Mono County Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)

Mono County
Town of Mammoth Lakes

OCTOBER 2006

Mono County
Multi-Jurisdictional
Local Hazard
Mitigation Plan (LHMP)

Mono County
Town of Mammoth Lakes

Prepared By:

Mono County Community Development Department
P.O. Box 347
Mammoth Lakes, CA 93546
(760) 924-1800, fax (760) 924-1801
commdev@mono.ca.gov

Mono County Local Hazard Mitigation Plan

The Mono County Local Hazard Mitigation Plan is intended to be a living document that changes over time as circumstances change and new information becomes available. To suggest amendments to the plan, or to request further information concerning the plan, contact the Mono County Community Development Department. You may also visit the Mono County website or the Town of Mammoth Lakes website (www.monocounty.ca.gov or www.ci.mammoth-lakes.ca.us) to view the document online. The Mono County and Town of Mammoth Lakes websites also include a complete listing of staff members and their contact information.

Mono County Community Development Department
commdev@mono.ca.gov

(760) 924-1800 (Mammoth Lakes)
(760) 932-5430 (Bridgeport)

Mono County CDD
Box 8
Bridgeport, CA 93517

Mono County CDD
Box 347
Mammoth Lakes, CA 93546

Town of Mammoth Lakes Community Development Department
www.ci.mammoth-lakes.ca.us

(760) 934-8989

Town of Mammoth Lakes Community Development Department
P.O. Box 1609
Mammoth Lakes, CA 93546

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Resolutions of Adoption

Resolutions of Adoption from Town of Mammoth Lakes Town Council and Mono County Board of Supervisors:

RESOLUTION NO. 06-119

A RESOLUTION OF THE TOWN COUNCIL OF THE TOWN OF MAMMOTH LAKES, STATE OF CALIFORNIA, ADOPTING THE MONO COUNTY MULTI-JURISDICTIONAL LOCAL HAZARD MITIGATION PLAN

WHEREAS the Town of Mammoth Lakes has historically experienced severe damage from natural hazards such as flooding, wildfire, earthquakes, avalanches, landslides, and severe winter storms on many occasions in the past century, resulting in loss of property and life, economic hardship, and threats to public health and safety;

WHEREAS the Mono County Multi-Jurisdiction Local Hazard Mitigation Plan (the Plan) has been developed after more than two years of research and work by the Town of Mammoth Lakes in association and cooperation with the Mono County Community Development Department for the reduction of hazard risk to the community;

WHERAS the Plan specifically addresses hazard mitigation strategies and plan maintenance procedures for the Town of Mammoth Lakes;

WHEREAS the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural and human caused hazards that impact the Town of Mammoth Lakes, with the effect of protecting people and property from loss associated with those hazards;

WHEREAS a public meeting was held to present the Plan for comment and review as required by law;

NOW, THEREFORE, BE IT RESOLVED by the Town Council of the Town of Mammoth Lakes, California, as follows:

1. That the above recitations are true.

2. The Plan is hereby adopted as an official plan of the Town of Mammoth Lakes.

3. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them.

4. Future revisions and Plan maintenance required by the Disaster Mitigation Act of 2000 and FEMA, are hereby adopted as a part of this resolution for a period of five (5) years from the date of this resolution.

5. An annual report on the progress of the implementation elements of the Plan shall be presented to the Town Council by October 31st of each calendar year.

6. The Town of Mammoth Lakes will comply with all applicable Federal statues and regulations in effect with respect to the periods for which it receives grant funding, in compliance with 44 CFR.13.11 (c); and will amend our Plan whenever necessary to reflect applicable changes in Tribe, state or Federal laws and statues as required in 44 CFR 13.11. (d).

APPROVED AND ADOPTED this 6th day of December, 2006.

Kirk A. Stapp, Mayor

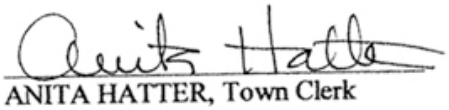
ATTEST:

Anita Hatter, Town Clerk

STATE OF CALIFORNIA)
COUNTY OF MONO) ss.
TOWN OF MAMMOTH LAKES)

I, ANITA HATTER, Town Clerk of the Town of Mammoth Lakes, DO HEREBY CERTIFY under penalty of perjury that the foregoing is a true and correct copy of Resolution No. 06-119 adopted by the Town Council of the Town of Mammoth Lakes, California, at a meeting thereof held on the 6th day of December, 2006, by the following vote:

AYES:	Councilmembers Eastman, McCarroll, Sugimura, Mayor Pro Tem Harvey and Mayor Stapp
NOES:	None
ABSENT:	None
ABSTAIN:	None
DISQUALIFICATION:	None



ANITA HATTER, Town Clerk

RESOLUTION NO. R06-123a
BOARD OF SUPERVISORS, COUNTY OF MONO

A RESOLUTION OF THE MONO COUNTY BOARD OF SUPERVISORS ADOPTING THE MONO COUNTY MULTI-JURISDICTION LOCAL HAZARD MITIGATION PLAN

WHEREAS, the County of Mono has historically experienced severe damage from natural hazards such as flooding, wildfire, earthquakes, avalanches, landslides, and severe winter storms on many occasions in the past century, resulting in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the Mono County Multi-Jurisdiction Local Hazard Mitigation Plan (the Plan) has been developed after more than two years of research and work by the County of Mono in association and cooperation with the Mono County Community Development Department for the reduction of hazard risk to the community; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and plan maintenance procedures for the County of Mono; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural and human caused hazards that impact the County of Mono, with the effect of protecting people and property from loss associated with those hazards; and

WHEREAS, the Plan directs the respective officials to pursue the implementation of the mitigation measures; and

WHEREAS, the Disaster Mitigation Act of 2000 requires a formal maintenance process that includes a schedule for monitoring and evaluating the Plan at least every five years to ensure that it remains an active and pertinent document; and

WHEREAS, the Plan will be monitored, evaluated, and updated by the Mono County Community Development Department as part of its annual review of the status of its planning documents and ongoing programs; and

WHEREAS, a public meeting was held to present the Plan for comment and review as required by law;

NOW, THEREFORE, BE IT RESOLVED that the Mono County Board of Supervisors takes the following action:

1) Adopts the Mono County Multi-Jurisdiction Local Hazard Mitigation Plan.

2) Directs the respective officials identified in the mitigation strategy of the Plan to pursue implementation of the recommended actions assigned to them.

3) In conformance with the Disaster Mitigation Act of 2000, certifies that future revisions and Plan maintenance required by FEMA shall be incorporated and adopted as a part of this resolution for a period of five (5) years from the date of this resolution.

4) Requests that an annual report on the progress of the implementation elements of the Plan be presented to the Board of Supervisors each calendar year.

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5) Pledges that the County of Mono will comply with all applicable Federal statues and regulations in effect with respect to the periods for which it receives grant funding, in compliance with 44 CFR.13.11 (c); and will amend the Plan whenever necessary to reflect applicable changes in Tribe, state or Federal laws and statues as required in 44 CFR 13.11. (d).

APPROVED AND ADOPTED this 12th day of December, 2006, by the following vote of the Board of Supervisors, County of Mono:

AYES : Supervisor Bauer, Farnetti, Hazard, Hunt, Reid.

NOES : None.

ABSENT : None.

ABSTAIN : None.

Tom Farnetti

TOM FARNETTI, CHAIRMAN
BOARD OF SUPERVISORS
COUNTY OF MONO

ATTEST:

CHRISTY ROBLES
ACTING CLERK OF THE BOARD

APPROVED AS TO FORM:

MARSHALL RUDOLPH
COUNTY COUNSEL

Guide to Using the LHMP

↗ Purpose of the Local Hazard Mitigation Plan

The Local Hazard Mitigation Plan (LHMP) is a planning document for hazards mitigation, focusing primarily on natural hazards as required by State and Federal law. Its purpose is to identify natural hazards in the area and ways to mitigate the impacts of those hazards before they occur. The intent of the LHMP is to minimize impacts to people and property from identified natural hazards. It is not intended to provide response scenarios for emergency events.

↗ Emergency Operations Plans

Both the Town of Mammoth Lakes and Mono County have Emergency Operations Plans (EOPs) that address specific emergency procedures for a variety of events, including natural hazard events, terrorism, airplane crashes, bioterrorism, etc. The EOPs are specific response plans for emergency response situations. These plans are maintained by the County Office of Emergency Services and by the Town's Police Department and include lists of emergency response personnel as well as procedures for responding to a variety of events. The plans are updated annually.

↗ LHMP Contents

The LHMP establishes a planning process for developing the document, incorporates applicable prior hazard studies, assesses the resources available for hazards mitigation planning, including existing ongoing hazards planning and mitigation for the area, identifies natural hazards affecting the area and assesses the risk to people and property from those hazards, and provides mitigation strategies for minimizing the impacts of identified hazards. A separate map set in Appendix A contains various maps and figures pertaining to hazards that affect communities in Mono County.

I. PLANNING PROCESS

FOCUS OF THE PLAN

The Mono County Local Hazard Mitigation Plan (LHMP) is a multi-jurisdictional hazard plan that addresses the unincorporated areas of Mono County as well as the Town of Mammoth Lakes, the county's only incorporated area. It also considers areas outside the county that either may impact areas within the county or that are accessed from the county; e.g., Rock Creek Lake in Inyo County could affect Mono County and Red's Meadow in Madera County is accessed from Mono County.

Mono County is a sparsely populated rural county located on the eastern side of the Sierra Nevada mountain range. The State of Nevada forms the county's eastern border. Approximately 94 percent of the County's 3,103 square miles are publicly owned; the area's spectacular scenery of high valleys and rugged mountain ranges has made it a popular recreation destination. The major population center, and the County's only incorporated area, is the Town of Mammoth Lakes. The remainder of the County's residents are scattered in small communities throughout the County.

Approximately 13,500 people lived in the County in 2004; 7,475 persons lived in the Town of Mammoth Lakes and 6,050 lived in small communities throughout the remainder of the County. By 2020, the resident countywide population is projected to increase to 16,248 people.

Mono County is a recreation destination. Throughout the year, there is a significant tourist population in many of the county's communities and at various recreation destinations such as Mammoth Mountain Ski Area, June Mountain Ski Area, Mono Lake, and Bodie.

Communities in the county include Topaz, Coleville and Walker in the Antelope Valley; Bridgeport, the county seat, in the Bridgeport Valley; Mono City and Lee Vining in the Mono Basin; June Lake along the June Lake Loop; Mammoth Lakes; Long Valley, McGee Creek, Crowley Lake, Aspen Springs and Sunny Slopes in Long Valley; Swall Meadows and Paradise in the Wheeler Crest area; Chalfant, Hammil and Benton in the Tri-Valley area; and Oasis in the Fish Lake Valley.

RELATIONSHIP BETWEEN THE LHMP AND LOCAL EMERGENCY OPERATION PLANS

The Local Hazard Mitigation Plan (LHMP) is a planning document for hazards mitigation, focusing primarily on natural hazards as required by State and Federal law. Both the town and the county have Emergency Operations Plans (EOPs) that address specific emergency procedures for a variety of events, including natural hazard events, terrorism, airplane crashes, bioterrorism, etc. The EOPs are specific response plans for emergency response situations; the LHMP is a planning document intended to identify hazards and provide mitigation so impacts to people and property from identified hazards can be minimized.

PLANNING PROCESS & PARTICIPANTS

Mono County and Mammoth Lakes have long been aware of the natural hazards within their boundaries and have had local hazard mitigation policies and programs in place for some time. The County and the Town developed a Local Hazard Mitigation Plan utilizing those documents as the framework for the plan.

The planning process began with a meeting of the County and Town management staff. At that meeting it was determined that the Mono County Community Development Department (CDD) would be responsible for the development of the plan. Town and County staff worked together at that point to identify hazards that should be included in the plan as well as resources to be included in the Local Capabilities Assessment portion of the document.

County staff then contacted a variety of agencies and organizations (listed below) to elicit technical information on hazards as well as comments about what additional hazard mitigation planning could be implemented. Town staff did the same for agencies and organizations associated with the town (listed below). During this time, County and Town staffs were also in the process of eliciting information and concerns from the public at a series of regularly scheduled community meetings throughout the area (see next section on Public Involvement).

Mono County planning staff was then responsible for compiling the accumulated information to prepare a working draft of the document. County and town planning staff worked together on the mitigation section to ensure that all local concerns were addressed.

The working draft was circulated for review to a variety of agencies and organizations and to the public, including the following:

Mono County Collaborative Planning Team--

A multi-agency planning team that coordinates planning efforts in Mono County for a variety of needs (e.g., jobs, transit, recreation, wildlife mitigation and enhancement, etc.). It includes representatives from the following organizations:

Mono County (Community Development Department, includes Building, Planning, Code Compliance)
Benton-Paiute Reservation
Bridgeport Indian Colony
Town of Mammoth Lakes (Community Development Department, includes Building, Planning, Code Compliance)
Bureau of Land Management, Bishop Office
California Department of Fish and Game
California Department of Transportation (Caltrans), District 9
Lahontan Regional Water Quality Control Board
USFS/Inyo National Forest
USFS/Humboldt- Toiyabe National Forest

Mono County--

Mono County Assessor
Mono County CAO
Mono County Department of Social Services

Mono County Emergency Services Department (Sheriff's Office)
Mono County Information Technology (IT)
Mono County Office of Education
Mono County Public Health Department
Mono County Public Works Department
Mono County Risk Manager

Town of Mammoth Lakes--

Mammoth Lakes-Yosemite Airport
Mammoth Community Water District (MCWD)
Mammoth Community Hospital
Mammoth Lakes Fire Protection Department
Mammoth Unified School District (MUSD)
Town of Mammoth Lakes Police Department

State and Federal Agencies--

California Department of Forestry and Fire Protection (CDF)
California Highway Patrol
US Marine Corps Mountain Warfare Training Center
US Geological Survey
Yosemite National Park

Local Entities--

Inyo County
Inyo Mono Advocates for Community Action (IMACA)
Inyo Mono Transit
Local fire protection districts
Local utility providers (water and sewer districts etc.)
Los Angeles Department of Water and Power (LADWP)
Mammoth Mountain Ski Area (MMSA)
Southern California Edison (SCE)
Walker River Irrigation District (WRID)

Comments received from these agencies and organizations and from the public were incorporated into the final draft that will be available for additional public comment prior to the public hearing to consider adoption of the plan. Comments received during the public hearing will also be incorporated into the final plan.

PUBLIC INVOLVEMENT

Mono County has long been committed to an open planning process. For over 15 years, the County has had regional and community planning advisory committees functioning in every community in the unincorporated area. There are planning advisory committees in Antelope Valley, Swauger Creek/Devil's Gate, Bridgeport Valley, Mono Basin, June Lake, Mammoth Vicinity/Upper Owens, Long Valley, Wheeler Crest, and Tri-Valley. The committees are comprised primarily of local residents along with local representatives of state and federal agencies (e.g., U.S. Forest Service, California Department of Fish and Game). The committees meet on a monthly basis, at a regular time and place; notice of those meeting times and places is regularly provided in each of the communities.

All meetings are open to the public and many community members who are not members of the committees often attend the meetings.
Those committees serve as advisory committees to the County to provide public input on a wide range of topics, to identify issues and opportunities related to planning and development issues in their community areas, and to develop policies based on the identified needs. Since the committees meet on an ongoing basis they have the ability to look both at long-term needs and concerns for their area as well as short-term projects. Over the years, the committees have evolved into community forums with strong ongoing public participation from local residents.

Early in the development process for the LHMP, county staff members went to each of the planning advisory committees to outline the purpose and process of the LHMP and to elicit information and concerns from the public. Comments received at those initial meetings were incorporated into the working draft of the LHMP. That working draft LHMP was then presented to each of the planning advisory committees for review; comments from those meetings were incorporated into the final draft document.

The Town of Mammoth Lakes is also committed to an open planning process and conducts extensive public meetings to solicit comments on all town documents. To receive a wide range of public opinion on community issues and priorities, the Town holds public workshops on specific topics.

Copies of the draft document were available for review at the Mono County Community Development offices in Bridgeport and Mammoth Lakes and at the Town of Mammoth Lakes offices. Notices regarding the availability of the draft were published in local papers. The draft document has also been available for review on the Mono County website (www.monocounty.ca.gov) and the Town of Mammoth Lakes website (www.ci.mammoth-lakes.ca.gov). The public will have an additional opportunity to comment on the plan during the public hearing processes conducted by the Board of Supervisors and by the Mammoth Lakes Town Council to consider adoption of the plan. Comments received during the public hearing process will be incorporated into the final plan.

INCORPORATION OF PRIOR STUDIES

To develop the Mono County LHMP, the following documents were reviewed and, where appropriate, sections of those documents were incorporated into this document:

- Mono County General Plan, Safety Element
- Mono County General Plan, Land Use Element
- Mono County Master Environmental Assessment (MEA)
- Mono County Emergency Operations Plan (EOP)
- Mono County Land Development Regulations, including:
  - Chapter 21, Floodplain Regulations
  - Chapter 22, Fire Safe Regulations
- Mono County Code--
  - Chapter 13.08, Land Clearing, Earthwork and Drainage Facilities
- Town of Mammoth Lakes, General Plan Update
- Town of Mammoth Lakes Emergency Operations Plan
- Town of Mammoth Lakes Zoning Code

A number of websites were reviewed for technical information on hazards and that information was incorporated in this document. A complete list of the references used during the completion of this document is included in the References section.

II. LOCAL CAPABILITIES ASSESSMENT

AVAILABLE RESOURCES FOR HAZARD MITIGATION PLANNING

HUMAN RESOURCES

Mono County and the Town of Mammoth Lakes have a wide array of human, technical and financial resources available to engage in mitigation planning and to develop a LHMP for the County and the Town. The human resources available for mitigation planning include those organizations and entities previously identified as plan participants. The following section identifies those organizations and offices and briefly lists how that entity will enhance hazard mitigation planning in Mono County.

Mono County Collaborative Planning Team--

Mono County (Community Development Department-- Building, Planning, Code Compliance)
Overall knowledge of planning process and planning documents in Mono County, Mono County GIS system.

Benton-Paiute Reservation
Cooperative planning for Benton-Paiute Reservation lands.

Bridgeport Indian Colony
Cooperative planning for Bridgeport Indian Colony lands.

Town of Mammoth Lakes (Community Development Department-- Building, Planning, Code Compliance)
Overall knowledge of Town's planning process and planning documents, Town GIS system.

Bureau of Land Management (BLM), Bishop Office
Information on lands managed by BLM in Mono County and on particular resource issues; e.g., wildland fires.

California Department of Fish and Game (DFG)
Information on lands managed by DFG in Mono County and on specific resource issues; e.g., water resources.

California Department of Transportation (Caltrans), District 9
Knowledge of state highway programs, including hazard mitigation; e.g., avalanche control.

Lahontan Regional Water Quality Control Board
Knowledge of water resource issues in the county.

USFS/Inyo National Forest
Information on lands managed by Inyo NF in Mono County and on particular resource issues; e.g., wildland fires, avalanche control.

USFS/Humboldt-Toiyabe National Forest
Information on lands managed by Humboldt-Toiyabe NF in Mono County and on particular resource issues; e.g., wildland fires.

Mono County Offices--

Mono County Assessor
Information on property values and past property losses.

Mono County Department of Social Services
Information on emergency housing and Red Cross response in Mono County.

Mono County Emergency Services Department (Sheriff's Office)

Knowledge of emergency planning and preparedness and hazards mitigation.

Mono County Information Technology (IT)

Knowledge of Mono County's GIS system.

Mono County Office of Education

Information on county schools and impacts of hazards on them.

Mono County Public Health Department

Information on provision of health care services and emergency preparedness, GIS system.

Mono County Public Works Department

Knowledge of hazards mitigation on county roadways, floodplain management in the county, county property including airports, Mono County GIS system.

Mono County Risk Manager

Knowledge of risk assessment planning and procedures.

Town of Mammoth Lakes--

Mammoth Lakes-Yosemite Airport

Knowledge of Mammoth Lakes-Yosemite Airport and hazard mitigation planning.

Mammoth Community Water District

Knowledge of town's water and sewer systems.

Mammoth Hospital

Information on provision of emergency medical services in Mammoth.

Mammoth Lakes Fire Protection District

Information on provision of fire protection and suppression activities in and around Mammoth Lakes.

Mammoth Unified School District

Knowledge of school district facilities and emergency preparedness.

Town of Mammoth Lakes Police Department

Information on emergency preparedness in and around Mammoth Lakes.

State and Federal Agencies--

California Department of Forestry and Fire Protection (CDF)

Knowledge of wildland fire history in Mono County, fire hazard risks, wildland fire protection and suppression in Mono County.

California Highway Patrol

Knowledge of emergency preparedness and hazards mitigation on state highways.

US Marine Corps Mountain Warfare Training Center

Knowledge of hazards mitigation planning and preparedness at Marine Corps sites in Pickel Meadows and Coleville.

US Geological Survey (USGS)

Knowledge of emergency preparedness for earthquake and volcanic disaster scenarios.

Yosemite National Park

Knowledge of emergency preparedness, hazard risks, and hazards mitigation on federal lands adjacent to Mono County (e.g., fire hazard risks).

Local Entities--

Inyo County

Knowledge of emergency preparedness, hazard risks, and hazards mitigation in Inyo County.

Inyo Mono Advocates for Community Action (IMACA)

Cooperative planning for emergency services for elderly and disabled citizens.

Inyo Mono Transit

Cooperative planning for emergency transit services.

Local fire protection districts and Fire Safe Councils

Cooperative planning for fire protection and suppression throughout Mono County.

Local utility providers (water and sewer districts etc.)
Cooperative planning for emergency preparedness and hazards planning for utilities.
Los Angeles Department of Water and Power (LADWP)
Cooperative planning for hazards mitigation on facilities and land owned and operated by the LADWP in Mono County.
Mammoth Mountain Ski Area (MMSA)
Largest private employer in the County. Knowledge of avalanche control.
Snow Survey Associates, Mammoth Lakes
Information on avalanches in the area.
Southern California Edison (SCE)
Electrical utility system in the county.
Walker River Irrigation District (WRID)
Cooperative planning for hazards mitigation on the facilities owned and operated by the WRID (Bridgeport Reservoir, E. Walker River, Topaz Lake)

TECHNICAL RESOURCES

Technical resources for hazard mitigation planning in Mono County include the following:

Documents

California Office of Emergency Services (OES)
Local Hazard Mitigation Plan Development Guide.
State of California Multi-Hazard Mitigation Plan. 2004.
Federal Emergency Management Agency (FEMA)
Flood Insurance Study (FIS) , Mono County, California, Unincorporated Areas. 1997.
State and Local Mitigation Planning How-To Guide. Understanding Your Risks: Identifying Hazards and Estimating Losses. 2001.
Mears, Arthur. **Alternatives for Safety Element Avalanche Policies.** 1988. Discussion paper and avalanche study commissioned by Mono County.
Mono County
Mono County Emergency Operations Plan (EOP). 2004.
Mono County Code
Mono County Land Development Regulations (Revised Land Use Element). 2001.
Chapter 13.08, Land Clearing, Earthwork and Drainage Facilities.
Mono County Department of Public Works
Letter of Map Revision for West Fork of the Walker River, Mono County, California. 2003.
Mono County Local Transportation Commission
Mono County Regional Transportation Plan (RTP). 2002.
Mono County Planning Division
Mono County General Plan, Land Use Element and Land Development Regulations. 2001.
Mono County General Plan, Safety Element. 1993.
Mono County Master Environmental Assessment (MEA). 2001.
Town of Mammoth Lakes
Emergency Operations Plan. 2001.
General Plan Update. 2004.
US Geological Survey (USGS)
Hill, David P., et al., **Response Plan for Volcano Hazards in the Long Valley Caldera and Mono Craters Region, California** (USGS Bulletin 2185).
Hill, David P., et al. **Future Eruptions in California's Long Valley--What's Likely?** (USGS Fact Sheet 073-97).

Hill, David P., et al. **Living With a Restless Caldera--Long Valley, California** (USGS Fact Sheet 108-96).

Sorey, Michael, et al**. Invisible CO_2 Gas Killing Trees at Mammoth Mountain, California** (USGS Fact Sheet 172-96).

Websites

California Department of Forestry and Fire Protection (CDF)
www.fire.ca.gov
Information on wildland fire hazards and fire histories.

California Department of Water Resources (DWR)
www.water.ca.gov
Current information floodplain management and on dam safety.

California Fire Alliance
www.cafirealliance.org
Information on communities at risk and fire planning and mapping.

California Geological Survey
www.consrv.ca.gov/CGS
Information on seismic hazards, landslide hazards, loss estimates for seismic events.

Eastern California Regional Fire Safe Council
www.easternsierrafirecouncil.org
Information on fire safety in the Eastern Sierra.

Environmental Systems Research Institute (ESRI)
esri.com/hazards/makemap.htm
FEMA FIRM map data.

Federal Emergency Management Agency (FEMA)
www.fema.gov
Information on hazards planning.

US Geological Survey (USGS)
www.usgs.gov
Information on seismic hazards, volcanic hazards, landslide hazards, and water hazards.

Data/Mapping

Mono County Assessor files
Mono County GIS system
Town of Mammoth Lakes GIS system

LOCAL MITIGATION FUNDING SOURCES

Local funding sources for hazards planning in Mono County are limited. Local fire districts collect mitigation fees at the time of building construction to offset fire prevention and suppression services. There are no other local funding sources.

LOCAL HAZARD ORDINANCES

Mono County has several ordinances that promote hazard preparedness and mitigation, i.e.:

- **Floodplain Regulations (Chapter 21 of the Land Development Regulations)**
  The floodplain regulations establish special development regulations for those areas of the county subject to inundation.

- **Fire Safe Regulations (Chapter 22 of the Land Development Regulations)**
  The fire safe regulations establish basic wildland fire protection standards for Mono County.

- **Land Clearing, Earthwork, and Drainage Facilities (Chapter 13.08 of the Mono County Code)**
  The grading ordinance establishes regulations for slopes (including driveways), cut and fill, and erosion control in order to minimize disturbances from geologic hazards.

- **Emergency Services Ordinance (Chapter 2.60 of the Mono County Code)**
  The emergency services ordinance provides for the preparation and implementation of plans to protect people and property during an emergency in Mono County. It also requires the coordination of emergency services provided by the Town with those provided by all other public agencies, corporations, organizations and private persons.

- **Mutual Aid Agreements**
  The County maintains mutual aid agreements with the Town of Mammoth Lakes, Inyo County, the U.S. Forest Service, and the Bureau of Land Management to support each other in emergencies. In addition, all the fire protection organizations in the county (local fire protection districts, USFS, BLM, California Department of Forestry and Fire Protection, U.S. Marine Corps Mountain Warfare Training Center) are trained and ready to cooperate with each under mutual aid agreements.

The Town of Mammoth Lakes also has several ordinances that promote hazard preparedness and mitigation, i.e.:

- **Snow Deposition Design Zone (Chapter 17.28, Special Purpose Zones, of the Town of Mammoth Lakes Municipal Code)**
  The intent of this zone is to minimize hazards related to avalanches in areas where avalanche potential has been found to exist after investigation and study.

- **Land Clearing, Earthwork, and Drainage Facilities (Chapter 12.08 of the Town of Mammoth Lakes Municipal Code)**
  The grading chapter regulates grading and earthwork in order to minimize disturbances from geologic hazards, erosion, siltation and flooding.

- **Floodplain Management (Chapter 12.10 of the Town of Mammoth Lakes Municipal Code)**
  This chapter establishes regulations for development in floodplain areas in order to minimize public and private losses due to flood conditions.

- **Emergency Services Ordinance (Chapter 2.48 of the Town of Mammoth Lakes Municipal Code)**
  The emergency services ordinance provides for the preparation and implementation of plans to protect persons and property during an emergency in Mammoth Lakes. It also requires the coordination of emergency services provided by the Town with those provided by all other public agencies, corporations, organizations and private persons.

ONGOING HAZARDS MITIGATION

Ongoing hazards mitigation projects and programs within Mono County include the following:

- **Mono County Emergency Operations Plan (EOP)**
  The Mono County EOP is maintained and updated annually in order to provide immediate emergency response services in Mono County.

- **Town of Mammoth Lakes Emergency Operations Plan (EOP)**
  The Town of Mammoth Lakes EOP is maintained and updated annually in order to provide immediate emergency response services in Mammoth Lakes.

- **Response Plan for Volcano Hazards in the Long Valley Caldera and Mono Craters Region, California**
  The U.S. Geological Survey (USGS) monitors and evaluates seismic and volcanic activity in the Eastern Sierra, specifically in the Long Valley Caldera and the Mono-Inyo Craters volcanic chain. The plan includes procedures to alert the public to a possible eruption. The USGS is in the process of updating its assessment of geologic hazards in the Eastern Sierra. The update will be a multi-hazard assessment including sections on earthquake, volcano, and landslide hazards.

- **Floodplain Regulations**
  New development and substantial improvements[1] to existing development in Mono County are subject to the requirements of the Floodplain Regulations (Chapter 21 of the Land Development Regulations). Those regulations contain standards for construction, utilities, subdivisions, and manufactured homes. The Floodplain Regulations are applied during the building permit or development permit phase of new construction or improvements. Similarly, development in Mammoth Lakes is subject to the requirements of its Floodplain Management Ordinance (Chapter 12.10 of the Town of Mammoth Lakes Municipal Code).

- **National Flood Insurance Program (NFIP)**
  The County and Town maintain their floodplain regulations in order to continue to participate in the National Flood Insurance Program allowing local residents to purchase flood insurance.

[1] Substantial improvement means any repair, reconstruction or improvement of a structure, the cost of which equals or exceeds fifty percent of the market value of the structure.

- **FEMA Flood Zones**
  The County and the Town utilize the FEMA Flood Insurance Rate Maps (FIRM) to identify the 100-year floodplain in Mono County. Policies in the Land Use Element and the Safety Element of the Mono County General Plan regulate development in the 100-year floodplain in conjunction with the County Floodplain Regulations. In the June Lake and Chalfant areas, subsequent floodplain studies have been completed. The results of those studies are used to administer the county's Floodplain Regulations in June Lake and Chalfant. Policies in the Town's General Plan regulate development in the 100-year floodplain in conjunction with the Town Floodplain Management Ordinance.

- **Ongoing Monitoring of Stream Flows and Flood Stages**
  The U.S. Geological Survey (USGS) and the California Department of Water Resources (DWR) monitor stream flows in Mono County and maintain online sites with real-time stream flow data. They also provide alerts when streams reach flood stage.

- **Dam Safety**
  The California Department of Water Resources, Division of Safety of Dams, is responsible for the safety of dams in California. State regulations address the maintenance, repair, replacement, removal, and construction of dams and permit the State to periodically inspect dams. All dams in California are subject to these regulations unless they are owned and operated by the United States. State regulations require dam owners to maintain surveillance instruments at their dams, to monitor those instruments, and to submit those measurements and their evaluation of the measurements to the State periodically. The State typically makes inspections and reviews data either annually or semiannually. However, the State has 1200 jurisdictional dams and 46 engineers to inspect them; "the owner's timely review of surveillance data is vital to assure to continued safety of the dam" (DWR, Division of Safety of Dams, **Surveillance Measures Within California's Dam Safety Program**).

- **Fire Safe Regulations**
  New construction in the unincorporated area of the county is subject to the provisions of the Fire Safe Regulations (Chapter 22 of the Land Development Regulations). Those regulations establish basic wildland fire protection standards for emergency access, signing and building numbering, private water supply reserves for fire use, and vegetation modification. The Fire Safe Regulations are applied during the building permit or development permit phase of new construction.

- **California Department of Forestry and Fire Protection (CDF), San Bernardino Unit, Annual Fire Protection Plan**
  Mono County is located within the San Bernardino administrative unit of the CDF. Each CDF unit prepares an annual Fire Management Plan as part of the overall ongoing California Fire Plan for wildland fire protection in California. The overall goals of the California Fire Plan are to "…reduce total costs and losses from wildland fire in California by protecting assets at risk through focused prefire management prescriptions and increasing initial attack success."

  The California Fire Plan has five strategic objectives:
  1) To create wildfire protection zones that reduces the risks to citizens and firefighters.
  2) To assess all wildland areas, not just the state responsibility areas. The analysis will include all wildland fire service providers - federal, state, local government, and private.

3) To identify and analyze key issues and develop recommendations for changes in public policy.
4) To have a strong fiscal policy focus and monitor the wildland fire protection system in fiscal terms.
5) To translate these analyses into public policies.

Five major components will form the basis of an ongoing fire planning process to monitor and assess California's wildland fire environment:

1) Wildfire protection zones. Areas of low fire risk intended to buffer communities from devastating wildfire.
2) Initial attack success. Measurements of the percentage of fires that are successfully controlled before unacceptable costs are incurred. This measure can be used to assess the department's ability to provide an equal level of protection to lands of similar type.

(CDF, **San Bernardino Unit 2003 Fire Management Plan.** 2003.)

- **Fire Prevention Property Inspections**
  CDF and the U.S. Forest Service conduct fire prevention property inspections throughout Eastern Sierra communities. Eastern Sierra Regional Fire Safe Council volunteers assist both agencies with inspections. A secondary objective of volunteer inspections is community outreach to provide residents with information about living at the wildlands interface, i.e. creating and maintaining defensible space, firescaping, building defensible homes, fire preparedness, and emergency response.

- **CDF Project Plan Check**
  CDF staff reviews project plans for proposed development located in State Responsibility Areas (SRAs) to ensure that the development complies with California Fire Safe Requirements (and Mono County Fire Safe Requirements) for proper access, signage, water supplies, and building materials.

- **USFS and BLM Fire Management Activities**
  The Inyo National Forest, the Humboldt-Toiyabe National Forest, and the Bureau of Land Management (BLM) manage large areas of public lands within Mono County. Many of the wildfires in Mono County start on public lands. Both Forests and the BLM have fire management plans that address prescribed burning, forest thinning and other fire management tools.

- **Eastern Sierra Regional Fire Safe Council**
  The ESRFSC is a nonprofit organization created to advise citizens in the Eastern Sierra (Mono and Inyo counties) how best to deal with the threat of wildfire. The council works with local volunteer fire departments and assists CDF as they train volunteers to perform residential fire hazard inspections. Volunteers also work with homeowners to raise awareness about wildfire risks and methods of home hazard reduction. ESRFSC has also created community fuel breaks and defense projects and is working with eastside communities to create local fire safe councils.

- **Town of Mammoth Lakes Fire Safe Council**
  The Town of Mammoth Lakes Fire Safe Council is composed of a chairman, several agency volunteers, and volunteers from the Town of Mammoth Lakes. The council has worked on a variety of projects to help reduce the threat of wildfire in Mammoth Lakes, including a fuels reduction grant and a chipping program for woody debris in neighborhood areas.

- **Local Fire Safe Councils**
  Fire Safe Councils have also been established in communities in the county (June Lake, Wheeler Crest, Mono Basin) to increase fire safety in those communities and the surrounding areas.

- **Land Clearing, Earthwork, and Drainage Facilities Regulations**
  This county ordinance, more commonly known as the Grading Ordinance (Chapter 13.08 of the Mono County Code) regulates grading, cut and fill, and drainage facilities for new development and improvements to existing development depending on the amount of planned site disturbance. The intent of the regulations is to ensure the safety and stability of development and to prevent on- and off-site erosion impacts. The ordinance requires a soils report prepared by a soils engineer for grading in, on, under, over or adjacent to old fills, swamp, marshlands, or in areas known or believed to be potential slide areas. Areas with expansive soils also require a soils report prepared by a soils engineer.

  The Town also has a Land Clearing, Earthwork, and Drainage Facilities ordinance (Chapter 12.08 of the Town Municipal Code) that has similar requirements for development in the Town.

- **Mono County Land Development Regulations**
  The Mono County Land Development Regulations restrict site disturbance in certain land use designations in order to protect environmentally sensitive areas and reduce the risk of landslides.

- **Alquist-Priolo Special Study Zones**
  In order to mitigate risks from seismic hazards such as surface fault rupture, the Mono County General Plan Safety Element and the Town General Plan regulate development near active faults, seismic hazard zones and other geologic hazards as required by the provisions of the Alquist-Priolo Special Studies Zone Act and the Seismic Hazard Mapping Act. Policies in the County Safety Element require projects in Alquist-Priolo fault hazard zones, seismic hazard zones, or other known geologic hazard areas, to provide a geologic or geotechnical report prior to project approval.

  County Safety Element policies also encourage applicants to design or redesign their projects as necessary to avoid unreasonable risks from seismic hazards and specify that the county will deny applications for planning permits where geologic studies provide substantial evidence that the proposed project will be exposed to unreasonable risks from seismic hazards. Projects that include mitigation measures to reduce risks to acceptable levels may be approved.

- **Unreinforced Masonry Mapping Program**
  In compliance with State law and Safety Element policies, the Mono County Building Division has identified potentially hazardous buildings and has developed a mitigation program for the identified buildings.

- **New Construction--Seismic Safety Requirements**
  In order to ensure that new construction is designed to withstand seismic hazards, the Building Divisions of the County and the Town require new construction to comply with the engineering and design requirements of Seismic Zone 4.

- **CSMIP Monitoring**

The California Geological Survey (CGS), through its California Strong Motion Instrumentation Program (CSMIP), installs earthquake-monitoring devices in structures such as buildings, hospitals, dams, utilities and industrial facilities. Data collected from those devices are used both for earthquake emergency response and for engineering and scientific research. Sites are selected according to long-term strategies developed in consultation with the Strong Motion Instrumentation Advisory Committee, a committee of the Seismic Safety Commission. SMIP stations in Mono County are maintained at the following locations:

Lake Crowley—U.S. 395 bridge
Lake Crowley--Long Valley Dam downstream
Mammoth Lakes--Convict Creek
Mammoth Lakes--High School grounds (temp.)
Mammoth Lakes Fire Station # 1
Chalfant--Zack Ranch
June Lake Fire Station
Benton
Lee Vining--Tioga Pass
Bridgeport
Walker

- **Avalanche Conditional Development Areas**
  Avalanche Conditional Development Areas are established in the Mono County General Plan. Conditional Development Areas are private property that has previously experienced avalanche activity. Policies in the General Plan Safety Element limit development in Conditional Development Areas, promote seasonal, rather than year-round use, of those areas, and require the exploration of land trades or purchases for private property identified as being impacted by avalanches. General Plan policies also direct the county to work with the USFS and Caltrans to mitigate the effects of avalanches that start on public lands and that affect public highways.

- **Snow Deposition Design Zone (Chapter 17.28, Special Purpose Zones, of the Town of Mammoth Lakes Municipal Code)**
  The Snow Deposition Design Zone is established in the Town of Mammoth Lakes Municipal Code. The intent of the zone is to minimize hazards related to avalanches in areas where avalanche potential has been found to exist after investigation and study. The zone regulates development in residential areas with identified avalanche hazard.

- **Snow Storage Regulations**
  The County and the Town both enforce snow storage regulations intended to establish snow storage areas and to reduce hazards from snow and ice sliding from structures.

- **Winter Road Closures**
  Caltrans closes portions of Highways 120, 270, 108, 89 and 158 in Mono County each winter due to severe winter weather conditions and snow. Monitor Pass, Sonora Pass, and Tioga Pass are closed from approximately November to May depending on snow levels.

- **Weather Related Road Closures**
  Caltrans closes U.S. 395 during severe winter storm conditions and during periods of avalanche risk. Weather-related road closures are broadcast on local radio stations and on websites. Caltrans also uses Changeable Message Signs to notify the public about road conditions and closures.

- **Avalanche Control Measures**
  The USFS monitors avalanche risk and mitigates those risks when they threaten community areas. Mitigation includes structural mitigation such as snow fences and snow sheds and active mitigation such as avalanche control. Caltrans also does extensive avalanche risk monitoring in order to determine when highway users are threatened and in order to implement avalanche control and response measures.

- **Avalanche Awareness Programs**
  There is a variety of active avalanche mitigation and awareness programs in Mono County, many of them aimed at backcountry skiers. The Mammoth Mountain Ski Patrol maintains a website with avalanche information (patrol.mammothmountain.com) and has instituted a ski patrol avalanche dog program to train avalanche search and rescue dogs. An Eastern Sierra Avalanche Bulletin is available at www.csac.org/Bulletins/Calif/e-sierra.html. Additional avalanche and weather information is available at www.esavalanche.org, www.sierrabackcountry.org, and at the NOAA weather forecast website.

- **Public Awareness of Natural Hazards**
  In order to reduce the risks associated with the natural hazards occurring in Mono County, Safety Element policies require the County to inform affected persons of potential seismic, geologic, volcanic, fire, flood, avalanche and other natural hazards in the area during the county permit process. In compliance with state law, sellers of property are required to notify buyers of potential hazards affecting the subject property.

- **Mono County Public Health Department Special Needs Database**
  In order to prepare for emergencies, the Mono County Public Health Department maintains a database of special needs clients on a GIS file. The file contains the GPS coordinates of the participant's daytime and nighttime driveways and front door, a building outline, and the assessor's parcel number of the participant's parcel. Once this data is entered in the database, the Public Health Officer sends the participant a letter thanking them for being pro-active in planning for emergency preparedness and stressing the need to continue to plan for emergencies or disasters. The letter also includes brochures from FEMA, the Red Cross, and OES on how to prepare for an emergency or disaster. The database is reviewed annually and revised as necessary.

- **Emergency Access**
  The county and town Public Works Departments and applicable fire protection districts and/or the California Department of Forestry and Fire Protection review development applications in order to ensure adequate access for emergency vehicles.

- **Emergency Response System**
  The County and the Town maintain up-to-date Emergency Operations Plans (EOPs) in order to provide hazards mitigation, preparedness, and response. The County's emergency services personnel maintain mutual aid agreements and conduct regular training exercises. As part of the preparedness process for hazards mitigation in the county, emergency services personnel also educate the public regularly concerning the various natural hazards encountered in the County.

- **Emergency Resources**

Local entities maintain a variety of resources that can be utilized during emergencies. The Mammoth Fire District maintains a communications trailer, a Hazardous Materials (HazMat) trailer, Basic Life Support (BLS) trailers, a Red Cross trailer, and a decontamination tent. Mammoth Yosemite Airport has temporary hospital facilities on site that are approved by the Red Cross as an official Red Cross shelter/relief area, heated private hangars on site have water and sewer connections and can be used as makeshift shelters, the community hangar has stoves, water, and sewer facilities, and the airport has storage tanks containing 500,000 gallons of water for emergency use and generators to pump that water.

- **GIS Database**
  Mono County is in the process of developing a GIS database that includes facilities and hazard areas in both the county and the town. The database now includes FEMA flood maps, two avalanche maps, Alquist-Priolo fault zone maps, Fire Hazard Area maps from CDF, and State Responsibility Area maps (SRAs) from CDF. Other potentially relevant data layers in GIS include: Public Works flood maps (Walker River flood), dam locations and dam inundation zones, fault lines and fault regions, historic earthquake epicenters, historic faults, seismic shaking hazards, medical facilities locations, 911 locations, emergency posting locations, and ambulance areas.

III. RISK ASSESSMENT

NATURAL HAZARDS AFFECTING MONO COUNTY

The following natural hazards may occur in Mono County and the Town of Mammoth Lakes:

- Avalanche;
- Dam failure;
- Flood;
- Landslide;
- Seismic Hazards;
- Severe Winter Storm;
- Volcano; and
- Wildfire.

These hazards were identified through review of existing hazard planning documents [Mono County General Plan Safety Element, Mono County Emergency Operations Plan (EOP), Mono County Master Environmental Assessment, Mono County Regional Transportation Plan, Town of Mammoth Lakes General Plan, Town of Mammoth Lakes Emergency Operations Plan (EOP), State of California Multi-Hazard Mitigation Plan], review of the U.S. Geological Survey website (earthquakes and other seismic hazards, volcano hazards), review of the California Geological Survey website (earthquakes and other seismic hazards), review of the California Department of Water Resources website (flooding, dam safety), review of the California Department of Forestry and Fire Protection website (wildfires), review of FEMA and OES data, and a review of past disaster declarations in Mono County. The planning process also utilized input from County and Town agencies (Planning, Public Works, Assessor, Risk Management, Office of Emergency Services), local organizations and businesses, local planning advisory committees, the public, and local offices of state and federal land management agencies (USFS/Inyo and Humboldt-Toiyabe National Forests, Bureau of Land Management, CDF).

Table 2 discusses how and why each hazard was determined to affect Mono County and the Town of Mammoth Lakes. While all of these hazards could occur in Mono County, the following are considered to be the most prevalent hazards, due to past and ongoing hazard events in the county: avalanche/severe winter storm, flood, seismic hazards, and wildfire.

MONO COUNTY DISASTER DECLARATIONS SINCE 1950

The California Office of Emergency Services (OES) Disaster Information Database provided the following information concerning natural disasters declared in Mono County since 1950.

TABLE 1 Mono County Disaster Declarations Since 1950

Drought

Disaster #/Description	Date of Declaration	Declaration Type
GP – 1977	1/12/1977	

Earthquake

Disaster #/Description	Date of Declaration	Declaration Type
GP 80-21 Mono County Earthquake	5/2/8/1980	Gubernatorial

Floods

Disaster #/Description	Date of Declaration	Declaration Type
CA OCD 50-01	11/21/1950	Gubernatorial
CD 47-DR-CA	12/23/1955	Local, Gubernatorial, Presidential
CD 82-DR_CA	4/4/1958	Local, Gubernatorial, Presidential
FDAA 547-DR Heavy Rains	2/15/1978	Local, Gubernatorial, Presidential
DC 82-03 Through 82-14	4/28/1982	OES Director's Concurrence
GP 84-02, 84-03 Flooding	9/26/1984	Gubernatorial
FEMA 758-DR-CA Spring Storms	2/18/1986	Local, Gubernatorial, Presidential
FEMA 1046-DR-CA Late Winter Storms	3/12/1995	Local, Gubernatorial, Presidential
FEMA 1155-DR-CA Winter Storms	1/4/1997	Local, Gubernatorial, Presidential

Energy

Disaster #/Description	Date of Declaration	Declaration Type
GP-2001	1/17/2001	Gubernatorial

Statewide energy emergency declared by Governor Davis when California was experiencing higher demand for energy than what was available in the grid.

TABLE 2 NATURAL HAZARDS IN MONO COUNTY

Hazard	How Identified	Why Identified
Avalanche	• Review of existing avalanche studies • Review of Mono County and Mammoth Lakes General Plans • Review of Mono County and Mammoth Lakes EOPs • Public input	• Avalanches occur every year in Mono County • Avalanches have caused property loss and deaths in the past
Dam Failure	• Review of Mono County and Mammoth Lakes General Plans • Review of Mono County and Mammoth Lakes EOPs • Review of FEMA flood maps • Review of DWR Awareness Floodplain Maps • Public input	• Mono County has a number of dams • Dams could be affected by earthquakes that are prevalent in Mono County, by severe spring runoff, or by lahars[2]
Flood	• Review of Mono County and Mammoth Lakes General Plans • Review of Mono County and Mammoth Lakes EOPs • Review of FEMA FIRM maps • Review of DWR Awareness Floodplain Maps • Public Input	• Mono County has experienced property loss from flooding in the past • The County and Town have identified structures within flood zones
Landslide	• Review of Mono County and Mammoth Lakes General Plans • Review of Mono County and Mammoth Lakes EOPs • Public Input	• Associated with earthquakes and steep slopes as well as with extreme precipitation events
Seismic Hazards	• Review of USGS website • Review of CGS website • Review of Mono County and Mammoth Lakes General Plans • Review of Mono County and Mammoth Lakes EOPs	• Earthquakes are prevalent in Mono County • Earthquakes have caused structural damage and property loss in the past
Severe Winter Storm	• Review of Mono County and Mammoth Lakes General Plans • Review of Mono County and Mammoth Lakes EOPs	• Severe winter weather conditions occur every year in Mono County • Severe winter weather has caused property damage in the past

[2] Lahars are mud flows mobilized by a lava flow melting snow or a fresh layer of volcanic ash mobilized by heavy rain.

TABLE 2 NATURAL HAZARDS IN MONO COUNTY (continued)

Hazard	How Identified	Why Identified
Volcanic	• Review of USGS website • Review of CGS website • Review of Mono County and Mammoth Lakes General Plans • Review of Mono County and Mammoth Lakes EOPs	• Seismic unrest in the Long Valley Caldera and Mono-Inyo volcanic chain is ongoing and is monitored by the USGS
Wildfire	• Review of Mono County and Mammoth Lakes General Plans • Review of Mono County and Mammoth Lakes EOPs • Review of CDF website	• Severe wildfires have occurred in areas adjacent to Mono County • Mono County's communities are surrounded by undeveloped forest and sagebrush scrub

RISK ASSESSMENT – SPECIFIC HAZARDS

The remainder of this chapter assesses the risk for each identified hazard in the county. This section identifies the hazards associated with each event, profiles hazard events, assesses the vulnerability to the hazard by community and by development type, estimates losses associated with each hazard, and identifies existing mitigation and presents additional mitigation. Throughout the following analysis the term "developed parcels" means parcels with a structure with an assessed value of $10,000 or more.

The Mono County Planning Division used GIS and other modeling tools to map the areas of the county and the town that are vulnerable to identified natural hazards. Those maps were used along with existing land use maps and planned land use maps to determine which existing critical facilities and services are most likely to be affected by the identified natural hazards. The Mono County General Plan and the Town of Mammoth Lakes General Plan were also reviewed to identify where development is expected to occur over the next twenty years and to assess where critical facilities could be affected in the future.

Due to its isolated location and limited access, particularly in winter when several of the highways across the Sierra Nevada mountains are closed due to snow, the County has a number of critical facilities and services. Critical facilities are essential to the health and welfare of the resident and visitor population and are especially important in the aftermath of a hazard event. The importance of these facilities lies not only in the structure and its contents but also in the services provided at that facility.

In Mono County and the Town of Mammoth Lakes, the following buildings and facilities are considered critical facilities:

Hospitals and other medical facilities
Emergency medical response facilities and equipment
Police, sheriff, and search and rescue facilities and equipment
Firefighting facilities and equipment
Highway maintenance facilities and equipment, including snow removal equipment

Emergency operations centers
Schools (contain large groups of at-risk population)
Senior citizen facilities (contain large groups of at-risk population)
Airports and heliports
Highways (395, 6, 203 and in the summer the routes across the Sierra—120, 89)
Communications systems
Potable water systems
Wastewater systems
Power systems (electric, propane)
Hazardous materials facilities (facilities housing industrial/hazardous materials)

AVALANCHE HAZARDS

Avalanche References:

California State Multi-Hazard Mitigation Plan
Mono County General Plan, Safety Element
Mono County Master Environmental Assessment (MEA)
Mono County Emergency Operations Plan
Town of Mammoth Lakes General Plan, Environmental Resource Management Chapter
Town of Mammoth Lakes Emergency Operations Plan
Avalanche Hazard Maps (Mono County Master Environmental Assessment)
Snow Deposition Design Zone, Mammoth Lakes (Mammoth Lakes General Plan, Snow Hazards)

Avalanche Figures: See Appendix A, Map Set

A. IDENTIFYING AVALANCHE HAZARDS IN MONO COUNTY

Avalanches are a threat on moderately steep slopes in Mono County, particularly along the eastern face of the Sierra Nevada, in areas that receive significant amounts of snow. Very steep slopes do not accumulate enough snow to pose a threat. Numerous factors contribute to unstable snow conditions, including snowpack structure, snow density, temperature fluctuations, wind speed and direction, and precipitation intensity. Avalanches in Mono County may affect communities, residents, and visitors.

Community areas influenced by avalanche hazards include Swauger Creek, Twin Lakes outside Bridgeport, Virginia Lakes, Lundy Lake, June Lake, Long Valley/McGee Creek, and Wheeler Crest (Swall Meadows). Roadway sections threatened by potential avalanches include portions of Lower Rock Creek Road; U.S. 395 at the community of Long Valley northwest of McGee Creek, Wilson Butte, and north of Lee Vining; S.R. 158 entering June Lake; and several county roads entering eastern slope community areas.

Some of the community areas affected by avalanche hazards are primarily seasonal use areas and are not heavily inhabited in winter; i.e., Virginia Lakes and Lundy Lake. All avalanches threatening developed community areas in Mono County originate on public lands managed by the U.S. Forest Service. Mammoth Mountain Ski Area and June Mountain Ski Area contain avalanche zones that are routinely monitored and controlled by the ski patrol. Those avalanche zones do not affect community areas.

The Sierra Nevada Ecosystem Project (SNEP) Final Report to Congress notes that:

> **"**In the Sierra Nevada, the vast majority of avalanches occur during and after storms… Avalanches occur throughout the snow zone of the Sierra Nevada, but become more common with increasing elevation and steeper slopes… The greater solar radiation input and higher temperatures on south facing slopes tend to stabilize those slopes faster than shaded slopes."
> (SNEP, Vol. II, "Impacts of Floods and Avalanches")

The Town of Mammoth Lakes General Plan Snow Hazards section notes the following concerning avalanche hazards within the Town's boundaries:

> "Mammoth Lakes' winters can produce 20 feet or more of snow in the Town and double that on the mountains, which can cause serious hazards and structural problems on any site if its unique properties are not taken into account. The characteristic of snow that have hazardous implications include its: weight, instability on slopes, snowmelt, snow creep, adhesive tendency, slickness, ice

damming and avalanches. In addition, the occasional storm can brings so much snow that the community is temporarily immobilized. Avalanches are the most devastating and sudden of the hazards of a mountain winter, avalanches are a mass of snow, sometimes mixed with rock, ice, soil, and timber, moving rapidly downhill. They may break in slabs or in a flume of loose powder snow. Many factors contribute to unstable snow conditions, including snow pack structure, snow density, temperature fluctuations, wind speed and direction, precipitation intensity, etc. Avalanche danger can generally be assumed for any slope, timbered or not, that has a gradient between 30 and 45 degrees. Anything steeper will rarely accumulate enough snow to be hazardous. These gradients, however, apply only to the starting zone. The track gradient is not necessarily as steep, with 25 to 35 degrees being common. The run out zone can be gentle or even flat."

"Relatively conventional structures can be built to withstand moderate hazard forces by utilizing structural design measure such as reinforced concrete walls without windows, or with shuttered windows or wedge-shaped design facing the hazard prone slopes etc. Additionally avalanche protection devices such as barriers and sheds, can be used to protect existing and proposed structures, as long as other properties are not exposed to additional hazards. Areas identified in the Town of Mammoth Lakes where avalanche starting potential has been found to exist have been overlaid with a Snow Deposition Design Zone in order to minimize health and safety hazards related to avalanche potential. The overlay district designates areas found located immediately above, adjacent or otherwise within the one hundred and fifty feet of the thirty degree point of an avalanche starting zone. Any development within this zone shall be permitted by use permit only and require an Avalanche Risk Assessment certified by a recognized expert in the field of avalanche occurrence. Furthermore any high avalanche hazard areas in Mammoth Lakes planning area should not contain critical or permanently occupied facilities located within its boundaries."

B. PROFILING AVALANCHE HAZARD EVENTS

SEVERITY OF THE HAZARD

Although most avalanches in Mono County occur in the remote backcountry and do not affect people or structures, both property damage and loss of life have resulted from avalanches in Mono County in the past. Areas of substantial avalanche danger are known and avoided or carefully managed to drastically reduce or eliminate avalanche conditions.

PREVIOUS AVALANCHE OCCURRENCES

Information on previous avalanche occurrences in Mono County is available from a variety of sources. The information available is often limited and usually does not include details of the hazard event or monetary estimations of the economic damages. The information provided below addresses avalanches that occurred in or adjacent to developed areas. It does not include avalanche information for Mammoth Mountain Ski Area or June Mountain Ski Area or for wilderness skiing areas.

- **Twin Lakes (Bridgeport Valley)**: Twin Lakes has a large area of concentrated residential development that is open for year-round use. The area experiences frequent, large avalanches. There have been at least 15 incidents of damage to buildings and other structures during the last 40 years, including 4 fatalities. Destructive avalanches have occurred in 1969, 1978, 1982, and 1986. In 2005, a Sheriff's Department snow cat was destroyed in an avalanche.
- **Virginia Lakes**: Virginia Lakes is primarily a seasonal residential area and is not regularly used during winter when the access road is not plowed. Seven buildings on the north side of the Virginia Lakes access road were destroyed by a large avalanche in 1982. In 1986, a large

avalanche extended its path through a forest on the flat bottom of the valley before stopping on the south edge of Virginia Lakes Road.

- **June Lake**: Until North Shore Drive was constructed into June Lake as a secondary access route, S.R. 158, the main access into June Lake, was periodically closed as a result of avalanches, avalanche danger, or avalanche control.
- **Long Valley:** Residential development in Long Valley is exposed to large avalanches originating from the northeast face of McGee Mountain and from slopes below "Castle Rock," directly above the existing development. Avalanches originating from Castle Rock can extend to the development during unusual conditions, and avalanches originating from McGee Mountain have extended across U.S. 395. In 1992 an avalanche hit a barn, destroying the barn and killing two horses.
- **Wheeler Crest:** A major dry-snow avalanche occurred in 1969 in Swall Meadows. Avalanche risk also exists on the Lower Rock Creek access road from a number of small east-facing paths that descend directly onto the road.
- **Town of Mammoth Lakes**: A large avalanche path exists in the Sherwin Range, just south of Mammoth Lakes. A number of avalanches have occurred there previously (1986, 2005). During the winter of 1983, avalanches destroyed many cabins at Lake Mary in the Mammoth Lakes Basin. That same year, a mud and snow slide damaged two homes on Forest Trail near Canyon Lodge, forcing residents to evacuate. In 1992, an avalanche in Old Mammoth killed a snowboarder and a dog. In 2005, an avalanche in the Sherwin Range 2 miles southwest of town was set off by a backcountry snowboarder; there was one injury.
- **Area North of Lee Vining**: Several large avalanche paths are known to extend east of U.S. 395 approximately 1-2 miles north of Lee Vining. In 2001, 2005, and 2006 the highway was closed due to avalanches; there were no injuries or fatalities.
- **Lundy Lake**: The area of private homes at the west end of Lundy Lake is threatened by a large, steep avalanche path. Discussion with local residents indicates that seven buildings were destroyed there during two separate avalanches in the 1960s and 1970s. At present, Lundy is not occupied continuously during the avalanche season, and the road from U.S. 395 is closed in winter.

Both property damage (approximately 40 properties between 1969 and 1986) and loss of life have resulted from avalanches in the past in Mono County. In response, the County and the Town have identified areas around communities where avalanches may occur and have regulated development in those areas. In compliance with state law, Mono County developed avalanche hazard maps to illustrate areas where avalanches are known to have occurred in the past. Those maps are included in Appendix A: Map Set. Maps exist for Twin Lakes outside Bridgeport, Virginia Lakes, Lundy Lake, June Lake, Long Valley/McGee Creek, and Wheeler Crest. Similarly, the intent of the Town's Snow Deposition Design Zone (Chapter 17.28, Special Purpose Zones, of the Town of Mammoth Lakes Municipal Code) is to minimize hazards related to avalanches in areas where avalanche potential has been found to exist after investigation and study.

FUTURE PROBABILITY OF AVALANCHES OCCURRING

Avalanches occur every year in Mono County, most of them in the backcountry. According to the Mono County Emergency Operations Plan (EOP), 90 percent occur during or soon after sustained snowfall; the remaining 10 percent occur when older snow becomes unstable, often in late winter or spring. The peak period of avalanche danger can be predicted with reasonable accuracy. In Mono County, snow conditions are monitored by the USFS, by Caltrans, and by Mammoth Mountain Ski Area and June Mountain Ski Area to assess and manage the avalanche danger in areas known to be subject to avalanches.

C. VULNERABILITY TO AVALANCHE HAZARDS—OVERVIEW

Avalanche hazards are considered to be one of the most prevalent natural hazards in Mono County due to their repeated occurrence each year and the damage they have caused in the past. As a result, avalanche hazard mitigation is a well-established and ongoing process in the county, with wide participation from a variety of local, state, and federal organizations.

Most avalanches in Mono County occur in the backcountry, on USFS lands in the western part of the county. A number of community areas, situated at the base of the eastern slopes of the Sierra Nevada, however, have experienced avalanches in the past. These avalanches originate primarily on public lands managed by the USFS. Based on Planning Division data, the structures at risk are those located within known avalanche paths, which include portions of the communities of Twin Lakes, Virginia Lakes, Lundy Lake, June Lake, Mammoth Lakes, Long Valley and Wheeler Crest. Other areas of recognized avalanche hazard include the area just north of Lee Vining along U.S. 395, the area just south of June Lake along U.S. 395, an area along U.S. 395 and Crowley Lake Drive near Long Valley, and an area of Lower Rock Creek Road between U.S. 395 and Swall Meadows. There are no critical facilities or structures or at-risk populations within these areas. However, according to a 1988 study commissioned by Mono County, approximately 560 privately owned parcels are at risk. Newer estimates using data developed by the Mono County Planning Division put the number at approximately 670 parcels at risk (developed and undeveloped). Based on these data, the following number of developed parcels is located in avalanche hazard areas:

Twin Lakes (Bridgeport Valley)	164 developed parcels (mostly residential structures)
Virginia Lakes	35 developed parcels (mostly residential structures)
June Lake	13 developed parcels (mostly residential structures)
Long Valley	30 developed parcels (mostly residential structures)
Wheeler Crest	15 developed parcels (mostly residential structures)
Town of Mammoth Lakes	Not available
Area North of Lee Vining	3 developed parcels (2 commercial structures, 1 residential structure)
Total	260 developed parcels

Mono County and the Town of Mammoth Lakes both regulate development within identified avalanche hazard areas. Over the 20-year timeframe of the county and town General Plans, limited residential development may occur within these areas.

D. VULNERABILITY TO AVALANCHE HAZARDS—STRUCTURES

Structures in avalanche hazard areas are primarily residential structures. Over the 20-year timeframe of the county and town General Plans, development will occur in and adjacent to developed community areas. Mono County and the Town of Mammoth Lakes regulate development within avalanche hazard areas and require that any future development be sited and designed to avoid hazards from avalanches. Development within those areas is limited to single-family residential development. Review of the county and town General Plan land use maps shows that no critical facilities or infrastructure are planned for future development in identified avalanche hazard areas.

E. ESTIMATING LOSSES FROM AVALANCHE HAZARDS

Mono County does not have the information necessary to perform a detailed estimate of losses from avalanche hazards. The lack of information is discussed further in the section Estimating Losses. Even a broad estimate of losses utilizing the number of units located in avalanche hazard areas multiplied by the valuation from the county's tax rolls is problematic because the county's mapped data for avalanche areas are incomplete. Without mapped data, the county cannot link parcels in avalanche areas to their valuations in the county assessor's database. The avalanche data on the county's GIS shows only 19 parcels in avalanche areas with an assessed value of approximately $2.4 million. The mitigation section includes mitigation to address this deficiency.

F. EXISTING AVALANCHE HAZARD MITIGATION

Organizations within the County utilize a variety of measures to reduce or eliminate the risk from avalanche hazards, including:

- Artificial release is utilized by the ski areas and the USFS, both at the ski areas and above S.R. 158 in June Lake.
- Defense structures are used to protect structures in areas with a known avalanche hazard.
- Forecasting is used by the ski areas, the USFS, and Caltrans to predict when avalanche conditions may occur and to warn people of the hazards.
- Public education is used by the ski areas, the USFS, and local organizations to warn residents and visitors of avalanche hazards, particularly skiers and snowboarders using backcountry routes. In addition, the County and the Town inform property owners of potential avalanche hazards in the area during the permit process and during transfer of property ownership.
- In order to reduce the risks associated with the natural hazards occurring in Mono County, Safety Element policies require the county to inform affected persons of potential seismic, geologic, volcanic, fire, flood, avalanche and other natural hazards in the area during the county permit process. In compliance with state law, sellers of property are required to notify buyers of potential hazards affecting the subject property.

In addition, the County and the Town both regulate development in identified avalanche hazard zones in order to minimize development in those areas and to reduce or eliminate avalanche hazards to existing development in those areas. Future development in avalanche hazard areas will be minimal and limited to single-family residential development.

The mitigation listed above is ongoing and will continue over the 20-year timeframe of the county and town General Plans.

G. PROPOSED AVALANCHE HAZARD MITIGATION

Many of the parcels in avalanche hazard zones are adjacent to or on public lands managed by the USFS. Placing those properties into federal ownership or into the ownership of land conservation organizations and restricting their use to permanent open space use would eliminate existing avalanche hazards to people and property. The GIS data for the county is incomplete and does not include all known avalanche areas; there is no mapped avalanche information for Mammoth Lakes.

DAM FAILURE HAZARDS

Dam Failure References:
- *California State Multi-Hazard Mitigation Plan*
- *Mono County General Plan, Safety Element*
- *Mono County MEA*
- *Mono County Emergency Operations Plan*
- *Town of Mammoth Lakes Emergency Operations Plan*
- *Dam Inundation Zones (FEMA FIRM Maps)*

Dam Failure Figures: See Appendix A, Map Set

A. IDENTIFYING DAM FAILURE HAZARDS IN MONO COUNTY

Mono County has 21 dams. In addition, Rock Creek Lake dam, which is located in Inyo County, is upstream of properties located in Mono County. Table 3 shows the location of the dams, the streams or rivers dammed, and the amount of water impounded. None of the dams in the County is sizable enough to be considered a major dam.

Dam failure is the uncontrolled release of impounded water from behind a dam. Flooding, earthquakes, blockages, landslides, lack of maintenance, improper operation, poor construction, vandalism, and terrorism can all cause a dam to fail. Dam failure causes downstream flooding that can affect life and property.

Since 1929, California has supervised all non-federal dams in the state to prevent failure for the purpose of safeguarding life and protecting property. Supervision is carried out through the state's Dam Safety Program under the jurisdiction of the California Department of Water Resources (DWR). The law requires the examination and approval or repair of dams completed prior to August 14, 1929, the approval of plans and specifications for and supervision of construction of new dams and the enlargement, alteration, repair, or removal of existing dams, and the supervision of maintenance and operation of all dams under the state's jurisdiction. Since 1950, there has been only one dam failure in California. The Dam Safety Program was revised after that failure to address additional concerns.

B. PROFILING DAM FAILURE HAZARDS IN MONO COUNTY

MAGNITUDE OF THE HAZARD

The Mono County Emergency Operations Plan (EOP) notes that failure of any of the dams located in the county could cause flooding but the threat is far less severe than at major dams such as Folsom that are located above densely populated areas. Most of the dams in Mono County are relatively small and are located in remote areas with little or no development downstream of them. Dam failures in Mono County could impact highways in the area, indirectly affecting the safety of county residents and visitors. For example, the failure of the dam at Grant Lake could cut off U.S. 395, affecting Mono County's main transportation route.

The greatest threat for dam failure in Mono County occurs in late spring when Eastern Sierra reservoirs are typically full. Dam failures could be triggered by large earthquakes or by a major warm storm that suddenly increased runoff substantially. Lack of proper maintenance or operation could also contribute to dam failure.

TABLE 3 Dams and Reservoirs in Mono County

Reservoir	Dam	Acre-Feet[3] Impounded	Stream/River	Owner	Location
Agnew Lake	Agnew	810	Rush Creek	SCE	June Lake
Black Reservoir	Black	185	Black Creek	Settelmeyer	Antelope Valley
Bridgeport Reservoir	Bridgeport	42,500	E. Walker River	WRID	Bridgeport
Crowley Lake	Long Valley	183,000	Owens River	LADWP	Long Valley
Ellery Lake	Rhinedollar	749	Lee Vining Creek	SCE	Lee Vining
Gem Lake	Gem	17,298	Rush Creek	SCE	June Lake
Grant Lake	Grant	47,500	Rush Creek	LADWP	June Lake
Lobdel Lake	Lobdel	640	Desert Creek	Day & Weaver	Antelope Valley
Lower Twin Lake	Lower Twin	2,000	Robinson Creek	Plymouth	Bridgeport
Lundy Lake	Lundy	4,113	Mill Creek	SCE	Mono Basin
Lake Mamie	Lake Mamie	125	Mammoth Creek	USFS	Mammoth
Lake Mary	Lake Mary	125	Mammoth Creek	USFS	Mammoth
Poore Lake	Poore	1,200	Poore Creek	Park Livestock	Antelope Valley
Rock Creek Lake*	Rock Creek	NA	Rock Creek	USFS	Rock Creek Canyon
Saddlebag Lake	Saddlebag	10,077	Lee Vining Creek	SCE	Lee Vining
Sardine Lake	Sardine	385	Walker Creek	LADWP	Mono Basin
Tioga Lake	Tioga	1,254	Lee Vining Creek	SCE	Lee Vining
Twin Lakes	Twin Lakes	150	Mammoth Creek	USFS	Mammoth
Power Plant Pond	Upper Gorge	26	Owens River	LADWP	Long Valley
Upper Twin Lake	Upper Twin	1,500	Robinson Creek	Plymouth	Bridgeport
Waugh Lake	Rush Creek Meadows	5,277	Rush Creek	SCE	June Lake
Walker Lake	Walker	540	Walker Creek	LADWP	Mono Basin

Day & Weaver = E. Day and W.M. Weaver Jr. SCE = Southern California Edison
LADWP = Los Angeles Department of Water and Power Settelmeyer = Settelmeyer Ranches Inc., et al.
Park Livestock = Park Livestock Company USFS = USFS, Inyo National Forest
Plymouth = Plymouth Land and Stock Co., et al. WRID = Walker River Irrigation District
* Rock Creek Lake and Dam are located in Inyo County but would impact Mono County.
For more technical information on dams and their drainage areas see:
Dams Within Jurisdiction of the State of California (Bulletin 17-93), California Department of Water Resources.

The county EOP notes that failure of nine of the 21 reservoirs in the county presents a flooding threat; i.e.,

Crowley Lake
The failure of Long Valley Dam would scour the Owens River Gorge downstream, a deep gorge with no development except small-scale Los Angeles Department of Water and Power (LADWP) power plants and limited recreational use. Depending on the volume of water, the community of Bishop, 12 miles downstream, could also be flooded.

Waugh, Gem and Agnew Lakes
These reservoirs and dams are located on Rush Creek above the June Lake Loop. The failure of Rush Creek Meadows Dam at Waugh Lake could affect Gem Lake and Agnew Lake downstream. The failure of Gem Lake Dam could similarly affect Agnew Lake downstream. Rush Creek empties into

[3] An acre-foot is the amount of water that would cover one acre to the depth of one foot.

Silver Lake along the June Lake Loop; development within the path of its floodwaters includes single-family residential development, a resort complex, and campgrounds. Much of that development is used only seasonally.

Saddlebag Lake
Saddlebag Lake is located toward the top of Lee Vining Canyon, along the Tioga Pass Road in Lee Vining Canyon. Lee Vining Canyon has a limited number of seasonal campgrounds, a USFS ranger station, and limited seasonal recreational use. Lee Vining Canyon is an extremely deep canyon; the developed uses are located near the mouth of the canyon. The community of Lee Vining is located at the mouth of Lee Vining Canyon, on a ledge above the creek bed.

Lundy Lake
Lundy Lake is located in Lundy Canyon. A small subdivision is located directly downstream of the dam. Many of those homes are second homes, used only seasonally.

Upper and Lower Twin Lakes (Bridgeport)
Failure of either these dams could flood downstream areas adjacent to Robinson Creek, including campgrounds, resorts, and the Rancheria subdivision. Depending on the severity of the flooding, Bridgeport could also be affected.

Bridgeport Reservoir
The failure of Bridgeport Reservoir would inundate the East Walker River downstream, perhaps well into Nevada, affecting recreational users of the river, as well as downstream ranches.

Rock Creek Dam
The failure of Rock Creek Dam, which is located in Inyo County, would affect downstream areas located in Mono County, including campgrounds and resorts, some of which are used only seasonally.

Lake Mamie, Lake Mary, and Twin Lakes (Mammoth Lakes)
The Town of Mammoth Lakes Emergency Operations Plan (EOP) notes that there are three dams above the town—those at Lake Mamie, Lake Mary, and Twin Lakes. Lake Mamie and Lake Mary drain into Twin Lakes. Twin Lakes impounds about 150 acre-feet, and breach of its dam could send a 3-foot high wall of water downstream. Areas along Mammoth Creek, particularly in Old Mammoth, could experience considerable and rapid flooding.

PREVIOUS DAM FAILURES IN MONO COUNTY
There have been no previous dam failures in Mono County.

PROBABILITY OF FUTURE DAM FAILURES
The future probability of such an occurrence is unknown. Dam failures could be triggered by large earthquakes or by a major warm storm that suddenly increased runoff substantially. The California Department of Water Resources, Division of Safety of Dams, supervises the maintenance and operation of dams in California (other than those owned and operated by the United States) in order to ensure the safety of dams.

C. VULNERABILITY TO DAM FAILURE HAZARDS—OVERVIEW

Dam failure hazards are not considered to be one of the most prevalent natural hazards in Mono County due to the small size of the dams, the fact that there has never been a dam failure in the County, and the fact that dam failure mitigation is a well-established and ongoing process in the county through the state's Dam Safety Program.

Most of the dams in Mono County are relatively small and are located in remote areas with little or no development downstream of them. However, some areas could be impacted if a dam were to break or a flooded reservoir led to dam failure. Eight of the 21 reservoirs in Mono County present flooding potential. In addition, the failure of Rock Creek Lake Dam, which is located in Inyo County, would impact downstream development in Mono County. Based on GIS data, 62 developed parcels in Mono County are currently located within a dam inundation hazard area. Approximately 80 percent of the properties are residential. Based on the assessed value of the structures on these properties, flood damages would cost approximately $9.7 million. The other 20 percent of the parcels are owned by the Los Angeles Department of Water and Power (LADWP). Sustained losses for these parcels would total close to $40 million. There are no critical facilities located within dam inundation zones.

D. VULNERABILITY TO DAM FAILURE HAZARDS—STRUCTURES

Most of the dams in Mono County are relatively small and are located in remote areas with little or no development downstream of them. Approximately 80 percent of the properties located in dam failure hazard areas are residential. Mono County and the Town of Mammoth Lakes both regulate development in floodplain areas where dam inundation is also likely to occur. Over the 20-year timeframe of the county and town General Plans, limited single-family residential development may occur within these areas. However, it will be setback from the hazard zone and sited to minimize impacts from any type of flooding, including from dam inundation. In addition, development near floodplains must be designed and built to standards that minimize damage from flooding.

Critical facilities located within dam inundation zones include power plant facilities in the following locations:

- Southern California Edison facilities located below Lundy Lake, below Tioga Lake, and above June Lake (2 facilities);
- June Lake PUD facilities located below Grant Lake; and
- Los Angeles Department of Water and Power Hydroelectric Generating Stations in the Owens Gorge (2 facilities).

E. ESTIMATED LOSSES FROM DAM FAILURE HAZARDS

Mono County does not have the information necessary to perform a detailed estimate of losses from dam failure hazards. The lack of information is discussed further in the section Estimating Losses. A broad estimate of losses can be obtained by utilizing the number of units located in dam failure hazard areas multiplied by the valuation from the county's tax rolls. Based on the assessed value of the residential structures in dam failure hazard areas, flood damages would cost approximately $9.7 million. Sustained losses for parcels owned by the Los Angeles Department of Water and Power (LADWP) would total close to $40 million.

F. EXISTING DAM FAILURE HAZARDS MITIGATION

The State of California regulates non-federal dams in California and the federal government regulates federal dams to ensure the safe operation of those dams. Mono County and the Town of Mammoth Lakes both regulate development in floodplain areas where dam inundation is also likely to occur. Over the 20-year timeframe of the county and town General Plans, limited single-family residential development may occur within these areas. However, it will be set back from the hazard zone and sited to minimize impacts from any type of flooding, including from dam inundation. In addition, development near floodplains must be designed and built to standards that minimize damage from flooding. In order to reduce the risks associated with the natural hazards occurring in Mono County, Safety Element policies require the county to inform affected persons of potential seismic, geologic, volcanic, fire, flood, avalanche and other natural hazards in the area during the county permit process. In compliance with state law, sellers of property are required to notify buyers of potential hazards affecting the subject property. The mitigation listed above is ongoing and will continue over the 20-year timeframe of the county and town General Plans.

G. PROPOSED DAM FAILURE HAZARDS MITIGATION

Because the failure of Rock Creek Dam in Inyo County would impact downstream areas in Mono County, the County should work with the USFS to study the potential impacts of the failure. Once the impacts have been assessed, an emergency response plan should be developed and implemented.

FLOOD HAZARDS

Flood Hazard References:

California State Multi-Hazard Mitigation Plan
Mono County General Plan, Safety Element
Mono County MEA
Mono County Emergency Operations Plan
California Department of Water Resources website, www.water.ca.gov
US Geological Survey website, www.usgs.gov
Town of Mammoth Lakes General Plan
Town of Mammoth Lakes Emergency Operations Plan
Awareness Floodplain Maps (California Department of Water Resources)
FEMA FIRM Maps
Town of Mammoth Lakes Flood Hazard Map

Flood Hazard Figures: See Appendix A, Map Set

A. IDENTIFYING FLOOD HAZARDS IN MONO COUNTY

Mono County has many streams, rivers and lakes that are subject to flooding. The most dominant flood types in the county are alluvial fan floods, flash floods, and riverine flooding. Alluvial fan floods occur when runoff flows down canyon walls and out onto the adjacent alluvial fan. The rapidly moving water picks up large boulders and other debris from the watershed and deposits them in runoff channels, blocking the flow of water. Flooding in alluvial fans often causes greater damage than clear-water flooding. Flash floods are caused by the rapid buildup of runoff after high-intensity rainfall. Flash floods are often fast, intense events with high flows. Riverine flooding is the most common type of flooding and occurs when a stream channel overflows its banks. The water rises and flows onto the adjacent floodplain. A less common type of flooding that could occur in the county is a seiche. Seiches are earthquake-generated waves within enclosed or restricted bodies of water such as lakes and reservoirs that can overtop dams and pose a hazard to people and property within their reach. There is no available evidence that seiches have occurred in Mono County lakes and reservoirs.

Mono County has three watersheds, the Owens River drainage, the Mono Lake drainage, and the Walker River drainage. Flooding can occur in all three drainages. While the County receives most of its precipitation as winter snow, summer thunderstorms can also bring localized torrential rain. Average annual precipitation is 30 inches at the Sierra Crest and 5-10 inches further east in the valleys. Table 4, which shows the Average Annual flow in selected streams throughout the county, provides an indication of the potential magnitude of flooding in various areas.

TABLE 4 Mono County, Average Annual Flow, Selected Streams

Stream	Average Annual Flow in Acre-Feet[4]
West Walker River (Antelope Valley)	200,000 af
Robinson Creek (Twin Lakes Bridgeport)	43,000 af
Lee Vining Creek (Lee Vining)	49,000 af
Rush Creek (June Lake)	60,000 af
Rock Creek (Tom's Place, Wheeler Crest)	23,000 af
Owens River (Owens Gorge)	400,000 af

[4] An acre-foot of water would cover one level acre to a depth of one foot.

The Mono County MEA notes the following concerning potential flood hazards in Mono County:

> "Flooding is a potential risk to private properties situated in the vicinity of several waterways within the County. The Federal Emergency Management Agency (FEMA) has prepared Flood Insurance Rate Maps illustrating 100-year flood hazard areas for several streams. The community areas most likely to be impacted by a 100-year flood include properties along the East and West Walker Rivers, Reversed Creek, and Spring Canyon Creek. Areas in these high hazard zones include Antelope Valley, Bridgeport Valley, the June Lake Loop, and the Tri-Valley area. Floods in these areas have a 1 percent probability of occurring in any given year (i.e. the 100-year flood). The FEMA maps lack information regarding the base flood elevation and are therefore of limited use for planning purposes. The maps also lack information concerning local alluvial fan and mudflow hazards. There is a significant need to update the flood hazard maps of community areas, particularly those for the Antelope Valley, June Lake, and the Tri-Valley areas, where development pressures are the greatest."

The California Department of Water Resources (DWR) is in the process of preparing Awareness Floodplain Maps for the entire state. Currently, those maps are available for portions of Mono County. The Awareness Floodplain Maps are "approximate assessments mapping 100-year 'awareness floodplains' for both riverine and alluvial fan conditions." The intent of the maps is to provide the public with an additional tool to understand potential flood hazards not currently mapped as a regulated floodplain.

FLOODING IN MAMMOTH LAKES

The Town's General Plan notes that: "the Town of Mammoth Lakes has generally low flood hazards with the exception of Mammoth Creek, which can carry significant volumes during peak 100-year flood conditions." The Town applies Federal Emergency Management Agency (FEMA) standards to development in the 100-year floodplain, which is the area with a 1 percent or greater chance of being flooded in any one year.

B. PROFILING FLOOD HAZARD EVENTS

SEVERITY OF FLOODING HAZARD

Past flooding events in Mono County include flash flooding in the Tri-Valley in 1978, 1984, 1986, and 1989, and the West Walker River Flood in 1997. The magnitude of the flash flooding is not known but the impact of that flooding is discussed below in the section on previous occurrences.

Peak discharge for the January, 1997, flooding on the Walker River was larger than recorded for previous floods at many stations on the Walker River. The peak discharge on January 2, 1997, at six gaging stations along the West Walker River was greater than the 100-year peak discharge determined for those sites (USGS Fact Sheet 182-97).

The initial report filed by the Corps of Engineers Project Team after the West Walker River storm event in January, 1997, noted the following concerning the severity of the event:

> "A storm event occurred on January 2 and 3, 1997, in the West Walker River. The stream gages downstream and upstream of Walker, California, washed out prior to the storm's peak flow. The last recorded discharge was approximately 6,500 cubic feet per second (cfs). Estimates for the 100-year peak flow range from 6,230 cfs to 7,600 cfs. On January 2, 1997, the estimated peak flow ranged from 8,000 cfs to 19,000 cfs. The USGS gage below the confluence of the Little Walker and West Walker Rivers recorded a peak of 12,000 cfs. The peak flow at the community of Walker

could have been higher at 13,000 to 14,000 cfs. The estimated peak flow is about twice the 100-year event. At the peak with the river flowing at 14,000 cfs it is enough water to cover one acre 20 feet deep every minute."

PREVIOUS FLOODING OCCURRENCES

The Flood Insurance Study (FIS) for the unincorporated areas of Mono County contains the following information about flash flooding events in the Tri-Valley in 1978, 1984, 1986, and 1989:

> "Flash flooding is reported to have occurred along U.S. Highway 6 in the Benton, Hammil, and Chalfant Valley areas in 1978, 1984, 1986, and 1989. The floods of 1984 and 1986 resulted in damage to County roads in the amounts of $ 134,000 and $ 120,000, respectively. The worst flood on record occurred on August 9 and 10, 1989, when precipitation amounts of 1.45 and 1.70 inches, respectively, resulted in tremendous flows down the alluvial fan slopes of the White Mountains. The ensuing mudflow traversed Spring Canyon Creek, causing damage to roads, agricultural land, and some structures. Crop damage was estimated at $1.5 million. The U.S. Natural Resource Conservation Service (formerly the Soil Conservation Service) office in Bishop reported receiving nine applications under the Emergency Conservation Program for damage to 1,365 acres of cultivated agricultural land in the Benton and Hammil Valley areas. The CALTRANS office in Bishop reported expenditures of approximately $ 150,000 to fix State highways. Damage to County roads was estimated at another $ 257,000, for which the County applied to the Office of Emergency Services for reimbursement under the State Natural Disaster Assistance Act Program. There were reports of 50 homes being damaged from mudflows as high as 18 inches, although no structures were washed away. Some residents and tourists were evacuated."

Flooding occurred in the Walker River Basin in January, 1997. Extensive damage occurred along the West Walker River in the Walker River Canyon and in the communities along the West Walker River in the Antelope Valley. After the Walker River flood in January, 2001, Mono County identified repetitive loss properties along the Walker River and acquired a number of those properties (11 parcels in Walker, 4 in Mountain Gate, and 1 in Topaz).

Additional information on historic floods in Mono County is presented in the following paragraphs.

> **General:** "Particularly large snowmelt floods in the Sierra Nevada have been documented in 1906, 1938, 1952, 1969, 1983, and 1995… their total volumes were two to four times larger than average. In all cases, snow deposition was more than twice average amounts and persisted into April or May… Midwinter rainfall on snow cover has produced all the highest flows in major Sierra Nevada rivers during this century… All lands adjacent to streams that have been inundated before are at risk in the future."
> **Source:** Richard Kattelmann, "Impacts of Floods and Avalanches," Sierra Nevada Ecosystem Project: Final Report to Congress, vol. II, Assessments and scientific basis for management options. Davis: University of California, Centers for Water and Wildland Resources, 1996.
>
> **Date:** 2/17/86-2/19/86
> **Place**: Throughout Mono County
> **Summary**: Severe flooding closed roads and caused damage throughout Mono County. State of Emergency declared 2/27/86.
> **Economic Damage**: Unknown, but Mono County received $13,251 out of a $15 million statewide flood assistance fund from the Governor's Office of Emergency Services.
> **Details**: A flash flood warning for Mono County was issued on 2/17 and winds were reported as high as 75 mph. On the 18th, the East Walker River overflowed its banks and covered the road with

1.5' of water. Flooding also occurred at Willow Springs on the 18th. By the 19th, S.R. 182 at Aurora Canyon was closed as a result of flooding. U.S. 395 at Bodie Road and S.R. 203 at Meridian in Mammoth were also flooded. Old Benton was under 2-3' of water, and Hammil Valley, Benton, and Chalfant were also flooded.
Source: Sheriff's Log, Storm, 1986

Date: 8/9/89
Place: Southern Mono County
Summary: Flash floods closed S.R. 120, U.S. 6, and County Road at Benton Crossing. Major areas affected: Chalfant, Benton, Hammil Valley. County declared State of Emergency.
Economic Damage: 70 homes (50 homes, 20 mobile homes): $700,000 in water damage; Agriculture losses: $1.5 million, Elementary school: $25,000, Federal and system roads: $412,000, Public facilities: $5,000.
TOTALS: Private Damage, $2,200,000; Public Damage, $417,000
Details: Wall of water moved down U.S. 6 at 20 mph near Benton.
Source: Sheriff's Log, Flood '89

Date: 3/9/95 - 3/11/95
Place: Walker and Coleville areas of northern Mono County
Summary: Urban and small stream flooding
Economic Damage: $1.5 million total, which includes the following areas: Lake Tahoe-Truckee Area, Central Sierra east Slopes, Extreme Western NV, west-Central Nevada
Details: U.S. 395 closed from NV state line to Bridgeport because of rock and mudslides.
Source: Storm Data and Unusual weather phenomena,
http://datastore.lib.virginia.edu/vaclim/etexts/storm/

Date: 03/09/95 – 03/11/95
Place: Mono County
Summary: 1 Fatality Mono County declared state of emergency 3/14/95.
Economic Damage: 2 homes destroyed ($160,000); 10 cases of minor damage to rental properties ($100,000); 60 Debris clearance sites (cost unknown); 8 emergency proactive measures ($8,000); Storm Damaged Roads ($485,000); county wide electric utility damage ($800,000). Total: $1,553,000
Source: Sheriff's Log, Avalanche & Flooding; Winter Storms 03-11-1995
Note: Flooding AND avalanches occurred during this storm. All info is grouped together in sheriff's log, so the above totals do not refer exclusively to flood damage. Identical information is included in "Historical Avalanche Information."

Date: 1/1/97 – 1/2/97
Place: Mono County
Summary: The floods of 1/97 were caused by many factors: 1) the Eastern Sierra had experienced two above normal precipitation years in 1995 and 1996, 2) a major winter storm from 12/21-12/22/96 deposited heavy snow in the Eastern Sierra (4-6' below 7000' and up to 8' at higher elevations), and 3) large amounts of moisture and warm air ("The Pineapple Express") were transported from the subtropics into the Eastern Sierra on January 1st and 2nd. The resulting rainfall and snowmelt that poured off the mountains led to extensive flooding.
Economic Damage: Damage from flooding was found in the towns of Mammoth Lakes, Coleville, Walker, and Topaz, Bridgeport. 111 home and 4 businesses were destroyed by the floods, totaling at least $25 million in damages. 30-plus families countyg28
wide were displaced. Destruction to public facilities was near $5 million. Extensive damage was done to the federal highway system: a 12-mile stretch of U.S. 395 (between Topaz and Sonora Junction at

S.R. 108) was completely destroyed by the West Walker River. The cost for repairs was estimated at $20 million. Total damage to the federal highway system in the county was near $48 million. TOTAL: $78 million.
Bridgeport: The town of Bridgeport was under two feet of water in the downtown area.
Coleville/Walker: Houses were washed away in Coleville and Walker, with helicopter rescues necessary. Agricultural Land Loss: $15 million; Residential Land Loss: $3.25 million; Residences: $5.5 million; Mobile Homes: $960,000; Sierra East Mobile Homes Sites: $337, 000.
Mammoth Lakes: The Mammoth Lakes Police Department was under 6" of water. An Initial Damage Estimate Report submitted to the Governor's Office of Emergency Services indicated that the town's total damages (property and service) were just over $1.2 million. A 1/9/97 article "Raging floodwaters devastate Walker, section of U.S.-," in the Review Herald reported that the damage to private property and business revenue in Mammoth Lakes was actually closer to $3 million.
June Lake: The June Lake Public Utility District had $125,00 in damage to its water diversion systems, as well as road damage in the Clark Tract.
Twin Lakes: Three homes were damaged; one a total loss, one with major damage, and one with minor damage.
Details: Heavy rains with high snowfalls (Mammoth Lakes reported 8" of rain in 36 hours) caused a rapid rise to rivers, creeks, and streams. County declared a Federal Disaster Area by President Clinton on January 4, 1997.
West Walker River below Little Walker near Coleville, CA: Flood Stage = 5.5', Maximum Stage and Crest = 10.06' (11,700cfs) on 1/2/97, a record stage/flow. The river set a new maximum January mean flow: 1807 percent of the long-term (1961-1990) median. The USGS estimated this to be a greater than 100 yr. flood.
West Walker River near Coleville, CA: Flood Stage = 7.0', Maximum Stage and Crest = 9.12' was the highest stage recorded before the gage was washed away on 1/2/97. Crest was estimated at over 12'. The USGS estimated this to be a greater than 100 yr. flood.
Lee Vining Creek: Peaked at over 700cfs at the diversion dam and caused minor damage to LADWP's aqueduct facilities.
Walker and Parker Creeks: Backed up at their U.S. 395 culverts, and contributed their flows to Rush Creek further downstream.
Sources: 1. Storm Data and Unusual weather phenomena, http://datastore.lib.virginia.edu/vaclim/etexts/storm/;
2. Sheriff's Log, Flood, 1997
3. 1/9/97 article "Raging floodwaters devastate Walker, section of U.S. 395," in the Mono County Review Herald

FUTURE PROBABILITY OF FLOODING

There is a 1 percent chance that a 100-year flood will occur in any given year in the 100-year floodplain areas indicated on the FEMA FIRM maps. There is a 0.2 percent chance that a 500-year flood will occur in any given year in the 500-year floodplain areas indicated on the FEMA FIRM maps. Some flooding may occur annually but it may not be the 100-year flood and it may not occur within the identified 100-year floodplain area.

C. VULNERABILITY TO FLOOD HAZARDS—OVERVIEW

Flood hazards are considered to be one of the most prevalent natural hazards in Mono County due to their repeated occurrence, the damage they have caused in the past, and the large number of developed parcels within flood hazard areas. As a result, flood hazard mitigation is a well-established and ongoing process in the county, with wide participation from a variety of local, state, and federal organizations.

Flood hazards in Mono County occur primarily along the West Walker River and East Walker River in the Bridgeport Valley and the Antelope Valley, in the June Lake Loop, along Old Mammoth Creek in Mammoth Lakes, and in the Tri-Valley. Different areas of the county are subject to different types of flooding. Riverine flooding occurs along the West Walker River, the East Walker River, the June Lake Loop, and Old Mammoth Creek. Flash floods and alluvial fan flooding occur in the Tri-Valley.

D. VULNERABILITY TO FLOOD HAZARDS—STRUCTURES

The structures at risk from flood hazards are predominantly residential structures. Even within other land use designations such as agricultural parcels and mixed use parcels, the predominant structures are residential structures.

A 1990 survey by the county found 352 buildings (216 residential structures) located in flood zones within the county. The 1990 survey identified only structures located within the FEMA 100-year floodplain. More current data developed using the County and Town's GIS system show 879 developed parcels located in flood zones within the county, including locations within the Town. The current assessment identified structures within the FEMA 100-year floodplain as well as structures within a 250 foot buffer floodplain area. The total assessed value of those parcels is $ 148,821,159. The parcels within flood zones are predominantly residential parcels, with large areas developed agricultural parcels, and limited commercial and mixed use parcels (primarily commercial and residential uses).

After the 1997 Walker River flood, several repetitive loss properties in the Antelope Valley were acquired by the county. Those parcels can only be used for open space, recreational purposes, or wetlands management practices. No new structures or improvements are permitted on those properties except for limited public structures related to the permitted uses. All structures built on the parcels must be floodproofed or elevated above the Base Flood Elevation.

Critical facilities located within flood hazard zones include the following:

- Walker Senior Center;
- California Highway Patrol in Bridgeport;
- June Lake Fire Department;
- June Lake Community Center;
- Mammoth Fire Station; and
- Sheriff's Substation south of Mammoth.

E. ESTIMATING LOSSES FROM FLOOD HAZARDS

Mono County does not have the information necessary to perform a detailed estimate of losses from flooding hazards. The lack of information is discussed further in the section Estimating Losses. A broad estimate of losses can be obtained by utilizing the number of units located in flood hazard areas multiplied by the valuation from the county's tax rolls. Based on the assessed value of the structures in flood hazard areas, flood damages would cost approximately $148,821,159.

Mono County and the Town of Mammoth Lakes both regulate development in floodplain areas. Over the 20-year timeframe of the county and town General Plans, limited single-family residential development may occur within these areas. However, it will be setback from the hazard zone and sited to minimize impacts from any type of flooding. In addition, development near floodplains must be designed and built to standards that minimize damage from flooding.

F. EXISTING FLOOD HAZARD MITIGATION

The County and the Town currently regulate development in the floodplain through a variety of land use planning regulations and policies:

- The County limits the intensity of development within the 100-year floodplain by designating lands in identified floodplains for non-residential, low intensity uses, when possible.
- The County participates in the National Flood Insurance Program (NFIP) through its Floodplain Regulations (Chapter 21 of the Mono County Land Development Regulations). Those regulations limit development within the floodplain, establish a floodplain administrator, and identify requirements for future development within or adjacent to a floodplain, including raising structures above the base flood elevation.
- The County implements its Land Clearing, Earthwork and Drainage Facilities ordinance (Mono County Code Chapter 13.08) that is intended to avoid or minimize erosion and siltation impacts from development that could lead to increased flooding hazards.
- After the Walker River flood in January 2001, Mono County identified repetitive loss properties along the Walker River and acquired a number of those properties (11 parcels in Walker, 4 in Mountain Gate, and 1 in Topaz) in compliance with the Stafford Act §404 acquisition program. Uses on those parcels are restricted to uses compatible with open space, recreational, or wetlands management practices, i.e. parks for outdoor recreational facilities, nature reserves, unimproved pervious parking lots and other uses as described in 44 C.F.R. § 206.434. No new structures or improvements are permitted on those parcels except a public facility that is open on all sides and related to open space uses, a public restroom, or a public structure related to the allowable uses and approved by the County prior to the start of any construction. All structures built on these parcels must be floodproofed or elevated to the Base Flood Elevation plus one foot of freeboard.
- In accordance with the stream setback requirements in the County's Land Development Regulations, the County requires new development to set back adequately from surface waters for flood protection purposes. Any deviations from the stream setback requirements within the 100-year floodplain must be reviewed by the County Floodplain Administrator prior to permit issuance.
- Future development projects with the potential to cause substantial flooding or siltation are required to provide an analysis of the potential impacts prior to project approval. The analysis is required to include project alternatives or mitigation measures to avoid or mitigate potential impacts to downstream resources.
- The County's GIS system includes the FIRM maps and the DWR Awareness Floodplain Maps that are currently available for the county.
- The Town also regulates development in floodplains and near the perimeter of natural water bodies and in flood areas when there is a threat to life or property.
- The Town maintains a flood hazard management program including regulations in the Town Development Code.

- The Town retains, to the maximum practical extent, primary community watercourses and bodies in their natural state, through criteria in the Town Development Code. Creek corridors are carefully identified, corridor setbacks are established, and strict regulations precluding riparian vegetation removal and creek regime modification are followed.
- In order to reduce the risks associated with the natural hazards occurring in Mono County, Safety Element policies require the county to inform affected persons of potential seismic, geologic, volcanic, fire, flood, avalanche and other natural hazards in the area during the county permit process. In compliance with state law, sellers of property are required to notify buyers of potential hazards affecting the subject property.

The mitigation listed above is ongoing and will continue over the 20-year timeframe of the county and town General Plans.

G. PROPOSED FLOOD HAZARD MITIGATION

By documenting past flood events on the GIS system, the County and the Town can develop historic flooding patterns for the area that can be used to better understand where repetitive flooding hazards occur and enable the County and Town to minimize risks to existing development in those areas.

There is a need to update the FIRM maps for the County and to complete the DWR Awareness Floodplain Maps for the County, particularly for the Walker River watershed communities, the June Lake Loop, and the Tri-Valley area.

Currently, the FIRM maps are utilized for land use planning. The County and the Town should incorporate the DWR Awareness Floodplain Maps into the land use planning process and the GIS system as those maps become available. The County and the Town should request FEMA to include the DWR Awareness Floodplain Map data on the FIRM maps.

Stream restoration efforts are occurring throughout the County for a variety of reasons. The County and the Town have an opportunity to ensure that stream restoration efforts address flood management issues.

While many residents of Mono County are aware of the flood hazards within their communities, others become aware of those hazards only during the building process when they encounter stream setback requirements or floodplain regulations. The County and the Town should ensure that property owners are aware of flood hazards and practices necessary to diminish the impacts of those hazards through an ongoing public education program. This should include information on participation in the NFIP.

While the County and the Town currently have elements of flood management in place, there is no overall, cohesive strategy for flood management. The County and the Town should develop a Comprehensive Flood Management Strategy that includes the following elements:

Flood management strategies should be developed for each watershed in the County. The watersheds should be considered as single management units since upstream land management decisions affect downstream parcels.

Watershed-based flood management should include all agencies/entities whose decisions affect flood management.

Adequate floodplain management should stress:

- Avoiding risks in the floodplain.
- Minimizing the effects of those risks when they cannot be avoided.
- Mitigating the effects of damage when it occurs.
- Accomplishing the above in such a way that diminishes negative environmental impacts.
- Nonstructural mitigation (e.g., standards requiring elevation above the base flood level) should be given preference over structural mitigation (e.g., constructing diversion channels), when feasible.

LANDSLIDE HAZARDS

Landslide Hazard References:

California State Multi-Hazard Mitigation Plan
Mono County General Plan, Safety Element
Mono County MEA
Mono County Emergency Operations Plan
California Geological Survey website, www.consrv.ca.gov/CGS
US Geological Survey website, www.usgs.gov
Town of Mammoth Lakes General Plan
Town of Mammoth Lakes Emergency Operations Plan
Rockfall and Landslide Hazard Maps (Mono County Master Environmental Assessment)

Landslide Hazard Figures: See Appendix A, Map Set

A. IDENTIFYING LANDSLIDE HAZARDS IN MONO COUNTY

Landslide hazards in Mono County are primarily associated with seismic activity and heavy rainfall. Rockfalls and mudflows occur after those events. The Mono County MEA (Chapter 19) notes the following concerning landslide hazards in the County:

> "Rockfalls and landslides are particularly common along the very steep slopes of the eastern scarp of the Sierra Nevada, where talus slopes provide evidence of abundant past rockfalls. During the winter and spring months, rockfalls can be lubricated with snow and ice and can become extremely fast moving and destructive. The May 1980 earthquakes triggered numerous rockfalls, especially at Convict Lake and in McGee Canyon (Bryant, 1980) and "spectacular rockfalls " were observed in Chidago Canyon and the White Mountains during the July 21, 1986 earthquake in Chalfant Valley (Smith, 1987). Landslides in areas of hilly and mountainous terrain can be triggered by groundshaking, heavy rains or human activities such as road cuts, grading, construction removal of vegetation, and changes in drainage.
>
> Mudflows involve very rapid downslope movement of saturated soil, sub-soil, and weathered bedrock. Large mudflows, such as the one that occurred in 1989 in the Tri-Valley area, can be destructive, particularly at the mouths of canyons. The movement of soil and debris by mudflow and other landslides over time is evident in the large alluvial fans at the edges of valley areas."

B. PROFILING LANDSLIDE HAZARDS IN MONO COUNTY

SEVERITY OF THE HAZARD

There is no information available on the magnitude of landslides and rockfalls in Mono County.

PREVIOUS OCCURRENCES

There is limited information on previous occurrences of landslides or rockfalls in Mono County. Since many of the areas at risk for rockfalls are outside community areas, the risk to people and property is small. A report on the Mammoth Lakes earthquakes of May 1980, contains the following information on landslides and rockfalls resulting from those earthquakes:

"Landslides and rockfalls were wide spread through the region during the Mammoth Lakes earthquakes. Near the epicentral region in Convict and McGee Canyons, rockfalls were common; in places, rock debris partially or completely covered snowfields (photo 2). A magnitude 5.3 earthquake at 1158 PDT on May 26 generated numerous rockfalls into the McGee Creek drainage and its tributaries. Large dust plumes could be observed over the Sierra Nevada immediately following many magnitude > 4.5 events. Several backcountry roads and trails were buried by debris that locally was more than 30 m thick. Two hikers in Yosemite Valley, approximately 70 km to the west, were severely hurt by a rockfall.

The danger of rockfalls prompted the closure of many wilderness and backcountry areas. The steep-walled Hot Creek drainage was also closed primarily because of rockfall danger; in addition, a potential for sudden increases in water temperature and volume of discharge of the hot springs was a severe threat to bathers. A rhyolite boulder the size of a one-car garage was dislodged by earthquake shaking from a cliff 1.5 km northwest of Mammoth Elementary School and rolled approximately 500 m to lower slopes below.

Ground cracks were abundant in the Mammoth Lakes region after the earthquakes. Many lurch cracks formed in fill along paved and dirt roads (photo 4). Earth materials throughout the region for the most part are unconsolidated, particularly in the Long Valley caldera. Unconsolidated and locally moist soils contributed to ground failures from lurching, downslope movement, settlement, and liquefaction."
(McJunkin, et al., 1980)

In addition to earthquakes, landslides and rockfalls can also be caused by heavy rains, e.g.:

Date: 3/9/95 - 3/11/95
Place: northern Mono County
Summary: Rock and mudslides resulting from heavy rains
Economic Damage: Unknown (Road damage)
Details: U.S. 395 closed from Nevada state line to Bridgeport because of rock and mudslides.
Source: Storm Data and Unusual weather phenomena,
http://datastore.lib.virginia.edu/vaclim/etexts/storm/

PROBABILITY OF FUTURE OCCURRENCES

Rockfalls and mudflows occur every year in the Eastern Sierra. The probability of one occurring in any given area is unknown.

C. VULNERABILITY TO LANDSLIDE HAZARDS—OVERVIEW

Landslide hazards are not considered to be one of the most common natural hazards in Mono County due to the low incidence of landslides in the county, the small number of identified landslide risk areas, and the fact most Mono County communities are located away from canyon slopes where landslides primarily occur.

Mountainous and hilly areas are generally at high risk for landslides. Land or mudslides can occur in areas with a slope of 15 percent or more. Neighborhoods and businesses located on or below bluffs and hills are especially vulnerable to landslides. Landslide Risk Zone Map 7-3B in the California State Multi-Hazard Mitigation Plan shows only southeast corner of the county (White Mountains and Oasis) as

having any landslide incidence and/or susceptibility. The southern half of the White Mountains in Mono County is shown as having Moderate Landslide Incidence (1.5% to 15% of area involved). The extreme southeast corner of the county (Oasis) is shown as having Moderate Susceptibility/Low Incidence.

Community areas in the County affected by rockfall hazards include Lundy Canyon and the June Lake Loop (primarily the Down Canyon area). The remaining rockfall risk areas are outside community areas. Alluvial fan areas in the Tri-Valley may also be affected by large mud and debris flows.

The Town of Mammoth Lakes General Plan notes that:

> "Landslides move under the force of gravity affected by the type of earth materials involved, the internal friction of the slide mass and slope over which the mass is moving. Triggering events include: Earthquakes, periods of heavy precipitation, natural erosion and development activity. These problems are limited primarily to areas with a combination of poorly consolidated material and slopes that exceed 30%. While these slopes are found in portions of Mammoth Knolls, Mammoth Slopes, and areas of Old Mammoth, there is no record of landslide potential."

The Town of Mammoth Lakes General Plan also notes that:

> "Liquefaction is a quicksand condition in which there is a total loss of foundation support also a result of earthquake activity. This condition occurs in areas with shallow ground water and where finer grained sands make up a significant part of the near surface (less than 30 feet) soil section. Areas potentially subject to liquefaction are in the lower parts of the community including Sherwin Meadows, and areas in Old Mammoth."

D. VULNERABILITY TO LANDSLIDE HAZARDS—STRUCTURES

Based on County and Town GIS data, 105 developed parcels are located in landslide risk areas within the county. The total assessed value of those parcels is $58,066,492. The majority of the parcels are residential parcels located in the June Lake Loop. Five commercial parcels (including 2 resort parcels) are located in the June Lake Loop. Two resort parcels in more remote areas, the Convict Lake Resort and the Lundy Lake Resort, are both located in landslide hazard areas. Four parcels owned by LADWP that are located near the Owens River Gorge are also located within a landslide hazard area. There are no critical facilities located within landslide hazard areas.

Over the 20-year timeframe of the county and town General Plans, development will occur in and adjacent to developed community areas. Two community areas, the Down Canyon area of June Lake and portions of Mammoth Lakes, are susceptible to landslide hazards. Mono County and the Town of Mammoth Lakes regulate development within landslide hazard areas and require that any future development be sited and designed to minimize hazards from landslides or rockfalls.

E. ESTIMATING LOSSES FROM LANDSLIDE HAZARDS

Mono County does not have the information necessary to perform a detailed estimate of losses from landslide hazards. The lack of information is discussed further in the section Estimating Losses. A broad estimate of losses can be obtained by utilizing the number of developed parcels located in landslide hazard areas multiplied by the valuation from the county's tax rolls. Based on the assessed value of the developed parcels in landslide hazard areas, landslide damages would cost approximately $ 52 million.

The majority of the parcels are residential parcels located in the June Lake Loop. The total also includes five commercial parcels in June Lake, two remote resort parcels, and four parcels owned by LADWP in the Owens Gorge.

F. EXISTING LANDSLIDE HAZARD MITIGATION

The County and the Town currently regulate development in landslide hazard areas through the following land use planning regulations and policies:

- The Mono County General Plan regulates land uses in areas identified as subject to natural hazards:

  Action 4.3: Through the permit process, including site plan review, direct development to avoid locating in hazardous areas.

  Policy 5: Regulate land uses that may increase the potential for natural hazards, such as activities which disturb vegetative cover on steep slopes, or which could divert hazard flows toward down-gradient development.

  Action 5.1: Consider enacting a hillside development ordinance to address requirements for evaluation of landslide, rockfall, and other geologic hazards on hillsides.

  Action 5.2: Prior to site development, require geotechnical evaluation of the potential for landslides and mudslides in applicable areas.

  Action 5.3: Amend the zoning code to include maximum site disturbance restrictions in appropriate zoning districts.

- The County's Land Clearing, Earthwork, and Drainage Facilities Regulations ordinance, more commonly known as the Grading Ordinance (Chapter 13.08 of the Mono County Code) regulates grading, cut and fill, and drainage facilities for new development and improvements to existing development depending on the amount of planned site disturbance. The intent of the regulations is to ensure the safety and stability of development and to prevent on- and off-site erosion impacts. The ordinance requires a soils report prepared by a soils engineer for grading in, on, under, over or adjacent to old fills, swamp, marshlands, or in areas known or believed to be potential slide areas. Areas with expansive soils also require a soils report prepared by a soils engineer. The Town also has a Land Clearing, Earthwork, and Drainage Facilities ordinance (Chapter 12.08 of the Town Municipal Code) that has similar requirements for development in the Town.
- The Mono County Land Development Regulations and the Town's Zoning Code restrict site disturbance in certain land use designations in order to protect environmentally sensitive areas and reduce the risk of landslides.
- In order to reduce the risks associated with the natural hazards occurring in Mono County, Safety Element policies require the county to inform affected persons of potential seismic, geologic, volcanic, fire, flood, avalanche and other natural hazards in the area during the county permit process. In compliance with state law, sellers of property are required to notify buyers of potential hazards affecting the subject property.

The mitigation listed above is ongoing and will continue over the 20-year timeframe of the county and town General Plans.

G. PROPOSED LANDSLIDE HAZARD MITIGATION

No additional landslide hazard mitigation is proposed.

SEISMIC HAZARDS

Seismic Hazards References:

- *California Multi-Hazard Mitigation Plan*
- *Mono County General Plan, Safety Element*
- *Mono County MEA*
- *Mono County Emergency Operations Plan*
- *California Geological Survey website*, www.consrv.ca.gov/CGS
- *US Geological Survey website*, www.usgs.gov
- *USGS Fact Sheet 108-96, Living with a Restless Caldera--Long Valley, California*
- *Town of Mammoth Lakes General Plan*
- *Town of Mammoth Lakes Emergency Operations Plan*
- *Alquist-Priolo Fault Hazard Zone Maps*
- *Areas Damaged by Historic Earthquakes (1800-1998) (USGS)*
- *Distance of the earthquake that cause the dominant hazard for peak ground acceleration at 10% probability of exceedance in 50 years with alluvial site conditions (DMG/USGS)*
- *Epicenters, Magnitude >6 Earthquakes, 1800-2000, California (California Geological Survey)*
- *Magnitude of the earthquake that causes the dominant hazard for peak ground acceleration at 10% probability of exceedance in 50 years with alluvial site conditions (DMG/USGS)*
- *Probabilistic Seismic Hazards, Mono County (California Geological Survey and USGS)*
- *Seismic Hazard Maps (Mono County Master Environmental Assessment)*

Seismic Hazard Figures: See Appendix A, Map Set

A. IDENTIFYING SEISMIC HAZARDS IN MONO COUNTY

Mono County is located in an area of California with a major fault system known as the Eastern California Shear Zone. About 10mm/year of slip occurs on faults east of the Sierra Nevada (CGS Note 31).

From California Geological Survey (CGS) Note 31:

There are thousands of recognized faults in California, hundreds of which have been given formal names, but only a very small number of these pose significant hazards. The motion between the Pacific and the North American plates occurs primarily on the faults of the San Andreas Fault system and the Eastern California Shear Zone. Other faults have much lower rates of movement, and correspondingly longer times between significant earthquakes.

From the Mono County MEA, Chapter 19, Natural Hazards:

Mono County covers an area that is relatively young by geologic standards. It is located at a stress point where the earth's crustal plates are exerting opposite pressures against each other. This combination creates both "tectonic" earthquakes (e.g., land mass movement) and volcanic activity that can trigger earth shaking (e.g., magma chamber movement and lava dyke formations). Up-to-date information concerning earthquake activity in the county is available on the U.S. Geological Survey website, www.usgs.gov.

The primary seismic hazard in the County is strong to severe groundshaking generated by movement along active faults. The entire county, except for a small portion of the Sierra crest, is in an area where intense groundshaking is possible. This area has been designated as a Seismic Zone 4, the zone of greatest hazard defined in the Uniform Building Code.

In addition to tectonic movement, the Long Valley-Mammoth Lakes region has experienced numerous earthquakes caused by the movement of magma below the earth's surface. The oval-shaped Long Valley Caldera spans an area approximately 10 by 20 miles, and is among the largest volcanoes in the continental United States. For additional current information on the Long Valley caldera, see the U.S. Geological Survey website, www.usgs.gov.

Ground failure induced by groundshaking includes liquefaction, lateral spreading, lurching, and differential settlement, all of which usually occur in soft, fine-grained, water-saturated sediments, typically found in valleys. During the 1980 Mammoth Lakes earthquake sequence, ground failure was prevalent at Little Antelope Valley, along margins of the Owens River in upper Long Valley, along the northwest margins of Lake Crowley, and along Hot Creek Meadow.

All of Mono County is situated within Seismic Zone 4, and consequently new construction in the County must comply with stringent engineering and construction requirements. In addition, existing buildings that may be subject to seismic hazards must comply with new requirements of the unreinforced masonry building law (Government Code Section 8875).

Subsidence is caused by tectonic movement of the earth; by withdrawal of fluids such as water or oil; by compaction that occurs when copious amounts of water are applied to an arid area; or by severe loading, such as when large bodies of water are impounded. The most dramatic tectonic subsidence occurs during earthquakes, when areas can drop suddenly. During the May 1980 sequence of earthquakes near Mammoth Lakes, there were several locations near the Hilton Creek Fault where the ground surface dropped about four inches on the northeast side of fractures. Along the "Mammoth Airport fault zone," up to 12 inches of vertical offset on the east side of ruptures was observed (Taylor and Bryant, 1980). Another tectonic change in ground elevation that occurs in Mono County is associated with the movement of magma beneath Long Valley Caldera.

From Dave Hill, Scientist-in-Charge, Long Valley Observatory, U.S. Geological Survey
Uplift of the resurgent dome since 1989 now amounts to over 30 inches (80 cm). Roughly half of the total uplift accumulated between 1980 and 1984. The uplift rate has fluctuated since January 1983—with a steady uplift rate of about 2 cm/year from 1990 through mid-1997, and a 10-cm surge in the last half of 1997 during a strong earthquake swarm that included nine magnitude M>4 earthquakes (2 M=4.9 earthquakes). Uplift slowed toward the end of 1999 and has remained at ~880 cm from 2000 through the present [see USGS Bulletin 2185, Hill et. Al. (2002) for a more up-to-date summary].

The USGS maintains recent earthquake information on its website, including a continuously updated map showing the location and magnitude of earthquakes in the Long Valley area over the previous seven days (see quake.wr.usgs.gov/recenteqs/Map/Long_Valley.html). If that web site address has changed, try accessing it through the USGS home page (www.usgs.gov).

B. PROFILING SEISMIC HAZARDS IN MONO COUNTY

SEVERITY OF THE HAZARD

A number of moderate (magnitude 5 to 6) earthquakes occurred in the Long Valley area in the 20th century. A magnitude 5.4 earthquake struck 6 miles southeast of the Long Valley Caldera in 1978 beginning the present period of geologic unrest. Numerous swarms of earthquakes have occurred since then. A period of intense shaking occurred in May 1980 and included four strong magnitude 6 shocks, 3 of which occurred on the same day (USGS Fact Sheet 108-96). These earthquakes are caused by two closely related processes, movement along faults and the pressure of magma rising beneath the Earth's

surface. The largest 20th century earthquake in the area, a magnitude 6.4 earthquake, occurred in the Chalfant Valley in July, 1986.

From California Geological Survey (CGS) Note 31--

Earthquakes large enough to cause moderate damage to structures in the vicinity of the epicenter--those of M5 or larger--occur 3 to 4 times a year….On the average of once every 2 or 3 years, a moderate earthquake (M6 to 6.9) strikes somewhere in the state….Major earthquakes (M7 to 7.9) occur in California about every 10 years on average.

PREVIOUS SEISMIC OCCURRENCES

Earthquakes occur frequently in the Eastern Sierra, in Mono County, and particularly in the Long Valley area. Review of the USGS website shows that earthquakes occur in the general vicinity weekly and almost daily. The majority of those earthquakes are under magnitude 3 and are not felt by people. Associated seismic and geologic hazards such as landslides, rockfalls, and ground failure have occurred in conjunction with earthquakes.

The California Geological Survey, in its list of Significant California Earthquakes; e.g., earthquakes of magnitude 6.5 or greater that caused loss of life or more than $ 200,000 in damage, lists earthquakes of magnitude 6.2 and 6.0 in Mammoth Lakes on May 25, 1980 (www.consrv.ca.gov/CGS). The CGS also has mapped data on historical earthquakes throughout California that show the epicenters of and areas damaged by magnitude 5 or greater earthquakes from 1800 to 1999 (CGS Map Sheet 49). During that timeframe, Mono County experienced earthquakes with a magnitude between 6.0 and 6.9, with the epicenters located at the eastern and western edges of the Long Valley Caldera (see Seismic Hazard Maps, Appendix A). The damage map from Map Sheet 49 shows the minimum number of times that damaging shaking (MMI of VII or greater[5]) has occurred throughout California. Damaging shaking has occurred two times in the vicinity of the Long Valley Caldera and one time in the southern half of the county (from Mammoth east to the Tri-Valley)(see the Seismic Hazard Maps, Appendix A). Damaging shaking also occurred once in the Mono Basin area.

Dave Hill, from the USGS Long Valley Observatory, noted the following concerning a Chalfant Valley earthquake in 1986:

> "The Chalfant Valley earthquake (M=6.4) occurred on July 21, 1986. It was preceded by a month-long foreshock sequence that began M=2.6 earthquake on July 3 and built up to a M~5.8 (as I recall) earthquake just 24 hours before the main shock. The area had shown virtually no previous earthquake activity (since the mid-1970s anyway). The aftershock sequence was also rather energetic including three M>5.5 earthquake (the largest was close to M~6). I think the associated damage was minimal aside from rock falls in the mountains and a number of mobile homes in the Chalfant area that were toppled from their (unstable) foundations." (Dave Hill, pers. comm.)

McJunkin, et al., in California Geology magazine, noted the following concerning the 1980 earthquakes in Long Valley:

> On May 25, 1980 at 0933 Pacific Daylight Time (PDT) a magnitude 6.0 earthquake (all magnitudes are from Caltech Seismological Laboratory) occurred approximately 10.5 km east-southeast of Mammoth Lakes, California (figure 1). During the next 16 minutes, four magnitude 4.1 - 5.0 shocks and one 5.5 shock occurred. This seismic activity was the beginning of an earthquake sequence that produced 72 magnitude 4.0 - 4.9 events, six magnitude 5.0 - 5.5 events and three

[5] Modified Mercalli Intensity (MMI) is a scale that measures the effects of earthquake ground motion on people and structures. MMI VII effects are characterized by significant damage to weak structures.

events of magnitude 6.0 - 6.3 during the next 48 hours; thousands of magnitude < 3.9 earthquakes were generated during this same time period. The largest earthquake in the sequence was magnitude 6.3 and occurred at 1245 (PDT) on May 25. Seismic activity after this event was fairly continuous (photo 1) for the next three days; however, most events were less than magnitude 5.0. Damage from earthquake shaking was most pronounced in the Mammoth Lakes community and surrounding local areas. After the first event on May 25, Mammoth Lakes was without power until noon; during this period vital community services operated from auxiliary power supplies. Most damage to buildings was nonstructural and included broken windows and water mains, cracked plaster, and fallen chimneys. Damage to shelf stock and fixtures was moderate to severe in many stores, restaurants, and motels; in addition, extensive destruction to breakable contents in homes was commonly reported. Hot Creek Fish Hatchery and Mammoth Elementary School, east of U.S. 395, also received considerable nonstructural damage from earthquake shaking. Initial damage losses to schools, other public buildings, and roads in the Mammoth Lakes region was estimated to be $2 million (Cole, 1980, p. 1).

CARBON DIOXIDE IN MAMMOTH LAKES

After a persistent swarm of earthquakes in 1989, the geologists monitoring seismic activity in the Long Valley Caldera discovered that large volumes of carbon dioxide were present at various locations on Mammoth Mountain. The carbon dioxide is probably derived from magma in the caldera. High concentrations of carbon dioxide in the soil have killed many trees on Mammoth Mountain. Carbon dioxide is also a potential hazard to people. When it leaks from the soil, it can collect in snow banks, depressions in the ground, and poorly ventilated enclosures, such as cabins and tents, posing a hazard for humans. Maps in Appendix A show the location of carbon dioxide concentrations on Mammoth Mountain.

PROBABILITY OF FUTURE SEISMIC EVENTS

From the Mono County Emergency Operations Plan

Earthquakes occur all the time in Mono County, most of them of very small magnitude and not felt by people. Most people do not feel tremors under magnitude 3. Major damage to well-built structures does not occur until the earthquake is stronger than magnitude 5. Each unit of magnitude represents an earthquake wave amplitude 10 times greater than the next lower number. Each unit of magnitude corresponds to almost 30 times more energy than the previous magnitude.

Seismologists do not know when a large earthquake will hit the Eastern Sierra again but do know that one will occur.

Probabilistic Seismic Hazard Assessment (PSHA) maps prepared by the California Geological Survey (CGS) and the USGS show that the areas with the greatest earthquake shaking hazard in Mono County include the Long Valley Caldera, the western portion of the Mono Basin extending north along the Eastern Sierra escarpment, the western edge of the White Mountains, the southeast corner of the county around Oasis, and the northern tip of the county around Topaz Lake (see PSHA map in Seismic Hazard Maps, Appendix A). These regions are near major, active faults and will on average experience stronger earthquake shaking more frequently. This intense shaking can damage even strong modern buildings. Areas with the lowest shaking hazard in the county include the eastern portion of the Bodie Hills and much of the area between Bridgeport Valley and the Antelope Valley. The remainder of the county is in the middle in terms of earthquake shaking hazards. The hazard pattern shown on the PSHA maps produced by CGS and USGS is very similar to the damage pattern shown on the map indicating Areas Damaged by Historic Earthquakes (1800-1998) (see Seismic Hazard Maps, Appendix A). Both maps show high hazard and damage from earthquakes of MMI VII or greater along the Eastern California Shear Zone in the southern half of Mono County.

Several major fault systems in California accommodate high slip rates and significantly contribute to the earthquake hazard in California including the Eastern California Shear Zone, a fault system that extends along the Eastern Sierra from Mono County south through Inyo County. The eastern border of California from Mammoth Lakes north includes faults with poorly constrained or unknown slip rates with multiple fault strands distributed over a wide area (DMG Open-File Report 96-08).

Maps prepared by the California Geological Survey (CGS) and the USGS show the magnitude of the earthquake that causes the dominant hazard for peak ground acceleration at 10% probability of exceedance in 50 years with alluvial site conditions (see Seismic Hazard Reference Maps, Appendix A). In most of Mono County, the earthquake that would cause the dominant hazard would be magnitude 6.5-7; in Bridgeport Valley it would be magnitude 6.0-6.5; and in the Tri-Valley it would be magnitude 7.0-7.5.

Maps prepared by the DMG and the USGS also show the distance of the earthquake that causes the dominant hazard for peak ground acceleration at 10% probability of exceedance in 50 years with alluvial site conditions (see Seismic Hazard Reference Maps, Appendix A). That map indicates the distance to the earthquake that contributes most to the hazard at each site. For most areas, the fault that is nearest the site causes the highest hazard. In much of Mono County, the distance to the nearest fault is very small.

C. VULNERABILITY TO SEISMIC HAZARDS—OVERVIEW

Seismic hazards are considered to be one of the most prevalent natural hazards in Mono County due to their repeated occurrence, the damage they have caused in the past, and the geographically widespread nature of the hazard. As a result, seismic hazard mitigation is a well-established and ongoing process in the county, with participation from a variety of local, state and federal organizations.

The entire county is subject to intense groundshaking resulting from seismic events. Alquist-Priolo Fault Hazard zones occur in communities throughout the county, particularly in those communities at the base of the Sierra Nevada mountains and in areas at the base of the White Mountains. Ground failure induced by groundshaking includes liquefaction, lateral spreading, lurching, and differential settlement, all of which usually occur in soft, fine-grained, water-saturated sediments, typically found in valleys. During the 1980 Mammoth Lakes earthquake sequence, ground failure was prevalent at Little Antelope Valley, along margins of the Owens River in upper Long Valley, along the northwest margins of Lake Crowley, and along Hot Creek Meadow.

Subsidence caused by tectonic movement of the earth; by withdrawal of fluids such as water or oil; by compaction that occurs when copious amounts of water are applied to an arid area; or by severe loading, such as when large bodies of water are impounded, has also occurred throughout the county after seismic events.

D. VULNERABILITY TO SEISMIC HAZARDS—STRUCTURES

The County and Town GIS system was utilized to identify areas subject to seismic hazards. First the GIS system was used to identify parcels located within Alquist-Priolo Fault Hazard Zones, i.e.:

- 255 developed parcels are located in Alquist-Priolo Fault Hazard Zones.
- The total assessed value of those parcels is $57,727,270.

- The majority of those parcels are residential parcels, the remainder are primarily agricultural parcels and commercial parcels.
- There are several critical facilities located within fault hazard zones:
  Topaz Interagency Fire Control Station;
  Walker Senior Center
  California Interstate Telephone Co. in Lee Vining
  Lee Vining Elementary School
  Southern California Edison facilities in June Lake (2)
  Canyon Lodge in Mammoth Lakes
  South California Edison facilities at junction of Highways 395 and 203
  Geothermal Plants at junction of Highways 395 and 203
  Mammoth Overpass at junction of Highways 395 and 203

The GIS system was also used to identify parcels located in Strong Shaking Areas, i.e.:

- 961 developed parcels are located in strong shaking areas.
- The total assessed value of those parcels is $168,354,286.
- The majority of those parcels are residential parcels, the remainder are primarily agricultural parcels and commercial parcels.
- There are a number of critical facilities located in strong shaking areas. Those facilities on shown on the maps in Appendix A.

A number of the County's structures are old and were constructed before seismic safety standards for construction were developed. As a result, some of those structures may be more vulnerable to seismic hazards than newer construction. Some information on the age and condition of housing units in the county is currently available; similar information for uses other than residential ones is not available.

The Mono County Community Development Department is in the process of conducting a Housing Condition Survey for the unincorporated area of the county. The survey is fairly complete only in June Lake; additional work is needed to complete the survey in other communities. The preliminary results of that survey are listed in Table 36 in the Mono County Housing Element. Based on the preliminary survey, there were approximately 236 units in poor condition, primarily in June Lake, Antelope Valley, and the Tri-Valley. Housing units determined to be in poor condition were not structurally sound and needed repairs and/or paint.

The county's Housing Element also contains information on the age of housing units outside Mammoth Lakes (Table 37 in the Mono County Housing Element). Approximately 39 percent of all housing units in the unincorporated area were built more than 30 years ago. Twenty-one percent were built more than 40 years ago, and 13 percent were built more than 50 years ago. Bridgeport Valley (65%) and Mono Basin (47%) have the highest percentage of housing units built more than 30 years ago, although over a third of the housing units in all planning areas except June Lake were built more than 30 years ago. Bridgeport Valley (33%), Mono Basin (22%), and Long Valley (22%) have the highest percentage of housing units built more than 40 years ago. Bridgeport Valley (22%), June Lake (14%), and Long Valley (14%) have the highest percentage of housing units built more than 50 years ago.

In Long Valley and June Lake many of the housing units built more than 40 years ago were originally constructed as seasonal cabins. Over the years, many of those units have been converted to year-round housing. In Bridgeport Valley and Mono Basin, many of the older housing units were constructed as

primary residences and have been maintained as such. In general, Mono County's housing stock is in fair to good condition. Approximately 60 percent of all housing units in the unincorporated area have been built in the past 30 years. There are areas in the county, however, where maintenance and rehabilitation of the housing stock is an issue.

Over the 20-year timeframe of the county and town General Plans, development will occur in and adjacent to developed community areas. Seismic hazards are present throughout the county; strong earthquakes have occurred in the past in the Tri-Valley area and in the Long Valley area and Mammoth Lakes. The Tri-Valley and Long Valley areas are primarily residential with limited small-scale commercial and industrial uses. That is not expected to change over the next 20 years. Mammoth Lakes includes more extensive residential, commercial, and resort development but much of that development is new and built in compliance with seismic safety standards. In compliance with state law, Mono County and the Town of Mammoth Lakes regulate development in and adjacent to identified fault hazard zones and require all new development to comply with current seismic safety standards.

E. ESTIMATING LOSSES FROM SEISMIC HAZARDS

Mono County does not have the information necessary to perform a detailed estimate of losses from seismic hazards. The lack of information is discussed further in the section Estimating Losses. A broad estimate of losses was obtained by using the HAZUS loss estimation software to estimate earthquake hazards. A highly likely earthquake scenario was chosen on the Hilton Creek fault in Long Valley. The HAZUS software estimated that a 6.7 magnitude earthquake on the Hilton Creek fault would damage 949 buildings at least moderately. An estimated 22 buildings would be completely destroyed. The total economic loss for the earthquake would be $ 132.98 (millions of dollars). Total building related losses would be $81.19 (millions of dollars); 13% of the estimated losses would be related to the business interruption of the region. The largest loss would be sustained by residential occupancies (80% of the loss). The biggest losses for the transportation and utility lifeline systems would be sustained by Mammoth Yosemite Airport (with an economic loss of $3.75 million), the distribution lines and facilities for potable water, wastewater, and natural gas (with economic losses totaling $28 million), and electrical power facilities (with an economic loss of $18 million). These losses would occur predominantly in the Long Valley communities and in Mammoth Lakes.

The HAZUS software estimates the loss from a seismic event in one area of the county. A broad estimate of losses from seismic hazards throughout the county can be obtained by utilizing the number of developed parcels located in seismic hazard areas multiplied by the valuation from the county's tax rolls. Based on the assessed value of the developed parcels in seismic hazard areas (Alquist-Priolo Fault Hazard Zones), losses from seismic damages would total approximately $ 57.7 million.

A second broad estimate of losses from a seismic event was obtained by using the GIS system to identify parcels located in Strong Shaking Areas and multiplying those parcels by the assessed value for the parcels. The County's GIS showed 961 developed parcels in strong shaking areas with a total assessed value of $ 168,354,286.

F. EXISTING SEISMIC HAZARD MITIGATION

The County and the Town currently regulate development in seismic hazard areas through the following land use planning regulations and policies:

- The County's Land Clearing, Earthwork, and Drainage Facilities Regulations ordinance, more commonly known as the Grading Ordinance (Chapter 13.08 of the Mono County Code) regulates grading, cut and fill, and drainage facilities for new development and improvements to existing development depending on the amount of planned site disturbance. The intent of the regulations is to ensure the safety and stability of development and to prevent on- and off-site erosion impacts. The ordinance requires a soils report prepared by a soils engineer for grading in, on, under, over or adjacent to old fills, swamp, marshlands, or in areas known or believed to be potential slide areas. Areas with expansive soils also require a soils report prepared by a soils engineer. The Town also has a Land Clearing, Earthwork, and Drainage Facilities ordinance (Chapter 12.08 of the Town Municipal Code) that has similar requirements for development in the Town.
- The Mono County Land Development Regulations restrict site disturbance in certain land use designations in order to protect environmentally sensitive areas and reduce the risk of landslides.
- In order to mitigate risks from seismic hazards such as surface fault rupture, the Mono County General Plan Safety Element and the Town General Plan regulate development near active faults, seismic hazard zones and other geologic hazards as required by the provisions of the Alquist-Priolo Special Studies Zone Act and the Seismic Hazard Mapping Act. Policies in the County Safety Element require projects in Alquist-Priolo fault hazard zones, seismic hazard zones, or other known geologic hazard areas, to provide a geologic or geotechnical report prior to project approval.

  County Safety Element policies also encourage applicants to design or redesign their projects as necessary to avoid unreasonable risks from seismic hazards and specify that the county will deny applications for planning permits where geologic studies provide substantial evidence that the proposed project will be exposed to unreasonable risks from seismic hazards. Projects that include mitigation measures to reduce risks to acceptable levels may be approved.
- In compliance with State law and Safety Element policies, the County and Town Building Divisions have identified potentially hazardous unreinforced masonry buildings and have developed a mitigation program for the identified buildings.
- In order to ensure that new construction is designed to withstand seismic hazards, the County and Town Building Divisions require new construction to comply with the engineering and design requirements of Seismic Zone 4.
- The California Geological Survey (CGS), through its California Strong Motion Instrumentation Program (CSMIP), installs earthquake-monitoring devices in structures such as buildings, hospitals, dams, utilities and industrial facilities. Data collected from those devices are used both for earthquake emergency response and for engineering and scientific research. Sites are selected according to long-term strategies developed in consultation with the Strong Motion Instrumentation Advisory Committee, a committee of the Seismic Safety Commission. SMIP stations in Mono County are maintained at the following locations:

  Lake Crowley—U.S. 395 bridge
  Lake Crowley--Long Valley Dam downstream
  Mammoth Lakes--Convict Creek
  Mammoth Lakes--High School grounds (temp.)
  Mammoth Lakes Fire Station # 1
  Chalfant--Zack Ranch
  June Lake Fire Station
  Benton
  Lee Vining--Tioga Pass
  Bridgeport
  Walker

- In order to reduce the risks associated with the natural hazards occurring in Mono County, Safety Element policies require the county to inform affected persons of potential seismic, geologic, volcanic, fire, flood, avalanche and other natural hazards in the area during the county permit process. In compliance with state law, sellers of property are required to notify buyers of potential hazards affecting the subject property.

The mitigation listed above is ongoing and will continue over the 20-year timeframe of the county and town General Plans.

G. PROPOSED SEISMIC HAZARD MITIGATION

Currently, the County and the Town have limited information on the condition of structures within their jurisdictions. Unreinforced masonry buildings have been identified and the county has started a housing conditions survey but there is no comprehensive survey of the structural condition of all buildings. Assessing the condition of all structures would enable the County and Town to pinpoint structurally hazardous areas and to develop a rehabilitation and replacement program to mitigate the impacts from seismically unsafe structures.

SEVERE WINTER STORM HAZARDS

Severe Winter Storm Hazard References:
Mono County General Plan, Safety Element
Mono County MEA
Mono County Emergency Operations Plan
Town of Mammoth Lakes General Plan
Town of Mammoth Lakes Emergency Operations Plan

A. IDENTIFYING SEVERE WINTER STORM HAZARDS IN MONO COUNTY

Severe winter storms occur throughout Mono County but particularly along the eastern slope of the Sierra Nevada, in the western part of the county, and at higher elevations. Severe winter storms are classified as those that cause road closures, power outages, school closures, and associated avalanche hazards. They may include heavy winds, heavy snow, whiteout conditions, or ice storms. Developed areas may be subject to snow and ice shedding. When snow slides toward pedestrian areas, parking lots, or other structures, it poses a significant hazard.

Other winter storm hazards include excessive amounts of snow causing roofs to collapse and people being stranded in their cars due to road closures. Severe winter storms are a particular concern in Mammoth Lakes, especially when large numbers of visitors are present. Visitors are often unfamiliar with driving in snow, using woodstoves, and other hazardous winter weather situations. In addition, if large numbers of visitors become stranded in Mammoth Lakes, the town's resources may become stressed.

Severe winter storms that involve warm rain or warm temperatures may include flooding. Avalanche hazards and flooding hazards are discussed in prior sections of this chapter.

B. PROFILING SEVERE WINTER STORM HAZARDS IN MONO COUNTY

SEVERITY OF THE HAZARD

Severe winter storms are classified as those that cause road closures, power outages, school closures, and associated avalanche hazards. The severity of the hazard depends on how people are affected and how many people are affected. The most severe hazards occur when large numbers of people are affected or when property or lives are affected. As discussed above, severe winter storms often pose more of a hazard in Mammoth Lakes due to the large numbers of visitors who may be affected.

WINTER STORM HISTORY

Severe winter storms occur every year in Mono County. The following section provides some data on past storms. Previous sections on avalanches and flooding also provide historical information on severe winter storms.

Date: 03/21/95-01/23/95
Place: Mammoth Lakes, Bridgeport
Summary: 1' of new snow in Bridgeport, and 44" of new snow in Mammoth Lakes
Source: http://datastore.lib.virginia.edu/vaclim/etexts/storm/

Date: 12/21/96-12/23/96

Place: Mono County Area
Summary: 53" of snow at Mammoth Lakes and 72" at Mammoth Ski Resort; Blizzard
Economic Damage: $50,000
Details: Blizzard conditions developed in the county between 3-9pm on 12/22. Wind gusts of 61-87 knots were reported in Mammoth lakes area. A tree fell on a house in Mammoth Lakes. Another tree fell on a power line, knocking out power for over half the town. 50 cars were reported stranded in the blizzard on S.R. 203.
Source: http://datastore.lib.virginia.edu/vaclim/etexts/storm/

Date: 12/26/96-12/27/96
Place: Mammoth Lakes
Summary: 12" of snow at Mammoth Lakes and 15" at Mammoth Ski Resort in 12 hr. period.
Source: http://datastore.lib.virginia.edu/vaclim/etexts/storm/
Date: 01/12/97-01/13/97
Place: Mammoth Lakes
Summary: A weather observer in Mammoth Lakes measured 12" of snow in 12 hrs.
Source: http://datastore.lib.virginia.edu/vaclim/etexts/storm/

Date: 01/19/97-01/21/97
Place: Mammoth Lakes
Summary: A weather observer in Mammoth Lakes measured 2' of snow in 36 hrs.
Source: http://datastore.lib.virginia.edu/vaclim/etexts/storm/

Date: 01/22/97-01/23/97
Place: Mammoth Mountain
Summary: A weather observer in Mammoth Lakes measured 12" of snow in 12 hrs.
Source: http://datastore.lib.virginia.edu/vaclim/etexts/storm/

Date: 03/03/01-03/04/01
Place: Mammoth Lakes
Summary: Spotter reported 19" of snow in 24 hrs.
Source: http://datastore.lib.virginia.edu/vaclim/etexts/storm/

Date: 03/04/01-03/05/01
Place: Mammoth Lakes
Summary: Spotter reported 37" of snow in 24 hrs and a storm total of 44" at ski area, elev. 9600'.
Source: http://datastore.lib.virginia.edu/vaclim/etexts/storm/

Date: 03/04/01-03/05/01
Place: June Lake
Summary: Spotter reported of 40" of snow in 24 hrs.
Source: http://datastore.lib.virginia.edu/vaclim/etexts/storm/

Date: 03/04/01-03/05/01
Place: Lee Vining
Summary: Spotter reported of 24" of snow in 12 hrs and a storm total of 48." U.S. 395 closed north of Lee Vining due to avalanche; no injuries or damage.
Source: http://datastore.lib.virginia.edu/vaclim/etexts/storm/

Date: 03/09/01

Place: Mammoth Lakes
Summary: Spotter reported 4" of snow in 4 hrs.
Source: http://datastore.lib.virginia.edu/vaclim/etexts/storm/

Date: 03/09/01
Place: Walker
Summary: Spotter reported 7" of snow in 3 hrs.
Source: http://datastore.lib.virginia.edu/vaclim/etexts/storm/
Date: 10/04
Place: Mono County
Summary: Most snow in October since 1945. Mammoth Mountain had 82" by Halloween
Source: http://webpages.charter.net/tcrocker818/021305.htm

Date: 12/27/04-01/12/05
Place: Mammoth Lakes
Summary: Over 16' in a two-week period (5' between 01/03-01/05). Avalanche warning issued for Mono County. U.S. 395 closed for several hours. (Mammoth Mountain received more than 27' of snow from 10/04 – 01/12/05)
Source: Various

Date: 01/06/05
Place: Mammoth Lakes
Summary: A couple died in a snow-buried car.
Source: http://travel2.nytimes.com/mem/travel/article-page.html?res=9406E6DC1238F930A15752C0A9639C8B63

PROBABILITY OF FUTURE OCCURRENCES

Severe winter storms occur regularly in Mono County. The probability of one occurring in any given year is unknown.

C. VULNERABILITY TO SEVERE WINTER STORM HAZARDS—OVERVIEW

Severe winter storm hazards are an ongoing concern in Mono County due to their repeated occurrence and the large number of visitors to the area in the winter, particularly to Mammoth Lakes. Severe winter storm hazards can occur throughout the county but are particularly prevalent at higher altitudes, in communities along the base of the Sierra Nevada, and along the county's highways, particularly U.S. 395.

Severe winter storm hazards may impact structures and property as well as people. Impacts to structures and property can occur as a result of avalanches, flooding resulting from winter storms, impacts resulting from wind, ice or heavy amounts of snow. Mitigation for impacts to structures and property resulting from winter storms is a well-established and ongoing process in the county, with participation from a variety of local, state, and federal organizations. Impacts to people are not as easy to address since individual lack of judgment often causes severe impacts to people from winter storm conditions.

Avalanche hazards and flooding hazards are discussed in prior sections of this chapter.

D. VULNERABILITY TO SEVERE WINTER STORM HAZARDS--STRUCTURES

A number of the County's structures are old and were constructed before snow load requirements for construction were developed. As a result, some of those structures may be more vulnerable to snow loads than newer construction. Some information on the age and condition of housing units in the county is currently available; similar information for uses other than residential ones is not available.

The Mono County Community Development Department is in the process of conducting a Housing Condition Survey for the unincorporated area of the county. The survey is fairly complete only in June Lake; additional work is needed to complete the survey in other communities. The preliminary results of that survey are listed in Table 36 in the Mono County Housing Element. Based on the preliminary survey, there were approximately 236 units in poor condition, primarily in June Lake, Antelope Valley, and the Tri-Valley. Housing units determined to be in poor condition were not structurally sound and needed repairs and/or paint.

The County's Housing Element also contains information on the age of housing units outside Mammoth Lakes (Table 37 in the Mono County Housing Element). Approximately 39 percent of all housing units in the unincorporated area were built more than 30 years ago. Twenty-one percent were built more than 40 years ago, and 13 percent were built more than 50 years ago. Bridgeport Valley (65%) and Mono Basin (47%) have the highest percentage of housing units built more than 30 years ago, although over a third of the housing units in all planning areas except June Lake were built more than 30 years ago. Bridgeport Valley (33%), Mono Basin (22%), and Long Valley (22%) have the highest percentage of housing units built more than 40 years ago. Bridgeport Valley (22%), June Lake (14%), and Long Valley (14%) have the highest percentage of housing units built more than 50 years ago.

In Long Valley and June Lake many of the housing units built more than 40 years ago were originally constructed as seasonal cabins. Over the years, many of those units have been converted to year-round housing. In Bridgeport Valley and Mono Basin, many of the older housing units were constructed as primary residences and have been maintained as such. In general, Mono County's housing stock is in fair to good condition. Approximately 60 percent of all housing units in the unincorporated area have been built in the past 30 years. There are areas in the county, however, where maintenance and rehabilitation of the housing stock is an issue.

Over the 20-year timeframe of the county and town General Plans, development will occur in and adjacent to developed community areas. Severe winter storm hazards are present throughout the county; Mammoth Lakes and the other communities along the front of the Sierra Nevada are particularly susceptible to heavy snow, ice, and whiteout conditions. The communities in the county are primarily residential with limited small-scale commercial and industrial uses. That is not expected to change over the next 20 years. Mammoth Lakes includes more extensive residential, commercial, and resort development but much of that development is new and built in compliance with current safety standards.

E. ESTIMATING LOSSES FROM SEVERE WINTER STORM HAZARDS

Mono County does not have the information necessary to perform a detailed estimate of losses from severe winter storm hazards. The lack of information is discussed further in the section Estimating Losses. The sections of this chapter on avalanche hazards and flooding hazards provide broad estimates of the losses from those hazards. The county has no identified winter storm hazard areas and does not have information on which development is structurally unsafe and could be affected by severe winter storms. As a result, the County has no way of estimating losses from winter storms.

F. EXISTING SEVERE WINTER STORM HAZARD MITIGATION

The County and the Town currently mitigate impacts from severe winter storms with the following policies and programs:

- Tioga Pass, Sonora Pass, Monitor Pass and S.R. 270 to Bodie are all closed during the winter, as is the northern portion of S.R. 158, S.R. 203 from four miles east of the Mono County boundary west, and the portion of S.R. 120 between U.S. 395 and Benton. During periods of heavy snowfall, S.R. 167, the southern portion of S.R. 158, and portions of U.S. 395 may also be closed.
- Caltrans and the California Highway Patrol monitor the safety of local highways and institute road controls as necessary.
- Alternative access routes in Mono County are limited primarily to the existing street and highway system due to the terrain and the large amount of publicly owned land. However, the County and Town have developed alternative access routes for community areas that had limited access (i.e. North Shore Drive in June Lake, the Mammoth Scenic Loop north of Mammoth Lakes).
- New development in heavy winter storm areas must meet required snow load requirements for roofs to ensure the structurally safety of those buildings.
- Emergency communications in the region provide weather, road, and emergency information during storms.
- The County and the Town have developed snow storage requirements and setback requirements for new development to ensure that ice shedding from roofs is not a hazard.
- The County and the Town have public education programs to ensure both residents and visitors know how to live safely in winter storm conditions.

G. PROPOSED SEVERE WINTER STORM HAZARD MITIGATION

Many areas in the county, including communities, do not have adequate cell phone or radio service and do not have a reliable method to call for help or to receive warnings in case of emergencies. Installing additional cell and radio towers to ensure adequate coverage throughout the county would help mitigate potential impacts from several hazards by providing a warning system.

Currently, the County and the Town have limited information on the condition of structures within their jurisdictions. Unreinforced masonry buildings have been identified and the county has started a housing conditions survey but there is no comprehensive survey of the structural condition of all buildings. Assessing the condition of all structures would enable the County and Town to pinpoint structurally hazardous areas and to develop a rehabilitation and replacement program to mitigate the impacts from structurally unsafe buildings.

VOLCANIC HAZARDS

Volcanic Hazard References:

- *California Multi-Hazard Mitigation Plan*
- *Mono County General Plan, Safety Element*
- *Mono County MEA*
- *Mono County Emergency Operations Plan*
- *Town of Mammoth Lakes General Plan*
- *Town of Mammoth Lakes Emergency Operations Plan*
- *US Geological Survey website,* www.usgs.gov
- *USGS Fact Sheet 073-97, Future Eruptions in California's Long Valley Area--What's Likely*
- *USGS Fact Sheet 108-96, Living with a Restless Caldera--Long Valley, California*
- *USGS Fact Sheet 172-96, Invisible CO_2 Gas Killing Trees at Mammoth Mountain, California*
- *USGS Bulletin 2185, Response Plan for Volcano Hazards in the Long Valley Caldera and Mono Craters Region, California*
- *Inyo Craters Location Map (USGS)*
- *Inyo Fissures Location Map, (USGS)*
- *Long Valley Caldera Topo Map (USGS)*
- *Mono-Inyo Eruptions During the Past 5,000 Years (USGS)*
- *Pyroclastic Flow Hazards Mono-Inyo Craters Volcanic Chain (USGS)*
- *Pyroclastic Flow Hazards South Moat Area (USGS)*
- *Simplified Geologic Map of the Long Valley Area (USGS)*
- *Tephra Fall Hazard Zones (USGS)*
- *Tree Kill Areas Near Mammoth Mountain (USGS)*

Volcanic Hazard Figures: See Appendix A, Map Set

A. IDENTIFYING VOLCANIC HAZARDS IN MONO COUNTY

Volcanic eruptions could occur in the Long Valley Caldera and along the Mono-Inyo Craters chain from Mammoth Mountain to Mono Lake. Vents located along these chains are known to have produced explosive eruptions in the past, resulting in pyroclastic flows or surges (violent eruptions of lava fragments) and tephra fall (solid material ejected during a volcanic eruption and transported through the air). U.S. Geological Survey (USGS) scientists estimate that pyroclastic flows and surges could travel as far as 10 miles from vents in the south moat area of the Long Valley Caldera. The south moat area is located south of S.R. 203 between Mammoth Lakes and U.S. 395 (see Pyroclastic Flow Hazards South Moat Area in Appendix A Map Set). An explosion from the vents along the Mono-Inyo Craters chain could result in pyroclastic flows or surges traveling seven to eight miles to the east. To the west, those flows would be blocked by the high Sierra Nevada (see Pyroclastic Flow Hazards Mono-Inyo Craters Volcanic Chain in Appendix A Map Set). Downwind deposits of ash produced by an explosive eruption could reach thicknesses of at least 8 inches at a distance of 22 miles from the eruption, 2 inches at 53 miles, and 0.5 inches at 185 miles. Significant ash fall could affect large portions of Mono County and surrounding areas, depending on the wind direction and size of the eruption.

B. PROFILING VOLCANIC HAZARD EVENTS

MAGNITUDE OF THE HAZARD

Volcanic eruptions in Mono County have ranged from the cataclysmic eruption that formed the Long Valley Caldera 760,000 years ago to small to moderate eruptions that formed many of the topographic features in the area such as Mammoth Mountain and the Inyo Craters. When an eruption does break out in the Long Valley area, its impact will depend on the location, size, and type of eruption as well as the wind direction. An eruption during the winter months could melt heavy snow packs, generating mudflows and locally destructive flooding (USGS Fact Sheet 073-97). Smaller eruptions similar to previous eruptions along the Mono-Inyo volcanic chain during the past 5,000 years would typically begin with a series of steam blast explosions that can throw large blocks of rock and smaller fragments hundreds of feet in the air, leaving deep, circular pits like the Inyo Craters (USGS Fact Sheet 073-97).

If magma reaches the surface, gases in it can escape explosively, hurling volcanic ash as high as 6 miles or more. Airborne volcanic ash will be carried downwind and the amount and size of the ash will diminish with distance from the eruption site. Accumulations of ash pose little threat to life or property but may close roads and seriously disrupt utilities and communications (USGS Fact Sheet 073-97).

From Dave Hill, Scientist-in Charge, Long Valley Observatory, U.S. Geological Survey

The Long Valley Caldera-Mono Craters is also capable of producing effusive (nonexplosive) basaltic eruptions (the type common in Hawaii). The resulting hot, relatively fluid lava flows, while not a direct threat to life, will cover progressively larger areas as long as the eruption continues. Depending on vent location and eruption duration, these relatively slow-moving lava flows can pose serious problems for the built infrastructure (see pg. 33 in USGS Bulletin 2185).

The ash produced by explosive volcanic eruptions poses a special hazard to aircraft. A small to moderate explosive eruption can send ash to elevations exceeding 30,000 feet, posing a serious hazard to commercial aircraft on transcontinental routes that pass over Mono County. Smaller explosive (or even effusive basaltic) eruptions could pose an ash problem for air traffic to and from Mammoth Yosemite airport or other local airports.

VOLCANIC HISTORY IN MONO COUNTY

The Long Valley Caldera was created approximately 760,000 years ago when a large amount of magma erupted explosively, collapsing the ground to form the 10 by 20-mile oval depression known as the Long Valley Caldera. Clusters of smaller volcanic eruptions have occurred in the caldera at roughly 200,000-year intervals. About 100,000 years ago, the most recent of these eruptions formed the Mammoth Knolls, low hills just north of the Town of Mammoth Lakes.

Volcanoes in the Mono-Inyo chain of craters have erupted more recently. Mammoth Mountain was formed by numerous eruptions 220,000 to 50,000 years ago. Mono and Inyo Craters were created between 400,000 and 5000 years ago. Panum Crater and Inyo Craters last erupted 500 to 600 years ago. The most recent eruptions in the chain occurred at Paoha Island, on Mono Lake, about 250 years ago.

A period of ongoing geologic unrest in the Long Valley area began in 1978 with a magnitude 5.4 earthquake centered 6 miles southeast of the caldera. Since then earthquake activity has increased. The most intense swarms occurred in May 1980 and included four strong magnitude 6 earthquakes. Between 1979 and 1980, the center of the caldera rose almost a foot, after decades of stability. The swelling continues, and by early 2000 totaled nearly 2.5 feet, indicating there is new magma rising beneath the caldera.

During the early 1990s, trees began dying at several places on Mammoth Mountain at the southwest edge of Long Valley Caldera. Studies showed that the trees were being killed by large volumes of carbon dioxide gas (CO_2) seeping up through the soil from the magma below. Such emissions of volcanic gas, as well as earthquake swarms and ground swelling, commonly precede volcanic eruptions (USGS Fact Sheet 108-96).

PROBABILITY OF FUTURE VOLCANIC OCCURRENCES

Volcanoes have been active in the area for millions of years and future eruptions are certain to occur. The pattern of volcanic activity over the past 5,000 years suggests that the next eruption in the Long Valley area will probably occur along the Mono-Inyo volcanic chain; the probability of such an eruption occurring in any given year is less than 1% (USGS Fact Sheet 073-97). Based on eruption frequency along the Mono-Inyo volcanic chain over the past 5,000 years, the probability of another eruption is roughly 1 in 200 (~0.5%) per year. Continued unrest of the sort that has occurred since 1980 results in a slightly elevated probability (but still generally less than 1% per year). Unrest sufficiently intense to warrant condition ORANGE, could boost the probability significantly above 1% per year, depending on the nature of the unrest (Dave Hill, Scientist-in-Charge, Long Valley Observatory).

As long as increased volcanic unrest continues in the Long Valley area (earthquake swarms, ground deformation, CO_2 gas emissions), the chances of an eruption occurring in the future will remain somewhat increased (USGS Fact Sheet 073-97). Evidence from large volcanic systems worldwide shows that unrest can continue for decades or centuries without leading to an eruption but may also result in eruptions after short periods of unrest (USGS Fact Sheet 073-97). To provide timely warning prior to an eruption, scientists from the USGS Volcanic Hazards Program continue to monitor geologic unrest in the Long Valley Area.

As a general consideration, unlike earthquakes, which do most of their damage in a matter of minutes or less (aside from possible strong aftershocks that can occur days to weeks later), volcanic eruptions commonly wax and wane over a period of months to years. Unlike other more discrete hazard events, volcanic eruptions hold the potential for requiring sustained response/mitigation measures over extended time periods.

C. VULNERABILITY TO VOLCANIC HAZARDS—OVERVIEW

Volcanic hazards are not considered to be one of the most prevalent natural hazards in Mono County due to the uncertainty of such an event and the fact that a monitoring system is well-established for the Long Valley Caldera through the U.S. Geological Survey's (USGS) Long Valley Observatory. The USGS' monitoring system provides a warning system intended to mitigate the impacts of volcanic activity on local and regional communities.

Volcanic hazards include lava flows, ash fall, lahars (volcanic mudflows), and debris avalanches. The USGS has identified volcanic hazards for the Long Valley Caldera based on activity over the last 15,000 years. The USGS has identified potential hazard zones for different volcanic eruptions in Mono County (Pyroclastic Flow Hazard Zones Mono-Inyo Craters Volcanic Chain, Pyroclastic Flow Hazard Zones South Moat Area, Tephra Fall Hazard Zones—see www.usgs.gov). These maps were utilized with the County and Town's GIS systems to identify how many parcels and structures would be affected by each of the identified volcanic scenarios. Volcanic hazard maps showing the affected parcels are included in the Map Set in Appendix A.

In Scenario 1, Pyroclastic Flows and Surges Along the Mono-Inyo Craters, 3,694 developed parcels could be affected, with a total assessed value of $889,760,986. The area affected by this scenario would extend from Mammoth Lakes to the north shore of Mono Lake and from partially up the Sierra Nevada to the eastern shore of Mono Lake. While it is unlikely that this entire area would be affected at once since it is unlikely that all the craters would erupt at once, this plan assumes the worst case scenario that the entire identified hazard zone is affected. If an eruption occurred during winter, with heavy snowfall on the ground, the effects of the volcanic eruption could be intensified with rapid snowmelt creating mudflows or lahars carrying debris throughout the hazard zone. This scenario would affect the entire Town of Mammoth Lakes, as well as the communities of June Lake and Lee Vining, and developed areas in the Mono Basin and the western portion of Long Valley. While this scenario appears to be catastrophic, pyroclastic flows are often slow-moving events and there would likely be warning of an event.

In Scenario 2, Pyroclastic Flows and Surges from Potential Vents in the South Moat Area, 3,213 developed parcels would be affected, with a total assessed value of $834,769,339. The areas affected by this scenario would extend from Mammoth Lakes to the community of Crowley Lake, south to the crest of the Sherwins and north to the Glass Mountains. While it is unlikely that this entire area would be affected at once since it is unlikely that the entire south moat area would erupt at once, this plan assumes the worst case scenario that the entire identified hazard zone is affected. The degree of severity of this scenario could also be affected by an eruption occurring during winter, creating mudflows or lahars. This scenario would affect the entire Town of Mammoth Lakes, as well as the communities of Long Valley, McGee Creek, and Crowley Lake, and developed areas in the western portion of Long Valley. While this scenario appears to be catastrophic, pyroclastic flows are often slow-moving events and there would likely be warning of an event.

In Scenario 3, Potential Hazards from Tephra Fall in the Long Valley-Mono Lake Area, 5,002 developed parcels would be affected, with a total assessed value of $1,124,567,282. The entire county would be affected by this scenario except for the southeast corner (Chalfant and Oasis) and the northern portion (Walker River Canyon north). This scenario would affect the Town of Mammoth Lakes, Hammil Valley, Benton, Wheeler Crest and Paradise, the Long Valley communities, June Lake, the Mono Basin communities, and Bridgeport Valley. Areas outside the identified areas would be affected by a lighter ash fall, depending on wind conditions. Ash fall would be more destructive to the natural environment and to humans and wildlife than to structures. While it would impede access on roadways and at airports and affect the local water supply, it would probably not damage as many buildings as other volcanic events. As with other volcanic events, the impact could be exacerbated by an occurrence during winter when snowfall mixed with ash could create ash flows.

D. VULNERABILITY TO VOLCANIC HAZARDS—STRUCTURES

Scenario 1 could affect all structures and infrastructure located in those areas, including:

- U.S. 395, the primary access route to the affected communities
- Mammoth Yosemite Airport
- Lee Vining Airport
- Geothermal plants located at the junction of Highways 203 and 395
- Residential, commercial and industrial development in the affected communities
- Communications lines into the affected communities
- Critical structures and facilities located in those communities, i.e.:
  - Mammoth Hospital
  - Mammoth Community Water District Facilities

Mammoth Fire Protection District Facilities
Mammoth Unified School District Facilities
Mammoth Police Department
Mono County Sheriff's Facilities located in Mammoth Lakes
Mono County Offices located in Mammoth Lakes including Public Health and Social Services
County, Town, Caltrans and USFS Road Maintenance Facilities located in Mammoth Lakes, Crestview, and Lee Vining
June Lake Public Utility District Facilities
June Lake Fire Protection District Facilities
Lee Vining Fire Protection District Facilities
Lee Vining Elementary and High School

Scenario 2 could affect all structures and infrastructure located in those areas, including:

U.S. 395, the primary access route to the affected communities
Mammoth Yosemite Airport
Geothermal plants located at the junction of Highways 203 and 395
Benton Crossing Landfill (a concern because household hazardous waste is stored there)
Residential, commercial and industrial development in the affected communities
Communications lines into the affected communities
Critical structures and facilities located in those communities, i.e.:
Mammoth Hospital
Mammoth Community Water District Facilities
Mammoth Fire Protection District Facilities
Mammoth Unified School District Facilities
Mammoth Police Department
Mono County Sheriff's Facilities located in Mammoth Lakes and Crowley Lake
Mono County Offices located in Mammoth Lakes including Public Health and Social Services
County, Town, Caltrans and USFS Road Maintenance Facilities located in Mammoth Lakes and Long Valley
Long Valley Fire Protection District Facilities
Hilton Creek Community Service District Facilities

Scenario 3 could affect all structures and infrastructure located in those areas, including:

U.S. 395, the primary access route to the affected communities
Other highways, including U.S. 6
Mammoth Yosemite Airport
Lee Vining Airport
Bryant Field Airport (Bridgeport)
Residential, commercial and industrial development in the affected communities
Communications lines into the affected communities
Critical structures and facilities located in those communities, primarily road maintenance facilities and equipment and the water supply, i.e.:
Community water systems in Wheeler Crest, Crowley Lake, Mammoth Lakes, June Lake, Lee Vining, Mono City, and Bridgeport
County, Town, Caltrans and USFS Road Maintenance Facilities located in Mammoth Lakes, Lee Vining, Crestview, Bridgeport, Long Valley, and Benton

Over the 20-year timeframe of the Mono County General Plan and the Town of Mammoth Lakes General Plan, development is expected to occur in and adjacent to existing developed areas. New areas of development outside existing community areas are not expected to occur. Mono County communities in the unincorporated area of the county are expected to increase primarily with single-family residential development. The exception to this is June Lake which is expected to develop significant additional resort development including multi-family residential, lodging, and commercial uses. The General Plan for Mammoth Lakes provides for extensive additional resort development before buildout occurs. Additional critical facilities are not expected to be developed although existing critical facilities may expand.

E. ESTIMATING LOSSES FROM VOLCANIC HAZARDS

Mono County does not have the information necessary to perform a detailed estimate of losses from volcanic hazards. The lack of information is discussed further in the section Estimating Losses. A broad estimate of losses can be obtained by utilizing the number of developed parcels located in volcanic hazard areas multiplied by the valuation from the county's tax rolls. In Scenario 1, Pyroclastic Flows and Surges Along the Mono-Inyo Craters, 3,694 developed parcels could be affected, with a total assessed value of $889,760,986. In Scenario 2, Pyroclastic Flows and Surges from Potential Vents in the South Moat Area, 3,213 developed parcels would be affected, with a total assessed value of $834,769,339. In Scenario 3, Potential Hazards from Tephra Fall in the Long Valley-Mono Lake Area, 5,002 developed parcels would be affected, with a total assessed value of $1,124,567,282.

F. EXISTING VOLCANIC HAZARD MITIGATION

Existing volcanic hazard mitigation is provided through the ongoing monitoring efforts of the USGS at the Long Valley Observatory. The USGS is in the process of updating its Response Plan for Volcano Hazards in the Long Valley Caldera and Mono Craters Region, California, a document that provides a warning and response system for different identified hazard levels in the Long Valley Caldera. The Response Plan is intended to provide a system for warning local and regional communities of various levels of volcanic activity and the associated hazards. The warning system allows local and regional government and emergency response personnel to evacuate residents and visitors when necessary.

G. PROPOSED VOLCANIC HAZARD MITIGATION

No additional mitigation is proposed to address volcanic hazards.

WILDFIRE HAZARDS

Wildfire Hazards References:

Mono County General Plan, Safety Element
Mono County MEA
Mono County Emergency Operations Plan
California Department of Forestry and Fire Protection (CDF) website, www.fire.ca.gov
California Fire Alliance website, www.cafirealliance.org
Communities at Risk for Wildfire (CDF, FRAP)
Fire Threat (CDF, FRAP)
Fuel Rank (CDF, FRAP)
Fuels, Fire Hazard Severity Zones (CDF, FRAP)
State Responsibility Areas (CDF)
Fire History Mammoth Lakes (General Plan)

Wildfire Hazard Figure: See Appendix A, Map Set

A. IDENTIFYING WILDFIRE HAZARDS IN MONO COUNTY

The California Fire Alliance's list of Communities at Risk notes that the following communities in Mono County are at risk from wildland fires:

TABLE 5 Communities at Risk From Wildland Fires, Mono County

Community	Threat from Federal Lands	Threat Level
Antelope Valley, East	Yes	3
Aspen Springs	Yes	2
Bridgeport	Yes	2
Coleville	Yes	3
Green Creek	Yes	3
June Lake	Yes	3
Lee Vining	Yes	2
Mammoth Lakes	Yes	3
Mono City	Yes	2
Paradise Camp	Yes	2
Pickle Meadows	Yes	3
Swall Meadows	Yes	2
Topaz	Yes	3
Twin Lakes	Yes	3
Virginia Creek	Yes	3

In Table 5, 3 is the highest threat level. An indication that the community is subject to threat from federal lands indicates that the community is adjacent to or surrounded by federal lands that are subject to wildland fires.

The following information on wildland fires in Mono County is from the Mono County MEA:

Wildland Fires in Mono County

The combination of highly flammable fuel, long dry summers and steep slopes creates a significant natural hazard of wildland fire potential in most of Mono County. Wildland fires can result in death, injury, economic loss and significant public investment in fire fighting efforts. Woodlands and other natural vegetation can be destroyed resulting in a loss of timber, wildlife habitat, scenic quality and recreational resources. Soil erosion, sedimentation of fisheries and reservoirs, and downstream flooding can also result.

The Inyo National Forest, the Toiyabe National Forest, the Bureau of Land Management (BLM), and the California Department of Forestry (CDF) use similar ratings systems to assess fire hazards throughout the county. The rating systems take into account the economic value of the resources on the land, the potential rate of spread due to fuel type, and the resistance to fire control. The BLM has not rated the land it manages in Mono County for fire hazards. Much of the USFS land is rated as moderate to high fire hazard

On National Forest lands, a high rating is applied to areas with the most continuous fuel. These areas also tend to be the most heavily used recreational areas. Areas of extreme/high hazard also include steeply sloped terrain subject to frequent critical fire weather (i.e., more than eight critical fire days per year) and/or heavy to medium fuel loading (i.e., woods, brushwood, or scrub). The areas that are rated medium are lands with less recreation demand and lower economic value to the forest. The areas rated low typically have little fuel to burn and little, if any, recreation demand.

Mammoth Lakes is in a Very High Fire Hazard Severity Zone and is therefore subject to the maintenance requirements of Section 51182 of the Government Code [CDF, Fire and Resources Assessment Program (FRAP), December 2005 map].

The State of California recently adopted wildland protection regulations for future development in the SRA. These regulations address emergency access, signing and building numbering, private water supply reserves for emergency fire use, and vegetation modification; Mono County has adopted a local ordinance that has the same practical effect as the CDF regulations (Fire Safe Regulations, Chapter 22 of the Mono County Land Development Regulations).

The following discussion is an excerpt from the **Status of the Sierra Nevada--Sierra Nevada Ecosystem Project: Final Report to Congress (1996)**. The text below should be regarded as direct quotations from the source material; page numbers indicated in parentheses refer to the SNEP document and cover the previous paragraph or section.

> The strategy has three general goals, ranging from short to long term and from relatively narrow to broad. Each goal can be viewed as nesting within the following one. The first goal--the immediate need from a fire-management standpoint--is to reduce substantially the area and average size burned by large, severe wildfires in the Sierra Nevada. ... A second, longer-term goal should be to restore more of the ecosystem functions of frequent low- to moderate-severity fire. A third, overarching goal is to improve the health, integrity, and sustainability of the Sierra Nevada ecosystems (SNEP, Vol. II, Ch. 56, p. 1479).

> The strategy we discuss here has three basic components: (1) networks of defensible fuel profile zones (DFPZs) ... created and maintained in high-priority locations; (2) enhanced use of fire for restoring natural processes and meeting other ecosystem management goals; and (3) expansion of fuel treatments to other appropriate areas of the landscape, consistent with desired ecosystem conditions (SNEP, Vol. II, Ch. 56, p. 1480).
>
> Multiple benefits of DFPZs may include (1) reducing severity of wildfires within treated areas (as with any fuel-management treatment), (2) providing broad zones within which firefighters can conduct suppression operations more safely and more efficiently, (3) effectively breaking up the continuity of hazardous fuels across a landscape, (4) providing "anchor" lines to facilitate subsequent area-wide fuel treatments, and (5) providing various nonfire benefits (SNEP, Vol. II, Ch. 56, p. 1480).

Clearance Around Structures

Adequate clearance of flammable vegetation around individual structures and clusters of structures serves to prevent the spread of fire from the wildland to structures, and from structures to wildlands. The Mono County Fire Safe Regulations (Chapter 22 of the Land Development Regulations) require the maintenance of clearances around structures.

Peak Load Water Supplies

Water supplies for fire prevention services are provided by a variety of mutual water companies, county Water Districts, Public Utility Districts, and Community Services Districts, as well as by the mobile water tenders of the local Fire Protection Districts. Chapter 4 of the County's MEA, "Community Services and Facilities," discusses the general capabilities and availability of local community water service in the county. Minimum water capacities for fire protection purposes are established in the Mono County Fire Safe Regulations (Chapter 22 of the Land Development Regulations).

Road Widths

Adequate road widths are necessary to ensure ready movement of fire engines, bulldozer-transport units and other heavy firefighting equipment to developed areas of the county. The Mono County Public Works Department has established road width standards that apply to new development projects. Additional road width standards are established in the Mono County Fire Safe Regulations (Chapter 22 of the Land Development Regulations).

Evacuation Routes

The Emergency Operations Plans (EOPs) for Mono County and the Town of Mammoth Lakes indicate that major routes (State and County), immediate access routes to community areas, and internal community street systems could be subject to closure by avalanches, landslides, snow and fog white-outs, wildfires and flooding. In addition, imminent hazards such as high avalanche hazard conditions could prohibit travel even along open access routes. The developed areas of Wheeler Crest, West Chalfant, Lundy Lake, Virginia Lakes and Twin Lakes all have only one access.

The EOPs set forth site specific evacuation plans as well as general evacuation procedures for various emergency situations. The Wheeler Crest Area Plan also calls for development of an additional access road into the community area.

From the Mono County Emergency Operations Plan:

The Eastern Sierra wildland fire season normally lasts from mid-June through early-October, although drought years or unusual weather may extend that range. Extreme conditions occur during periods of low humidity, low fuel moisture (percentage of water in vegetation), and high winds. Fires

started during these times will burn fast and hot, and are difficult to control unless initial attack occurs right away. Lightning is a major cause of wildfire, but careless campers, children playing with fire, and arsonists can also start them.

> (Bill Bryant, the Fire Officer for the Bridgeport Ranger District, has indicated that the fire season may last through late October and that human caused fires have accounted for some of the larger fires; these fires usually occur when the fire danger is high to extreme resulting in fast higher intensity fires.)

Most structures in the county are built of wood; some were built before fire codes. Many homes are located on forested lots, which increases their exposure to wildfire unless owners have created and maintained a defensible perimeter.

Winter affects fire potential in several ways. Snow can prevent the spread of fire between structures, but is can also block access by fire vehicles. From fall through spring, buildings are kept heated for long hours every day, increasing the risk of fire. Wood stoves are popular and are sometimes used by visitors not familiar with their safe use.

Wildland fire protection is mostly the responsibility of the U.S. Forest Service (USFS) and Bureau of Land Management (BLM), which manage the extensive National Forest and public resource lands in the county. Both agencies maintain fire organizations during the fire season. Throughout the Sierra, resources are typically dispatched through year-round interagency fire coordination (dispatch) centers in Bishop and Minden, Nevada.

The California Department of Forestry (CDF), which operates a conservation camp jump west of Bishop, has several hand crews available for fires on the Eastern Sierra. It also maintains a limited engine group, dispatched out of San Bernardino.

Most communities in the county have local fire departments, staffed by volunteers and usually equipped with limited equipment. The Marine Corps Mountain Warfare Training Center in the northern end of the county also has a fire department.

All fire organizations in the county are trained and ready to cooperate with each other under mutual aid agreements. The USFS and BLM have extensive contacts through their agencies. Within hours of a major wildfire on federal lands, they can mobilize incident command teams from throughout the country. Both Inyo and Humboldt-Toiyabe National Forests are part of the Sierra Front Wildfire Cooperators, set up to handle large fires in our area. The local Operational Area Fire & Rescue Coordinator—representing OES in Mono County—can arrange to get mutual aid firefighting resources.

B. PROFILING WILDFIRE HAZARD EVENTS IN MONO COUNTY

MAGNITUDE OF THE HAZARD

Wildland fires in Mono County range from fires that burn less than one acre in size to the Cannon Fire in Walker in 2002 that burned 27,500 acres. Public lands surrounding communities in the county contain highly flammable vegetation that in many cases has not been thinned in years. The area experiences high temperatures and high winds over mountainous terrain that makes firefighting difficult. Highway and air access to the area is limited, further increasing the difficulty of fighting wildland fires.

HISTORICAL WILDLAND FIRE INFORMATION FOR MONO COUNTY

General History: BLM, Bishop Field Office, Draft Fire Management Plan, 2004

"During the 23-year period from 1980 through 2002, 587 wildland fires occurred wholly or partially within the 7 FMUs covered in the Fire Management Plan (Coleville, Bodie Hills/Bridgeport, Granite Mtn., Benton, Long Valley, Owens Valley, Inyo Mtn Wilderness) and burned a total of 75,179.5 acres (includes acres burned outside the FMU boundaries). The average is 25.5 fires, burning 3,269 acres annually across the seven FMUs. Fire cause for these 587 fires was determined to be 52% natural (lightning), 37% human caused, and the remaining 11% were of unknown origin. While the majority of the 587 fires were relatively insignificant in terms of size and intensity, several large, damaging fires did occur. Typically these fires were wind-driven and burned at FIL 5 or 6, quickly consuming several thousand acres before suppression efforts were successful."

Source: http://www.ca.blm.gov/pdfs/bishop_pdfs/eadocs/Fire_Management_Plan.pdf

See the PDF for a map of the 7 FMUs and a table detailing fire size, # of fires, and acres burned.

Date: September 2002
Name: Birch Fire
Place: Birch Creek Canyon near Swall Meadows
Summary: 2,500 acres burned
Economic Damage: $386,000
Details: Entire Rock Creek drainage area (including USFS campgrounds), local residents (including entire Swall Meadows community), and merchants were evacuated. Lower and Upper Rock Creek Roads closed. No structures destroyed.
Sources: http://www.yubanet.com/birch.shtml
http://www.monosheriff.org/submedia/n00.htm

Date: 6/15/02-6/28/02
Name: Cannon Fire
Place: Walker, CA
Summary: 22,750 acres burned; 3 fatalities occurred due to air-tanker crash, 1 injury when a water truck was destroyed in a rollover accident.
Economic Damage: $7.9 million
Details: Fire thought to be human-caused. Strongly influenced by high winds (20-30 mph), dry fuel conditions, variety of fuel types, and mountainous topography. Hundreds of evacuations occurred east and west of U.S. 395. Portions of U.S. 395 closed.
Sources: http://www.yubanet.com/cannon.shtml
http://www.monosheriff.org/submedia/n00.htm

Date: 7/12/02-7/19/02
Name: Gate Complex Fire
Place: The Coleville fire: 1 mile west of the Coleville High School, the Gate fire: 3 miles south of Coleville, and the Slinkard fire: north from Slinkard valley near S.R. 89 to the Topaz Lodge along U.S. 395.
Summary: 9,866 acres (Complex consisted of four separate fires: the Coleville Fire was 37 acres; the Gate Fire was 315 acres; the Buckeye Fire was estimated to be 861 acres; and the Slinkard Fire was 8,653 acres.) Fire started by lightning.
Economic Damage: $ 1.6 million
Details: Portions of U.S. 395 (Bridgeport to Holbrook Junction) and S.R. 89 (Monitor Pass) closed. Evacuations were required for all of Coleville and areas north to NV. All residents from the Monitor Pass turnoff north to the Nevada State Line and from the Monitor Pass turnoff south to Topaz Lane were

evacuated. Power and telephone outages occurred in Walker and Coleville. 908 fire personnel were on-scene, including helicopters and air tankers.
Sources: http://www.yubanet.com/gate_complex.shtml
http://www.monosheriff.org/submedia/n00.htm

Bill Bryant, Fire Officer, Bridgeport Ranger District, Humboldt-Toiyabe National Forest, notes that:

> "The communities of Coleville, Topaz and Walker have experienced numerous large wildland fires that have resulted in extensive loss of property, revenue and forest resources. The China Garden Fire occurred in 1974, burned 1,700 acres and destroyed 13 homes in the town of Walker. The Cannon Fire occurred in 2002 and burned 22,000 acres and burned one structure in the town of Walker. There have been two large fires within the past 10 years near the U.S. Marine Housing area in Coleville that burned several thousand acres and destroyed private property. All the above fires were human caused."

The Inyo National Forest Fire Management Plan notes that:

> "Historical fire database from NFMAS shows that the Inyo N.F. averaged 87 fires per year, and 2094 acres burned per year within the 64-year analysis period. In more recent years the forest averaged 117 fires per year, and burned 2735 acres per year. The increase in fire activity is attributed to improved documentation, an increase of human caused fires, and a heavier fuel load due to fire exclusion."
>
> The Inyo NF receives over 14.5 million recreation visits per year due to its heavy use as a destination recreation resource. Visitors enjoy four seasons of recreation….The result of this high use is a high-risk potential of human caused fires…..over 66% of fires on the Inyo are lightning caused and 15% caused by campfires. The following statistics are from 1995-2000.

Lightning	8,617 acres	66%
Equipment	1 acre	1.5%
Smoking	2.5 acres	1.2%
Campfire	1,267 acres	15%
Debris burn	0.6 acres	0.5%
Arson	0.8 acres	1%
Misc.	351 acres	14%

> The fire prevention program on the Inyo NF consists of two parts: a fuels management/wildland urban interface program and a traditional fire prevention program. The leading cause of unwanted, human caused campfires on the Inyo NF has been and continues to be escaped campfires. A systematic prevention program of public information, education and contact, patrols, hazard reduction, inspections and signing will achieve goal of reducing careless negligent human caused fires."

HISTORICAL WILDLAND FIRE INFORMATION FOR MAMMOTH LAKES

Date: 1992
Name: Rainbow Fire
Place: Devil's Postpile National Monument
Summary: 85% of the monument's acreage (798 acres) was burned.

Details: The Rainbow Fire was ignited by lightning on August 20, 1992 in the Inyo National Forest south of Devils Postpile National Monument and spread to the monument by wind. Ideal weather conditions prevented the fire from further spreading into the Town.
Sources: http://data2.itc.nps.gov/parks/depo/ppdocuments/DEPO_EA_Final.pdf
http://www.nps.gov/depo/depo_nr/fire/fire.htm

PROBABILITY OF FUTURE WILDLAND FIRES IN MONO COUNTY

Wildfires occur every year in Mono County and most of the county's communities have been identified as being at high risk from wildland fires. Despite this, Mono County has had fatalities due to wildfires only when three firefighters were killed fighting the Cannon Fire in 2002 when their air-tanker crashed, and only limited structural loss because most of the wildfires occur on public lands outside developed community areas. Wildfires in Mono County affect resource values such as wildlife habitat, watershed values, and scenic values. In addition, with the exception of 4.5 full-time firefighters (4 of whom are based in Mammoth Lakes), all the firefighters in Mono County are volunteer. For large fires, the county relies on CDF and public agency (USFS, BLM) personnel.

The probability of a wildfire in Mono County causing damage to people or structures has increased within the past 20 years as more people have built homes at the urban-wildland interface and as more people have chosen to become permanent residents of the county and town.

C. VULNERABILITY TO WILDFIRE HAZARDS—OVERVIEW

Wildfire hazards are considered to be one of the most prevalent natural hazards in Mono County due to their repeated occurrence, the damage they have caused in the past, and the geographically widespread nature of the hazard. As a result, wildfire hazard mitigation is a well-established and ongoing process in the county, with participation from a variety of local, state, and federal organizations.

The California Department of Forestry and Fire Protection (CDF), through its Fire and Resources Assessment Program (FRAP), is required to periodically assess California wildlands in terms of fire potential. In its most recent assessment in 2003, FRAP utilized housing density classes to analyze areas exposed to significant fire risk. All classes other than wildland are considered wildland-urban interface, the area where the threat from wildland fires to people and property is greatest. In Mono County, most community areas would qualify as urban, with outlying areas surrounding the communities as interface. Some more widely dispersed residential areas such as Wheeler Crest and Swauger would qualify as interface.

FRAP 2003 Assessment—Housing Density Classes

Class	Description
Wildland	Less than one housing unit per twenty acres
Rural	From one housing unit per five acres to one housing unit per twenty acres
Interface	From one housing unit per acre to one housing unit per five acres
Urban	Greater than one housing unit per acre

All of the communities in the county are surrounded by wildlands managed by the U.S. Forest Service and the Bureau of Land Management and are vulnerable to fires starting on those lands.

Wildland fires cause risks to a number of environmental features in addition to the risks to people and property and can increase the risk from other natural hazards such as floods. Fires may cause risks to watershed values, ecosystem health, range forage, timberlands and woodlands, soils, riparian and aquatic habitats, recreation and open space, and downstream water quality and water supply infrastructure.

Watershed Values: Loss of vegetation exposes soils leading to increased erosion and sedimentation in stream systems. With less vegetation, less water is absorbed by plants causing increased runoff with a large sediment load that can have significant effects downstream. Increased sediment loads in streams can affect aquatic life and riparian habitats and groundwater recharge facilities and can damage water supply facilities. This is a significant concern in Mono County.

Soils: Fires increase soil erosion, particularly in denuded watersheds. This is a significant concern in Mono County.

Range Forage: Fires can eliminate forage used for range animals. This is not a significant concern in Mono County.

Timberlands and Woodlands: Wildland fires can eliminate forest areas that can affect soils and watershed values as well as affect habitat conditions. This is a concern in Mono County.

Riparian and Aquatic Habitats: Small, quick, cool fires benefit water quality and aquatic habitat by leaving a mosaic of burned and unburned vegetation. This results in little or no post-fire increases in erosion and stream sedimentation, no significant increases in stream water temperatures during critical periods, little or no increase in flood flows, and a greatly diminished risk of future catastrophic wildfires, due to reduced fuel hazards. Slow, hot fires that burn most of the vegetation are very destructive to aquatic habitats resulting in greatly increased post-fire erosion and sedimentation, potentially significant increases in water temperatures due to the loss of riparian vegetation, increased flood potential and the potential for more debris, and the probability this cycle would be repeated when a thick stand of even-age vegetation grows back. Increased sedimentation and water temperatures can dramatically affect aquatic habitat. This is a significant concern in Mono County.

Recreation and Open Space: Wildfires can reduce recreational and open space values as well as destroy recreational facilities. Grasslands and shrub lands can return to their pre-burn character within a decade. Mature forests take much longer. The recovery of riparian areas and streams and lakes depends on how heavily the area is affected. This is a significant concern in Mono County.

Water Quality and Water Supply Systems: Water quality can be affected through increased sedimentation and nutrient loadings. Water supply systems can be affected directly as well as through increased sedimentation. This is a concern in Mono County.

D. VULNERABILITY TO WILDFIRE HAZARDS—STRUCTURES

The County and Town GIS system was utilized to identify parcels located within wildfire hazard zones. Based on the Mono County GIS data:

- 2,442developed parcels are located in wildfire hazard zones within the county and the town.
- The total assessed value of the parcels is $449,567,574.

- Critical Facilities within wildfire hazard zones include the following:

  Walker Senior Center, Toiyabe Indian Health Project, Bridgeport Fire Station, Lee Vining Fire District facilities, Geothermal Plants at junction of Highways 395 and 203, Long Valley Fire District facilities, Los Angeles Department of Water and Power Generating Station in Owens Gorge, and Caltrans road yard in Crowley Lake.

E. ESTIMATING LOSSES FROM WILDFIRE HAZARDS

Mono County does not have the information necessary to perform a detailed estimate of losses from wildfire hazards. The lack of information is discussed further in the section Estimating Losses. A broad estimate of losses can be obtained by utilizing the number of developed parcels located in wildfire hazard areas multiplied by the valuation from the county's tax rolls.

F. EXISTING WILDFIRE HAZARD MITIGATION

Impacts from wildfires are currently mitigated by the following policies and programs:

- The County implements its Firesafe Standards (Chapter 22 of the Mono County Land Use Regulations) in areas outside fire protection districts. The firesafe standards address access, water supply.
- The Town and the Mammoth Lakes Fire Protection District implement firesafe requirements inside the town boundaries.
- The Town, in collaboration with the USFS, is reducing fuel loads in areas adjacent to the town boundaries.
- The Eastern Sierra Regional Firesafe Council provides information to homeowners and local fire protection districts on firesafe development and maintaining defensible space.
- The Mammoth Lakes Firesafe Council provides similar information to residents of the town.
- The U.S. Forest Service, the Bureau of Land Management, and the California Department of Forestry and Fire Protection are responsible for fire protection and suppression on the majority of land within the county. Those agencies are members of the California Fire Alliance and work together to develop fire protection plans for areas in the county.

G. PROPOSED WILDFIRE HAZARD MITIGATION

Update the county's General Plan Safety Element to ensure that it thoroughly addresses fire hazard planning. Utilize OPR's ***Fire Hazard Planning*** during the update**.**

Review the current update of the Town's General Plan Safety Element to ensure it thoroughly addresses fire hazard planning.

Ensure that wildland fire hazards are disclosed during real estate transactions as required. Ensure that wildland fire hazards are disclosed during the building permit process.

Develop community-level fire plans for communities throughout the county, utilizing resources and assistance from the California Fire Alliance. These fire plans should address the following:

Develop an informed, educated public that takes responsibility for its own decisions relating to wildfire protection.

Develop an effective wildfire suppression program for local communities.

Develop an aggressive hazardous fuel management program.

Revise land use policies and standards to ensure that they protect life, property and local resource values.

Implement construction and property standards that provide defensible space.

Develop and implement an ongoing program to increase public awareness of wildland fire hazards.

All communities and fire protection districts should participate in the Eastern Sierra Regional Firesafe Council.

The county and the town should consider appointing a fire hazard coordinator with the responsibility for developing fire plans for the county, participating in the Eastern Sierra Regional Firesafe Council and the California Fire Alliance, coordinating with local, state, and federal fire protection and suppression entities, developing and implementing public education and awareness programs concerning fire safety, and applying for funding for fire hazard mitigation such as fuel reduction programs.

Mono County's Collaborative Planning Team should include representatives from the Eastern Sierra Regional Firesafe Council and local, state, and federal agencies concerned with fire protection. Fire hazard planning, pre-fire management programs, and public education should be a focus of the Collaborative Planning Team.

Help local landowners participate in the state's Vegetation Management Program (VMP), when applicable. The Vegetation Management Program (VMP) is a cost-sharing program that focuses on the use of prescribed fire and mechanical means to address wildland fire fuel hazards and other resource management issues on State Responsibility Area (SRA) lands.

Participate in CDF's hazardous fuel reduction program.

Participate in the Bureau of Land Management's Wildland Urban Interface Grant Awards program for hazardous fuel reduction.

Develop and implement a plan to provide an emergency access route for communities with only one access route.

VULNERABILITY TO IDENTIFIED HAZARDS: OVERVIEW

Portions of Mono County and the Town of Mammoth Lakes are vulnerable to avalanches, dam failures, flooding, landslides, seismic hazards, severe winter storms, volcanic hazards, and wildfires. The Mono County Planning Division used GIS and other modeling tools to map the areas of the county and the town that are vulnerable to identified natural hazards. The Mono County General Plan and the Town of Mammoth Lakes General Plan were also reviewed to identify where development is expected to occur over the next twenty years and to assess where future development could be affected by identified hazards.

Mono County and Mammoth Lakes have long been aware of the natural hazards within their boundaries and have had local hazard mitigation policies and programs in place for some time. Development is prohibited or restricted in areas where some hazards are known to occur (e.g., avalanche influence areas, floodplains, Alquist-Priolo Fault Hazard zones). However, development has occurred and exists throughout the county and the town in areas subject to a variety of hazards. The area's vulnerability to these hazards is discussed in detail in the previous chapter. The maps in Appendix A show where developed parcels may be affected by hazards throughout the county.

This section summarizes the hazards that may affect each area of the county:

Antelope Valley: Flood (extensive impact), wildfires (extensive impact), seismic (strong shaking and parcels in Alquist-Priolo Fault Hazard zones)

Swauger: Avalanche

Bridgeport Valley: Avalanche (Twin Lakes), dam inundation (minor), flood (extensive impacts), wildfires (extensive impact), seismic (strong shaking and parcels in Alquist-Priolo Fault Hazard zones), volcanic (ash fall)

Mono Basin: Avalanche, dam inundation, flood (minor), wildfires (extensive impact), seismic (strong shaking and parcels in Alquist-Priolo Fault Hazard zones), volcanic (ash fall and impacts from pyroclastic flows from the Mono-Inyo Craters)

June Lake: Avalanche, dam inundation, flood (minor), wildfires (extensive impact), seismic (strong shaking and parcels in Alquist-Priolo Fault Hazard zones), volcanic (ash fall and impacts from pyroclastic flows from the Mono-Inyo Craters)

Long Valley: Avalanche, dam inundation, flood (minor), wildfires (extensive impact), seismic (strong shaking and parcels in Alquist-Priolo Fault Hazard zones), volcanic (ash fall and impacts from pyroclastic flows from the Mono-Inyo Craters and from pyroclastic flows from the South Moat Area)

Wheeler Crest: Avalanche, dam inundation (Owens Gorge), wildfires (extensive impact), seismic (strong shaking and parcels in Alquist-Priolo Fault Hazard zones), volcanic (ash fall)

Tri-Valley: Flood (extensive impact), wildfires (extensive impact), seismic (strong shaking and parcels in Alquist-Priolo Fault Hazard zones)

Mammoth Lakes: Avalanche, flood (extensive impact in limited area), wildfires (extensive impact), seismic (strong shaking and parcels in Alquist-Priolo Fault Hazard zones mostly located at perimeter of developed area), volcanic (ash fall and impacts from pyroclastic flows from the Mono-Inyo Craters and from pyroclastic flows from the South Moat Area)

VULNERABILITY: STRUCTURES

The Hazard Mitigation Plan for Mono County and the Town of Mammoth Lakes identifies critical facilities located in the county and the town and the hazards to which these facilities are susceptible. A critical facility is defined as a facility in either the public or private sector that provides essential products and services to the general public, that is necessary to preserve the welfare and quality of life in the county, or that fulfills important public safety, emergency response, and/or disaster recovery functions. Critical facilities may also be sites that would be dangerous or hazardous if they were harmed during a hazard event.

Due to its isolated location and limited access, particularly in winter when several of the highways across the Sierra Nevada mountains are closed due to snow, the County has a number of critical facilities and services. Those include hospital and health care facilities, emergency medical response facilities and equipment, fire protection facilities and equipment, water and wastewater facilities, gas, electric and communication facilities, snow removal facilities and equipment, schools and senior citizen facilities, hazardous waste collection sites, airports, and highways. Most of the critical facilities and services are critical to the health and welfare of county residents and visitors during a hazard event. Schools and senior citizen facilities are critical since they contain large groups of at-risk populations. Hazardous waste collection sites are critical since they could create a hazardous condition if affected by a hazard. Critical facilities are shown on the maps in Appendix A.

The Mono County Community Development Department used GIS to map the County's and the Town's critical facilities and to determine which are most likely to be affected by hazards. The results of that analysis are shown on the maps in Appendix A and are discussed in the previous chapter under specific hazards.

An analysis of the county General Plan indicates that development is expected to occur in and adjacent to existing communities over the 20-year timeframe of the plan. Development regulations prohibit that development from occurring in identified avalanche influence areas, floodplains, landslide areas, and seismic hazard zones. Much of the future development will occur in areas subject to severe winter weather conditions. Since over 90 percent of the county is public land managed by the U.S. Forest Service or the Bureau of Land Management, future development will also occur in areas in the urban-wildland interface where wildland fires are a hazard. Development regulations also require new development to be fire safe, to meet structural requirements for snow loads and seismic standards.

ESTIMATING POTENTIAL LOSSES

The Mono County Community Development Department used GIS modeling and data from the County Assessor's database files to estimate the potential dollar losses from the hazards identified as having the potential to impact communities in the area. The county and the town do not have the detailed information necessary to complete the "Estimate Losses" section of this LHMP with any specificity. Completing a detailed inventory of existing assets would enable the county and town to understand more fully the areas and types of development most susceptible to identified hazards and to identify more specific mitigation for each hazard. The county and the town need to inventory existing development to obtaining the following data:

1. **Type of Structures –** The county and town do not have data on the types of existing structures on parcels. Building stock is currently classified only by land use designation, making it difficult to accurately divide building stock into the suggested categories (residential, commercial, industrial, agricultural, religious/non-profit, government, education, utilities).
2. **Construction –** The county and town do not have data on the construction of all existing structures (wood, steel, masonry) etc., making it difficult to determine susceptibility to hazards, value of structure, and replacement value.
3. **Size of Buildings –** The county and town do not store information at the building level. There are no databases that give building size by square foot.
4. **Total Number of Buildings** – The GIS system does not include building footprints; the total number of buildings would need to be estimated based on a rough calculation of all developed parcels in the town and county (parcels with a structural value > $10,000).
5. **Value of Structures** – The only valuation tool available to the county and town is the most recent tax assessment of a structure; often it is terribly outdated and undervalues the structure.
6. **Value of Contents** – This would depend on the information gathered in Items 1-4 above.
7. **Total Replacement Value** – This is dependent on updating Items 1-6 above.
8. **Calculate the Proportion of Assets Located in Hazard Areas** – Currently, because it is difficult to accurately divide building stock into the suggested categories (See Item 1 above), it would be difficult to come up with an accurate proportion within a hazard area.

Once a more detailed inventory of buildings and facilities is completed and entered on the county's GIS and database files, the county will be able to add additional historical data on hazard events in the county. That information can then be added to GIS data sets for plotting on map products. The county can then use the FEMA document *Understanding Your Risks: Identifying Hazards and Estimating Losses* (FEMA 386-2) to plot loss estimation values and develop corresponding GIS map products. The Mitigation Strategy section of this LHMP contains mitigation to address the county's current lack of data.

DEVELOPMENT TRENDS

Mono County is located on the eastern side of the Sierra Nevada mountain range and is bordered to the east by the state of Nevada. Approximately 94 percent of the county's 3,103 square miles is publicly owned; as a result, tourism and recreation-oriented enterprises are the primary economic activity in the county. The major population center, and the county's only incorporated area, is the Town of Mammoth Lakes. The remainder of the county's residents are scattered in small communities throughout the county.

Communities in the county include Topaz, Coleville and Walker in the Antelope Valley; Bridgeport, the county seat, in the Bridgeport Valley; Mono City and Lee Vining in the Mono Basin; June Lake in the June Lake Loop; the Town of Mammoth Lakes; Long Valley, McGee Creek, Crowley Lake, Aspen Springs and Sunny Slopes in Long Valley; Swall Meadows and Paradise in the Wheeler Crest area; and Chalfant, Hammil and Benton in the Tri-Valley.

The Land Use Element of the county's General Plan contains policies that focus future growth in and adjacent to existing communities. Substantial additional development outside existing communities is limited by environmental constraints, the lack of large parcels of private land, and the cost of providing infrastructure and services in isolated areas. Land use policies for community areas in the county focus on sustaining the livability and economic vitality of community areas. The County anticipates that growth in the unincorporated area will occur primarily in the Antelope Valley, Bridgeport Valley, June Lake, Wheeler Crest/Paradise, the Tri-Valley, and Long Valley.

Many county residents do not work in the community in which they live. Residents in the Antelope Valley commute to work in Bridgeport and in Gardnerville, Minden, and Carson City in Nevada; residents of the Tri-Valley area commute to work in Bishop; and residents of Long Valley, June Lake, and Benton commute to work in Mammoth Lakes. Bridgeport is the only unincorporated community with a large portion of its residents working in the community. Development in Mammoth Lakes and rising housing prices there are forcing many residents of Mammoth to move elsewhere (Crowley Lake, June Lake, Bishop, Chalfant) and commute to jobs in Mammoth Lakes.

Mono County also has a large number of second homes and seasonal use homes. The unincorporated area had a vacancy rate of 39 percent in 2000 (Mono County Housing Element). This unusually high rate reflects the large number of vacation homes and seasonal use units in the area, many of which remain vacant for most the year. In 2000, eighty-four (84) percent of the vacant units were seasonal or recreational use units (Mono County Housing Element).

When the census was taken in 2000, Mono Basin and June Lake had the highest percentages of vacant units reserved for seasonal use, 100 percent and 95 percent respectively, while Antelope Valley and Tri-Valley had the lowest percentages of vacant units reserved for seasonal use, 51 percent and 55 percent respectively (Table 14).

Development in Mono County communities is primarily residential with limited small-scale commercial uses serving local and tourist/recreational needs. Limited small-scale light industrial uses, such as heavy equipment storage and road yards, also occur in some county communities. Most communities also have some public facilities such as schools, libraries, community centers, parks and ball fields, and government offices (in Bridgeport). This development pattern is not anticipated to change, due to the small scale of communities in Mono County and the lack of employment opportunities in most communities.

The Town of Mammoth Lakes is the county’s only incorporated community. The town is a four-season resort community with a permanent population of approximately 7,500 residents (over half of the county’s entire resident population). Vacation residences and lodging facilities accommodate a substantially larger population of second homeowners and visitors. The local economy is based primarily on tourism, especially during summer and winter months when visitation rates are highest. Winter conditions support skiing, snowboarding, and other outdoor recreational uses. In the summer, hiking, fishing, camping, bicycling (mountain and road), golfing, and sightseeing are popular resident and visitor activities.

As noted in the introduction to the Town’s General Plan:

"The ratio of permanent residents to visitors is an important element in understanding demographics in Mammoth Lakes and associated impacts. Overall, the town is prone to large fluctuations in the total non-resident population because of the seasonal nature of its tourism-dependent economy. During the winter tourist season the community and ski area require a large number of seasonal employees (more than can be filled by the full-time resident community) to meet peak service demands. As a result, the resident population increases by approximately 3,000 during the peak tourism season. The town must accommodate a much larger population when tourist populations are present. During peak tourism periods, the total number of people in town at one time exceeds 35,000 people."

The Town's General Plan provides the following information concerning the town's planning area and municipal boundaries:

"The Planning Area for the Town includes areas where existing or proposed facilities have a direct relationship to the current Town boundaries and services. It encompasses land in the unincorporated portions of Mono County in which the Town provides municipal services and extends from the Whitmore Recreation area on the east to the Mammoth Scenic Loop on the north. The Planning Area also includes Inyo National Forest lands located within Madera County that have their sole vehicular access through the town of Mammoth Lakes and for which the Town provides public safety and building inspection services. The Municipal Boundary [for Mammoth Lakes] is the land contained within the incorporated limits of the town of Mammoth Lakes. The boundary encompasses a total area of approximately 25 square miles. The Mammoth Lakes Sphere of Influence is coterminous with the municipal boundary, indicating that no additional lands are anticipated to be annexed into the municipal boundary. The Town of Mammoth Lakes adopted an urban limit policy in 1993 in order to maintain a clear delineation between the developed portions of the community and the surrounding National Forest lands. The Urban Growth Boundary policies in this plan limit residential, industrial and commercial development to those areas already designated for such uses. The ultimate size and intensity of the community would be limited to those areas not now designated for open space. The Urban Development Boundary encompasses an area of about four square miles."

LOCAL HAZARD CONCERNS

Mono County has a number of community planning advisory committees that meet on a regular basis to address planning and development concerns in their local planning areas. The Local Hazard Mitigation Plan was discussed at those meetings and the following local hazard concerns were raised:

Antelope Valley

- There is limited radio service in the Antelope Valley. In the event of an emergency, residents would be unable to hear warnings sent out over the radio.
- The Antelope Valley is at the end of the power line. As a result, they suffer power outages as frequently as 20-30 times a year.
- Residents are worried about their proximity to the marine base and its associated hazards.
- The east side of Walker (north of the clinic) is prone to flooding and needs to be maintained.
- Mill Creek and Mill Canyon both cross under U.S. 395 and are subject to flooding. In the event of a flood, these are two likely places where U.S. 395 can be washed away.
- Rock Creek at Birch has a similar situation in which flooding is likely.

Mono Basin

- There are areas in Mono Basin that need brush clearing in order to fully function as overflow channels in the case of flooding.

June Lake

- There is a single point of entry into the Peterson Tract of June Lake.

Long Valley

- Because of its location, there is no radio service at either Tom's Place or Sunny Slopes. In the event of an emergency, residents would be unable to hear warnings sent out over the radio.

Wheeler Crest

- There is a single point of entry into and out of the community.
- The dam at Rock Creek is located in Inyo County, but the structures that would be affected if it broke are all located in Mono County (Tom's Place, Swall Meadows). Neither county has done anything to prepare for such an event because they both assume it is the other's responsibility.

Chalfant

- The water tank in White Mountain Estates is located in close proximity to an earthquake fault. It cracked during the 1980 earthquakes and the community is worried about what will occur in the event of a future earthquake.

Benton

- Flood ditches are overgrown with willows and other riparian vegetation behind many houses in Benton. In the event of a flood, the value of these ditches will be compromised and water will not be effectively channeled out. Whose job is it to maintain the flood ditches?
- The lack of cell phone reception throughout the county is a potential hazard. In case of an emergency, residents need to be able to have a reliable method to call for help. A good cell phone connection can mean the difference between life and death.

IV. MITIGATION STRATEGY

MITIGATION OVERVIEW

Mono County and the Town of Mammoth Lakes have long been aware of the many natural hazards within their boundaries and have had local hazard mitigation policies and programs in place for some time in their General Plans. The following local hazard mitigation actions and projects have been developed to address the hazards identified in the previous chapter and to correlate with the goals and policies in the county and town General Plans and with existing mitigation.

The proposed hazards mitigation in this plan has been developed to enhance existing mitigation for each hazard area and to "plug gaps" in the existing mitigation for each hazard. Mitigation was developed utilizing the following criteria:

- The proposed mitigation will provide a long-term reduction of loss from the identified hazard and will minimize or avoid secondary adverse environmental impacts.
- The proposed mitigation is legally enforceable.
- It can be implemented with existing staffing and funding or funding exists to implement it.
- It is acceptable to all stakeholders (federal, state, and local).
- It is environmentally sustainable and complies with all federal, state, and local environmental regulations.
- It is consistent with the county and/or the town's General Plans and complements existing hazard goals and policies in the county and town General Plans.
- It enhances, and does not duplicate, existing mitigation.

Implementation priorities were developed for the proposed hazard mitigation actions and projects by Mono County, the Town of Mammoth Lakes, and the Mono County Collaborative Planning Team based on the following criteria:

- How severe is the hazard? Hazards with a greater severity or magnitude were given a higher priority.
- Does the mitigation address a hazard that occurs over a wide geographic range in the county and/or town? Higher priority was given to mitigation that reduces the hazard over the greatest area.
- Does the mitigation address a hazard that recurs frequently? Higher priority was given to mitigation that addresses frequently occurring hazard events.
- Is funding available to implement the mitigation? Higher priority was given to mitigation for which funding is available.
- Is staffing available to implement the mitigation? Higher priority was given to mitigation for which staffing is available.

Projects identified as "high" priority are those that should be accomplished within the immediate planning timeframe (1-2 years). Projects identified as "medium" priority should be accomplished within

the mid-range planning timeframe (5-10 years) and those identified as "low" priority should be accomplished within the long-range planning timeframe (10-20 years).

PROPOSED MITIGATION ACTIONS AND PROJECTS

OVERALL HAZARD MITIGATION

Mitigation 1

The county and the town do not have the detailed information necessary to complete the "Estimate Losses" section of this LHMP with any specificity. Completing a detailed inventory of existing assets would enable the county and town to understand more fully the areas and types of development most susceptible to identified hazards and to identify more specific mitigation for each hazard. The county and the town need to inventory existing development to obtaining the following data:

- **Type of Structures –** The county and town do not have data on the types of existing structures on parcels. Building stock is currently classified only by land use designation, making it difficult to accurately divide building stock into the suggested categories (residential, commercial, industrial, agricultural, religious/non-profit, government, education, utilities).
- **Construction –** The county and town do not have data on the construction of all existing structures (wood, steel, masonry) etc., making it difficult to determine susceptibility to hazards, value of structure, and replacement value.
- **Size of Buildings –** The county and town do not store information at the building level. There are no databases that give building size by square foot.
- **Total Number of Buildings** – The GIS system does not include building footprints; the total number of buildings would need to be estimated based on a rough calculation of all developed parcels in the town and county (parcels with a structural value > $10,000).
- **Value of Structures** – The only valuation tool available to the county and town is the most recent tax assessment of a structure; often it is terribly outdated and undervalues the structure.
- **Value of Contents** – This would depend on the information gathered in Items 1-4 above.
- **Total Replacement Value** – This is dependent on updating Items 1-6 above.
- **Calculate the Proportion of Assets Located in Hazard Areas** – Currently, because it is difficult to accurately divide building stock into the suggested categories (See Item 1 above), it would be difficult to come up with an accurate proportion within a hazard area.

Priority:	High
Responsible Department:	County and Town Community Development Departments
Existing/Potential Resources:	Existing staff
Funding Resources Required:	None, existing staffing
Timeframe:	1-2 years
Ongoing Implementation:	Update the inventory and GIS mapping annually

Mitigation 2

Once the county updates its GIS and databases as specified in Mitigation 1 above, it can then use the FEMA document *Understanding Your Risks: Identifying Hazards and Estimating Losses* (FEMA 386-2) to plot loss estimation values and develop corresponding GIS map products for all areas of the county including Mammoth Lakes.

Priority:	High
Responsible Department:	County and Town Community Development Departments
Existing/Potential Resources:	Existing staff
Funding Resources Required:	Unknown
Timeframe:	1-2 years
Ongoing Implementation:	Update GIS and county databases on an ongoing basis as additional information becomes available

Mitigation 3

Many areas in the county, including communities, do not have adequate cell phone or radio service and do not have a reliable method to call for help or to receive warnings in case of emergencies. Installing additional cell and radio towers to ensure adequate coverage throughout the county would help mitigate potential impacts from several hazards by providing a warning system.

Priority:	High
Responsible Department:	County and Town Community Development Departments, County and Town Offices of Emergency Services
Existing/Potential Resources:	Existing staff
Funding Resources Required:	Unknown
Timeframe:	1-2 years
Ongoing Implementation:	Maintain and improve cell phone service

AVALANCHE HAZARD MITIGATION

Mitigation A-1

Many of the parcels in avalanche hazard zones are adjacent to or on public lands managed by the U.S. Forest Service. Placing those properties into federal ownership or into the ownership of land conservation organizations and restricting their use to permanent open space would eliminate existing avalanche hazards to people and property.

Priority:	Medium
Responsible Department:	County and Town Community Development Departments
Existing/Potential Resources:	Existing staff
Funding Resources Required:	None, existing staffing
Timeframe:	5-10 years
Ongoing Implementation:	Restrict land use on properties in identified avalanche hazard zones.

Mitigation A-2

Complete avalanche mapping for the county's GIS system, including data for Mammoth Lakes.

Priority:	Medium
Responsible Department:	County and Town Community Development Departments
Existing/Potential Resources:	Existing staff
Funding Resources Required:	None, existing staffing
Timeframe:	5-10 years
Ongoing Implementation:	Update GIS mapping as required.

DAM FAILURE HAZARDS MITIGATION

Mitigation D-1

Work with the U.S. Forest Service to study the potential impacts of the failure of Rock Creek Dam. Once the impacts have been assessed, develop and implement an emergency response plan.

Priority:	Medium
Responsible Department:	County Community Development Department, County Department of Public Works, USFS
Existing/Potential Resources:	Existing staff
Funding Resources Required:	Existing staff for plan; unknown for implementation of plan
Timeframe:	1-2 years
Ongoing Implementation:	None.

FLOOD HAZARD MITIGATION

Mitigation F-1

Document past flood events on the GIS system in order to develop historic flooding patterns for the area that can be used to better understand where repetitive flooding hazards occur and enable the County and Town to minimize risks to existing development in those areas.

Priority:	High
Responsible Department:	County and Town Community Development Departments
Existing/Potential Resources:	Existing staff
Funding Resources Required:	None, existing staffing
Timeframe:	1-2 years
Ongoing Implementation:	Update GIS annually with new flood data.

Mitigation F-2

Request FEMA to update the FIRM maps for the county, particularly for the Walker River watershed communities, the June Lake Loop, and the Tri-Valley area. As maps are updated, input that data on the county and town's GIS system.

Priority:	High
Responsible Department:	County and Town Community Development Departments, County Flood Administrator
Existing/Potential Resources:	Existing staff
Funding Resources Required:	None, existing staffing
Timeframe:	1-2 years
Ongoing Implementation:	Update FIRM maps as needed. Update the county and town's GIS system as new FIRM maps are made available.

Mitigation F-3

Request DWR to complete the Awareness Floodplain Maps for the county, particularly for the Walker River watershed communities, the June Lake Loop, and the Tri-Valley area. As the maps are completed, input that data on the county and town's GIS system.

Priority:	High
Responsible Department:	County and Town Community Development Departments. County Flood Administrator
Existing/Potential Resources:	Existing staff
Funding Resources Required:	None, existing staffing
Timeframe:	1-2 years
Ongoing Implementation:	Update DWR maps as needed. Update the county and town's GIS system as new DWR maps are made available.

Mitigation F-4

Incorporate the DWR Awareness Floodplain Maps into the land use planning process for the county and the town and the GIS system as those maps become available. Request FEMA to include the DWR Awareness Floodplain Map data on the FIRM maps.

Priority:	High
Responsible Department:	County and Town Community Development Departments, County Flood Administrator
Existing/Potential Resources:	Existing staff
Funding Resources Required:	None, existing staffing
Timeframe:	1-2 years
Ongoing Implementation:	Update DWR maps as needed. Update the county and town's GIS system as new DWR maps are made available.

Mitigation F-5

Ensure that ongoing stream restoration efforts throughout the county and town address flood management issues during the planning and implementation of those restoration efforts.

Priority:	High
Responsible Department:	County and Town Community Development Departments, Mono County Collaborative Planning Team
Existing/Potential Resources:	Existing staff
Funding Resources Required:	None, existing staffing
Timeframe:	1-2 years
Ongoing Implementation:	-----

Mitigation F-6

Ensure that property owners are aware of flood hazards and practices necessary to diminish the impacts of those hazards through an ongoing public education program. This should include information on participation in the NFIP.

Priority:	High
Responsible Department:	County and Town Community Development Departments
Existing/Potential Resources:	Existing staff
Funding Resources Required:	None, existing staffing
Timeframe:	1-2 years
Ongoing Implementation:	-----

Mitigation F-7

The County and the Town shall develop a Comprehensive Flood Management Strategy for the county that includes the following elements:

1. Flood management strategies for each watershed in the county. Watersheds should be considered as single management units since upstream land management decisions affect downstream parcels.
2. Watershed-based flood management should include all agencies/entities whose decisions affect flood management.
3. Adequate floodplain management should stress:
   a. Avoiding risks in the floodplain.
   b. Minimizing the effects of those risks when they cannot be avoided.
   c. Mitigating the effects of damage when it occurs.
   d. Accomplishing the above in such a way that diminishes negative environmental impacts.
   e. Nonstructural mitigation (e.g., standards requiring elevation above the base flood level) should be given preference over structural mitigation (e.g., constructing diversion channels), when feasible.
4. Implementation programs.

Priority:	High
Responsible Department:	County and Town Community Development Departments, Mono County Collaborative Planning Team
Existing/Potential Resources:	Existing staff
Funding Resources Required:	None, existing staffing
Timeframe:	1-2 years
Ongoing Implementation:	Implement the plan. Review on an annual basis and revise as necessary.

LANDSLIDE HAZARDS MITIGATION

No additional mitigation is proposed to address landslide hazards.

SEISMIC HAZARDS MITIGATION

Mitigation S-1

The County and the Town shall conduct a comprehensive survey of the structural condition of all buildings. Coordinate this survey with existing information from the Unreinforced Masonry Building survey and the Housing Conditions survey. Once the survey is completed, input the data on the GIS system.

Priority:	High
Responsible Department:	County and Town Community Development Departments
Existing/Potential Resources:	Existing staff
Funding Resources Required:	None, existing staffing
Timeframe:	1-2 years
Ongoing Implementation:	Update the GIS system annually.

Mitigation S-2

Utilizing the structural survey required in Mitigation S-1, pinpoint structurally hazardous areas and buildings and develop a rehabilitation and replacement program to mitigate the impacts to unsafe structures from identified hazards in the area, including seismic hazards. Input data on structurally hazardous areas/buildings on the GIS system.

Priority:	Medium
Responsible Department:	County and Town Community Development Departments, Mono County Collaborative Planning Team
Existing/Potential Resources:	Existing staff
Funding Resources Required:	None, existing staffing
Timeframe:	5-10 years
Ongoing Implementation:	Update the GIS system annually.

Mitigation S-3

Seek funding to implement the rehabilitation and replacement program to mitigate impacts to unsafe structures.

Priority:	Medium
Responsible Department:	County and Town Community Development Departments, Mono County Collaborative Planning Team
Existing/Potential Resources:	Existing staff
Funding Resources Required:	Unknown
Timeframe:	5-10 years
Ongoing Implementation:	Implement the program. Review on an annual basis and revise as necessary.

SEVERE WINTER WEATHER HAZARD MITIGATION

The additional mitigation proposed for severe winter weather hazards includes overall Mitigation Measure 2 that pertains to the development and installation of additional cell phone towers and the mitigation measures proposed for seismic hazards mitigation that address the structurally unsafe buildings.

VOLCANIC HAZARDS MITIGATION

No additional mitigation is proposed to address volcanic hazards.

WILDFIRE HAZARDS MITIGATION

Mitigation W-1

Update the county's General Plan Safety Element to ensure that it thoroughly addresses fire hazard planning. Utilize OPR's ***Fire Hazard Planning*** during the update.

Priority:	High
Responsible Department:	County Community Development Department
Existing/Potential Resources:	Existing staff
Funding Resources Required:	Existing funding
Timeframe:	1-2 years
Ongoing Implementation:	Review on an annual basis and revise as necessary.

Mitigation W-2

Review the current update of the Town's General Plan Safety Element to ensure it thoroughly addresses fire hazard planning.

Priority:	High
Responsible Department:	Town Community Development Department
Existing/Potential Resources:	Existing staff
Funding Resources Required:	Existing funding
Timeframe:	1-2 years
Ongoing Implementation:	Review on an annual basis and revise as necessary.

Mitigation W-3

Review and, if necessary update, the county's General Plan land use policies and regulations and building regulations to ensure that they address fire hazard planning as a component of the development process.

Priority:	High
Responsible Department:	County Community Development Department
Existing/Potential Resources:	Existing staff
Funding Resources Required:	Existing funding
Timeframe:	1-2 years
Ongoing Implementation:	Review on an annual basis and revise as necessary.

Mitigation W-4

Ensure that wildland fire hazards are disclosed during real estate transactions as required. Ensure that wildland fire hazards are disclosed during the building permit process.

Priority:	High
Responsible Department:	County and Town Community Development Departments, Building Divisions
Existing/Potential Resources:	Existing staff
Funding Resources Required:	Existing funding

Timeframe:	1-2 years
Ongoing Implementation:	Requires ongoing implementation.

Mitigation W-5

Develop community-level fire plans for communities throughout the county, utilizing resources and assistance from the California Fire Alliance. These fire plans should address the following:

- Developing an informed, educated public that takes responsibility for its own decisions relating to wildfire protection.
- Developing an effective wildfire suppression program for local communities.
- Developing an aggressive hazardous fuel management program.
- Revising land use policies and standards to ensure that they protect life, property and local resource values.
- Implementing construction and property standards that provide defensible space.

Priority:	High
Responsible Department:	County and Town Community Development Departments, Regional Planning Advisory Committees, local fire protection districts
Existing/Potential Resources:	Existing staff
Funding Resources Required:	Existing funding
Timeframe:	1-2 years
Ongoing Implementation:	Review plans annually and revise as necessary.

Mitigation W-6

Develop and implement an ongoing countywide program to increase public awareness of wildland fire hazards.

Priority:	High
Responsible Department:	County and Town Community Development Departments, Office of Emergency Services
Existing/Potential Resources:	Existing staff
Funding Resources Required:	Existing funding
Timeframe:	1-2 years
Ongoing Implementation:	Requires ongoing implementation.

Mitigation W-7

All communities and fire protection districts should participate in the Eastern Sierra Regional Firesafe Council.

Priority:	High
Responsible Department:	County and Town Community Development Departments, local fire protection districts
Existing/Potential Resources:	Existing staff
Funding Resources Required:	Existing funding
Timeframe:	1-2 years
Ongoing Implementation:	Requires ongoing implementation.

Mitigation W-8

The county and the town should appoint a fire hazard coordinator with the responsibility for developing fire plans for the county, participating in the Eastern Sierra Regional Firesafe Council and the California Fire Alliance, coordinating with local, state, and federal fire protection and suppression entities, developing and implementing public education and awareness programs concerning fire safety including safe building materials and landscaping, and applying for funding for fire hazard mitigation such as fuel reduction programs.

Priority:	High
Responsible Department:	County and Town Community Development Departments, Mono County Collaborative Planning Team
Existing/Potential Resources:	Existing staff
Funding Resources Required:	Unknown
Timeframe:	1-2 years
Ongoing Implementation:	Requires ongoing funding and support for the position.

Mitigation W-9

Mono County's Collaborative Planning Team should include representatives from the Eastern Sierra Regional Firesafe Council and local, state, and federal agencies concerned with fire protection. Fire hazard planning, pre-fire management programs, and public education should be a focus of the Collaborative Planning Team.

Priority:	High
Responsible Department:	County and Town Community Development Departments, Mono County Collaborative Planning Team
Existing/Potential Resources:	Existing staff
Funding Resources Required:	Existing staff
Timeframe:	1-2 years
Ongoing Implementation:	Requires ongoing consideration of fire hazard planning issues.

Mitigation W-10

Help local landowners participate in the state's Vegetation Management Program (VMP), when applicable. The Vegetation Management Program (VMP) is a cost-sharing program that focuses on the use of prescribed fire and mechanical means to address wildland fire fuel hazards and other resource management issues on State Responsibility Area (SRA) lands.

Priority:	Medium
Responsible Department:	County and Town Community Development Departments or Fire Coordinator if appointed
Existing/Potential Resources:	Existing staff
Funding Resources Required:	Existing staff
Timeframe:	5-10 years
Ongoing Implementation:	Requires ongoing assistance.

Mitigation W-11

Help local landowners participate in CDF's hazardous fuel reduction program.

Priority:	Medium
Responsible Department:	County and Town Community Development Departments or Fire Coordinator if appointed
Existing/Potential Resources:	Existing staff
Funding Resources Required:	Existing staff
Timeframe:	5-10 years
Ongoing Implementation:	Requires ongoing assistance.

Mitigation W-12

Help local landowners participate in the BLM's Wildland Urban Interface Grant Awards program for hazardous fuel reduction.

Priority:	Medium
Responsible Department:	County and Town Community Development Departments or Fire Coordinator if appointed
Existing/Potential Resources:	Existing staff
Funding Resources Required:	Existing staff
Timeframe:	5-10 years
Ongoing Implementation:	Requires ongoing assistance.

Mitigation W-13

For communities with only one access route, develop and implement a plan to provide an emergency access route for the community.

Priority:	Medium
Responsible Department:	County and Town Community Development Departments and Department of Public Works
Existing/Potential Resources:	Existing staff
Funding Resources Required:	Existing staff for plan; unknown for implementation of plan
Timeframe:	1-2 years
Ongoing Implementation:	None.

V. PLAN MAINTENANCE

MONITORING, EVALUATING, & UPDATING THE PLAN

FEMA regulations require an update of Local Hazard Mitigation Plans every five years. The Mono County Local Hazard Mitigation Plan will be monitored by the Community Development Department (CDD) as part of its annual review of the status of its planning documents and ongoing programs and activities. The CDD presents an Annual Report to the Board of Supervisors, to the State Office of Planning and Research, and to the State Office of Housing and Community Development, detailing the status of programs, regulations, and development over the past year. That report is compiled by the CDD Director by soliciting status reports from the staff members responsible for programs, from other county departments responsible for projects or programs, and in some cases from other agencies responsible for programs and projects that affect development and/or safety issues in the county (e.g., Caltrans roadway improvement projects).

As part of that annual review process, the Local Hazard Mitigation Plan will be evaluated by the CDD, the Mono County Office of Risk Management, the Mono County Office of Emergency Services, and the Mono County Department of Public Works to ensure that it remains up-to-date. Staff from the Town of Mammoth Lakes will review the document for the sections that pertain to Mammoth Lakes. The criteria utilized for evaluating the plan are listed in the Mitigation Strategy chapter of this plan, i.e.:

1. Have the nature, type, and/or magnitude of identified hazards and risks changed over the last year? If so, the evaluation shall identify those changes.
2. Do the goals, objectives and action items adequately address current and expected conditions? If not, the evaluation shall identify which goals, objectives and/or action items need to be changed and how.
3. Are implementation measures appropriately prioritized? If not, the evaluation shall present a revised list of prioritized implementation measures.
4. Are current resources appropriate to implement the plan? If not, the evaluation shall identify additional resources.
5. Have problems occurred in implementing the plan (technical, political, legal, coordination with other agencies)? If so, the problems shall be identified and the evaluation shall include suggested alternative approaches to implementation.
6. Have outcomes occurred as expected? If not, the evaluation shall identify how those outcomes differed from the expected and whether changes need to be made in goals, action items, or implementation.

Following the annual review and evaluation of the Local Hazard Mitigation Plan, the Community Development Department will have 3 months to update the plan before submitting the amended plan to the Board of Supervisors and the Town of Mammoth Lakes for adoption. Comments received during the public hearings on the updated plan will be incorporated into the final amended plan.

During updates of the Local Hazard Mitigation Plan, changes to other county planning documents, such as the Mono County General Plan, the Master Environmental Assessment, the Mono County Regional Transportation Plan, and the Mono County Emergency Operations Plan, and to other town planning documents, such as the Town of Mammoth Lakes General Plan and the Town of Mammoth Lakes Emergency Operations Plan, should be incorporated into the update of the Hazards Plan.

INCORPORATING THE LHMP INTO OTHER PLANNING DOCUMENTS

Mono County and the Town of Mammoth Lakes conduct annual reviews of the status of their planning documents, ongoing programs and activities. Those annual reviews will provide a mechanism to ensure that actions identified in the Hazard Mitigation Plan are incorporated into the County's and Town's ongoing planning programs.

Mono County utilizes the Mono County General Plan, the Master Environmental Assessment, the Mono County Land Development Regulations, and building codes to guide development in the county. Its Emergency Operations Plan addresses emergency response for hazardous occurrences. The county's Regional Transportation Plan also addresses safety issues, including emergency preparedness. All of these regulations address hazards previously identified in the county's General Plan Safety Element and its Emergency Operations Plan. After the County adopts the Local Hazard Mitigation Plan, these existing mechanisms will have additional hazard mitigation strategies integrated into them.

The Town of Mammoth Lakes utilizes the Town of Mammoth Lakes General Plan, the Town Zoning Code, and building codes to guide development in the town. Its Emergency Operations Plan addresses emergency response for hazardous occurrences. All of these regulations address hazards previously identified in the Town's General Plan and its Emergency Operations Plan. After the Town adopts the Local Hazard Mitigation Plan, these existing mechanisms will have additional hazard mitigation strategies integrated into them

During the annual review process, the Community Development Department will review the Mono County General Plan, the Master Environmental Assessment, the Mono County Land Development Regulations, and the Regional Transportation Plan, analyze the need for plan amendments, and implement the amendment process if necessary. The county's Safety Element will be revised to incorporate the goals, objectives, action items, and implementation priorities in this plan. The Town will review its General Plan and Zoning Code to analyze the need for plan amendments and implement the amendment process if necessary. The Town's General Plan will be revised to incorporate the goals, objectives, action items, and implementation priorities in this plan.

The Building Division of the Community Development Department is responsible for administering federal, state, and local building code requirements. The Public Works Department is responsible for administering the Grading Ordinance, the Fire Safe Regulations, and the Floodplain Regulations. During the annual review process overseen by the CDD, those departments will evaluate their current code requirements to ensure that they meet minimum safety requirements established by federal and state law. The Town's Building and Public Works Departments will similarly evaluate current code requirements to ensure that they meet the minimum safety requirements.

Within six months of the adoption of this plan, the goals, objectives, action items, and implementation priorities listed in this plan will be incorporated into existing planning documents.

CONTINUED PUBLIC INVOLVEMENT

Mono County and the Town of Mammoth Lakes continue to be committed to an open planning process involving the public directly in the continual reshaping and updating of their many planning documents. This will apply to the Local Hazard Mitigation Plan as well. The Community Development Department

(CDD) oversees the annual review and update of the county's planning documents. As part of that annual review process, the CDD involves a number of committees that represent a variety of public and agency interests. The Mono County Collaborative Planning Team, a multi-agency planning team that coordinates planning efforts in Mono County for a variety of needs (e.g., jobs, transit, recreation, wildlife mitigation and enhancement, etc.), will evaluate the document and suggest changes that will then be incorporated into the document by CDD staff. The Collaborative Planning Team includes representatives from the following organizations:

Mono County (Community Development Department, includes Building, Planning, Code Compliance)
Benton-Paiute Reservation
Bridgeport Indian Colony
Town of Mammoth Lakes (Planning Division)
Bureau of Land Management, Bishop Office
California Department of Fish and Game
California Department of Transportation (Caltrans), District 9
Lahontan Regional Water Quality Control Board
USFS/Inyo National Forest
USFS/Humboldt-Toiyabe National Forest

CDD staff will also review the LHMP with the county's Regional Planning Advisory Committees (RPACs) at regularly scheduled monthly meetings in Antelope Valley, Benton, Bridgeport Valley, Mono Basin, June Lake, Long Valley, Wheeler Crest, and Tri-Valley. These are public meetings open to anyone who is interested in attending as well as committee members; the meetings are advertised in the paper and on community bulletin boards. Committee members include local residents and local representatives of various state and federal agencies (e.g., U.S. Forest Service, California Department of Fish and Game). Town staff will review the LHMP with town residents. Comments from those meetings will be incorporated into the document by CDD staff.

Copies of the plan and any proposed changes will be available for review at the Mono County Community Development offices in Bridgeport and Mammoth Lakes, at the town offices, at libraries throughout the county, and on the Mono County or the Town of Mammoth Lakes website (www.monocounty.ca.gov or www.ci.mammoth-lakes.ca.us). The document includes contact information including Mono County CDD and Town staff names, addresses, phone numbers, and email addresses.

The public will have an additional opportunity to comment on the plan and any proposed changes during the public hearing process conducted by the Board of Supervisors and by the Town Council to consider amendment of the plan.

VI. REFERENCES

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California Department of Conservation, Division of Mines and Geology (DMG) in cooperation with U. S. Geological Survey (USGS)

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Mono County Department of Public Works
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Persons Consulted

California Department of Transportation, District 9
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California Office of Emergency Services (OES)
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Humboldt-Toiyabe National Forest, Bridgeport Ranger District
Bill Bryant, Fire Officer
Sherry Sorensen, GIS Technician

Inyo National Forest, Supervisor's Office
Nancy Upham, Public Affairs Officer

Mono County Planning Advisory Committees--
Antelope Valley Regional Planning Advisory Committee
Benton Regional Planning Advisory Committee
Bridgeport Valley Regional Planning Advisory Committee
Mono Basin Regional Planning Advisory Committee
June Lake Citizens Advisory Committee
Long Valley Regional Planning Advisory Committee
Wheeler Crest Regional Planning Advisory Committee
Tri-Valley Regional Planning Advisory Committee

Mono County
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www.fire.ca.gov
Information on wildland fire hazards and fire histories, California Fire Plan, San Bernardino Unit 2003 Fire Management Plan.

California Department of Water Resources (DWR)
www.water.ca.gov
Current information floodplain management and dam safety

California Fire Alliance
www.cafirealliance.org
Information on communities at risk and fire planning and mapping.

California Geological Survey (CGS)
www.consrv.ca.gov/CGS
Information on seismic hazards, landslide hazards, loss estimates for seismic events.

California Office of Emergency Services (OES)
www.oes.ca.gov
Hazard mitigation, earthquake preparedness.

California Seismic Safety Commission (CSSC)
www.seismic.ca.gov
California Shake Maps, building mitigation, California Earthquake Loss Reduction Plan.

Eastern California Regional Fire Safe Council
www.easternsierrafirecouncil.org
Information on fire safety in the Eastern Sierra.

Environmental Systems Research Institute (ESRI)
esri.com/hazards/makemap.htm
FEMA FIRM map data.

Federal Emergency Management Agency (FEMA)
www.fema.gov
Information on hazards planning.

www.hazardmaps.gov/atlas.php
Hazards mapping.

US Geological Survey (USGS)
www.usgs.gov
Information on seismic hazards, volcanic hazards, landslide hazards, and water hazards.

VII. APPENDIX A—MAP SET

This map set contains hazard maps prepared by the Mono County Community Development Department utilizing the Mono County GIS system and other reference maps. The reference maps listed below were utilized to develop the hazard maps and to develop information throughout this Hazard Plan. A complete set of the reference maps is available at the Mono County Community Development Department.

I. Avalanche Hazard Maps

a. Avalanche Activity in Mono County (5 maps)
b. Mono County Avalanche Influence Areas

Reference Maps Utilized for Avalanche Hazards:

Avalanche Hazard Maps (Mono County Master Environmental Assessment)

Snow Deposition Design Zone, Mammoth Lakes (Mammoth Lakes General Plan, Snow Hazards)

II. Dam Failure Hazard Maps

a. Developed Parcels in Dam Inundation Areas (3 maps)
b. Critical Facilities in Dam Inundation Areas

Reference Maps Utilized for Dam Failure Hazards:

Dam Inundation Zones (FEMA FIRM Maps)

Major California Dams (California State Multi-Hazard Mitigation Plan, Map 7.1B)

State of California Dam Disaster Proclamations, 1950-1997 (California State Multi-Hazard Mitigation Plan, Map 7.1C)

III. Flood Hazard Maps

a. Developed Parcels in Flood Zones (3 maps)
b. Critical Facilities and Developed Parcels in Flood Zones—Mammoth Lakes
c. Critical Facilities in Flood Zones

Reference Maps Utilized for Flood Hazards:

Awareness Floodplain Maps (California Department of Water Resources, www.dwr.ca.gov)

FEMA FIRM Maps (FEMA, Mono County Planning Division)

Town of Mammoth Lakes Flood Hazard Map (Mammoth Lakes General Plan, Flood Hazards)

California State Flood Disaster Proclamations, 1950-1997 (California State Multi-Hazard Mitigation Plan, Map 6.1A)

California Hydrologic Regions (California State Multi-Hazard Mitigation Plan, Map 6.2A)

Dominant Flood Types (California State Multi-Hazard Mitigation Plan, Map 6.2B)
FEMA Flood Zones (California State Multi-Hazard Mitigation Plan, Map 6.2C)
Flood Damages by Counties Eligible for Public Assistance (California State Multi-Hazard Mitigation Plan, Map 6.3B)
National Flood Insurance Program (NFIP) Repetitive Loss Claims Through 1998 (California State Multi-kl
California Counties Declared by the Federal Government as Storm Disaster Areas, 1955-2002 (California State Multi-Hazard Mitigation Plan, Map 6.4B)

IV. Landslide Hazard Maps

a. Developed Parcels in Landslide Hazard Areas (3 maps)

Reference Maps Utilized for Landslide Hazards:

Rockfall and Landslide Hazard Maps (Mono County Master Environmental Assessment)
Landslide Risk Zones (California State Multi-Hazard Mitigation Plan, Map 7.3B)

V. Seismic Hazard Maps

a. Developed Parcels in Alquist-Priolo Earthquake Fault Zones (3 maps)
b. Critical Facilities and Developed Parcels in Earthquake Fault Zones—Mammoth Lakes
c. Levels of Earthquake Hazard in Mono County (shake map)
d. Levels of Earthquake Hazard in Mammoth Lakes (shake map)
e. Critical Facilities in Earthquake Fault Zones
f. Critical Facilities in Areas at Highest Hazard for Groundshaking

Reference Maps Utilized for Seismic Hazards:

Alquist-Priolo Fault Hazard Zone Maps (CDMG Special Studies Zone Maps)
Areas Damaged by Historic Earthquakes (1800-1998) (USGS)
Distance of the earthquake that cause the dominant hazard for peak ground acceleration at 10% probability of exceedance in 50 years with alluvial site conditions (USGS)
Epicenters, Magnitude >6 Earthquakes, 1800-2000, California (California Geological Survey)
Magnitude of the earthquake that causes the dominant hazard for peak ground acceleration at 10% probability of exceedance in 50 years with alluvial site conditions (USGS)
Probabilistic Seismic Hazards, Mono County (California Geological Survey and USGS)
Seismic Hazard Maps (Mono County Master Environmental Assessment)
Carbon Dioxide Maps for Mammoth Lakes (Town of Mammoth Lakes General Plan)
(USGS maps are available at www.usgs.gov; California Geological Survey maps are available at www.consrv.ca.gov/CGS)

VI. Severe Winter Storm Hazard Maps

a. Developed Parcels in Severe Winter Storm Areas (3 maps)

VII. Volcanic Hazard Maps

a. Hazard Zone for Pyroclastic Flows and Surges Along Mono-Inyo Craters
b. Hazard Zone for Pyroclastic Flows and Surges in the South Moat Area
c. Potential Hazards from Tephra Fall in the Long Valley-Mono Lake Area

Reference Maps Utilized for Volcanic Hazards:

Inyo Craters Location Map (www.usgs.gov)
Inyo Fissures Location Map, (www.usgs.gov)
Long Valley Caldera Topo Map (www.usgs.gov)
Mono-Inyo Eruptions During the Past 5,000 Years (www.usgs.gov)
Pyroclastic Flow Hazard Zones Mono-Inyo Craters Volcanic Chain (www.usgs.gov)
Pyroclastic Flow Hazard Zones South Moat Area (www.usgs.gov)
Simplified Geologic Map of the Long Valley Area (www.usgs.gov)
Tephra Fall Hazard Zones (www.usgs.gov)
Tree Kill Areas Near Mammoth Mountain (www.usgs.gov)

VIII. Wildfire Hazard Maps

a. Developed Parcels in CDF Wildland Fire Hazard Areas (3 maps)
b. Critical Facilities and Developed Parcels in Fire Hazard Areas—Mammoth Lakes
c. Critical Facilities in Fire Hazard Areas
d. Mono County Wildland Fire History by Decade

Reference Maps Utilized for Wildfire Hazards:

Communities at Risk for Wildfire (CDF, FRAP)
Fire Threat (CDF, FRAP)
Fuel Rank (CDF, FRAP)
Fuels, Fire Hazard Severity Zones (CDF, FRAP)
State Responsibility Areas (CDF)
Fire History Mammoth Lakes (Town of Mammoth Lakes General Plan)
Fire History Mono County (Mono County GIS)
(CDF maps, including FRAP maps, are available at www.cdf.ca.gov)

VII. APPENDIX B – EXISTING HAZARD POLICIES

The policies listed here are the adopted policies from the Mono County General Plan Safety Element and draft policies from the Town of Mammoth Lakes General Plan Update. Once the town's general plan update is finalized and adopted, the town's policies in this section will be updated.

AVALANCHE HAZARDS

MONO COUNTY POLICIES

GOAL Protect local communities from unreasonable risks associated with avalanche hazards.

OBJECTIVE A Limit development that attracts concentrations of people in historical avalanche paths (Conditional Development Areas) during the avalanche season.

Policy 1: Prohibit new subdivisions, new winter commercial uses, and multi-family developments in conditional development areas unless proper mitigation is provided. A Conditional Development Area[6] denotes private property that has previously experienced avalanche activity.

Action 1.1: Prior to approving new development, other than single family residential, in conditional development areas or within the Twin Lakes Avalanche Influence Area, the Planning Commission or Board of Supervisors shall find:

a) On the basis of a site specific study by a qualified snow scientist, that the site is not within a potential avalanche hazard; or
b) That the project has been designed by a registered civil engineer to withstand potential avalanche impact, or other appropriate structural mitigation measures have been incorporated into the project.
c) Unless otherwise mitigated, all building sites created through new subdivisions shall be identified and located outside avalanche areas.

Action 1.2: Impose subdivision and use restrictions in conditional development areas through future rezoning and use permit conditions.

Action 1.3: Update the County's GIS system to include avalanche zones. Solicit historical avalanche information from Caltrans, USFS, Mammoth Mountain Ski Area.

Policy 2: Promote seasonal, rather than year-round, land uses in conditional development areas.

Action 2.1: Require new commercial development projects in conditional development areas to discontinue operations during the avalanche season, unless mitigated as specified in

[6]Conditional Development Areas have been identified by local avalanche advisory committees appointed by the Board of Supervisors. In some communities where insufficient historical data exists, the high hazard zones identified in prior avalanche studies (i.e. Wilson, Beck, or Mears/Whitmore) have supplemented available historical information in defining the Conditional Development Area.

Action 1.1. The avalanche season is considered to run from November 1 to April 15 of the following calendar year. Upon application, the Board of Supervisors may change the foregoing dates for specific areas if it finds that public health and safety will not be affected.

Action 2.2: Encourage the use of seasonal trailers in conditional development areas where such use does not conflict with local zoning or private restrictive convenants.

Policy 3: Facilitate land trades or purchases that result in placing properties, which on the basis of prior studies may be impacted by avalanches, into federal ownership or into the ownership of land conservation groups, for permanent open space use.

Action 3.1: Survey landowners who own properties that, on the basis of prior studies, may be impacted by avalanches, for interest in land trades or purchases.

Action 3.2: Initiate land trade/purchase discussions between landowners and appropriate federal, state or county agencies, or land conservation groups.

Action 3.3: Request applicable federal or state agencies to assign high priority land acquisition status to private lands in areas that, on the basis of prior studies, may be impacted by avalanches.

Policy 4: Maintain and update historical avalanche data.

Action 4.1: Appropriate County agencies shall continue to compile avalanche data.

Action 4.2: The historical maps contained in this Plan and in the MEA shall be revised and updated as necessary to reflect the run-out boundaries of actual avalanches.

Action 4.3: Where the boundary of an actual avalanche area is in question, require site specific analysis of the historical avalanche impact to the parcel prior to issuance of any county permits, other than Building Permits for single family residential development. Such an analysis should be conducted by a qualified snow scientist, and the conclusions of the analysis should be incorporated into this Plan and into the Mono County Safety Element.

OBJECTIVE B Inform residents and visitors of the potential avalanche hazards in or near by local communities.

Policy 1: Inform affected persons of potential avalanche hazards in the area during the permit process and during transfer of property ownership.

Action 1.1: Designate community areas containing private lands influenced by historic avalanche path as "Avalanche Influence Areas" in the Mono County Safety Element and Land Use Element. The Avalanche Influence Area designation shall define community areas in which residents and visitors should be notified of where potential avalanche hazards exist in the vicinity.

Action 1.2: Designate historical avalanche paths as "conditional development zones" in the Mono County General Plan Safety Element and Land Use Element.

Action 1.3: Require that all applicants for County permits in avalanche influence areas be notified of the area's potential avalanche hazards, and require that they be referred to the Safety Element and to this plan and to the avalanche documents on file in the county Planning Division for further information.

Action 1.4: In accordance with state law, sellers of property will notify buyer/transferees of potential avalanche and seismic hazards affecting subject property.

OBJECTIVE C Plan for and provide emergency services in the event of avalanches.

Policy 1: Provide emergency access to avalanche influence areas where feasible.
Action 1.1: Evaluate potential emergency access routes for avalanche influence areas. The results of that evaluation shall be included in the SEMS Plan, in the Safety Element, in the Circulation Element, and in the Mono County RTP.
Action 1.2: Seek state or federal funding for emergency access road construction in avalanche influence areas.

Policy 2: Provide snow removal services to county roads only during periods of acceptable avalanche risks.
Action 2.1: The Director of Public Works will utilize broad discretion in determining when roads should be plowed.

Policy 3: Assist in providing local emergency housing facilities.
Action 3.1: Identify community facilities appropriate for emergency housing purposes in the Housing Element.

OBJECTIVE D Secure cooperation from the U.S. Forest Service and Caltrans in mitigating local avalanche hazards.

Policy 1: Seek cooperation from the U.S. Forest Service in mitigating avalanche hazards that originate on land managed by the USFS and that threaten private property.
Action 1.1: Continue to promote and encourage local and/or regional USFS offices to:
1) Expand the backcountry avalanche forecasting program to include threatened community areas;
2) Structurally mitigate (i.e. supporting structures, deflecting berms, retarding mounds, catching dams, snow fences, etc.) avalanche hazards threatening community areas; and
3) Initiate land exchanges with willing property owners in avalanche hazard areas.

Policy 2: Seek cooperation from Caltrans in mitigating avalanche hazards to local state highways.
Action 2.1: Promote and encourage Caltrans' assistance in funding local avalanche forecasting programs.
Action 2.2: Encourage Caltrans to post avalanche warning signs along potential avalanche sections of U.S. 395, such as in the Long Valley area, the Wilson Butte area, and the area north of Lee Vining during the avalanche season.

TOWN OF MAMMOTH LAKES POLICIES

OBJECTIVE II.4.A Minimize loss of life, injury, property damage, and natural resource destruction that may result from natural public safety hazards

Policy
II.4.A.b: Protect life and property from avalanche hazards.

Implementation Measures

II.4.A.b.1	The Town shall monitor known and potential avalanche hazard areas and require an Avalanche Risk Assessment on all development proposed within the Snow Deposition Desig Zone.
II.4.A.b.2	The Town shall allow only open space or low-density seasonal occupancy in high avalanche hazard zones.
II.4.A.b.3	The Town shall require developers to implement appropriate mitigation measures in avalanche areas through requirements in the Town development code.
II.4.A.b.4	The Town shall utilize an emergency notification and information system to inform the public of avalanche hazards and post warning signs on roadways subject to avalanche hazards.
II.4.A.b.5	The Town shall support and encourage actions by the U.S. Forest Service and Mammoth Mountain Ski Area to abate avalanche hazards that impact the Town of Mammoth Lakes.
II.4.A.b.6	The Town shall undertake a study to identify the limits of avalanche run-out areas.

DAM FAILURE HAZARDS

MONO COUNTY POLICIES

GOAL Avoid exposure of people and improvements to unreasonable risks of damage or injury from dam failures.

OBJECTIVE Regulate development in flood hazard areas in a manner that protects people and property from unreasonable risks of damage due to flooding.

Policy 1: Regulate the placement of new structures in the 100-year floodplain.

Action 1.1: Work with the Federal Emergency Management Agency, the State Department of Water Resources, and other appropriate agencies to update flood hazard studies for developing areas of the County. June Lake, Walker-Coleville-Topaz, and Tri-Valley should be priority study areas.

Action: 1.2: Continue to participate in the National Flood Insurance Program by enforcing and updating as necessary the provisions of the Floodplain Regulations (Chapter 21 of the Mono County Land Development Regulations).

Action 1.3: In accordance with the stream setback requirements of the Land Development Regulations, require new development to set back adequately from surface waters for flood protection purposes. Any deviations from the stream setback requirements within the 100-year floodplain should be reviewed by the County Floodplain Administrator prior to permit issuance.

Action 1.4: Future development projects with the potential to cause substantial flooding, erosion, or siltation shall provide an analysis of the potential impacts prior to project approval. The analysis shall:

a) be funded by the applicant;
b) be prepared by a registered geologist or civil engineer;
c) identify the nature of the hazard, and assess the impacts of the development on downstream development and resources; and
d) recommend alternatives and/or mitigation measures to mitigate potential impacts to downstream resources to a level of non-significance, unless a statement of overriding considerations is made through the EIR process.

Mitigation measures shall be included in the project plans and specifications and shall be made a condition of approval for the project.

Action 1.5: Limit the intensity of development within the 100-year floodplain in the Land Use Element.

Action 1.6: Continue to implement Mono County Code Chapter 13.08, Land Clearing, Earthwork and Drainage Facilities, and update as necessary.

Action 1.7: Update the county's information on the number and location of structures in the 100-year floodplain zone.

Action 1.8: Update the County's GIS system to include dam inundation zones.

Policy 2: Ensure that dams are operated and maintained in a safe manner.

Action 2.1: Ensure that dam owners and operators in Mono County comply with California Department of Water Resources, Division of Safety of Dams, requirements for dam safety, including periodic inspections.

TOWN OF MAMMOTH LAKES POLICIES

OBJECTIVE II.4.A Minimize loss of life, injury, property damage, and natural resource destruction that may result from natural public safety hazards.

Policy

II.4.A.a: Minimize loss of life, injury, property damage and natural resource destruction from flood damage.

Implementation Measures

II.4.A.a.1 The Town shall regulate development in flood plains and near the perimeter of natural water bodies and regulate development in flood areas when there is threat to life or property.

II.4.A.a.2 The Town shall maintain a flood hazard management program including regulations in the Town Development Code.

II.4.A.a.3 The Town shall retain, to the maximum practical extent, primary community water courses and bodies in their natural state, through criteria in the Town Development Code. Creek corridors should be carefully identified, corridor setbacks established, and strict regulations precluding riparian vegetation removal and creek regime modification should be followed.

FLOOD HAZARDS

MONO COUNTY POLICIES

GOAL Avoid exposure of people and improvements to unreasonable risks of damage or injury from flood hazards.

OBJECTIVE Regulate development in flood hazard areas in a manner that protects people and property from unreasonable risks of damage due to flooding.

Policy 1: Regulate the placement of new structures in the 100-year floodplain.

Action 1.1: Work with the Federal Emergency Management Agency, the State Department of Water Resources, and other appropriate agencies to update flood hazard studies for developing areas of the County. June Lake, Walker-Coleville-Topaz, and Tri-Valley should be priority study areas.

Action: 1.2: Continue to participate in the National Flood Insurance Program by enforcing and updating as necessary the provisions of the Floodplain Regulations (Chapter 21 of the Mono County Land Development Regulations).

Action 1.3: In accordance with the stream setback requirements of the Land Development Regulations, require new development to set back adequately from surface waters for flood protection purposes. Any deviations from the stream setback requirements within the 100-year floodplain should be reviewed by the County Floodplain Administrator prior to permit issuance.

Action 1.4: Future development projects with the potential to cause substantial flooding, erosion, or siltation shall provide an analysis of the potential impacts prior to project approval. The analysis shall:

a) be funded by the applicant;
b) be prepared by a registered geologist or civil engineer;
c) identify the nature of the hazard, and assess the impacts of the development on downstream development and resources; and
d) recommend alternatives and/or mitigation measures to mitigate potential impacts to downstream resources to a level of non-significance, unless a statement of overriding considerations is made through the EIR process.

Mitigation measures shall be included in the project plans and specifications and shall be made a condition of approval for the project.

Action 1.5: Continue to limit the intensity of development within the 100-year floodplain in the Land Use Element by designating lands in identified floodplain for non-residential, low intensity uses, when possible.

Action 1.6: Continue to implement Mono County Code Chapter 13.08, Land Clearing, Earthwork and Drainage Facilities, and update as necessary.

Action 1.7: Update the County's GIS system to include floodplain zones.

Action 1.8: As part of the GIS update, update the county's information on the number and location of structures in the 100-year floodplain zone.

Action 1.9 Utilize the California Department of Water Resources Awareness Floodplain Maps to define floodplain areas within the county.

Action 1.10 Request FEMA to include the California Department of Water Resources Awareness Floodplain Maps data on their maps.

TOWN OF MAMMOTH LAKES POLICIES

OBJECTIVE II.4.A Minimize loss of life, injury, property damage, and natural resource destruction that may result from natural public safety hazards.

Policy

II.4.A.a: Minimize loss of life, injury, property damage and natural resource destruction from flood damage.

Implementation Measures

II.4.A.a.1 The Town shall regulate development in flood plains and near the perimeter of natural water bodies and regulate development in flood areas when there is threat to life or property.

II.4.A.a.2 The Town shall maintain a flood hazard management program including regulations in the Town Development Code.

II.4.A.a.3 The Town shall retain, to the maximum practical extent, primary community water courses and bodies in their natural state, through criteria in the Town Development Code. Creek corridors should be carefully identified, corridor setbacks established, and strict regulations precluding riparian vegetation removal and creek regime modification should be followed.

LANDSLIDES

MONO COUNTY POLICIES

GOAL Avoid exposure of people and improvements to unreasonable risk of damage or injury from landslides.

OBJECTIVE Direct development to occur in a manner that reduces the risks of damage and injury from landslide and rockfall hazards to acceptable levels.

Policy 1: Regulate land uses that may increase the potential for natural hazards, such as activities that disturb vegetative cover on steep slopes, or which could divert hazard flows toward down-gradient development.

Action 1.1: Consider enacting a hillside development ordinance to address requirements for evaluation of landslide, rockfall, and other geologic hazards on hillsides.

Action 1.2: Prior to site development, require geotechnical evaluation of the potential for landslides and mudslides in applicable areas. The geotechnical report shall be prepared in accordance with the requirements stipulated under Actions 1.1-1.6 for Seismic Hazards.

Action 1.3: Enforce maximum site disturbance restrictions in appropriate land use designations.

TOWN OF MAMMOTH LAKES POLICIES

OBJECTIVE II.3.B Limit development densities in areas with higher slopes.

Policy

II.3.B.a The Town shall limit the creation of new parcels on slopes over 30 percent.

Implementation Measures

II.3.B.a.1 The Town shall update its development standards as needed to include advances in construction techniques that minimize soil erosion and slope instability.

II.3.B.a.2 The Town shall require a soils report on all development permits within areas of known slope instability or where significant potential hazard has been identified.

OBJECTIVE II.3.A Regulate development in a manner that protects people and property from unreasonable risks.

Policy

II.3.A.b: Minimize loss of life, injury, property damage, and natural resource destruction that may result from public safety hazards.

Implementation Measures

II.3.A.b.1 The Town shall implement the Uniform Building Code to comply with federal and state earthquake protection and slope stability standards for new development.

II.3.A.b.2 The Town shall require soils reports for new developments to identify the potential for liquefactions, expansive soils, ground settlement, and slope failure. Require reports to contain remedial measures that feasibly could be implemented to minimize potential impacts.

II.3.A.b.3	The Town shall promote public education efforts to inform residents and businesses regarding earthquake preparedness and response.
II.3.A.e.4	The Town shall participate in any updating and implementation of hazards response planning, including an emergency evacuation facilities plan and training programs.
II.3.A.b.5	The Town shall render all available assistance and cooperation in emergency situations to minimize loss of life, injury to persons, and damage to property.
II.3.A.b.6	The Town shall maintain an Emergency Plan for Mammoth Lakes that sets forth the responsibilities, functions, and operations of the Town government and its interrelationship with other agencies and jurisdictions that provide services during an emergency.
II.3.A.b.7	The Town shall develop and maintain an emergency notification and information system to minimize loss of life during a time of emergency.

SEISMIC HAZARDS

MONO COUNTY POLICIES

GOAL Avoid exposure of people and improvements to unreasonable risks of damage or injury from seismic hazards (earthquakes, land subsidence).

OBJECTIVE Direct development to occur in a manner that reduces the risks of damage and injury from known earthquake and geologic hazards to acceptable levels.

Policy 1: In order to mitigate risk from seismic hazards such as surface fault-rupture, and other geologic hazards, regulate development near active faults, seismic hazard zones and other geologic hazards consistent with the provisions of the Alquist-Priolo Special Studies Zone Act and the Seismic Hazard Mapping Act.

Action 1.1: Applicable development proposals in Alquist-Priolo fault hazard zones, seismic hazard zones, or other known geologic hazard areas, shall provide a geologic or geotechnical report prior to project approval. The report shall:

a) be funded by the applicant;
b) be prepared by a registered geologist or certified engineering geologist;
c) if a fault hazard, locate existing faults, evaluate their historic activity, and determine the level of risk they present to the proposed development;
c) if another geologic hazard, including a seismic hazard other than a fault hazard, locate site-specific geologic/seismic hazards affecting the project, identify areas containing geologic/seismic hazards that could adversely affect the site in the event of an earthquake or other geologic episode, and determine the level of risk they present to the proposed development;
d) recommend measures to reduce risk to acceptable levels; and
e) be prepared in sufficient detail to meet the criteria and policies of the State Mining and Geology Board, and to allow for review by the County's consulting geologist (see also Action 1.3).

Mitigation measures shall be included in the project plans and specifications and shall be made a condition of approval for the project.

Action 1.2: Require the scope of investigation for geologic and geotechnical reports to be commensurate with the complexity and exposure to risk of the proposed project. As an example, reports for hospitals, multi-story buildings, and other critical, sensitive, or high intensity structures should be prepared in greater detail than those for lower density wood frame structures.

Action 1.3: Retain a qualified consulting geologist to review geologic/geotechnical studies prepared in accordance with Action 1.1. The consulting geologist shall evaluate the adequacy of the report, interpret or set standards where they are unclear, and advise the County of the report's acceptability. Project proponents shall be required to fund the costs associated with the County's consulting geologist's review of project geologic hazard studies. The County's consulting geologist shall be retained in conformance with the requirements listed in the Mono County Environmental Handbook.

Action 1.4: During the initial project review process, encourage applicants to design or redesign their projects as necessary to avoid unreasonable risks from surface fault rupture and other geologic/seismic hazards. Work with the State Geologist to exempt from special geologic study requirements those projects that will clearly not be impacted by fault rupture or other geologic/seismic hazards.

Action 1.5: Deny applications for planning permits where geologic studies provide substantial evidence that the proposed project will be exposed to unreasonable risks from surface faulting, fault creep or other seismic hazards. Projects that include measures to reduce risks to acceptable levels may be approved. Consistent with Seismic Hazard Mapping Regulations, "acceptable level" means a reasonable assurance of public safety, although structural integrity and continued functionality are not ensured.

Action 1.6: Work with the State Geologist to address development proposals in areas where recent geologic/seismic episodes have occurred, but where special study zones or seismic zones have yet to be delineated.

Action 1.7: Require that all applicants for County permits in delineated special study zones or geologic/seismic hazard zones be notified of the area's potential for surface displacement or other seismic/geologic hazards, and that they be referred to this Element, support documents, seismic hazard zone maps (when available) and the Alquist-Priolo maps on file in the county Planning Division for further information.

Policy 2: Identify and mitigate seismic /geologic hazards to existing structures, and ensure that new construction is designed to withstand seismic/geologic events.

Action 2.1: The Building Division shall identify potentially hazardous buildings in accordance with the Unreinforced Masonry Building Law (Government Code Section 8875).

Action 2.2: The Building Division shall develop and implement a mitigation program for potentially hazardous buildings in accordance with the Unreinforced Masonry Building Law.

Action 2.3: The Building Division shall continue to require new construction to comply with the engineering and design requirements of Seismic Zone 4.

Action 2.4: The Building Division may require geotechnical studies as necessary to comply with the Uniform Building Code.

Policy 3: Identify areas of seismic and geologic hazards.

Action 3.1: Utilize historical data and geotechnical studies to designate areas of geologic hazards.

Action 3.2: Work with the Federal Emergency Management Agency, the State Department of Water Resources, and other appropriate agencies to designate alluvial fans and mudflow areas on Flood Insurance Rate Maps; the Tri-Valley area should be a study priority.

Action 3.3: Coordinate with the United States Geologic Survey and other research concerns in seismic hazard research and monitoring activities for the Long Valley Caldera and the Inyo-Mono Crater Chain.

Action 3.4: Request the Division of Mines and Geology to establish Mono County as a priority area for mapping areas of groundshaking, liquefaction, and earthquake-induced landslides in accordance with Seismic Hazard Mapping Regulations.

Action 3.5: Work with the California Geological Survey to maintain existing CSMIP monitoring stations in Mono County and to develop additional monitoring sites. Action 1.7:

Action 1.8: Update the County's GIS system to include dam inundation zones.

Policy 4: Limit the intensity of development in seismic and other geologic hazard areas.

Action 4.1: Designate known hazardous areas for low intensity uses in the land use element; assign low intensity zoning for such areas.

Action 4.2: Facilitate land trades or purchases that result in placing properties subject to major geologic hazards into federal ownership or into the ownership of land conservation organizations, for permanent open space use.

Action 4.3: Through the permit process, including site plan review, direct development to avoid locating in hazardous areas.

TOWN OF MAMMOTH LAKES POLICIES

OBJECTIVE II.4.A Minimize loss of life, injury, property damage, and natural resource destruction that may result from natural public safety hazards.

Policy

II.4.A.d: To minimize hazards to people and property from the impact of seismic activity.

Implementation Measures

II.4.A.d.1 The Town shall implement the Uniform Building Code to comply with federal and state earthquake protection and slope-stability standards for new development.

II.4.A.d.2 The Town shall require soils reports for new developments to identify the potential for liquefactions, expansive soils, ground settlement, and slope failure. Require reports to contain remedial measures that feasibility could be implemented to minimize potential impacts.

II.4.A.d.3 The Town shall promote public education efforts to inform residents and businesses regarding earthquake preparedness and response.

II.4.A.d.4 The Town shall participate in any updating and implementation of hazards-response planning, including an emergency evacuation facilities plan and training programs.

II.4.A.d.5 The Town shall render all available assistance and cooperation in emergency situations to minimize loss of life, injury to persons and damage to property.

II.4.A.d.6 The Town shall maintain an Emergency Plan for Mammoth Lakes that sets forth the responsibilities, functions, and operations of the Town government and its interrelationship with other agencies and jurisdictions that provide services during an emergency.

OBJECTIVE II.4.D Protect life and property from risks associated with high concentrations of carbon dioxide.

Policy

II.4.D.a: Exposure and access to areas subject to high concentrations of carbon dioxide shall be minimized.

Implementation Measures

II.4.D.a.1 The Town shall assist USGS in continuing the efforts of the USGS Volcano Hazards Program to protect people's lives and property.

II.4.D.a.2 The Town shall work collaboratively with Inyo National Forest and USGS in developing public education efforts to inform residents and businesses regarding the hazards of CO_2 and high-hazard areas.

II.4.D.a.3 The Town shall promote the monitoring of CO_2 through the use of carbon dioxide alarms in low-lying confined areas, such as basements and underground parking areas.

II.4.D.4 The Town shall work collaboratively with Inyo National Forest and USGS to ensure that all high-hazard areas are marked and/or closed to public access during high-risk periods

TOWN OF MAMMOTH LAKES POLICIES

OBJECTIVE II.3.A Regulate development in a manner that protects people and property from unreasonable risks.

Policy

II.3.A.a: To limit hazards to people and property resulting from snow and ice falling from roofs and other structures.

Implementation Measures

II.3.A.a.1 The Town shall be considered a snow area. All structures within the town shall be designed to withstand snow loads and any additional effects created by snow.

II.3.A.a.2 Buildings shall be designed and located so that snow shed, ice shed, and snowmelt runoff do not negatively impact neighboring properties or create a public hazard or nuisance.

VOLCANIC HAZARDS

MONO COUNTY POLICIES

GOAL Protect local communities from unreasonable risks associated with volcanic hazards.

OBJECTIVE Regulate development in volcanic hazard areas in a manner that protects people and property from unreasonable risks of damage due to volcanic hazards.

Policy 1: Identify areas of seismic/volcanic hazards.

Action 1.1: Support the United States Geologic Survey and other research concerns in seismic and volcanic hazard research and monitoring activities for the Long Valley Caldera and the Inyo-Mono Crater Chain.

Policy 2: Warn people of imminent volcanic hazards.

Action 2.1: Support the United States Geologic Survey in maintaining its warning system for the Long Valley Caldera and the Inyo-Mono Crater Chain.

WILDFIRE HAZARDS

MONO COUNTY POLICIES

GOAL Avoid exposure of people and improvements to unreasonable risks of damage or injury from wildfire hazards.

OBJECTIVE Direct development to occur in a manner that reduces the risks of damage and injury from known wildland fire hazards to acceptable levels.

Policy 1: Require adequate structural fire protection for new development projects.

Action 1.1: Development projects shall demonstrate the availability of adequate structural fire protection prior to or as a condition of permit issuance. Applicants shall provide either a will-serve letter from the applicable fire protection district or, if not within an existing fire district sphere of influence, a fire protection plan. The fire protection plan shall be part of the development application and shall identify the nature of the local fire hazard, assess the risk of wildland and structural fires presented by the project, and specify measures for detecting and responding to fires on the project site throughout all phases of the proposed development. Projects lacking adequate fire protection shall not be approved.

Action 1.2: Require subdivisions and residential, commercial, industrial, and resource extraction development projects, or similar high intensity proposals, to demonstrate the availability of adequate structural fire protection in accordance with Action 1.1. Project approvals shall include a finding that adequate structural fire protection is or will be available.

Action 1.3: Require development projects within the sphere of influence of a fire protection district to annex into the district.

Action 1.4: Require the formation of a fire protection entity for specific plan areas that include residential uses, unless the area is within the Sphere of Influence of an existing local fire protection agency

Policy 2: Require new construction to comply with minimum wildland fire safe standards, including those established for emergency access, signing and building numbering, private water supply reserves for fire use, and vegetation modification, as contained in the County's Fire Safe Regulations.

Action 2.1: Work with the California Department of Forestry to implement the County's Fire Safe Regulations.

Action 2.2: Consider adopting the Uniform Fire Code.

Action 2.3: Request the Mono County Fire Services Association, which consists of the 11 Fire Districts in the County, to review and comment on fire protection plans and major development proposals situated outside existing fire district spheres of influence.

Policy 3: Mitigate fire hazards through the environmental and project review process.

Action 3.1: Consider the severity of natural fire hazards, the potential for damage from wildland and structural fire, the adequacy of fire protection, appropriate project modifications and mitigation measures in the review of projects.

Action 3.2: Refer project proposals to local fire protection districts and the California Department of Forestry for review and comment.

Action 3.3: Require on-site detection and suppression, such as automatic sprinkler systems, where adequate structural fire protection services are not available.

Action 3.4: Regulate the intensity of development in areas lacking adequate structural fire protection. Residential subdivisions proposing parcels of less than forty acres should not be permitted in areas lacking structural fire protection.

Policy 4: Assist fire protection districts in securing adequate funding for capital facilities and ongoing operations to serve new development.

Action 4.1: Assist fire protection districts in the establishment and implementation of appropriate funding sources - such as fees, exactions, charges, and assessments - to enable existing fire districts to annex appropriate areas, and to enable new fire protection districts to be formed.

Action 4.2: Continue to allocate "unmet needs fund" through the augmentation hearing process to assist fire districts, as well as other appropriate special districts, in meeting unmet needs.

Action 4.3: Assist fire protection districts in applying for federal and state funding to enhance their wildland fire protection capabilities; e.g., the BLM's Rural Fire Assistance Program.

Policy 5: Maintain and expand wildland fire education and outreach programs.

Action 5.1: Continue fire prevention property inspections.

Action 5.2: Expand community education and outreach programs that raise awareness of wildfire risks and methods of home hazard reduction (e.g., defensible space, firescaping, hazards mitigation).

Action 5.3: Work with local agencies to promote the use of native plants.

TOWN OF MAMMOTH LAKES POLICIES

OBJECTIVE II.4.A Minimize loss of life, injury, property damage, and natural resource destruction that may result from natural public safety hazards.

Policy

II.4.A.e: Regulate development and ensure that development is initially designed and continues to utilize ongoing maintenance measures to protect people and property from unreasonable risks of wildland and structural fire hazards.

Implementation Measures

II.4.A.e.1

II.4.A.e.2 The Town shall require all new construction to comply with at least the minimum wildland fire-safe standards, including those established for emergency access, signing and building numbering, private water supply reserves for fire use, and vegetation modification.

II.4.A.e.3 The Town shall require adequate structural fire protection, and mitigation of all fire hazards through the environmental and project review process.

II.4.A.e.4 The Fire District should minimize the incidence of structural fires by: a) regular inspections by the Fire District, b) voluntary residential inspections, c) review of new development and remodeling plans in coordination with the Town's Development Review Procedures, and d) institution of public fire education programs.

II.4.A.e.5 The Town shall support the Mammoth Lakes Fire District Master Plan for Fire Protection and assist in the establishment and implementation of appropriate funding sources – such as fees, exactions, charges, and assessments – to facilitate the development of a third fire station and expansion of the Main Street fire station, to construct fire employee housing, and to relocate the training tower.

II.4.A.e.6 The Town shall help assure water supply and water flow sufficient to suppress two or more simultaneous fires through requirements in the Town development code.

II.4.A.e.7 The Town shall review the wildland fire-safe standards and develop additional town-specific policies that further protect people and property from unreasonable risks of wildland and structural fire hazards if necessary.

Policy

II.4.A.f: The ability of the fire department to respond to emergencies shall be sustained.

Implementation Measures

II.4.A.f.1 The Town shall maintain mutual aid agreements with other fire and emergency service agencies for outlying and rural areas of the community.