionally staffed departments to serve the residents and to carry out the day to day administrative activities. These are the different departments within the City:

Administration **Community Development** **Police Department**
Public Works / Engineer **City Manager/Attorney**
Parks and Recreation

The **City Administrative Office** is responsible for the oversight and management of the City's budget and fiscal programs and coordination of City events and personnel.

The **Community Development Department**'s responsibilities include: developing and maintaining the City's General Plan and Housing Element; conducting public hearings on land use proposals; construction plan reviews; issuance of building permits; correcting Housing Code violations; nuisance abatement; and finally, to seek and obtain grant funding from numerous Federal and State agencies for community programs.

The **Police Department** is responsible for providing the City's general law enforcement services using sound police administrative practices within the guidelines of current law.

The **Public Works / Engineering Department** is responsible for Planning, Constructing, Operating, Maintaining, and expanding all of the City's Major Infrastructure. This includes streets, water and wastewater, storm drainage, and subdivisions. The department is divided into four operating divisions:

- Administration
- Engineering
- Corporation Yard
- Water Treatment Plant

2. TECHNICAL CAPABILITY

Technical Expertise

The City of Placerville has a Community Development Department which has five full-time professionals with a combined experience of over 70 years. Those 5 positions are a Senior Building Inspector, a Community Development Director, an Associate Planner, a Community Development Specialist and an Administrative Secretary. The City also employees several Engineering Technicians and has tenured employees with the Public Works staff and Parks and Recreation.

Internet Access

City officials and employees have Internet access at different work stations in each Department. The City maintains a webpage that serves a variety of purposes.

3. FISCAL CAPABILITY

The City of Placerville has a limited fiscal capability due to continued revenue reductions across the board.

4. POLICY AND PROGRAM CAPABILITY

This part of the capabilities assessment includes the identification and evaluation of existing plans, policies, practices, programs, or activities that decrease the community's vulnerability to natural hazards. Activities that decrease hazard vulnerability should be sustained and enhanced if possible. Activities that increase hazard vulnerability should be reconsidered and thoroughly addressed.

Emergency Operations Plan

The City of Placerville shall maintain and periodically update the City's Emergency Plan

City of Placerville General Plan

The City of Placerville's General Plan states its goals in regards to the health and safety for the residence of the City. The City's Goals and Policies to accomplish those goals are stated below.

Geological Hazard
Goal- To prevent loss of lives, injury, and property damage due to geological hazards

Policies

- Lands with significant, identified geological hazards shall be designated for open-space and low intensity uses until it becomes feasible to mitigate the health and safety risks.
- The City shall require the following information and plans to be submitted for all projects subject to discretionary review by the City in areas of moderate or high slope instability and areas with identified soil instability problems.
    - Engineering geologic report
    - Soils and foundation engineering report
    - Grading, erosion, and sediment control plan
    - Plan review letter evidencing review of all proposed development by a qualified engineering geologist
    - As-built construction report, including building plans, explanation and discussion of any deviations from the approved grading plan, the location and results of field tests, results of laboratory tests, and a statement that the work was performed under the supervision of and in accordance with recommendations of the engineering geologist and/or soils engineer
    - Signature of an engineering geologist certified by the State of California and/or a soils engineer registered in the State of California.
- The City shall ensure that both public and private developments in areas with significant identified geological hazards are sited to minimize the exposure of structures and improvements to damage resulting from geological hazards and to minimize the aggravation of off-site geological hazards.
- Development in areas of lava-capped underground streams shall be properly engineered to allow for the free flow of water.
- The suitability of soil and/or rock formations should be one of the prime considerations for determining the type and intensity of development permitted.
- The City shall establish an ongoing program to collect and maintain current geological data.
- The City shall retain on an ongoing basis a qualified consulting geologist to assist the City in updating its geological data and to review geological reports prepared in connection with new development projects.

Earthquake
Goal- To prevent loss of lives, injury, and property damage due to the collapse of buildings and critical facilities and to minimize disruption of essential services in the event of an earthquake

Policies:

- The City shall, as required by State law, inventory all potentially hazardous buildings within the city and develop a mitigation program, including requirements for strengthening buildings, changing the use of the buildings to an acceptable occupancy level, or demolishing the building
- The City should ensure that all public facilities, such as buildings, water tanks, and reservoirs, are structurally sound and able to withstand seismic shaking and the effect of seismically-induced ground failure
- The City shall ensure that privately-owned and maintained above-ground petroleum products storage tanks and their retaining walls are structurally sound and able to withstand seismic shaking and the effects of seismically-induced ground failure

Flooding

Goal- To prevent loss of live, injury and property damage due to flooding

Policies:

- The City shall continue to participate in the National Flood Insurance Program. To this end, the City shall ensure that local regulations are in full compliance with standards adopted by the Federal Emergency Management Agency
- New residential development shall be constructed so that the lowest floor is at least one foot above the 100-year flood level.
- Non-residential development shall be anchored and flood-proofed to prevent damage form the 100-year flood, or alternatively, elevated to at least one foot above the 100-year flood level
- Existing development shall comply with policies when improvements are made costing at least 50 percent of the current market value of the structure before the improvements
- The City shall provide for channel improvements to and tree and brush clearing along watercourses in Placerville to reduce flooding

Wildland and Urban Fires

Goal- To prevent loss of lives, injuries, and property damage due to wildland and urban fires

Policies:

- Areas of high and extreme fire hazards shall be subject to special review, and building and higher intensity uses shall be limited unless the hazards are mitigated to a point acceptable by the Fire Department.
- All new development in areas of high and extreme fire hazards … shall be constructed with fire retardant roof coverings
- The City shall require the installation of an approved interior sprinkler system in all new combustible woodframe commercial buildings of 5,000 square feet or more.
- All new development in areas of high and extreme fire hazards … shall provide for clearance around the structures and the use of fire-resistant groundcover
- The City shall encourage the … Fire Department to maintain a regular program of fire inspection for commercial and industrial buildings

- The City will ensure in approving and constructing new roads and streets that they are adequate in terms of width, turning radius, and grade to facilitate access by firefighting apparatus. All plans for new streets for areas within the Urban Service Area and/or sphere of influence of the City shall be reviewed by the … Fire Department to ensure that City standards are met since there is a high probability that these areas will be annexed to the City at some point in the future.
- All new development shall be required to meet the minimum fire flow rates and other standards specified by the City's Fire Code.
- Future roadway systems and networks shall be designed with at least one means of egress other than the access in all developing areas
- The City shall not approve any medium or high density residential developments unless they are served by a street system with at least two streets capable of carrying peak load traffic
- Parcel splits and multi-family developments shall not be allowed in areas served by narrow streets until minimum access can be guaranteed to emergency vehicles at all times
- In approving commercial, industrial, and multi-family developments, the City shall ensure all structures are located within 150 feet of an access useable by fire trucks
- Existing streets shall be upgraded to meet City Subdivision Ordinance standards wherever possible
- Parking shall be restricted on streets less than 28 feet in width curb to curb
- The City shall continue to aggressively enforce its fire code and weed abatement regulations
- The City shall encourage the Placerville Fire District to enact and enforce a weed abatement ordinance for the unincorporated area within the Fire District's service area
- The City shall strive to restrict vehicular access and recreational use of undeveloped foothill areas during critical fire hazard periods
- The City shall adopt a uniform system for numbering structures, residences, and businesses.
- The City shall remove obstructions obscuring street signs and require that house numbers be legible form the street. Commercial structures with rear street access shall be identified with the business name and street address in a clear and conspicuous manner on the rear of the building

Land Subsidence

Mine Shafts and Openings

Goal- To protect the public from the hazards posed by old mine shafts and openings

Policy:

- The City shall enforce the Nuisance Abatement Ordinance requiring the identification and capping of all abandoned mine shafts and openings

5. POLITICAL WILLPOWER

The City understands the need for mitigation efforts and is supportive within the financial means available to the City. Therefore it is expected that the current and future political climates are favorable for supporting and advancing future hazard mitigation strategies.

Strategy

It is not the design of this section to list the exact details of what corrective action should be taken, but to merely offer the basis to which the City should build upon to reduce the impact that a natural disaster will have upon the City.

1. Objectives

The City of Placerville should make every effort to implement and improve on the Hazard Mitigation Plan, as well as take the necessary steps to reduce or eliminate hazards that are posed by environmental factors.

The City should continue with and improve upon, the programs and polices that reduce the effects of naturally occurring disasters.

The City should reconsider and revise the programs and policies that increase the risk to the public in an effort to reduce those potential hazards.

The City's Hazard Mitigation Plan should be updated and revised when City Officials deem it to be necessary.

2. Mitigation Actions

Prevention

The City of Placerville should take all steps necessary in an effort to lessen the impact of a major natural disaster prior to the occurrence of that natural disaster. The preventive measures that are already in place that reduces the risk of a major disruption in critical services should continue to be practiced and from time to time be updated as the needs of the City and community change.

Property Protection

The City of Placerville should take into consideration and prepare for the impacts that a natural disaster will have on both public and private property. The City should look at retrofitting critical facilities to help reduce the loss of that facility during a natural disaster.

Natural Resource Protection

The City of Placerville should also take into consideration and prepare for the impacts that a natural disaster will have on natural resources in the area. The City of Placerville is rich with natural resources which serve as the back drop for the community. To protect the natural beauty of the City will help spark the economic recovery from a natural disaster. The City's plan to use hazardous areas as recreational areas should continue to be a priority.

Structural Projects

The City of Placerville should continue in following the General Plans goals for new and other structural projects. The City should from time to time revise and update its policies, procedures and practices when approving and having new and other structural projects implemented.

Emergency Services

The City of Placerville should continue to update and training new and tenured employees in respects to hazard reduction and enforcement of City Ordinances that directly effect hazard mitigation. The City should also plan and prepare for any unexpected costs that might occur during a natural disaster from the response of emergency services.

Public Information and Awareness

The City of Placerville should work with local news organizations in an attempt to inform and keep the public aware of issues that affect both them as individuals as well as the community as a whole. The City should also create a network with local news organizations, business leaders and community leaders that has the ability to quickly pass along information.

V. Implementation

PURPOSE

The purpose of this section is to outline the possible implementation methods of the proposed mitigation actions identified in the preceding section.

Mitigation Action

The City of Placerville shall make every effort to implement and improve on the Hazard Mitigation Plan, as well as take the necessary steps to reduce or eliminate hazards that are posed by environmental factors.

The City shall continue with and improve upon, the programs and polices that reduce the effects of naturally occurring disasters.

The City shall reconsider and revise the programs and policies that increase the risk to the public in an effort to reduce those potential hazards.

The City's Hazard Mitigation Plan shall be updated and revised when City Officials deem it to be necessary.

LOCAL FUNDING SOURCES

The City of Placerville depends upon a variety of taxes and fees that support our general fund. These taxes and fees support a majority of the City's infrastructure. Current fiscal constraints have left the City with a very marginal surplus. The City uses grant funding, when available, to gap-fund necessary projects within the City.

The City cannot accomplish major projects without significant increases in revenue, whether it comes from taxes, fees or grants.

VI. Evaluation and Enhancement

A. MONITORING, REPORTING, REVISIONS AND UPDATES

The City of Placerville has a unique topography that is ever changing. The needs of the community as well as the City to improve public safety changes with the times. Even though there is that constant change and upgrades in hazard mitigation, disasters happen. Those disasters do not usually occur at the most opportune times and are fairly unpredictable. The City of Placerville will take the opportunity to, after each disaster, take the lessons learned from a particular disaster, compare it to previous disasters of the like, and apply those lessons to this Hazard Mitigation Plan.

The City of Placerville has created relationships with allied agencies, including El Dorado County Sheriffs Office, which over sees the Office of Emergency Services (OES) for El Dorado County. The El Dorado County Sheriff's OED division has 4 dedicated staff including one Sheriff Sergeant, two Sheriff's Deputies and one department analyst. The City of Placerville works in partnership with the OES on disasters and the hazard mitigation that goes along with those disasters.

The City of Placerville will also set up a set timetable to review and revise the Hazard Mitigation Plan to go along with the ever-changing needs of the community.

The City of Placerville will also continue to be involved with the public though our COPPS (Community Oriented Policing and Problem Solving) problem, in which citizens may voice their concerns. The citizens of Placerville may also at anytime voice their concerns to the City regarding mitigation issues.

GOLDEN WEST CSD (GWCSD) HAZARD MITIGATION PROJECT PLAN

The Golden West Community Services District (GWCSD) consists of 12.8 miles of roads, of which, approximately 7 miles are asphalt paved and 5.8 miles are surfaced in either recycled asphalt of gravel over subsoil. The area is located in the town of El Dorado, and is situated at the top of the Consumnes River canyon. The dominant vegetation is Oak, Grey Pine, and Manzanita woodland with non-native grasslands. The vegetation is decedent and highly susceptible to fire. In the last 10-15 years there has been considerable building of expensive, private homes in the area, especially along Crystal Boulevard and 18 gravel and recycled asphalt roads that feed onto Crystal Boulevard. There are three main roads that feed onto Highway 49: Crystal Boulevard, Dolomite Drive, and Galena Drive. One unimproved road (Mica Street) connects Crystal Boulevard with State Highway 49, and is designated as a fire exit for residents at the lower end of Crystal Boulevard and its feeder roads. Mica Street is closed by a fire gate at the juncture of Mica Street and Highway 49. Additionally, a portion of approximately 400 feet of a road connecting two other roads is impassable, which if opened and improved would reduce access and egress from the area by 50% or approximately 10 minutes. Opening this 400 feet would also provide faster access by firefighting and other emergency equipment.

RISK

An extract of the database maintained by the El Dorado County assessor's office was utilized to determine the account risk for the targeted area. There are 473 parcels, of which 397 have structures built upon them. Appendix A. lists all parcels as well as the square footage associated with structures on each parcel. The low square footage is 760 square feet, and the largest is 3,997 square feet, with the average residence size of 1,977 square feet. The typical home has wood siding or masonry veneer, with primarily asphalt shingles, the average interior is plaster or drywall, hardwood, carpet or vinyl composition, and adequate lighting/plumbing per building codes. The quality rating of residences ranged from 5 (fair) to 8 (high quality), with an average quality of 6.425. According to the tax assessor's records, the total square footage at risk is 782,916.

The El Dorado County assessor's office also provided information from Marshall and Swift Evaluation Service to determine reconstruction cost. Based on this data, using the average home as a basis, the reconstruction cost is $106.16 per square foot. Marshall and Swift data provided a multiplier for each region that reflects local costs. The multiplier for El Dorado County is 1.14. Therefore the risk is: $93.12 per square foot X 782,916 square feet X a factor of 1.14, or a total of $ 83,114,361.

FEMA generally uses 30% of the reconstruction cost as a value for contents.

BURN RECURRENCE INTERVAL (FREQUENCY)

In the last 2 years, there have been 5 fire incidents in the area, each with over 10 acre burns. Several other incidents have occurred over the last 15 years in nearby Wild-land-Urban Interface (WUI) area, which, without the quick action of CDF and local firefighters, could easily have

spread and brought catastrophic loss to the GWCSD. Maps (Appendix B), obtained from the California Department of Forestry and Fire Protection's Fire and Resource Assessment Program (FRAP) show that the last major fire incidents (over 100 acres) occurred in the GWCSD area during the period 1970-80. The growth of highly flammable fuels over the last 30 years is an indication that this area is at extremely high risk to wildfire. The Fire Threat and Fuel Rank maps show that fuels in the area are rated either High or Very High. With the exception of individual homeowner efforts to protect their properties, there has been little or no fuel reduction programs implemented, nor any fire mitigation measures put in place. A grass roots initiative is in place to form a Firesafe Council for the area that encompasses the GWCSD. The mission of the Firesafe council is to raise public awareness, educate residents on the dangers of wild land fires and to develop and implement a Community Action Plan and Community Evacuation plan.

Eighteen of the feeder roads onto Crystal Boulevard and Dolomite Drive are dead end with some type of turn around capability. However, approximately eleven (11) cannot accommodate any large firefighting equipment, nor are they wide enough for two firefighting vehicles to pass side by side. This situation represents a significant liability to adequate fire protection.

FLOODS

There is little or no probability of extensive floods from river flooding, as there are no significant streams in the area. There is, however, **medium to high probability** of damage to feeder roads that are either recycled asphalt or gravel surfaced due to erosion resulting from heavy rain during winter storms. Fortunately, for the last few years, flood damage to the roads due to storms has been minor. The storms of the 1996-97 winter, however caused extensive damage, and a FEMA grant was secured to repair the most seriously damaged gravel roads.

EARTHQUAKE

The area is located approximately 60 miles from the Lake Tahoe earthquake zone. There is no history of significant earthquake activity in the immediate area. Due to the nature of the soils in the area, there has been a history of minor slumping of soils and minor land slides (less than 100 cubic yards).

AVAILABLE FUNDING

Current parcel assessment fees of $120 per year are provided to the GWCSD for maintenance and improvement of the district roads, culverts, and bridges. This amounts to approximately $53,000 per year, and an additional approximate $38,000 is received from El Dorado County ad valorum taxes, for a total of $91,000. The ad valorum monies received from El Dorado County is subject to change at any time. This small amount significantly reduces the projects that can be undertaken each year, and is completely utilized for emergency repairs, weed abatement for ditches, and seriously needed improvement to roads in the worst condition. There are no funds that can be allocated to fire safe programs, fuel mitigation programs, other pre-disaster mitigation programs or improvements for providing community evacuation plans or escape routes.

MITIGATION GOAL

Fuel reduction is our highest priority since fire is a High to Very High threat to our community. Flooding and Earthquake damage is a lower priority, and for this reason, we will need to concentrate on mitigating fire dangers.

Action: Develop fuel reduction programs to reduce the threat of fires, and seek funding for these programs from State and Federal sources.

Local Hazard Mitigation Plan

CHAPTER I--INTRODUCTION

A. BACKGROUND:

Public Law 106-390, known as the Disaster Mitigation Act of 2000, amended the Robert T. Stafford Disaster Relief and Emergency Services Act. This Act now requires local government to have a Local Hazard Mitigation Plan (LHMP). The LHMP must be approved by the Federal Emergency Management Agency (FEMA), in order for the local government to be eligible to receive federal hazard mitigation project funding after that date.

As a Special District El Dorado Irrigation District (EID) has the option of filing a *stand alone* plan or promulgated as an *addendum* to El Dorado County's (EDC) Plan. EID staff has chosen to pursue the project as an addendum to the El Dorado County Plan.

B. PURPOSE:

The EID LHMP is a planning tool for use by the District in its efforts to reduce future losses from natural and/or man-made hazards. Information within this Plan was compiled by our operational force, input from the general public through frequent and publicized meetings, community involved strategic workshops, newsletters and customer service feedback. Moreover, some information within the Plan was developed through the use of contract personnel and firms specializing in vulnerable assessment programs to eliminate and mitigate potential hazards to District personnel, property, and public exposure.

C. HISTORY:

On October 30, 2000, the President signed into law the Disaster Mitigation Act of 2000 (DMA 2000). The purpose of DMA 2000 is to:

- Establish a national disaster mitigation program that will reduce loss of life and property, human suffering, economic disruption, and disaster assistance costs resulting from disasters, and
- Provide a source of pre-disaster hazard mitigation funding that will assist States and local governments in accomplishing that purpose.

DMA 2000 amends the Robert T. Stafford Disaster Relief and Assistance Act by, among other things, adding a new section, 322 – Mitigation Planning. This places new emphasis on local mitigation planning. ***It requires local governments to prepare and adopt jurisdiction-wide hazard mitigation plans as a condition to receiving Hazard Mitigation Grant Program***

(HMGP) project grants/funding. Local governments must review and if necessary, update the mitigation plan annually to continue program eligibility.

- ***Why develop a Mitigation Plan?***
  The full cost of the damage resulting from natural hazards – personal suffering, loss of lives, disruption of the economy, and loss of tax base – is difficult to measure. Our county is subject to many types of natural hazards: floods, winter storms, landslides, avalanches, earthquakes, and wildfires, all of which can have significant economic and social impacts. Some, such as winter storms are seasonal and strike in predictable locations. Others, such as wildfires can occur anytime of the year and almost anywhere in the County.

D. SCOPE OF PLAN:

The initial EID LHMP Committee developed the contents of this plan by using the Hazard Mitigation Planning Guide from the Office of Emergency Services.

Step 1 – Form a Committee and Set Hazard Mitigation Goals (June 2004)

The EID Local Hazard Mitigation Committee includes key staff from Health and Safety, Environmental, Water, and Hydro departments.

Step 2 – Identify Hazards (August 2004)

The EID Local Hazard Mitigation committee identified natural hazards which have been known to occur within EID's geographical range.

Step 3 – Identify Critical Facilities (August 2004)

Step 4 – Identify Existing Mitigation Strategies (September 2004)

Step 5 – Identify the Gaps in Existing Mitigation Strategies (on-going)

Step 6 – Identify Potential Mitigation Strategies (on-going)

Step 7 – Prioritize and Develop the Action Plan (November/December 2004)

Step 8 – Prioritizing Actions (January 2005)

Step 9 – Develop Implementation Strategy (February 2005)

Step 10 – Plan submittal to EDC (February 2005)

CHAPTER II--DISTRICT PROFILE

A. INTRODUCTION

EID is an *irrigation special district* organized in 1925 under the Irrigation District Act (Water Code §§20500, et seq.) and authorizing statutes (Water Code §§22975, et seq.). Its original purpose was to provide domestic water to the City of Placerville and irrigation water to local farmers. Under existing law, this agency provides water, wastewater, recycled water, hydroelectric, and recreation services within its service area, located in the western slope of the Sierra Nevada Mountains in the County of El Dorado, and serves approximately 100,000 customers. EID is an essential support element for fire fighting and it is imperative that our system remains fully operational at all times. Moreover, the U.S. Forest Service has identified 18 communities within El Dorado County that are at greatest risk for disaster level fire storms and we provide the key points of water for fighting and mitigating these wild land fires.

EID owns and operates a 21 megawatt hydroelectric electric generation project licensed by the Federal Energy Regulatory Commission (FERC Project 184) which consists of 4 reservoirs (Echo Lake, Lake Aloha, Caples Lake, and Silver Lake), dams, and approximately 23 miles of flumes, canals, siphons, and tunnels located through the Sierra Nevada Mountains east of Placerville in the Counties of El Dorado, Alpine, and Amador. It is imperative to safe guard and mitigate damage to all dams, reservoirs, and water conveyance systems because a failure could result in significant danger to those persons that reside, work, or play downstream.

Location: The District lies midway between the cities of Sacramento and South Lake Tahoe along the Highway 50 corridor. It is bounded by Sacramento County on the west and the town of Strawberry on the east. The community of El Dorado Hills is the west-most community served by the contiguous water system and Pollock Pines is the east-most. The area north of Coloma and Lotus establishes the northern-most service area. The largely agrarian communities of Pleasant Valley and South Shingle Springs anchor the southern-most service area. The City of Placerville is located in the central part of the District and receives water from the District on a wholesale basis. The District is spread over 226 square miles and is intermixed with low lying savanna topography of rolling hills and ultimately to high Alpine altitudes. See Attachment "A" Map

B. PAST DEVELOPMENT TRENDS

The original water system was a ditch conveyance system. Following many years of effort on the part of early Boards and committed staff to develop additional water supplies, the United States Bureau of Reclamation (USBR) authorized the Sly Park Unit under the American River Act of October 14, 1949 to augment the original water delivery system. The Sly Park Unit included the construction of Sly Park Dam and Reservoir, Camp Creek Diversion Dam and Tunnel, and conduits and canals used to convey, treat, and store water delivered from Sly Park's Jenkinson Lake. The project was completed in 1955, as a non-contiguous part of the Central Valley Project. The Sly Park Unit operated under contract by EID from 1955 until the District purchased the Sly Park Unit from the USBR on December 23, 2003.

The District's other main source of supply is at Folsom Reservoir. The District currently has two USBR water service contracts totaling 7,550 acre-feet and is working on a new 7,500 acre-feet

USBR contract for use in 2005. Additionally, the District was awarded a new water right for 17,000 acre-feet for diversion at Folsom Reservoir by the State Water Resources Control Board.

C. CURRENT DEVELOPMENT TRENDS

Today, the District provides municipal and industrial water (both retail and wholesale), irrigation water, wastewater treatment and re-cycled water, recreation, and hydroelectric services. As such, EID is one of the few California districts that provide the full complement of water-related services in the historical California Gold Rush area. Included in the District are the communities of Cameron Park, Camino, Diamond Springs, El Dorado, El Dorado Hills, Placerville, Pollock Pines, Shingle Springs, Rescue, and many smaller communities.

System Description: The District's contiguous service area spans 226 square miles and ranges from 500 feet at the Sacramento County line to over 8100 feet in elevation in the eastern part of the District. The system requires 181 pressure-regulating zones to operate reliably. The water system operates over 1,150 miles of pipe, 40 miles of ditches, 6 treatment plants, 33 storage reservoirs and 21 pumping stations. In addition, the wastewater system operates 58 lift stations, 300 miles of pipe, and 5 treatment facilities. The El Dorado Hills and the Deer Creek wastewater treatment facilities now produce Title 22 recycled water which is used at golf courses and on front and back yard landscapes in single family homes within selected communities within the District. EID's recycled water program is entering its third decade, and is considered a leader in the recycled water industry in California.

The District also owns and operates Sly Park Recreation Area at its main reservoir, Jenkinson Lake. Located in a heavily wooded area, it is popular for both day visits and overnight camping. The park includes 600 surface acres for water activities, 10 picnic areas, 9 miles of shoreline, 2 boat ramps, and 191 individual campsites. Group camping areas include: 5 adult, 2 youth, 1 handicapped and 1 equestrian. There are also 9 miles of hiking and equestrian trails, and a Native American/historical museum that includes a self-guided, 1/2-mile trail for those who enjoy nature and wildlife viewing.

CHAPTER III--HAZARD RISK ASSESSMENT

A. WHAT ARE THE HAZARDS?

El Dorado County is prone to a variety of natural hazards. In no particular order, these include: flooding, high winds, wildland fires, drought, landslide, avalanche, and severe winter storms. The following list of natural and manmade disasters (and the areas affected by them), either have or could affect future EID operations.

B. DEFINITIONS OF HAZARDS

Flooding: Floods are defined as a temporary overflow of water onto lands that are not normally covered by water. Flooding results from the overflow of major rivers and tributaries, storm surges, and/or inadequate local drainage. Floods can cause loss of life property damage, water supply contamination, and loss of power generation. Floods can also disrupt travel routes on roads and bridges.

Inland floods are most likely to occur in the spring due to the increase in rainfall and melting of snow; however, floods can occur at any time of the year. A sudden thaw in the winter or a major downpour in the summer can cause flooding. This was seen nine years ago when the region was hit by the *Pineapple Express*. This is a warm weather storm system from the southern Pacific Ocean. The storm disburses large amounts of rain in short time period. During the winter months this warm rain also causes rapid melting of snow.

- *Disaster Event:* During late 1996 EID experienced a series of strong storms that produced heavy snowfall that extended to lower elevations. Immediately following these colder storms, a wave of sub-tropical (warmer) storms (*Pineapple Express)* struck the area causing accelerated snow melt. The combination resulted in an unprecedented amount of runoff water that inundated streams, lakes and rivers. Reservoirs quickly went to capacity requiring the purposeful release of water downstream. The combination resulted in the flooding of various areas that damaged structures, water conveyance systems, diversion dams, created water contamination, and roadways. The monetary damage amount for this one incident was over $30 million and resulted in a "Presidential Declared Disaster" area.

High Winds: Significantly high winds occur especially during winter storms and thunderstorms. Falling objects and downed power lines are dangerous risks associated with high winds. In addition, property damage and downed trees are common during high wind occurrences. The risk of "downed" power lines have often resulted in significant wild land fires.

Severe Thunderstorms: All thunderstorms contain lightning. During a lightning discharge, the sudden heating of the air causes it to expand rapidly. After the discharge, the air contracts quickly as it cools back to ambient temperatures. This rapid expansion and contraction of the air causes a shock wave that we hear as thunder, a shock wave that can damage building walls and break glass.

- *Lightning:* **A** giant spark of electricity that occurs within the atmosphere or between the atmosphere and the ground. As lightning passes through air, it heats the air to a temperature of about 50,000 degrees Fahrenheit, considerably hotter than the surface of the Sun. Lightning strikes can cause death, injury, property damage, and wildfires.

Wildland fires*:* A forest fire is an uncontrolled fire in a woody area. They often occur during drought and when woody debris on the forest floor is readily available to fuel the fire. Grass fires are uncontrolled fires in grassy areas.

The District's facilities and infrastructure are located within and are adjacent to Federal Lands that have been described by the U.S. Forest Service as being heavily fueled and have the potential for a disaster level fire storm event. The U.S. Forest Service has identified 18 local communities that are at greatest risk for such an event and EID provides water and sewage services to them. Our facilities, infrastructure and personnel are also at risk due to the fire load and terrain setting. A wildfire storm has the potential of destroying power facilities, water delivery & storage, create water contamination, environmental damage and cause potential injury and death to staff. The El Dorado County Fire Safe Council in conjunction with the USFS, California Department of Forestry and local fire districts have assembled a fire vulnerably and mitigate plan for the County and it is included in the El Dorado County Hazard Mitigation Plan. EID has developed a Fire Emergency Response Plan for each of our facilities. It is the intent of this Mitigation Plan, in conjunction with El Dorado County Fire Safe Council's Mitigation Plan to address EID's vulnerabilities and mitigation efforts.

Ice & Snow Events*:* Ice and snow events typically occur during the winter months and can cause loss of life, property damage, environmental damage and tree damage.

- *Heavy Snow Storms***:** A winter storm can range from moderate snow to blizzard conditions. Blizzard conditions are considered blinding wind-driven snow over 35 mph that lasts several days. A severe winter storm deposits four or more inches of snow during a 12-hour period or six inches of snow during a 24-hour period.
- *Ice Storms***:** An ice storm involves rain, which freezes upon impact. Ice coating at least one-fourth inch in thickness is heavy enough to damage trees, overhead wires and similar objects. Ice storms also often produce widespread power outages.

Landslides: EID has facilities and water conveyance systems that have been identified as being in geologically active zones. One such zone is located in the American River Canyon straddling Highway 50 running east from Icehouse Road to Strawberry. The State of California CALTRANS geologists conducted a study of the area and identified "600" potential landslide areas. In 1997, and as a result of strong storms, two very large landslides occurred in this area and damaged and incapacitated the system and blocked Highway 50 for 60-days.

- *Disaster Event*: In October 2004 a wild land fire started in this area burning 7700 acres of land increasing the potential for debris flows and landslide activity. This added risk increases our vulnerability for substantial damage to facilities and operational systems.

Avalanches: An avalanche is a fall or slide of a large mass of snow, rock, or other material down a mountainside. The prevalent exposure would be in the higher country side and could impact the EID personnel, water conveyance systems and roadways. Heavy snow and rock fall activity has interrupted operations three times during 2004 alone. Flume and canals become inundated with debris. A massive avalanche could potentially damage and interrupt service for extended periods of time.

Earthquakes: Geologic events are often associated with California there are several active and inactive faults within El Dorado County.

- *Earthquakes:* A rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric, phone service, water, recycled water, sewer lines, and often cause landslides, flash floods, fires, and avalanches. Larger earthquakes usually begin with slight tremors but rapidly take the form of one or more violent shocks, and end in vibrations of gradually diminishing force called aftershocks. The underground point of origin of an earthquake is called its focus; the point on the surface directly above the focus is the epicenter. The magnitude and intensity of an earthquake is determined by the use of scales such as the Richter scale.

- Earthquake and shake maps are being obtained from the U.S. Geologic Service and the California Office of Emergency Services, and will be addressed in the next upgrade of the El Dorado County Hazard Mitigation Plan.

- The University of Reno is actively researching the potential threat of a level 6 or 7 earthquake in the Tahoe basin area. More information is available at the university's website (http://www.seismo.unr.edu/htdocs/WGB/LakeTahoeTsunami/). We will be reviewing this information further and the potential threat to EID operations and its customers.

Drought*:* A drought is defined as a long period of abnormally low precipitation, especially one that adversely affects growing or living conditions. The effect of drought is indicated through measurements of soil moisture, groundwater levels and streamflow. However, not all of these indicators will be minimal during a drought. For example, frequent minor rainstorms can replenish the soil moisture without raising groundwater or surface water storage. Low streamflow, groundwater, and surface water storage levels commonly cause diminished water supply.

The El Dorado County has been declared by the U.S. Agricultural Secretary as a drought disaster area. Extended drought periods can result in tremendous economic losses and ultimately our ability to provide vital services to the communities we serve.

We have recognized this serious potential problem and have taken initial steps to mitigate losses by enclosing "open" reservoirs and water conveyance systems.

C. SUMMARY OF VALUES

EID has conducted an assessment of the many Natural Hazards listed above that could impact our facilities and infrastructure*. Insured replacement cost values for structures and contents (as of 2003) are as follows:

Description		Building Appraised Insurable Cash Value	Contents Estimated Replacement Cost
District Headquarters - Placerville			
Dunlop Customer Service Building		$3,500,000	$600,000
Finance Building	P 2	106,695	55,000
Board Room	T 5	46,293	35,000
Administration Annex	T 6	25,500	20,000
Customer Service Building	P 1	313,599	277,200
O & M Support	T 9	16,875	22,500
Water Quality	T 3	25,500	15,000
Water Quality Shop	T 3A	10,000	5,000
Facilities Management Inspection	T 8	25,500	9,500
Facilities Management Admin.	T 10	46,250	45,500
Facilities Management	T 7	46,250	35,000
Information Systems	T 4	25,500	55,000
Operations & Maintenance	P 3	100,649	79,000
Auto & Weld Shop	P 4	97,377	134,750
Construction & Ditches	P 5	27,085	12,500
Electronics Repair Shop	T 11	3,000	23,250
Equipment Storage	P 7	10,000	26,000
Waste Storage	P 8	5,000	2,000

Warehouse P 6	87,613	77,250
General Services T 1	16,105	17,500
General Services Storage T 12	5,368	8,800
6 Backyard Type Storage Sheds	12,000	25,000
El Dorado Hills Wastewater Treatment Plant		
Control Building	38,116	10,300
Chlorine Building	12,206	25,000
Pump Building	19,682	0
Warehouse	30,534	5,500
Lab & Master Control Bldg (1999)	233,280	110,800
Blower Building (1999)	82,080	231,000
Digestor Control Building (1999)	6,480	128,000
Dissolved Air Flotation Bldg (1999)	25,650	184,000
Chemical Feed Building (1999)	37,800	67,000
Reclaimed Water Pump & Motor Control (1999)	15,794	175,000
Motor Control Building (1999)	5,832	70,000
El Dorado Hills Water Treatment Plant –		
Control Building	112,261	698,800
Equipment Building	219,690	23,000
Treated Water Pump Building	43,938	0
Filter Backwash Pump Building	4,524	0
Folsom Lake Raw Water Pump Station	61,514	0
Shingle Springs Booster Pump		
Pump Building	7,205	71,000
Generator Building	7,845	17,500
Sewer Lift Stations		
Business Park No. 1	17,024	11,000

Business Park No. 2	17,024	6,000
Business Park No. 3	17,024	6,000
Summit 1	50,590	12,500
Summit 3	16,910	11,000
Summit 5	16,910	10,000
Southpointe	14,223	13,000
Waterford 8	23,785	11,000
Waterford 9	23,785	11,000
Timberline Ridge Bldg. 1	15,371	12,250
Timberline Ridge Bldg. 2	1,774	1,750
New York Creek	12,553	7,250
Bar J	8,960	11,000
K Mart	9,624	19,500
Office of Education	12,257	11,500
Golf Course Booster Pump	8,482	15,000
Oak Ridge Reservoir	22,993	22,500
SouthPointe Booster Pump Station	15,390	23,000
Bass Lake		
Warehouse and Offices	88,004	21,000
Pump Warehouse	13,252	25,000
Control and Chlorine	25,725	12,500
Pump House	3,378	12,500
Deer Creek Wastewater Treatment Plant Cameron Park		
Office and Control	85,462	236,500
Warehouse	45,893	1,500
Upper Blower	27,891	65,000
Upper Pump House	33,313	45,500

Lower Pump House	22,126	0
Back Wash	17,414	11,500
Lower Blower/Main Electrical Controls	17,897	200,000
Reclaimed Water	44,550	139,500
Belt Press Building No. 1	75,000	300,000
Thickener Control Building	75,000	200,000
Effluent Building	45,000	200,000
Quartz Road Pump House	4,292	2,500
Reservoir 7 Water Treatment Plant		
Water Treatment Building	33,338	47,750
Pressure Reducing Station	7,197	7,500
Sanitation District No. 1	33,095	22,500
Reservoir No. 2	25,251	32,000
Moose Hall Reservoir		
Pump House Building	8,982	0
Storage Building	8,982	0
Sportsman's Hall	13,278	50,000
Reservoir No. 1 Water Treatment Plant		
Control and Chlorine	123,616	195,000
Water Treatment Building	34,609	22,500
Gold Ridge Pump Station	4,247	0
Sly Park Recreation Area		
Residence	53,423	0
Residence Garage	9,066	0
Storage Building	20,065	0
Warehouse/Shop/Garage	57,335	0
Office and Storage	53,906	11,000
Gatehouse Entrance	6,987	3,500

12 Restrooms ($10,000 each)	120,000	0
Museum	4,072	11,000
Shop	49,462	11,500
Boat Mooring Facility including slips & docks	300,000	
Courtesy Docks (3 each, $12,000 ea)	36,000	
Reservoir A Water Treatment Plant		
Control	154,733	47,000
Filter	186,662	305,000
Raw Water	23,502	130,500
Weber Dam Pump House	19,931	12,000
Swansboro Water System		
Cableview Court Chlorine Station	2,609	3,700
Dogwood Lane Well Building	2,609	3,200
Log Cabin Lane Well Building	3,679	2,500
Outingdale Water Treatment Plant/Tank	68,921	100,250
Strawberry Water Treatment Plant/Tank	48,600	94,000
Texas Hill Rental Properties		
4331 Big Cut Road	34,547	0
4300 Sofar Road	38,652	0
4156 Big Cut Road	60,188	0
5011 Quarry Road	46,062	0
TOTAL	**$8,139,072**	**$6,198,300**

B:BCCOV/PINS/10/93(revised 2/03)

*(Note: Values for flumes, canals, tanks, SCADA systems, etc. are under review and will be added to the next Plan update.

CHAPTER IV--THE DISTRICT'S NATURAL HAZARD MITIGATION STRATEGY

Mitigation Goals

The EID Local Hazard Mitigation Plan has identified the *natural* hazards that could impact its operations, staff personnel, local residents, and the public, and has assessed the risks inherent to each hazard.

It is a goal of EID to implement measures that are designed to lessen the effects of natural risks and hazards, and this Mitigation Plan is a means to that end. For example, within its jurisdictional areas, EID works hard to decrease the chance of wild land fires by training internal personnel and (on occasions), *contracting-out* to reduce the fuel load in areas of heavy vegetation. A grant program would add to our ability to abate or mitigate the future potential of wildland fires by increasing prevention activities.

The goals identified in the EID Natural Hazard Mitigation Plan are to:

- Save lives and protect property.
- Reduce impact of future disaster events.
- Enable post-disaster funding.
- Hasten recovery from disasters.
- Demonstrate a dedication to improving the District's Environmental and Safety Programs.

These goals are applicable to all natural hazards identified in this plan. Although broad in scope, their intent, namely to reduce the threat of natural hazards through mitigation approaches, is still quite clear in definition and vision. From these goals come the objectives of El Dorado Irrigation District's Local Hazard Mitigation Plan. The objectives are arranged in a manner that addresses each natural hazard individually. From the goals, objectives are derived, and from the objectives, actions are formulated.

A final set of objectives addresses mitigation measures that are applicable to all natural hazards identified within the Plan.

Prioritizing Mitigation Measures

In order to identify which natural hazards pose the greatest threat to EID operations, the Probability and Risk Assessments from Section III of this plan were scaled and quantified to provide an overall assessment of where the greatest threats from natural hazards lie. From this matrix, an initial measure of the identified natural hazards was calculated. This Probability/Risk Assessment Scoring Matrix provides a fundamentally sound, broad-based foundation from which to build more refined comprehension of natural hazard threats within EID in the future.

Natural Hazard Probability/Risk Assessment Scoring Matrix

SCALING	NATURAL HAZARD	PROBABILITY	RISK	TOTAL	THREAT
Very Low = 1	Dam Failure*	2	2	4	Very Low
Low = 2	Avalanche	2	1	3	
Moderate Low =3	Drought	4	3	7	
Moderate = 4	Earthquake	5	4	9	
Moderate/High = 5	Landslide	5	4	9	
High = 6	Flood	5	4	9	
Very High = 7	Severe Storm	4	3	7	
	Wildland Fire	6	5	11	Very High

*Probability/Risk can vary depending upon age and configuration

Mitigation Objectives

The following is a list of objectives developed in conjunction with the overall goals of this plan. Within each objective, one or more actions designed to facilitate the realization of the objective are identified. The objectives are sorted by specific natural hazards and are arranged in the order of priority identified in the Natural Hazard Rating Table. The highest priority objectives and actions are listed first, with the lowest priority objectives and actions listed last.

WILDLAND FIRES

Objective #1: Minimize the threat to lives and property posed by the possibility of wildland fire within EID boundaries.
Action 1.1: Reduce fuel loading within identified District areas subject to wildland fires.
Timeframe: On-going.
Funding: Funding required.
Staff: Individual property owners, ED County Fire Safe Council, the California Conservation Corp, U.S. Forest Service, and affected government agencies.
Action 1.2: Identify fire prone areas surrounding established facilities within the District with strong potential for fires. Develop partnerships with County Fire and adjacent neighbors to institute weed/brush abatement around/near EID facilities.
Timeframe: On-going.
Funding: Funding required.
Staff: ED County's Fire Safe Council.
Action 1.3: County fire requires road re-construction to facilitate emergency vehicle ingress and egress. (i.e., road to be widened at DCWWTP)
Timeframe: Ongoing
Funding: Funding required.
Staff: Contract personnel

EARTHQUAKES

Objective #2: Minimize the threat to lives and property as a result of a possible earthquake with the El Dorado County region.

Action 2.1: Hire contract personnel to ensure the construction features of existing structures are seismically safe buildings and meet State Building and Fire Codes.
Timeframe: 2 years.
Funding: Funding required.
Staff: Building Department.

Action 2.2: Inspect all District buildings and, where applicable, upgrade structures to withstand earthquake events.
Timeframe: Ongoing.
Funding: Funding required.
Staff: Outside contract specialists

Action 2.3: Develop and distribute an employee guide to earthquake preparedness techniques.
Timeframe: 1.5 years.
Funding: Funding required.
Staff: To be determined

SEVERE STORMS

Objective #3: Lessen storm related damage for all types of severe storms that impact EID.

Action 3.1: Review County ordinance to facilitate adequate snow storage and drainage easements. Petition to correct as necessary.
Timeframe: 1 year.
Funding: Funding required.
Staff: Hydro-electric; Drinking Water; Outside contractor

FLOODS

Objective #4: Minimize the threat to lives and property posed by the possibility of flood within the District jurisdiction.

Action 4.1: Review recognized flood-prone areas and match to exposures of personnel, facilities and equipment.
Timeframe: 1 year.
Funding: No funding required at this time.
Staff: Planning Department.

Action 4.2: Work with County to ensure that all bridges within District jurisdiction are structurally safe from failure during peak flow scenarios.
Timeframe: 1 year.
Funding: Funding may be required.
Staff: Outside Support: County Fire; Public Works Department; California Department of Transportation.

Action 4.3: Stockpile pumps, sandbags and related equipment in order to ensure an adequate supply to combat erosion during flood events. Develop a quick response team.
Timeframe: Ongoing.

Funding: Funding required.
Staff: To be determined

LANDSLIDES

Objective #5: Reduce landslide events and overall soil erosion within District property jurisdiction.
Action 5.1: As part of District *road maintenance*, inspect road cuts and fills for signs of slope failure. Stabilize slopes as necessary.
Timeframe: On-going.
Funding: Funding may be required.
Staff: Internal work crews
Action 5.2: Identify questionable hillsides. Construct "rock pens" and drill & anchor points, and provide cut and fill techniques for finished slopes at the angle of repose.
Timeframe: 3 years.
Funding: Funding required.
Staff: Internal and external support
Action 5.3: Work with County to identify grading ordinance, ensure that all disturbed slopes are re-vegetated after grading to reduce erosion potential while promoting slope stabilization.
Timeframe: On-going
Funding: Funding required
Staff: Internal/external

DROUGHT

Objective #6: Minimize the threat to property posed by the possibility of drought within El Dorado County.
Action 6.1: Develop and distribute a homeowner's guide to water conservation techniques.
Timeframe: 1 year.
Funding: Additional funding may be required.
Staff: District Customer Service Department.
Action 6.2: Construct additional "closed" water reservoirs to for growing customer base.
Timeframe: On-going
Funding: Funding required
Staff: Internal/external

AVALANCHE

Objective #7: Improve techniques of informing workers and the public on the level of avalanche danger within the District's backcountry regions in order to diminish the threat to lives and property posed by the potential for avalanche.
Action 7.1: Obtain equipment to monitor avalanche warning information systems that will inform and warn backcountry users of the current level of snow and rock avalanche danger.
Timeframe: 2 years.
Funding: Funding source required.

Staff: Sheriff's Office.
Action 7.2: Construct "rock pens" and drill & anchor points, and provide cut and fill techniques for potential areas of concern.
Timeframe: 2 years.
Funding: Funding required.
Staff: Internal and external support
Action 7.3: Educate District personnel on cold weather survival, skis and snowshoe travel.
Timeframe: On-going.
Funding: Funding required.
Staff: Cold weather survival school and ski resort personnel.
Action 7.4: Train additional personnel in the safe operation of the Districts Snow Cat vehicles and become a "mutual aid" resource.
Funding: Funding required.
Staff: Vendor.

Implementing Mitigation Strategies

Many mitigation measures are preexisting functional strategies. The actions listed above are included as a means of reinforcing those current hazard mitigation efforts. Some may be linked to jurisdictionally specific codes and ordinances or to existing plans under the El Dorado County Plan. In all cases, the EID Hazard Mitigation Plan seeks to function in harmony with and as an enhancement to preexisting plans, ordinance, rules and regulations.

Where mitigating actions are new and not a part of any preexisting governmental or organizational decree, the implementation of these action strategies will be contingent upon the necessary approvals from the appropriate governmental bodies and the securing of necessary funding from yet to be determined sources. Generally speaking, EID has only limited funding available for natural hazard mitigation. Thus, EID will look to secure federal and state natural hazard mitigation grant funding in an effort toward implementing mitigation strategies. We plan on consulting the comprehensive list of federal mitigation programs, activities, and initiatives online through the Federal Emergency Management Agency's website (accessed at http://www.fema.gov/doc/fima/fmpai.)

A primary emphasis will be placed upon implementing actions that provide the highest cost-to-benefit ratio. Knowing that funding is an ever-present issue, all effort will be given to identify actions most beneficial to the citizens and property within the County. The greatest natural hazard threat to lives and property is wildland fire. Wildland fire is the highest-scoring natural hazard threat in the Natural Hazard Probability / Risk Assessment Scoring Matrix. Therefore, it is clearly indicated that mitigation actions focused toward reducing the threat of wildland fires in the District have the greatest cost-to-benefits ratios and will provide the greatest mitigative relief in everyone's interest.

Plan Maintenance

At a minimum, EID's Local Hazard Mitigation Plan will be evaluated every year to ascertain its continued effectiveness. As part of this evaluation, the overall effectiveness of the plan will be considered in context to:

- Assess the number of natural hazard mitigation projects effectively completed
- Review the number of mitigation projects currently in progress, and
- Consider the success of related programs and activities associated with the plan.

Additionally within these annual evaluations, natural hazard mitigation strategies will be examined for a continued level of appropriateness in relationship to any changes in land uses or the level of intensity associated with prevailing land uses. Participants of the plan may be asked to provide an annual evaluation report of the status of natural hazard mitigation efforts within their respective jurisdictions.

Whenever the annual evaluation indicates a necessity to update the plan, an update of the plan will be initiated. Regardless of the plan's status, a mandatory update to EID's Plan will occur every five years in conjunction with the annual plan evaluation process.

Responsibility for organizing annual and all Plan updates/reviews will fall to the District's Safety Manager and Funding Analysis Departments, and will take responsibility for agendizing and noticing all action related to our plan review or update. Timing will be coordinated with the El Dorado County Office of Emergency Services (OES). The OES will be the determining body when assessing the need for any plan update in excess of the fixed five-year update period.

EID is committed to public involvement within this hazard mitigation plan. For both the plan review evaluation and update, a public hearing may be held by the EID Board. The hearing will be publicized and the public will be asked for comment concerning the plan.

In conjunction with El Dorado County, EID will strive to continue to develop our Local Plan as an outstanding planning tool, helping the citizens and customers of the El Dorado Irrigation District to create a safer place to live, work, and play.

ATTACHMENT "A"

DISTRICT BOUNDARY MAP (Next Page)

Plan Submitted by: Mike Bristow, EID Safety/Security Manager

SECTION I

PROJECT DESCRIPTION

The Sacramento Metropolitan Utilities District (SMUD) owns dams that are located in El Dorado County. Below is a listing of these dams:

1.1 Project Description

The most upstream watershed in the Upper American River Project is the Upper Rubicon River which is diverted at the Rubicon Diversion via the Rubicon-Rockbound Tunnel to Rockbound Lake Island Lake to Loon Lake Reservoir through Buck-Loon Tunnel with a maximum capacity of approximately 1,240 cfs.

1.2 Loon Lake Dam

Loon Lake watershed has a total direct area of 7.96* square miles (not including Buck-Loon Diversion), of which 1,450 acres, or about 29 percent, is lake surface when the reservoir is full. The reservoir is formed by 108 foot high earth core and rock fill dam on Gerle Creek, a major auxiliary dam and a dike of similar construction, impounding 76,500 acre-feet. There is a side channel, ungated overflow spillway on the north end of the dam which discharges into Gerle Creek. The major release is through the Loon Lake Powerhouse, an underground power-plant which discharges into a tunnel leading into Gerle Reservoir on Gerle Creek downstream from Loon Lake. Maximum power-plant capacity is about 1,065 cfs when reservoir is at spillway level.

1.3 Gerle Dam

Gerle Reservoir tributary area is 23.35 square miles in addition to the tributary area of the Loon Lake Reservoir, making a total of 31.31 square miles. Reservoir surface area is only about 50 acres at maximum capacity of 1,200 acre-feet. An ungated overflow spillway structure discharges directly over the 58 foot high concrete gravity dam into Gerle Creek. The major portion of inflow to Gerle Reservoir, including Look Lake Powerhouse releases, is diverted into Gerle Canal through a control structure consisting of two 6.5 foot wide by 10 foot high slide gates. Canal capacity is about 1,700 cfs with some surcharge on Gerle Dam spillway. Canal flows are controlled by turnouts along the canal alignment. Water is conveyed by the open Gerle Canal from Gerle Reservoir down the left bank of Gerle Creek to the South Fork Rubicon River at the Robbs Peak Tunnel Diversion.

Robbs Peak Diversion Dam and Tunnel portal are located on south Fork Rubicon River, Diverting South Fork flows and water from Gerle Canal. All flow diverted from the Rubicon River basin, which is in the Middle fork American River drainage, passes through the Robbs Peak Tunnel to the Robbs Peak Powerhouse and into the Union Valley Reserovir in the Silver Creek drainage, which is tributary to the South Fork American River. Capacity of Robbs Peak Power-plant is approximately 996 cfs when Union Valley Reservoir and Robbs Forebay are both at spillway elevation. Average annual diversion from Rubicon River basin into Silver Creek Basin is approximately 180,000 acre-feet.

1.4 Union Valley Dam

Union Valley Reservoir, the major project storage, is located on Silver Creek, with a tributary area of 83.7 square miles. The reservoir is formed by a 427 foot high earth dam with rock facing. Reservoir capacity is 277,000 acre-feet with a reservoir surface area of 2,860 acres at spillway elevation. The spillway is controlled by two radial gates 15 feet high by 40 feet wide, which discharge into a concrete lined spillway channel or chute which returns to Silver Creek below Union Valley Power-plant. Gates are locked open during the winter flood season. The dam, spillway, and gates have been altered since original construction of the reservoir to increase spillway capacity. Alterations at Union Valley were made about 1971. Union Valley Powerhouse, located immediately below the dam, has a maximum discharge capacity of 1,355 cfs when both Union Valley and Junction Reservoir are near spillway elevation. The controlling factor is electrical rather than hydraulic.

1.5 Ice House Dam

Ice House Reservoir is located on the South Fork of Silver Creek, with a tributary area of approximately 27.2 square miles. The reservoir, with a maximum capacity of 46,000 acre-feet and surface area of 678 acres, is formed by an earth core, rock fill dam 154 feet high on the South Fork of the Silver Creek near the small resort and historical site of Ice House. The spillway is located on the left abutment, and is controlled by two radial gates, 14 feet high by 40 feet wide. Gates are locked open during the winter season. Stream flow maintenance releases and spills from Ice House Reservoir are made to the South Fork of Silver Creek and flow downstream to Junction Reservoir. A power-plant has recently been constructed with a tunnel to convey water directly from Ice House Reservoir to Union Valley Reservoir. Jones Fork Powerhouse has an hydraulic capacity approximately 250 cfs.

1.6 Junction Dam

Junction Dam and Reservoir have been constructed below the Junction of the Silver Creek and the South Fork of Silver Creek. The reservoir is utilized as the forebay to Jaybird Powerhouse. Tributary area is approximately 31.14 square miles in addition to tributary areas of Union Valley and Ice House Reservoirs, making a total of 142.0 square miles. Junction Dam is a concrete arch, 168 feet high and 550 feet long. Reservoir capacity is about 3,250 acre-feet. The spillway is an ungated over-pour structure on the dam discharging immediately into Silver Creek. The major diversion from Junction Reservoir is the power tunnel to Jaybird Powerhouse, with a maximum discharge capacity of about 1,335 cfs.

1.7 Camino Dam

Camino Forebay is located immediately below Jaybird Powerhouse. Camino Dam is a concrete arch, 110 feet high and 470 feet long. Reservoir capacity is 845 acre-feet.

Flow is diverted by tunnel from the Forebay to Camino Powerhouse, discharging almost immediately into Slab Creek Reservoir on the South Fork American River. The tunnel to Camino Powerhouse intercepts flows from Brush Creek, a tributary to the

South Fork American River. The Major portion of Silver Creek flows, including diversions from Rubicon River, pass through Camino Powerhouse.

1.8 Brush Creek Dam

Brush Creek Dam and Reservoir are located on Brush Creek, a small tributary of the South Fork of the American River, which discharges directly into Slab Creek Reservoir. Brush Creek Reservoir has a tributary area of about 8 square miles. The dam is a concrete variable radius arch, 213 feet high and 780 feet in length, forming a reservoir of 1,750 acre-feet with a surface area of 21 acres at maximum operating pool. The dam has a central over-pour spillway.

Brush Creek Reservoir is located on an extension of Camino Tunnel which feeds Camino Powerhouse. The elevations of Camino Dam and Brush Creek Dam are approximately the same, so that water drawn by Camino Powerhouse may come from either reservoir. Brush Creek Reservoir not only provides for utilization of water from Brush Creek watershed, but also acts as off-stream storage for water from Camino Forebay.

1.9 Slab Creek Dam

Slab Creek Reservoir represents the most downstream impoundment of the SMUD Upper American River Project. Slab Creek Reservoir on the south Fork of the American River below Camino Powerhouse, acts as a forebay to the lowest SMUD plant. Maximum hydraulic capacity of the White Rock Powerhouse, is approximately 3,600 cfs. The tributary area of the Slab Creek Reservoir is 493 square miles with approximately 351 square miles of incremental area entering the system below Junction Reservoir. The reservoir is formed by a varable radus concrete arch dam 233 feet high with a crest length of 810 feet. Total capacity is 16,600 acre-feet with a surface area of only 249 acres. The reservoir is about 4.75 miles long and very narrow, making it more of a conveyance than storage at extremely high inflows. Fish releases to the river are made through a small power-plant below the dam. The spillway is an ungated over-pour structure on the dam with a length of 450 feet.

Downstream from Slab Creek Reservoir is the Chili Bar Dam and Reservoir, built concurrently with UARP, but owned and operated by the Pacific Gas and Electric Company. This reservoir is the afterbay for SMUD's White Rock Powerhouse. The dam is a concrete gravity structure about 111 feet high with a crest length of 380 feet and a storage capacity of 3,700 acre-feet. Surface area is 124 acres. This is the last dam on the South Fork of the American River before it enters Folsom Reservoir about 20 miles below Chili Bar.

SMUD operates the above facilities under the Federal Energy Regulation Commission (FERC) license, and meets the licensing requirements. None of its facilities are to be included in the El Dorado County Hazard Mitigation Plan analysis because none of the hazards identified in the Plan affect these structures, and the structures themselves are a mitigation measure in case of floods or earthquakes. SMUD representatives have been involved in the planning meetings; however, the information on the facilities are only included for information, and are not intended for hazard mitigation purposes.