Clarkdale Multi-Hazard Mitigation Plan

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EXECUTIVE SUMMARY

Town of Clarkdale officials and public servants recognize that natural and human-caused hazards pose a significant threat at varying degrees of magnitude and frequency, to the safety and economic stability of the Town and its residents. Often, the potential reality of hazards within the Town is not fully understood or realized until a major disaster occurs, and then significant resources are required to respond and recover from the damages. Town officials also understand that responding to hazards on a post-incident basis can result in increased costs, in terms of both financial and human losses. Accordingly, Clarkdale has prepared the **Clarkdale Multi-Hazard Mitigation Plan** (CMHMP) to assess the Town's vulnerability to natural and human-caused hazards, and to develop mitigation strategies that reduce the risks associated with those hazards.

This plan is generally arranged and prepared using the template set forth in the State of Arizona's *Model Local Hazard Mitigation Plan* (AzMLHMP). The AzMLHMP, and hence this plan, are prepared to satisfy recent federal requirements set forth by the Disaster Mitigation Act of 2000 (DMA2K). Compliance with these requirements will enable Clarkdale to maintain eligibility for certain federal and state mitigation funds. Seventy-five (75) percent of the funding for the planning process and plan preparation was provided through a planning grant from FEMA. The State of Arizona, through the Arizona Division of Emergency Management (ADEM), provided the matching twenty-five (25) percent of monies to complete the work. JE Fuller/ Hydrology & Geomorphology, Inc. was contracted by ADEM to lead and coordinate the planning effort, prepare the final plan documents, and enter the plan data into the Arizona Hazard Mitigation Planning System (an online, web-based planning tool developed by the State of Arizona).

The overall purpose of DMA2K was to establish a national program for pre-disaster mitigation, streamline administration of disaster relief at both the federal and state levels, and control federal costs of disaster assistance. Congress envisioned that implementation of these new requirements would result in the following key benefits:

- Reduction of loss of life and property, human suffering, economic disruption, and disaster costs.
- Prioritization of hazard mitigation planning at the local level, with an increased emphasis placed on planning and public involvement, assessing risks, implementing loss reduction measures, and ensuring that critical services/facilities survive a disaster.
- Establishment of economic incentives, awareness and education via federal support to state, tribal, and local governments, that will result in forming community-based partnerships,

implementing effective hazard mitigation measures, leveraging additional non-Federal resources, and establishing commitments to long-term hazard mitigation efforts.

In general, the DMA2K legislation requires all local, county, and tribal governments to develop a hazard mitigation plan for their respective communities in order to be eligible to receive certain federal mitigation funds including Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), and Flood Mitigation Assistance Program (FMA) funds.

In satisfying the regulatory requirements of DMA2K, the primary purpose of this plan is to identify natural and human-caused hazards that impact Clarkdale, assess the vulnerability and risk posed by those hazards to community-wide human and structural assets, develop strategies for mitigation of those identified hazards, present future maintenance procedures for the plan, and document the planning process. The CMHMP is divided into six primary sections as follows:

- Section 1 - Introduction
- Section 2 – Jurisdictional Participation Information
- Section 3 – Planning Process Documentation
- Section 4 – Risk Assessment
- Section 5 – Mitigation Strategy
- Section 6 – Plan Maintenance Procedures

Where appropriate, detailed information is documented or provided in appendices. There are also certain data sets pertaining to the Risk Assessment that are deemed “sensitive” by the Town, and are, therefore, made a part of this plan by reference, but are documented in a separate technical binder which will remain at Clarkdale and will not be submitted to FEMA or the State of Arizona for review. General summaries of those specific data are provided in the CMHMP instead.

The planning process used to develop the CMHMP included the assembly of a Yavapai County-wide Multi-Jurisdictional Planning Team (MJPT) that was comprised of members of each incorporated community, Yavapai County and various other public and private entities with interest in the mitigation of hazards. Yavapai County Emergency Management functioned as the primary point of contact and the lead agency for the planning effort. The MJPT primarily focused on the following objectives:

- ✓ Provide a unified approach to informing the public of hazard mitigation planning efforts.
- ✓ Identify, evaluate, prioritize, and profile the types of hazards impacting the County and its communities.
- ✓ Develop general, County-wide hazard mitigation goals and objectives to use as a starting template for each of the individual community plans.
- ✓ Provide a forum for community and inter-agency communication during the development of mitigation actions/projects, especially for those projects that may involve multiple communities.
- ✓ Capitalize on the experience and institutional knowledge base afforded by a cooperative, multi-agency, multi-community team. Many of the MJPT members are long time residents of Yavapai County and the Town of Clarkdale.

One of the key elements to the hazard mitigation planning process is the risk assessment. In performing a risk assessment, a community determines "what" can occur, "when" (how often) it is likely to occur, and "how bad" the effects could be. According to DMA2K, the primary components of a risk assessment that answer the above questions are generally categorized into the following measures:

- ☑ **Identify Hazards**
- ☑ **Profile Hazard Events**
- ☑ **Assess Vulnerability to Hazards**

The risk assessment for Clarkdale was performed using a County-wide perspective, with much of the information input and development being accomplished by the MJPT. The vulnerability analysis was performed in a way that the results reflect vulnerability at an individual community level, and at a County-wide level. Two categories of hazards, natural and human-caused, and a list of hazards for each category, have been identified by the State of Arizona. Beginning with that list, the MJPT used a systematic process that considered relevance, historical significance and experience, and catastrophic potential, to reduce the list to hazards that are most relevant to Yavapai County and the Town of Clarkdale. The following table summarizes the result of that process, with the top ranked hazards indicated by **bold** text. The italicized hazards will not be considered further due to resource limitations; however, the MJPT desired to include them in the list due to their relevance to the community.

Natural Hazards	Human-Caused Hazards
• *Drought* • Earthquake • Extreme Cold/Heat • **Flooding/Flash Flooding** • *Infestations* • Landslides/Mudslides • Monsoon • Subsidence • **Thunderstorm/High Winds** • *Tornados/Dust Devils* • **Wildfires** • *Winter Storms*	• Building/Structure Collapse • Dam/Levee Failure • Explosion/Fire • Fuel/Resource Shortage • **Hazardous Materials Incidents** • Power/Utility Failure • Sabotage • Special Event • **Transportation Accidents**

Profiles were developed for each of the top ranked hazards by researching and mapping historic hazard events, obtaining other hazard mapping, analysis and studies, and in Arizona, estimating the Calculated Priority Risk Index (CPRI) [1]. The other hazards have been generally profiled by the State of Arizona and are referenced accordingly.

A County-wide vulnerability analysis was performed to assess and evaluate the Town's population and critical facility exposure risk to the identified hazards. The risk was tabulated in terms of economic loss estimates and human population exposure. Economic losses include estimates of damage to critical, residential, industrial, and commercial facilities. Critical facilities were individually identified by the MJPT for each community and supplemental residential, commercial, and industrial facility information was obtained from FEMA's HAZUS program. It is estimated that there are at least $227 million dollars[2] worth of critical, residential, industrial, and commercial facilities within Clarkdale and over $18.3 billion County-wide. The 2003 Town population estimate is 3,595. The following table summarizes the general results of the vulnerability analysis for each of the top ranked hazards in the Town.

[1] The CPRI is explained in detail in the State of Arizona's *Model Local Hazard Mitigation Plan*. A digital copy of the plan can be obtained at the following URL or the reader can go to Section 4.2.3 of this plan: http://www.dem.state.az.us/operations/mitigation/MLHMP_Final_No%20Cover.pdf.

[2] This estimate is likely to be course as there were many assets that the community was unable to obtain detailed replacement estimates for given the plan development schedule.

Hazard	Potential Economic Loss [a]	Potential Human Exposure [b]
Flooding	$854,000 million [c]	69
Thunderstorms/High Winds	$1.6 million [c]	3,595
Wildfire	$113 million [c]	3,431
Hazardous Materials Incident	$22,000 [c]	3,439
Transportation Accident	(No losses estimated)	3,595

[a] – These numbers represent estimates of the losses that may be realized assuming the hazard occurs to all facilities within the hazard impact area.

[b] – These numbers represent the total human population potentially exposed to the hazard.

[c] – These numbers represent a collective community or Town-wide exposure. Individual event losses are likely to be a small fraction of these numbers.

The Clarkdale planning team developed a strategy for mitigating the hazard risks identified within the Town summarized in the table. The mitigation strategy provides the "*what, when, and how*" of actions that will reduce or possibly remove the community's exposure to hazard risks, and is generally categorized into the following components:

- ☑ **Capability Assessment**
- ☑ **Goals and Objectives**
- ☑ **Mitigation Actions/Projects**
- ☑ **Implementation Strategy**

The Clarkdale planning team assessed the community's capabilities regarding legal, regulatory, technical/staff, and financial resources, and then worked with the MJPT to develop a set of draft goals and objectives to establish guidelines for the mitigation of hazards in the County and incorporated communities. The Town then further customized the goals and objectives to be specific to Clarkdale's needs. Using the vulnerability analysis, capability assessment, and goals and objectives, the Clarkdale planning team then developed an initial list of mitigation actions/projects, with each action/project being scored based on a perceived value in the categories of social, technical, administrative, political, legal, economic, and environmental considerations.

Goal 1. Promote disaster-resistant future development.

Objective 1.A Update, develop, and support general plans, ordinances, and codes in accordance with state and federal regulations, to limit development in hazard areas or build to standards that will prevent or reduce damage.

Objective 1.B Adopt and support local, state and federal codes that protect assets and new development in hazard areas.

Goal 2. Promote public understanding, support, and demand for hazard mitigation.

Objective 2.A Educate the public to increase awareness of hazards and opportunities for mitigation actions.

Objective 2.B Promote partnerships among the federal, state, counties, local and tribal governments to identify, prioritize, and implement mitigation actions.

Objective 2.C Promote hazard mitigation in the business, residential, and agricultural community.

Objective 2.D Monitor and publicize the effectiveness of mitigation actions implemented community wide.

Goal 3. Build and support local capacity and commitment to become less vulnerable to hazards.

Objective 3.A Improve existing capabilities to warn the public of emergency situations.

Objective 3.B Develop mitigation programs to enhance the safety of the residents of each community during an emergency.

Objective 3.C Establish an evacuation plan and shelter facility for displaced residents in the event of an emergency.

Goal 4. Improve hazard mitigation coordination and communication with federal, state, local, and tribal governments.

Objective 4.A Establish and maintain a close working relationship with federal, state agencies and local and tribal governments.

Objective 4.B Establish and maintain intergovernmental agreements with local and tribal governments.

Goal 5. Reduce the potential level of damage and losses to people, existing and future critical facilities/infrastructure, and other community assets due to floods.

Objective 5.A Implement policies, procedures and regulations which reduce the potential exposure to flood hazards.

Objective 5.B Decrease vulnerability of community assets, especially critical facilities located in the 100-year floodplain.

Objective 5.C Maintain coordination with state and federal flood-related agencies.

Objective 5.D Maintain compliance with the National Flood Insurance Program (NFIP) requirements.

Objective 5.E Promote changes in current regulations to facilitate hazard mitigation.

Objective 5.F Protect life, improved property, and natural resources with vulnerability to the effects of flooding through advanced warning systems.

Goal 6. Reduce the level of human loss and damage and losses to existing and future critical facilities/infrastructure, and other community assets due to wildland fires.

Objective 6.A Develop a comprehensive approach to reducing the level of damage and losses due

to wildland fires.

Objective 6.B Protect life, improved property, and natural resources with vulnerability to the effects of wildland fires.

Objective 6.C Maintain coordination and support existing efforts to mitigate wildland fire hazards.

Objective 6.D Educate the public about wildland fire dangers and mitigation measures.

Objective 6.E Promote changes in current regulations to facilitate hazard mitigation.

Goal 7. Reduce the level of damage and losses to people, existing and future critical facilities/infrastructure, and other community assets due to thunderstorms/high winds.

Objective 7.A Educate the public to the threat of losses due to thunderstorms/high winds.

Objective 7.B Educate/warn the public of actions and precautions to take during thunderstorms/high wind events.

Goal 8. Reduce the potential level of damage and losses to people, existing and future critical facilities/infrastructure, and other community assets due to hazardous materials incidents.

Objective 8.A Develop a comprehensive approach to reducing the level of damage and losses due to hazardous materials incidents.

Objective 8.B Minimize vulnerability to the effects of hazardous materials incidents.

Objective 8.C Educate the public about hazardous materials dangers and mitigation measures.

Goal 9. Reduce the level of damage and losses to people, existing and future critical facilities/infrastructure, and other community assets due to transportation accidents.

Objective 9.A Develop a comprehensive approach to reducing the level of damage and losses due to transportation accidents.

Objective 9.B Protect existing assets with vulnerability to the effects of transportation accidents.

Objective 9.C Coordinate with rail road companies and federal, state, county, and local transportation departments to develop accident mitigation cooperatives and agreements.

Goal 10. Reduce the potential level of damage and losses to people, existing and future critical facilities/infrastructure, and other community assets due to other natural and human caused hazards.

Objective 10.A Develop a comprehensive approach to reducing the level of damage and losses due to other hazards.

Objective 10.B Protect life, improve property, and natural resources with vulnerability to the effects of other hazards.

Using the vulnerability analysis, capability assessment, and goals and objectives, the Clarkdale planning team then developed an initial list of mitigation actions/projects, with each action/project being scored based on a perceived value in the categories of social, technical, administrative, political, legal, economic, and environmental considerations. Once the actions/projects were ranked, an implementation strategy was then developed for each action/project to outline the responsible agency, funding source, completion date, and critical or interim activities for each action/project. The following table summarizes the actions/projects proposed by the Clarkdale planning team.

Name	Primary Goals Addressed	Description
Improve Flood Warning System on Verde River	5.F.1	Install gage and equipment for flood warning system in the Verde River at Tuzigoot Bridge.
Tuzigoot Bridge	5.B.1	Enlarge or replace Tuzigoot Bridge to alleviate traffic and emergency response vehicles during flooding events on the Verde River.
First Responder and Technician Training and Equipment	8.A.1	Through advanced training and use of equipment first responders are better able to identify hazards and protect the public.
Develop Transportation Master Plan	9.A.1	Hire a consultant or develop a Town transportation engineer to develop a Transportation Master Plan to identify transportation hazards in the community.
Property Maintenance Code	7.B.1 (6.E) (1.B)	Adopt International Construction Code Appendix - Property Maintenance Code to help maintain building integrity to prevent injury or loss of life and to mitigate structure damage to existing structures resulting from thunderstorms and high winds.
Targeted Debris Removal and Wildfire Fuel Reduction	5.B.2 (6.B)	Remove overgrowth and debris around washes in the Town including the Verde River. Project to increase river capacity and reduce wildfire hazard.
Enforce Building Codes	7.B.2 (1.B)	Enforce recently adopted International Construction Codes to prevent injury or loss of life and to mitigate structure damage to future structures resulting from thunderstorms and high winds.
Wildfire Fuel Reduction	6.B.1	Conduct wildfire hazard fuel reduction within and surrounding Clarkdale to reduce the risk to existing and new structures.
Adopt Sprinkler Ordinance	3.A.1	Adopt fire protection sprinkler ordinance to protect existing and new structures against potential fire hazards.
Back up Generators	7.B.3	Install back up power systems for critical public services and disaster shelters in the Town.

As a final step in the planning process, plan maintenance procedures were developed by the Clarkdale planning team to establish guidelines for maintaining, reviewing and updating the CMHMP over the next five (5) years. The plan will be reviewed on an annual basis and/or following a major disaster. Each review shall include an evaluation of the following:

- ***Public Involvement*** – Public involvement successes and challenges shall be reviewed and noted, with any recommendations for changes.
- ***Risk Assessment*** – The identified hazards and associated risks shall be evaluated with respect to the previous year's events, and any significant differences shall be noted for possible revision during the next planning cycle.
- ***Mitigation Strategy*** – The proposed A/Ps shall be reviewed and updated regarding status and implementation (i.e. – proposed project is now fully complete). Any changes shall be noted along with the successes and/or challenges associated with the implementation of those projects.

The CMHMP also outlines maintenance responsibilities and continued public involvement activities. Ultimately, the plan will require updating and re-approval from FEMA and the State of Arizona in five years.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

Appendix B: Arizona Department of Commerce 2003 Community Profiles

Appendix C: Public Involvement Records

Appendix D: Glossary of Terms

Appendix E: State of Arizona Hazard Profiles

Appendix F: Detailed Historic Hazard Records

Appendix G: Plan Maintenance Review Memorandums

Appendix H: Supporting Technical Data (PROVIDED UNDER SEPARATE COVER)

SECTION 1: INTRODUCTION

1.1 General Plan Description

Clarkdale officials and public servants understand that natural and human-caused hazards pose a significant threat at varying degrees of magnitude and frequency, to the safety and economic stability of the Town and its residents. Often, the potential reality of hazards within the Town is not fully understood or realized until a major disaster occurs, and then significant resources are required to respond and recover from the damages. Town officials also understand that this practice can result in increased costs, both in terms of financial and human losses. Accordingly, Clarkdale has prepared the **Clarkdale Multi-Hazard Mitigation Plan** (CMHMP) with a desire to become more aware of the Town's vulnerability to natural and human caused hazards, and to develop mitigation strategies that reduce the risks associated with those hazards.

It is important to note that although this plan is meant to be a *multi-hazard* plan addressing both natural and human caused disasters, its primary function is to address mitigation for natural hazards and other environmentally related, human caused events or incidents, recognizing that human involvement can often be attributed to many of the natural hazards addressed in this plan. One human caused hazard generally known as terrorism, is specifically not addressed by this plan with regard to vulnerability, prevention or mitigation of its possible impacts. According to the Model Local Hazard Mitigation Plan[1] (AzMLHMP), the term terrorism is defined as encompassing intentional, criminal or malicious acts involving Weapons of Mass Destruction (WMDs), including biological, chemical, nuclear, and radiological weapons; arson, incendiary, explosive, and armed attacks; industrial sabotage and intentional hazardous material releases; and cyber-terrorism (attacks via computer means). Therefore, while such a terrorist acts may possibly occur, it is not the intent of the CMHMP to analyze vulnerability and provide effective mitigation measures for these specific events. Instead, mitigation for terrorism related hazards is deferred to other planning efforts sponsored by the Federal Department of Justice and the Arizona Office for Homeland Security.

This plan is generally arranged and prepared using the template set forth in the AzMLHMP. The AzMLHMP, and hence this plan, are prepared to satisfy recent federal requirements set forth by the Disaster Mitigation Act of 2000 (DMA2K). This compliance will maintain Clarkdale's eligibility for certain federal and state mitigation funds. Interim Final Rule citations of DMA2K rules are

[1] ADEM, November 2003, *Model Local Hazard Mitigation Plan*, prepared by JE Fuller / Hydrology & Geomorphology, Inc.

provided as appropriate in each section. Following this introductory section, the plan is divided into five primary sections as follows:

- Section 2 – Jurisdictional Participation Information
- Section 3 – Planning Process Documentation
- Section 4 – Risk Assessment
- Section 5 – Mitigation Strategy
- Section 6 – Plan Maintenance Procedures

Where appropriate, detailed information is documented or provided in appendices. There are also certain data-sets pertaining to the Risk Assessment that are deemed "sensitive" by the Town. Those data are a part of this plan by reference, but are documented in a separate technical binder which will remain at the Town of Clarkdale and will not be submitted for FEMA or State of Arizona review. General summaries of those specific data are provided herein instead.

1.2 Plan Purpose and Authority

The Disaster Mitigation Act of 2000 (DMA2K), commonly known as the 2000 Stafford Act Amendments, was approved by Congress on October 10, 2000. Section 322 is the DMA2K amendment[2] to the Stafford Act that primarily deals with hazard mitigation planning as it relates to the development of local hazard mitigation plans. The DMA2K legislation was signed into law by the President on October 30, 2000 (Public Law 106-390). The Interim Final Rule for planning provisions (implemented at 44 CFR Part 201) was initially published in the Federal Register on February 26, 2002. The Interim Final Rule was again published on October 1, 2002 to extend the planning deadline to November 1, 2004. Local hazard mitigation planning requirements are implemented in the Interim Final Rule at 44 CFR Part 201.6.

The overall purpose of DMA2K was to amend the Stafford Act in order to establish a national program for pre-disaster mitigation, streamline administration of disaster relief at both the federal and state levels, and control federal costs of disaster assistance. Congress envisioned that implementation of these new requirements would result in the following key benefits:

- Reduction of loss of life and property, human suffering, economic disruption, and disaster costs.

[2] Section 322 is enacted under Section 104 of DMA2K.

- Prioritization of hazard mitigation planning at the local level, with an increased emphasis placed on planning and public involvement, assessing risks, implementing loss reduction measures, and ensuring that critical services/facilities survive a disaster.
- Establishment of economic incentives, awareness and education via federal support to state, tribal, and local governments, that will result in forming community-based partnerships, implementing effective hazard mitigation measures, leveraging additional non-Federal resources, and establishing commitments to long-term hazard mitigation efforts.

In general, the DMA2K legislation requires all local, county, and tribal governments to develop a hazard mitigation plan for their respective community in order to be eligible to receive certain federal mitigation funds including Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), and Flood Mitigation Assistance Program (FMA) funds.

In addition to satisfying the regulatory requirements of DMA2K, the primary purpose of this plan is to identify natural and human-caused hazards that impact Clarkdale, assess the vulnerability and risk posed by those hazards to community-wide human and structural assets, develop strategies for mitigation of those identified hazards, present future maintenance procedures for the plan, and document the planning process.

Funding for the development of the CMHMP was provided through a grant received from the Federal Emergency Management Agency and matching funds provided by the Arizona Division of Emergency Management (ADEM). JE Fuller/ Hydrology & Geomorphology, Inc. (JEFuller) was hired by ADEM to assist each of the counties and communities to prepare their respective hazard mitigation plans and to enter the plans into the Arizona Hazard Mitigation Planning System (AzHMPS) [3]

1.3 Community Description

1.3.1 Geography

Clarkdale is in the upper watershed of the Verde River located adjacent to and west of the City of Cottonwood. Clarkdale was founded in 1911 and was originally owned by the

[3] AZHMPS is an on-line hazard mitigation planning tool developed by VRisk for ADEM. This system can be accessed by the following URL: https://www.mitigationplan.com

United Verde Copper Company whose residents worked in the nearby smelter[4]. According to the Arizona Department of Commerce[5], Clarkdale was incorporated in 1957.

Clarkdale is located in the northeastern portion of Yavapai County, Arizona, as depicted in Figure 1-1, and is situated at an elevation of 3,550 feet. The Town is geographically located at longitude 112.06 degrees west and latitude 34.76 degrees north, and is 107 miles north of Phoenix and 220 miles northwest of Tucson. State Route 89A passes through Clarkdale and serves as the major roadway servicing the community. The major transportation routes and land features around Clarkdale are shown on Figure 1-2.

1.3.2 Climate

The terrestrial and ecological characteristics of Yavapai County have been mapped into three terrestrial ecoregions[6], which are depicted in Figure 1-3. The Town of Clarkdale is located in the Arizona Mountain Forest terrestrial ecoregion as shown in Figure 1-3. The description of climate and elevation ranges may not be appropriate descriptors for Clarkdale.

> ***Arizona Mountain Forest****… this ecoregion contains a mountainous landscape, with moderate to steep slopes. Elevations in this zone range from approximately 4,000 to 13,000 feet, resulting in comparatively cool summers and cold winters. Vegetation in these areas is largely high altitude grasses, shrubs, brush, and conifer forests.*[6]

[4] Clarkdale's 2002 General Plan, April 2002

[5] Arizona Department of Commerce, 2003, *Community Profile for Clarkdale, Arizona*

[6] URS, 2004, *State of Arizona All Hazard Mitigation Plan*

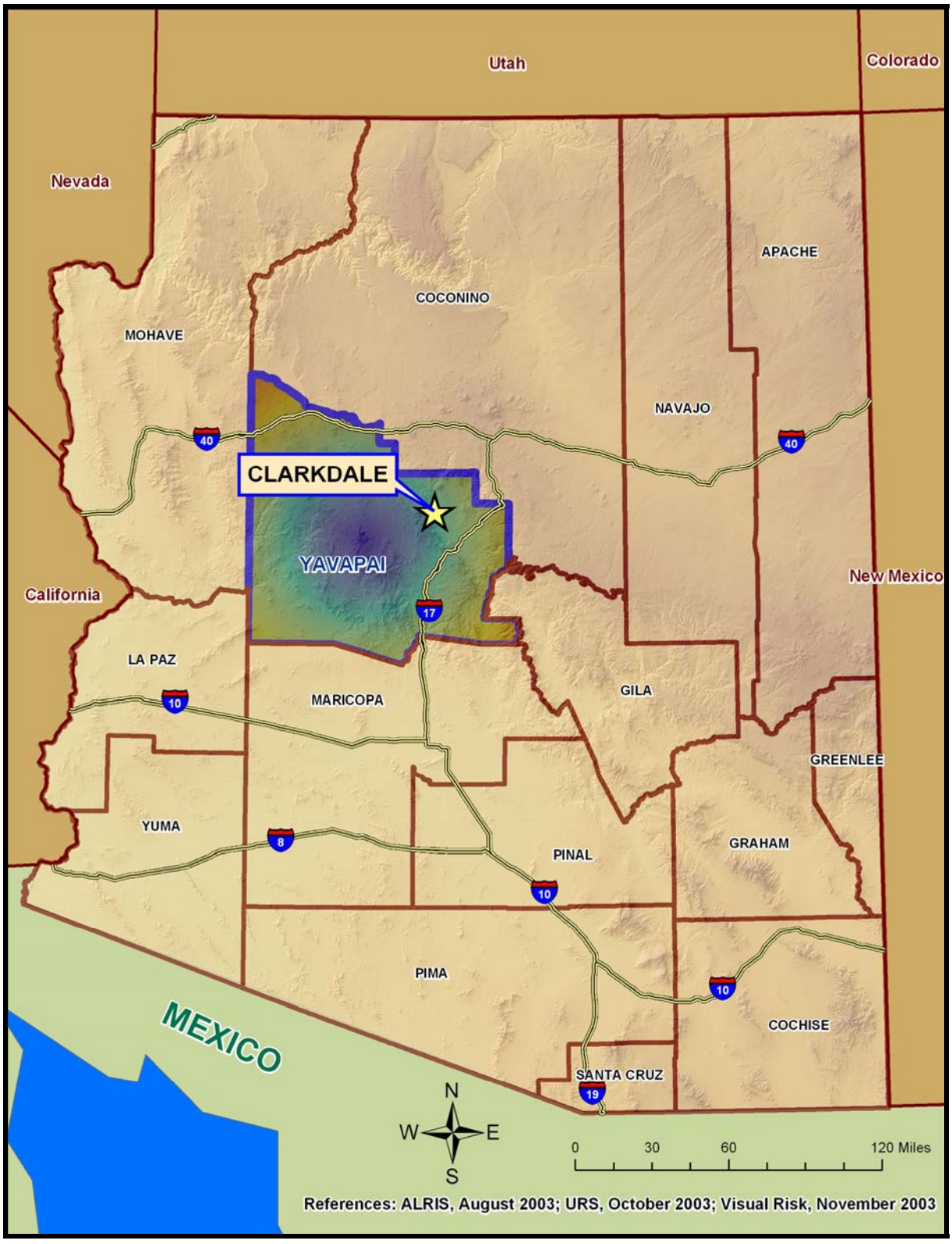


Figure 1-1: Vicinity Map

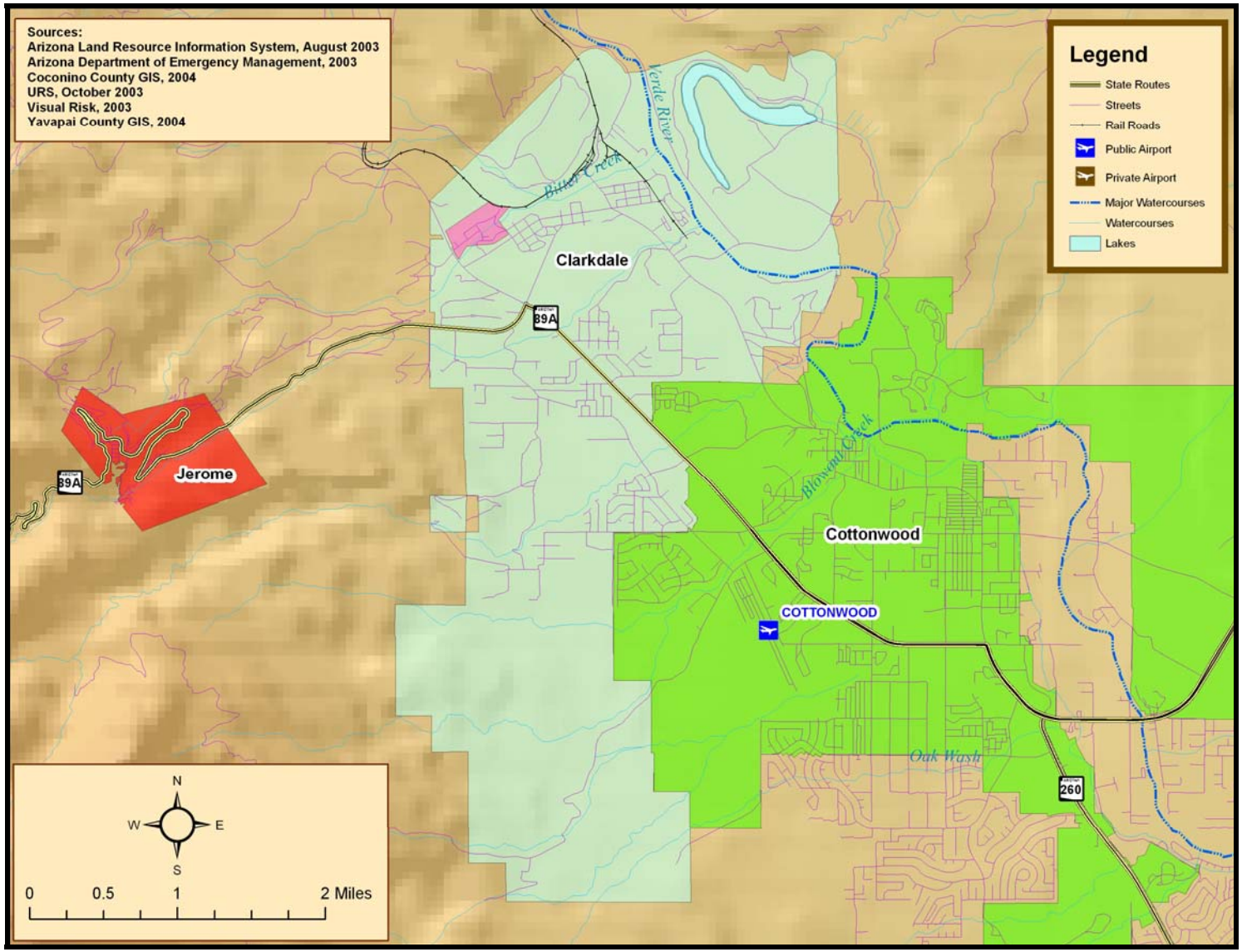


Figure 1-2: Transportation Routes Map

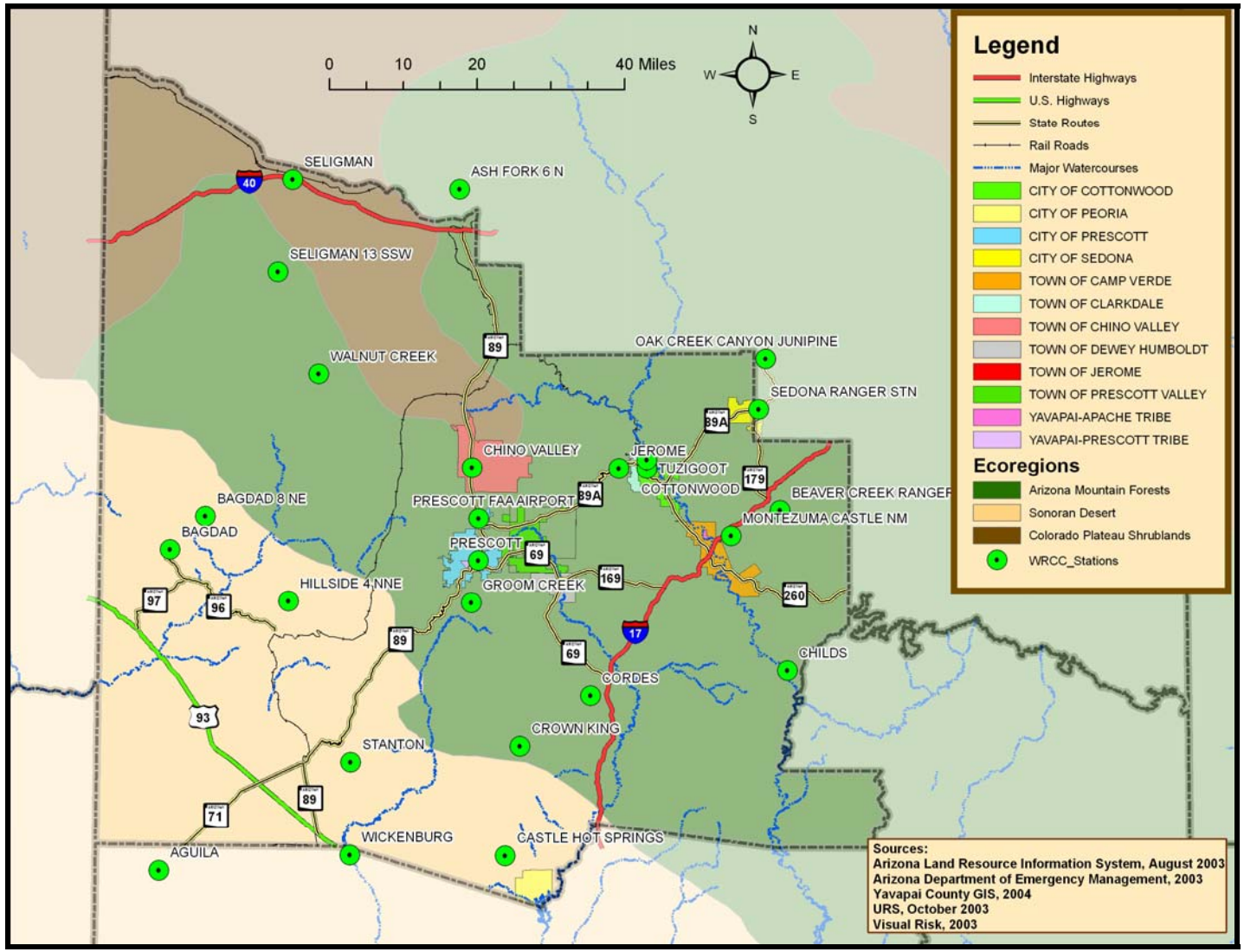


Figure 1-3: Terrestrial Ecoregions Map

Climatic statistics for weather stations within Yavapai County are produced by the Western Region Climate Center[7] and span records dating back to the early 1900's. Locations of reporting stations near Clarkdale are shown on Figure 1-3. Average temperatures for the Tuzigoot reporting station range from near freezing during the winter months to almost 100 degrees Fahrenheit during the hot summer months. Figure 1-4 presents a graphical depiction of temperature variability and extremes throughout the year for the Tuzigoot station, which is situated at an elevation of 3,470 feet within the Clarkdale Town limits.

Precipitation in Clarkdale and throughout Yavapai County is governed to a great extent by elevation and season of the year. From November through March, storm systems from the Pacific Ocean cross the state as broad winter storms producing mild precipitation events including snow in the higher elevations. Summer storms between the months of May and October result in heavy downpours that account for over half of Yavapai County's annual precipitation. Summer monsoons are created when moisture-bearing weather systems move into Arizona from the Gulf of California and from the Gulf of Mexico causing a shift in wind direction. The monsoons are often accompanied by thunderstorms caused by excessive heating of the land surface uplifting moisture-laden air[8]. Figure 1-5 presents tabular temperature and precipitation statistics for the Tuzigoot station.

[7] Most of the data provided and summarized in this plan are taken from the WRCC website beginning at the following URL: http://www.wrcc.dri.edu/CLIMATEDATA.html

[8] Office of the State Climatologist for Arizona, 2004. Partially taken from the following weblink: http://geography.asu.edu/azclimate/narrative.htm

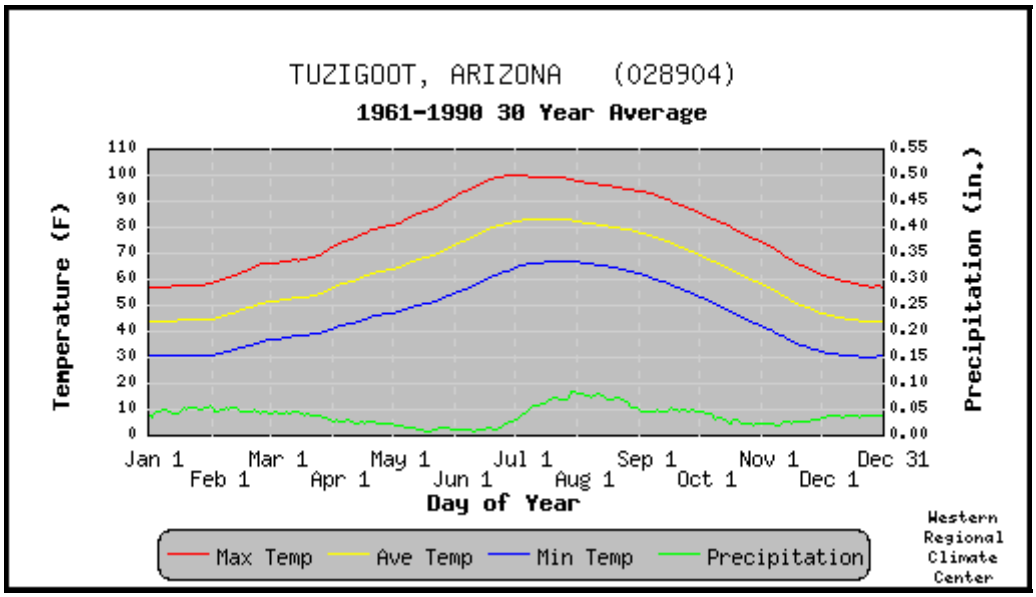


Figure 1-4

Daily Temperatures and Extremes for Tuzigoot, Arizona

TUZIGOOT, ARIZONA (028904)

Period of Record Monthly Climate Summary

Period of Record : 7/ 1/1977 to 9/30/2004

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	59.3	63.3	69.1	77.3	86.9	97.3	99.8	96.9	91.3	80.9	67.9	59.0	79.1
Average Min. Temperature (F)	31.4	34.3	38.8	44.0	51.2	59.4	66.6	65.7	58.9	48.0	36.7	30.5	47.1
Average Total Precipitation (in.)	1.26	1.22	1.27	0.70	0.34	0.24	1.70	2.10	1.58	0.98	0.73	0.97	13.09
Average Total SnowFall (in.)	0.5	0.7	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	1.7
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Percent of possible observations for period of record.
Max. Temp.: 98.9% Min. Temp.: 98.9% Precipitation: 98.8% Snowfall: 98.4% Snow Depth: 98%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

Figure 1-5

Monthly Climate Summary for Tuzigoot, Arizona

1.3.3 Demographics

The Arizona Department of Commerce prepares annual community profiles for individual counties and communities within the state. The 2003 profiles for the Town of Clarkdale and Yavapai County are provided in Appendix B for reference.

The total 2003 population for Clarkdale is estimated at 3,595 [9]. Table 1-1 summarizes population estimates for Clarkdale and other Yavapai County communities in 10-year cycles beginning in 1990 and projecting through 2040.

Table 1-1

Summary of population statistics for Yavapai County and incorporated communities

Jurisdiction	1990	2000	2010	2020	2030	2040
Yavapai County	68,145	167,517	198,052	240,849	278,426	305,681
Camp Verde	6,243	9,451	11,407	14,068	16,318	17,884
Chino Valley	4,837	7,835	10,445	12,771	14,928	16,580
Clarkdale	2,144	3,422	3,932	4,786	5,531	6,067
Cottonwood	5,918	9,179	10,749	15,246	19,053	21,706
Jerome	403	329	686	772	847	901
Prescott	26,592	33,938	42,272	49,863	56,472	61,222
Prescott Valley	8,858	23,535	35,776	46,365	56,427	64,307
Sedona*	7,720	10,192	12,380	14,611	16,546	18,088

Notes: Figures for 1990 and 2000 from Arizona Dept. of Commerce.
Figures for 2010-2040 from AZ Dept of Economic Security with projections dating from 1997.
* - population reflects both portions of the city in Coconino and Yavapai County

Clarkdale's economy developed as a service center for mining. Today, Major public employers include: Clarkdale-Jerome School District, Yavapai College, and the Town of Clarkdale. Major private employers include: Bent River Machine, Phoenix Cement, Wolf Insulation, Mold in Graphic Systems, and Verde Canyon Railroad. The civilian labor force in 2003 was 1,601 with an unemployment rate of 4.4 percent.

[9] Arizona Department of Economic Security, 2004, *July 1, 2003 Population Estimates for Arizona's Counties, Incorporated Places, and Balance of County Areas*

1.3.4 Development History

Processing the ore from the mine in Jerome, the Town of Clarkdale began near the Clarkdale Smelter in 1911. Clarkdale was built from a unified master plan intended to include all typical parts of a comprehensive planned small town. As a result of the Clarkdale Smelter, Clarkdale was ahead of other western towns with modern amenities. Mining operations shut down in 1953 however today, many of the old mining and smelter facilities still stand.

More recently, the population of Clarkdale went from 2,144 in 1990 to 3,595 in 2003. New housing permits went from 77 for 1990 to 93 for 2000. Taxable sales increased over 250 percent from 1990 to 2003. Future development within the Town of Clarkdale will most likely continue to grow on the outskirts of Cottonwood.

SECTION 2: JURISDICTIONAL PARTICIPATION INFORMATION

The following section provides a summary of key contact information for the Town's hazard mitigation planning primary point of contact and primary promulgation authorities.

2.1 Primary Point of Contact

The primary and secondary points of contact for the Clarkdale Multi-Hazard Mitigation Plan are summarized below:

Primary POC:
Sharry Bailey
Town of Clarkdale
Community Development Planning Director
P. O. Box 308
Clarkdale, Arizona 86324
Office Phone: 928-649-3538
Fax: 928-634-0407
Email: sherryb@clarkdale.az.us

Secondary POC:
Tommy Nester
Town of Clarkdale Police Officer/Emergency Services Coordinator
P. O. Box 308
Clarkdale, Arizona 86324
Office Phone: 928-634-7240
Fax: 928-634-1679
Email: cdpd@clarkdale.az.us

DMA2K Citation

Requirement §201.6(c)(1):

[The plan shall include…:] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

2.2 Promulgation Authority Information

Members of the Clarkdale Town Council that are primarily responsible for promulgation of the Town of Clarkdale Multi-Hazard Mitigation Plan include:

- Mayor Doug Von Gausig
- Vice Mayor Jerry Wiley
- Council Person Frank Sa
- Council Person Tim Wills
- Council Person Pat Williams

SECTION 3: PLANNING PROCESS DOCUMENTATION

DMA2K has placed a high degree of emphasis on the planning process in the development of local hazard mitigation plans. The purpose of Section 3 is to describe and document the plan development, selection of the planning team, public involvement strategies, successes and challenges, and general timeframes of events and milestones. Planning team selection and activities will be documented in Section 3.1. Public involvement processes and activities shall be documented in Section 3.2. Other planning processes are summarized in subsequent sections as they relate to the particular element being discussed.

DMA2K Citation

Requirement §201.6(c)(1):

[The plan shall include…:] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

3.1 Planning Teams

3.1.1 Planning Team Assembly

The planning process used to develop the YCMHMP included the assembly of a Multi-Jurisdictional Planning Team (MJPT) that was comprised of members of each incorporated community and various other public and private entities with interest in the mitigation of hazards. The Arizona Division of Emergency Management and JE Fuller/Hydrology & Geomorphology, Inc. (JEF) initiated the planning process with a kick-off meeting on September 9, 2004, wherein a general outline and schedule for the planning process was presented to key emergency management officials from Apache, Cochise, Gila, Greenlee, La Paz, Navajo, Santa Cruz, and Yavapai Counties. The purpose of the MJPT approach was to provide a holistic and united approach to hazard mitigation planning for all of the communities participating, and to share

DMA2K Citation

Requirement §201.6(b)(2):

[The planning process shall include:] An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process.

data and resources for developing local hazard mitigation plans. The Yavapai County MJPT met on a regular basis to discuss various aspects of the planning elements and the overall plan progress. Documentation of those meetings and agendas are further discussed later in this section. A subset of this planning team, comprised solely of Clarkdale staff, performed the detailed and focused plan development. Table 3-1 lists the individuals that participated at varying levels on the MJPT. Table 3-2 summarizes the individuals from the Town staff primarily responsible for developing this plan.

Table 3-1

Summary of multi-jurisdictional planning team members

Name	Agency/Organization/Company	Title
Nick Angiolillo	Yavapai County Public Works Emergency Management	Coordinator
Kenneth Spedding	Yavapai County Development Services	Development Services Director Floodplain Administrator
Darlene Trammell	ADEM	Local Hazard Mitigation Program Manager
David Smith	Town of Camp Verde	Marshal
Bill Lee	Town of Camp Verde	Town Manager
Dee Barnes	Chino Valley Police Department	Sergeant/Emergency Operations Coordinator
Bill Pupo	Town of Chino Valley	Town Manager
Sherry Bailey	Town of Clarkdale	Community Development Planning Director
Tommy Nester	Clarkdale Police Department	Officer/Emergency Services Coordinator
Mike Casson	City of Cottonwood Fire Department	Fire Chief
Tim Costello	City of Cottonwood	Public Works Director
Michael Butcher	Town of Jerome Fire Department	Fire Chief
Terez Storm	Town of Jerome Fire Department	Assistant
Darrell Willis	City of Prescott Fire Department	Fire Chief
Paul Laipple	City of Prescott Fire Department	Deputy Chief
Daniel Schatz	Town of Prescott Valley Police Department	Chief of Police
Larry Tarkowski	Town of Prescott Valley	Town Manager
Cullen Hollister	City of Sedona Department of Public Works	Assistant Director of Public Works Assistant City Engineer
Dana Cole	City of Sedona Department of Public Works	Assistant Engineer
Lisa Terry	Yavapai-Prescott Tribe	Environmental Specialist
Abigail Platero	Yavapai-Prescott Tribal Police	Police Chief

Table 3-2

Summary of Clarkdale staff involved in plan development

Name	Agency/Organization/Company	Title
Sherry Bailey	Town of Clarkdale	Community Development Planning Director
Don Eberle	Clarkdale Fire Department	Fire Chief
Normalinda Zuniga	Town of Clarkdale Community Development Department	Planner
Steve Burroughs	Town of Clarkdale	Public Works Manager
Tom Nester	Clarkdale Police Department	Emergency Director

3.1.2 Planning Team Activities

The MJPT primarily focused on the following objectives:

- ✓ Provide a unified approach to informing the public of hazard mitigation planning efforts.
- ✓ Identify, evaluate, prioritize, and profile the types of hazards impacting the County and its communities.
- ✓ Develop general, County-wide hazard mitigation goals and objectives to use as a starting template for each of the individual community plans.
- ✓ Provide a forum for community and inter-agency communication during the development of mitigation actions/projects, especially for those projects that may involve multiple communities.
- ✓ Capitalize on the experience and institutional knowledge base afforded by a cooperative, multi-agency, multi-community team. Many of the MJPT members are long time residents of Yavapai County.

The Yavapai County MJPT originally met for the first time on October 27, 2004. In that meeting, the overall requirements of DMA2K were presented and discussed. Also during that meeting, a tentative work plan and schedule were developed following guidelines set forth in the *Arizona Model Local Hazard Mitigation Plan* and the various FEMA "How-To" documents[10]. Subsequent meetings followed that initial work plan.

In general, the planning team meetings involved some level of either brainstorming ideas, evaluating the results of the previously assigned work tasks, or deciding upon a

[10] See the Bibliography in Appendix A for a listing of these materials.

planning direction or strategy. Assignments were usually given at each meeting. Table 3-3 summarizes the MJPT meeting dates, agenda items, and a summary of the meeting highlights. Copies of the sign in sheets for each meeting are provided in Appendix C.

Table 3-3

Summary of multi-jurisdictional meeting dates and activities

Meeting Date	Agenda Items	Summary of Highlights
September 9, 2004	• Introductions • Disaster Mitigation Act of 2000 Overview • Overview of MHMP • Scope and Schedule • MJPT Functions and Roles • Initial Assignments	☑ Discussed the DMA2K legislation and requirements ☑ Discussed the MHMP process ☑ Developed a work plan and planning schedule ☑ Assigned the tasks for next month: ▪ Establish MJPT for each county ▪ Plan first county MJPT meeting
October 27, 2004	• Introductions • Disaster Mitigation Act of 2000 Overview • Scope and Schedule • Planning Team Role and Responsibilities • Public Involvement Strategy • Hazard Assessment Introduction • Hazards and Their Identification • Community Asset Identification • Assignments	☑ Developed a work plan and planning schedule ☑ Brainstormed various public involvement opportunities ☑ Brainstormed additional MJPT invitees ☑ Generated an exhaustive list of natural and human-caused hazards that might potentially impact Yavapai County ☑ Presented and discussed results of historic hazard research ☑ Brainstormed historic hazard events for hazard profiling ☑ Assigned the tasks for the next month: ▪ Research and compile historic hazard data ▪ Collect digital GIS and CAD mapping if available ▪ Review CPRI Evaluation
December 7, 2004	• Public Involvement Strategy • Historic Hazard Research • Finalize CPRI Hazard Assessment • Select Top 5 Hazards for Vulnerability Analysis • Community Asset Inventory • Capability Assessment • Assignments	☑ Brainstormed various public involvement opportunities and assigned tasks ☑ Reviewed historic hazard events for hazard profiling ☑ Completed CPRI Hazard Assessment and selected the Top 5 Hazards ☑ Discussed asset inventory data requirements and procedure ☑ Discussed capability assessment ☑ Assigned the tasks for the next month: ▪ Collect digital GIS and CAD mapping if available ▪ Begin gathering asset inventory data ▪ Complete capability assessment ▪ Begin building hazard profile maps ▪ Set asset inventory meeting dates

Individual Clarkdale meetings were conducted to discuss the specific details of each local community hazard mitigation plan. The Clarkdale meetings involved identifying community assets and local hazards, discussing public involvement activities and developing goals and objectives for each community. Table 3-4 summarizes the individual meeting dates, agenda items, and a summary of the meeting highlights. Copies of the sign in sheets for each meeting are provided in Appendix C.

Table 3-4

Summary of Clarkdale meeting dates and activities

Meeting Date	Agenda Items	Summary of Highlights
January 18, 2005	• Asset Inventory	☑ Discussed the asset categories recommended ☑ Discussed data required for each asset for use in the vulnerability analysis and in the Arizona Hazard Mitigation Planning System ☑ Discussed asset data already obtained from various sources and requested additional data that may exist
April 20, 2005	• Asset Inventory • Hazard Profiles • Plan Maintenance Procedures	☑ Reviewed Asset Inventory and verified locations ☑ Reviewed Hazard Profiles to be used in the vulnerability analysis ☑ Discussed plan maintenance requirements after the plan is complete and adopted
October 3, 2006	• Review & progress check ✓ Asset inventory ✓ Capability assessment • Mitigation actions/projects ranking and implementation strategy • Assignments	☑ Discussed vulnerability analysis preliminary results and delays ☑ Based on schedule concerns, the MJPT collectively decided to move forward with mitigation strategy planning, even though the vulnerability analysis was not finalized ☑ Developed and discussed mitigation actions/projects ☑ Presented the STAPLEE strategy for ranking projects ☑ Presented and discussed data requirements for implementation strategy ☑ Assigned the following tasks for the next month: ▪ Complete Asset Inventory Information ▪ Complete Mitigation actions/projects identification, ranking and implementation strategy.

3.2 Public Involvement

An important and valuable aspect of the planning process is public involvement. Members of the community, not specifically participating on the planning team or employed by the community, can prove to be great assets to the hazard mitigation planning process in

many ways. The Clarkdale planning team employed the following strategies to solicit public involvement and input to the planning process:

- Advertised a public meeting with several annnouncements on local radio stations and sent press releases to local newspapers including Verde Independent, Camp Verde Bugle, Sedona Red Rock News, Cottonwood Journal Extra
- Provided information and interactive discussion at a HMP public meeting for Verde Valley Towns and Cities on March 10, 2005
- Developed a FAQ brochure to post on the Town website. (http://www.clarkdale.az.us/communitydevelopmentdept.html)
- Requested public participation in the public hearing process mandated by state law for city/town councils to be able to adopt the promulgation resolution.

DMA2K Citation

Requirement §201.6(b)(1):

[The planning process shall include:] An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval

Copies of the various public announcements and postings, and a copy of the public meeting brochure distributed are provided in Appendix C.

The public hearing for final approval of the plan was convened on ???. No written responses or formal comments were received from the general public during the course of the planning effort.

SECTION 4: RISK ASSESSMENT

One of the key elements to the hazard mitigation planning process is the risk assessment. In performing a risk assessment, a community determines "what" can occur, "when" (how often) it is likely to occur, and "how bad" the effects could be[11]. According to DMA2K, the primary components of a risk assessment that answer these questions are generally categorized into the following measures:

- ☑ **Identify Hazards**
- ☑ **Profile Hazard Events**
- ☑ **Assess Vulnerability to Hazards**

DMA2K Citation

Requirement §201.6(c)(2):

[The plan shall include:…] A risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.

The risk assessment for Clarkdale was performed using a County-wide perspective, with much of the information input and development being accomplished by the MJPT. The vulnerability analysis was performed in a way that the results reflect vulnerability at an individual community level, and at a County-wide level.

4.1 Hazard Identification

Hazard identification is the process of answering the question; *"What hazards can occur in my community or jurisdiction?"* Hazards impacting the County can be placed into two general categories, Natural and Human-Caused. Table 4-1 is a comprehensive, alphabetical listing of specific hazard types sorted by category. Each hazard has been identified by the State of Arizona All Hazard Mitigation Plan, which is herein referred to as the State Plan (URS, 2004) as a potential threat to Arizona communities. Yavapai County and the communities located within used this list as a starting

DMA2K Citation

Requirement §201.6(c)(2)(i):

[The risk assessment shall include:…] A description of the type, location, and extent of all natural hazards that can affect the jurisdiction.

[11] National Fire Protection Association, 2000, *Standard on Disaster/Emergency Management and Business Continuity Programs*, NFPA 1600.

Table 4-1

Summary of natural and human-caused hazard threats to Arizona communities

Natural Hazards	Human-Caused Hazards
• Avalanche • Drought • Dust/Sand Storms • Earthquake • Extreme Cold and Heat • Flooding/Flash Flooding • Infestations • Liquefaction • Landslides/Mudslides • Monsoon • Radon • Subsidence • Thunderstorm/High Winds • Tornados/Dust Devils • Tropical Storms/Hurricane • Volcanoes • Wildfires • Winter Storms	• Arson • Biological Hazards • Building/Structure Collapse • Civil Disobedience • Civil Disturbance • Civil Unrest • Dam/Levee Failure • Enemy Attack • Explosion/Fire • Extreme Air Pollution • Fuel/Resource Shortage • Hazardous Materials Incidents • Hostage Situation • Hysteria (Mass) • Power/Utility Failure • Radiological Accident • Sabotage • Special Event • Strike • Transportation Accident • Terrorism

point for the hazard identification process. Detailed definitions for each of these hazards are provided in the Glossary of Terms in Appendix D.

As previously discussed, the primary purpose of this hazard mitigation plan is to address natural hazards, and although many of the hazards identified in the human-caused category may certainly pose a risk to the communities within Yavapai County, the mitigation focus of the MJPT and Town of Clarkdale officials was primarily natural hazards and those human-caused hazards with a perceived significant potential to impact the environment. Also, the MJPT recognized that schedule, budget and resources also limited the team's ability to completely analyze all potential hazards, therefore, many of the human-caused hazards were eliminated from further consideration for this planning effort. A final list of hazards, summarized in Table 4-2, was developed using a systematic process of elimination that considered relevance, historical significance and experience, and

Table 4-2

Summary of natural and human-caused hazards most significant to Clarkdale and Yavapai County

Natural Hazards	Human-Caused Hazards
• *Drought* • Earthquake • Extreme Cold/Heat • **Flooding/Flash Flooding** • *Infestations* • Landslides/Mudslides • Monsoon • Subsidence • **Thunderstorm/High Winds** • *Tornados/Dust Devils* • **Wildfires** • *Winter Storms*	• Building/Structure Collapse • Dam/Levee Failure • Explosion/Fire • Fuel/Resource Shortage • **Hazardous Materials Incidents** • Power/Utility Failure • Sabotage • Special Event • **Transportation Accidents**

catastrophic potential. The hazards given top ranking by the MJPT are indicated by **bold** text. The italicized hazards will not be considered further due to resource limitations; however, the MJPT desired to include them in the list due to their relevance to the community.

4.2 Hazard Profiles

Hazard profiling answers the question; "How bad can it get?"[12] Developing a hazard profile includes researching and mapping historic hazard events, obtaining other hazard mapping, performing analysis and studies, and in Arizona, estimating the parameters used to establish the Calculated Priority Risk Index (CPRI) for each hazard considered.

The State Plan has documented hazard profiles for the following natural and human-caused hazards[13]:

- Dam Failure
- Disease
- Drought
- Earthquake
- Extreme Heat
- Flood
- Hail
- Hazardous Material (HAZMAT)
- Landslide
- Lightning
- Severe Winds
- Subsidence
- Terrorism
- Thunderstorm
- Tornado
- Tropical Cyclone
- Wildfire
- Winter Storm

[12] FEMA, 2001, *Understanding Your Risks; Identifying Hazards and Estimating Losses*, FEMA 386-2.

[13] URS, 2004, *State of Arizona All Hazard Mitigation Plan*

Copies of those profiles and descriptions are included in Appendix E for reference. The information provided herein is intended to build upon those data sets and further describe the hazard profiles for the top ranked Yavapai County hazards.

4.2.1 Historic Hazard Events

Research and mapping of historic hazard events is an important part of the hazard profiling process. These events not only establish a historic basis for mitigating the hazard, but also provide real-world estimates of the economic and human impacts of the hazard. Historic event data with a significant period of record can also be useful in developing probability statistics.

DMA2K Citation

Requirement §201.6(c)(2)(i):

[The risk assessment shall include:…] A description… jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

The State of Arizona, in the development of its hazard mitigation plan, compiled a list of historic hazard events for communities across Arizona. The MJPT researched local records and governmental databases to update and add new records of recent hazards to the state compiled list. The list was also divided into two data sets. One data set summarizes historic hazard event and loss data that could be solely attributed to Yavapai County. The other data set summarizes general statewide or multi-county, large-scale declarations that included Yavapai County. The general data set's reported losses include counties other than Yavapai, and therefore, could not be attributed solely to Yavapai County. The state's criteria for including a historic hazard event were:

- ✓ Reported damages of $50,000 or more
- ✓ At least one injury and/or fatality
- ✓ Historically significant event

Additional hazards records were researched using the same criteria, with the exception that all damages greater than $1 were included. Table 4-3 summarizes the results of the historic hazard research. The top hazards selected by the MJPT are indicated by bold type. Detailed listings of the summarized hazards are provided in Appendix F.

When reviewing Table 4-3, the reader should keep in mind that the numbers reported reflect the availability of such data from the sources researched, and that in reality it is

Table 4-3

Summary of historic hazard research for Yavapai County

	Statewide or Multiple County Declarations That Included Yavapai County Communities				Substantially Yavapai County Communities			
	No. of	Recorded Losses			No. of	Recorded Losses		
Hazard	Records	Fatalities	Injuries	Damage Costs ($)	Records	Fatalities	Injuries	Damage Costs ($)
Civil Disturbance	1	0	0	$311,000	0	0	0	$0
Dam/Levee Failure	0	0	0	$0	2	150	0	$0
Drought	67	0	0	$300,291,000	0	0	0	$0
Earthquake	0	0	0	$0	3	0	0	$0
Extreme Cold or Heat	1	0	0	$0	0	0	0	$0
Flooding/Flash Flooding	**15**	**19**	**115**	**$1,599,569,000**	**62**	**0**	**2**	**$12,175,000**
Hazardous Materials Incident	**3**	**0**	**0**	**$493,000**	**17**	**0**	**8**	**$155,000**
Infestation	12	0	0	$1,042,000	0	0	0	$0
Miscellaneous	4	0	0	$230,000	0	0	0	$0
Power/Utility Failure	2	0	0	$222,000	0	0	0	$0
Strike	1	0	0	$0	1	0	0	$8,000
Terrorism	2	0	0	$3,008,000	0	0	0	$0
Tornados/Dust Devils	0	0	0	$0	37	0	8	$312,000
Thunderstorm/High Winds	**6**	**0**	**0**	**$7,050,000**	**161**	**0**	**3**	**$19,188,000**
Transportation Accident	**0**	**0**	**0**	**$0**	**5**	**2**	**0**	**$453,000**
Tropical Storms/Hurricane	9	37	975	$767,428,000	0	0	0	$0
Wildfire	**17**	**0**	**0**	**$3,115,000**	**170**	**0**	**0**	**$4,823,000**
Winter Storm	17	9	5	$2,520,000	0	0	0	$0

expected that the numbers significantly under-predict the losses actually sustained over the past 30 to 40 years. A more thorough search for historic data in future planning efforts is warranted; however, for this first round of planning, the data sets can be considered representative.

4.2.2 Hazard Descriptions

The following are general summaries of the top hazards (those shown in **bold** print in Table 4-2) chosen by the MJPT as the most relevant and significant hazards impacting Yavapai County. Refer to the descriptions in Appendix E for summaries of the other hazards listed.

DMA2K Citation

Requirement §201.6(c)(2)(i):

[The risk assessment shall include:…] A description of the type, location, and extent of all natural hazards that can affect the jurisdiction.

Flooding/Flash Flooding – Flooding or flood related events are the number two hazard impacting Clarkdale and the rest of Yavapai County, as documented in Table 4-3. Damaging floods in Clarkdale can be primarily categorized as either riverine or local area flows. Riverine flooding occurs along the established watercourses when the bankfull capacities are exceeded by storm runoff or snowmelt. Erosion is also often associated with damages due to flooding. Local area flooding is often the result of poorly designed or planned development wherein natural flowpaths are altered or obliterated and localized flooding problems result. The following are highlights of the more prominent flooding events impacting Clarkdale and Yavapai County:

- In December 2004-January 2005, flooding occurred in multiple northern Arizona Counties. Flooding along the Verde River peaked at over two feet above flood stage in Clarkdale. Bridgeport and Cottonwood were similarly affected. Precipitation and snow melt in the Oak Creek watershed caused flooding more than a foot above floodstage in Sedona. Yavapai County had extensive flooding that overtopped roads and left many residents stranded in their homes. A Presidential Disaster was declared, releasing federal funds of approximately $3.2 million for Yavapai County. Source: Declaration Request Letter from Governor Janet Napolitano, January 27, 2005.
- In February 2005, flooding occurred in multiple northern Arizona counties. The Verde River and Williamson Valley Wash were heavily impacted by heavy rainfall on snowpack that resulted in evacuations, rescues, isolated communities, and extraordinary damage. Yavapai County received extensive flooding and road damages. The Wineglass subdivision in Paulden was completely cuttoff for over 10

days by floodwaters overtopping the three access roads. A Yavapai County Detention Facility was isolated for five days, denying parolees' access for mandatory check in. A Presidential Disaster was declared, releasing federal funds of approximately $2.0 million for Yavapai County. Source: Declaration Request Letter from Governor Janet Napolitano, March 18, 2005.

- In Janunary-February 1993, heavy rain fell over most of north, central and southeastern Arizona, resulting in significant flooding along most major watercourses. Yavapai County experienced considerable damages and resulted in loss of power, phone and roadway access. According to the USACE Flood Damages Report, Yavapai County had in excess of $10 million in public and private losses due to flooding damages. The flooding prompted a federal disaster declaration for almost the entire state. Source: USACE Flood Damages Report [14].
- In February 1980, severe flooding in central Arizona occurred, resulting in record discharges gauged in Metro Phoenix on the Verde, Agua Fria and Gila Rivers, as well as on Oak Creek in north central Arizona. Precipitation during this period measured at Crown King in the Bradshaw Mountains was 16.63 inches. Heavy to light rainfall from fell between February 13th and the 22nd. Extensive damage to roads and bridges occurred. Flooding occurred on rivers including the Upper and Lower Verde, Upper Agua Fria, New River, Upper Centennial, and the Upper Hassayampa. Source: National Climatic Data Center, January 2003, Storm Event Database.

For the purposes of this plan, the depiction and severity of flood hazard for Clarkdale is based on the 100-year floodplains delineated on Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM). The Yavapai County Development Services - Flood Control District (FCD) has numerous floodplain delineation maps on file that were prepared for various area drainage master studies or other non-FEMA related purposes. The FCD uses these maps when appropriate to aide in the development review process. These non-FEMA related floodplains were also included in the vulnerability analysis.

Two designations of flood hazard are used, with “high” hazard areas being any “A” zone and “medium” flood hazard being either a “B” or “Shaded X” zones. All “A” zones (i.e. – A, A1-99, AE, AH, AO, etc.) represent areas with a one percent (1%) probability of being flooded at a depth of one-foot or greater in any given year. All “B” or “Shaded X” zones represent areas with a 0.2 percent (0.2%) probability of being flooded at a depth of one-foot or greater in any given year. These two storms are often referred to as the 100-year and 500-year storm, respectively. Figure 4-1 presents a map of Clarkdale with the flood hazards shown.

[14] US Army Corps of Engineers, Los Angeles District, 1994, *Flood Damage Report – State of Arizona – Floods of 1993*

Verde River
Bitter Creek
Yavapai-Apache Reservation
Deception Gulch
Jerome
89A
Blowout Creek
Clarkdale
Cottonwood
Oak Wash

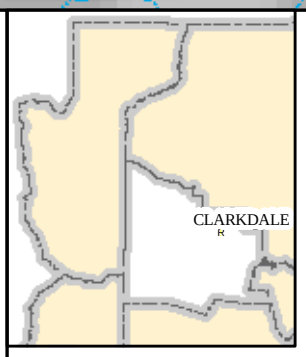
CLARKDALE MULTI-HAZARD MITIGATION PLAN

Legend

- Interstate Highways
- State Routes
- U.S. Highways
- Rail Roads
- Lakes

Flood Hazards

- High
- Medium
- Major Watercourses



N

0 1,500 3,000 6,000
Feet

Sources:
Arizona Land Resource Information System, August 2003
Arizona Department of Emergency Management, 2003
Yavapai County GIS, 2004
URS, October 2003
Visual Risk, 2003

Figure 4-1
Flood Hazard Map
for Clarkdale

JE FULLER
HYDROLOGY & GEOMORPHOLOGY, INC.

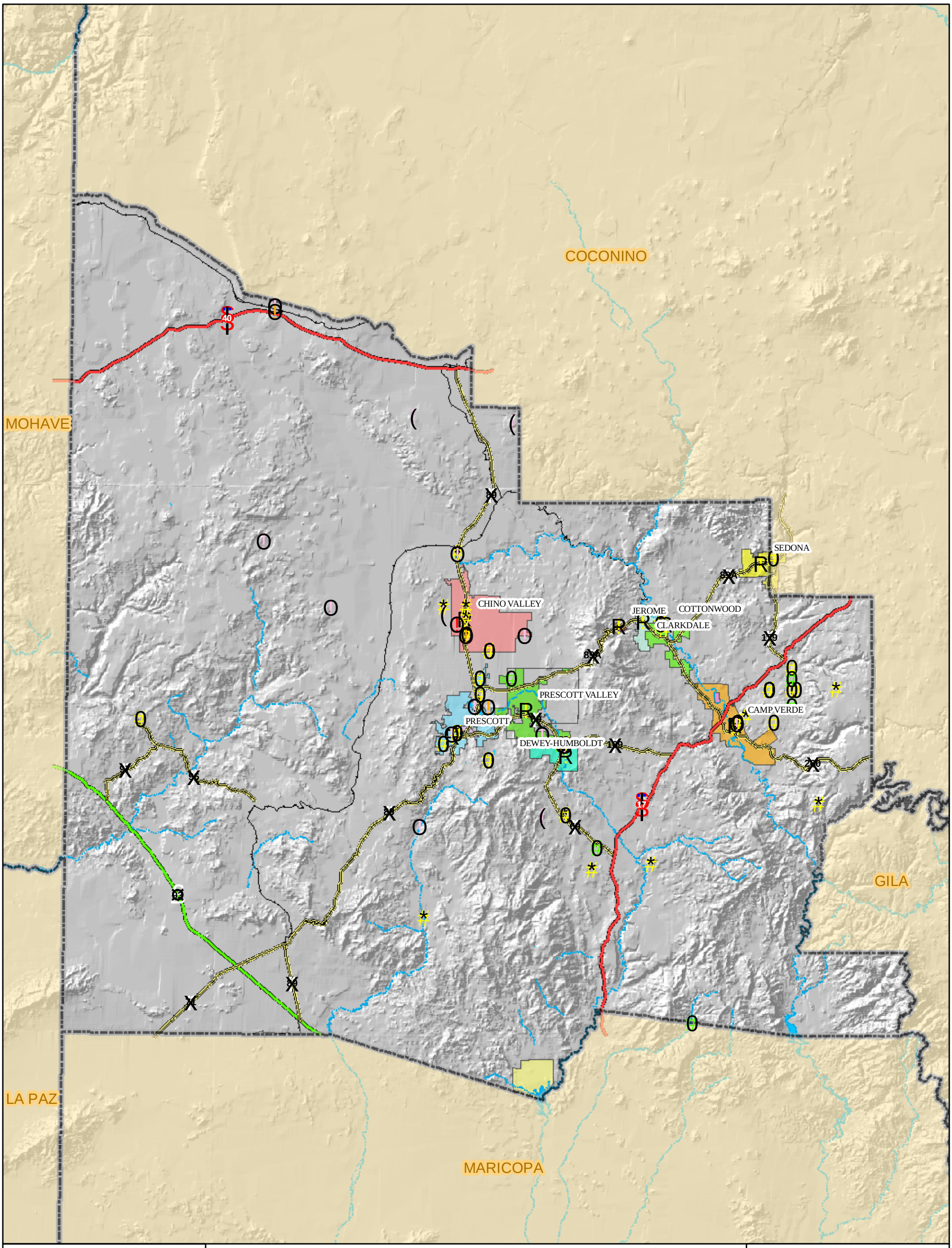
Thunderstorms/High Winds – Thunderstorms, High Winds and related events are the number one hazard impacting Clarkdale and Yavapai County, as documented in Table 4-3. Hazards most typically associated with thunderstorms include lightning, microbursts, hail, dust and sand storms, tornados, and flooding. Flooding hazards have been discussed in the previous section. Specific and detailed profiles of the remaining elements are provided in Appendix E. As indicated in Table 4-3, recorded damages due to the non-flood related aspects of thunderstorms within Yavapai County have caused a total of at least $19.2 million in damages and at least 3 reported injuries. The following are highlights of the more prominent non flood related thunderstorm events impacting Clarkdale and Yavapai County:

- In August 2000, a powerful thunderstorm moved through the Verde Valley with strong wind, hail, and funnel clouds. A funnel cloud was reported by a weather spotter in Camp Verde. Another funnel cloud was reported 1/2 mile southeast of the Cottonwood airport. A strong wind blew down power lines and damaged roofs in Camp Verde, Cottonwood, and in Lake Montezuma. The wind tore off a patio deck in Cottonwood. Three-quarter inch hail was reported in Clarkdale. Winds were measured at 53 knots. Source: National Climatic Data Center, January 2003, Storm Event Database.
- In September 1999, a stationary trough of low pressure centered over Nevada introduced strong westerly vertical shear combined with monsoon moisture to produce several instances of severe weather across Yavapai County over 2 days. Hail did significant damage in Prescott Valley and in Dewey, with newspaper accounts indicating widespread damage to cars and skylights. Insurance claims from the severe weather totaled approximately $18 million dollars. Two people were injured by the 1.75 inch diameter hail. The largest hail was reported 10 miles northeast of Prescott at 2.75 inches in diameter. Lightning started a house fire in Cottonwood. Winds measured at 52 knots in Dewey. Funnel clouds were spotted east of Chino Valley, northeast of Prescott, in Prescott Valley and Dewey. Source: National Climatic Data Center, January 2003, Storm Event Database.
- In June 1994, winds from a dry microburst destroyed two mobile homes, a 4,000 square feet commercial greenhouse, some chicken coops, and blew roofs off some homes in Chino Valley. A storage shed was damaged by winds gusting up to 79 mph in Lake Montezuma. Sheds and roofs were damaged by winds in Spring Valley 4 miles west of Cordes Junction. A mobile home was demolished by winds in Paulden. Estimated damage total was approximately $1.0 million. Source: National Climatic Data Center, January 2003, Storm Event Database.

Maps depicting general thunderstorm hazards based on average duration, average number of events, and lightning strike density are provided in Appendix E15. Figure 4-2

[15] Refer to Figures 7-24, 7-25, and 7-26 of the State Plan (URS, 2004).

depicts specific locations of historically significant thunderstorm and high wind events in Prescott and Yavapai County recorded by the National Climatic Data Center. Also shown are historic tornado touchdown locations within the County. The data points are randomly scattered across the County and no identifiable trends or patterns are noted.



CLARKDALE MULTI-HAZARD MITIGATION PLAN

Legend

- Interstate Highways
- State Routes
- U.S. Highways
- Rail Roads
- Lakes
- Major Watercourses

High Winds (mph)

- 40-72
- 73-100
- unknown

Fujita Tornado Scale

- F0 (40-72 mph)
- F1 (73-112 mph)
- F3 (158-206mph)
- unknown

0 30,000 60,000 120,000

Feet

Sources:
Arizona Land Resource Information System, August 2003
Arizona Department of Emergency Management, 2003
Yavapai County GIS, 2004
URS, October 2003
Visual Risk, 2003

Figure 4-2

Thunderstorm/High Wind Event Location Map for Yavapai County

JE FULLER HYDROLOGY & GEOMORPHOLOGY, INC.

Wildfire – Clarkdale and a large part of Yavapai County is characterized by the Arizona Mountain Forest ecoregion with large areas of dense forests (see Figure 1-3). Vegetation in the forests generally consists of Ponderosa Pine, Pinon Pine, Juniper, and Chaparral. This region presents the greatest wildfire hazard in the County.

The factors that influence the spread of wildfire include fuel type, fuel moisture, wind, weather, topography, and response capabilities. Only fuel and response can be managed to reduce the intensity and spread of wildfire. The majority of Clarkdale is either forested or contains brush and ground cover fuels with very few areas with dense urban development to provide significant fire breaks. In addition, the Town has topography favorable to wildfire and various areas that have limited access making quick response to a wildfire challenging. The intersection of environmental and economic sectors versus historically natural fire patterns and seasons, has left much of the forested areas in a prime condition to experience extremely destructive fires. Overlapping hazards such as bark beetle infestations and extended severe drought conditions only exacerbate the wildfire hazard. Given these conditions, the Town of Clarkdale and the Clarkdale Fire Department consider the wildfire risk to be extreme for the whole Town and surrounding area.

Figure 4-3 presents a map of Clarkdale depicting the extreme wildfire hazard. Also depicted on Figure 4-3 are historic fire locations and sizes based on data from two sources. The first historic fire locations came from the data presented in the State Plan. The second historic fire locations were obtained from data records kept by Yavapai County. The hazard ratings are based on the data prepared and presented in the State Plan and other modifications made by the Yavapai County MJPT to correct anomalies in the delineations in some locations.

372ACRES
372ACRES
Verde River
Bitter Creek
Deception Gulch
20ACRES
20ACRES
Jerome
81.26ACRES
Blowout Creek
Clarkdale
Cottonwood
Oak Wash
14640ACRES

CLARKDALE MULTI-HAZARD MITIGATION PLAN

Legend

- Major Watercourses
- Lakes
- Interstate Highways
- State Routes
- U.S. Highways
- Rail Roads

Historic Fires

- Less than 10 acres
- 10 - 100 acres
- 100 - 500 acres
- 500 - 5000 acres
- Greater than 5000 acres

Fire Hazard

- Extreme
- High
- Medium
- Low
- Yavapai County Historic Fires

N

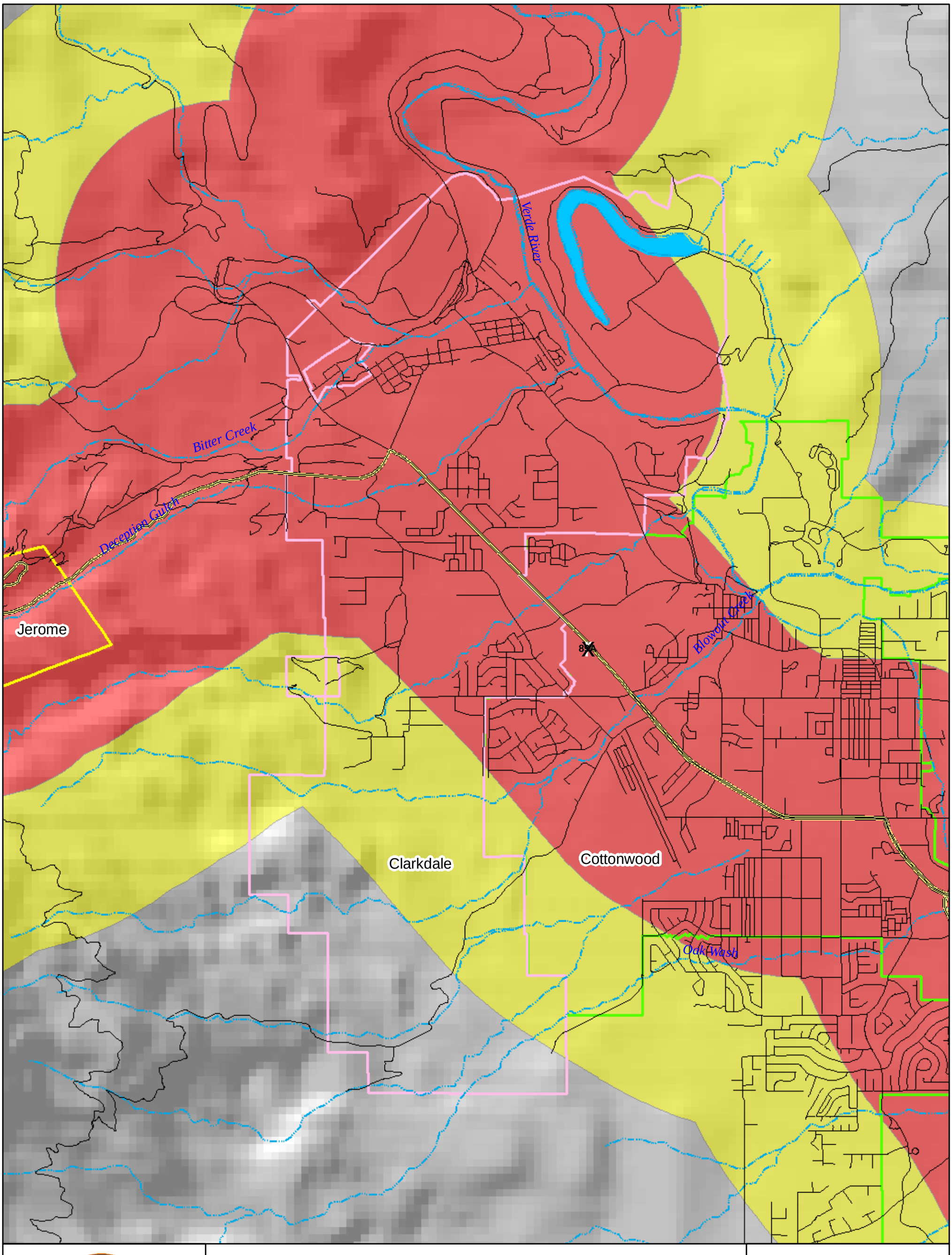
0 1,500 3,000 6,000
Feet

Sources:
Arizona Land Resource Information System, August 2003
Arizona Department of Emergency Management, 2003
Yavapai County GIS, 2004
URS, October 2003
Visual Risk, 2003

Figure 4-3
Wildfire Hazard Map
for Clarkdale

JE FULLER
HYDROLOGY & GEOMORPHOLOGY, INC.

Hazardous Materials Incidents – The threat of exposure to Hazardous Materials (HAZMAT) in our modern society is prevalent nationwide and throughout Yavapai County. HAZMAT incidents can occur from either point source spills or from transportation related accidents. Following the State's planning lead, the MJPT chose to focus only on those HAZMAT facilities and chemicals that are classified by the Environmental Protection Agency (EPA) as extremely hazardous substances (EHS). Typical EHS materials transported through Clarkdale include chlorine gas, sulphuric acid, and hydrogen flouride. The MJPT identified both point source facilities and major transportation corridors as part of the hazard profiling. The point source facilities were primarily obtained from Tier II HAZMAT reports maintained by the Arizona Emergency Response Commission (AZSERC) and provided by the County. Figure 4-4 depicts the transportation corridors where EHS materials are known to be transported on a somewhat regular basis.



CLARKDALE MULTI-HAZARD MITIGATION PLAN

Legend

- Interstate Highways
- State Routes
- U.S. Highways
- Rail Roads
- Major Watercourses
- Lakes
- EHS Facilities

Haz Mat Transport Corridor

- High
- Medium
- Historic Haz Mat Incidents

N

0 1,500 3,000 6,000
Feet

Sources:
Arizona Land Resource Information System, August 2003
Arizona Department of Emergency Management, 2003
Yavapai County GIS, 2004
URS, October 2003
Visual Risk, 2003

Figure 4-4
EHS Facility and Transportation Route Map for Clarkdale

JE FULLER HYDROLOGY & GEOMORPHOLOGY, INC.

Transportation Accident – Clarkdale is home to several major transportation elements. State Route 89A is one of the major routes through Clarkdale connecting Prescott and Prescott Valley to Jerome, Cottonwood and Sedona. State Route 260 connects State Route 89A to the I-17 in Camp Verde and then State Route 87 (Beeline Highway) in Gila County. There are also hundreds of miles of Town and County roadways that comprise Clarkdale's transportation infrastructure. Roadway traffic presents an appreciable hazard potential to Clarkdale. Major transportation routes for Clarkdale are shown on Figure 1-2.

The Verde Canyon Railroad extends from Clarkdale to Drake east-west through the northern portion of the County. Although today the railroad is known for it's recreational use, the rail is still used to transport freight. The Verde Canyon Railroad also connects Ashfork to Clarkdale via the Arizona Central Railroad.

The Cottonwood Municipal Airport is one of the three Primary Public Use, General Aviation Airports in Yavapai County located one mile east of Clarkdale in Cottonwood. The other two airports are located in Bagdad and Sedona. Earnest A. Love Field is a Primary Public Use, Commercial Service Ariport in Prescott. There is one Secondary Public Use, General Aviation Airport in Seligman, and a few other private airstrips scattered across the County. The combined impact of all the air and roadway traffic presents an appreciable hazard potential to Clarkdale.

In the past, Clarkdale residents have been exposed to several transportation related accidents. In most cases, the actual property damages at an incident level are limited to the vehicles involved. The greatest losses are manifested in fatalities and injuries. Associated consequences may include hazardous material releases, emergency response capacity limitations, freeway/highway closures, and wildfire ignition.

4.2.3 Hazard CPRI Ranking

Within the Arizona Hazard Mitigation Planning System (AzHMPS), the state has incorporated a tool (CPRI) by which individual hazards can be evaluated and even ranked according to an indexing system. The CPRI value is obtained by assigning varying degrees of risk to four (4) categories for each hazard, and then calculating an index value based on a

weighting scheme per Table 4-4 [16]. Table 4-5 summarizes the CPRI element assignments and resulting value for each hazard summarized in Table 4-2, with the MJPT top ranked hazards indicated by ***italicized bold*** text.

4.3 Vulnerability Assessment

The vulnerability assessment builds upon the previously developed hazard information by identifying the community assets and development trends and intersecting them with the hazard profiles to assess the potential amount of damage that could be caused by each hazard event. This concept is generally illustrated by Figure 4-5.

DMA2K Citation

Requirement §201.6(c)(2)(ii):

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

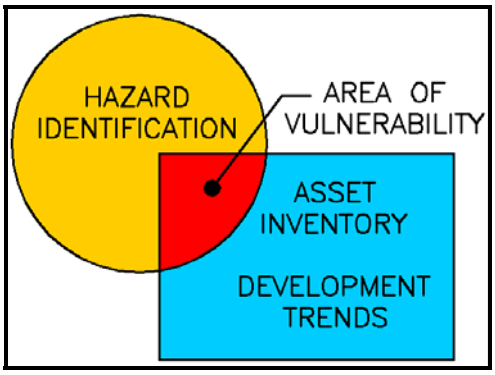


Figure 4-5
Conceptual Depiction of a Vulnerability Analysis

[16] Table 4.3 from the AzMLHMP

Table 4-4

Summary of Calculated Priority Risk Index (CPRI) categories and risk levels

CPRI Category	Degree of Risk			Assigned Weighting Factor
	Level ID	Description	Index Value	
Probability	Unlikely	• Extremely rare with no documented history of occurrences or events. • Annual probability of less than 0.001.	1	45%
	Possibly	• Rare occurrences with at least one documented or anecdotal historic event. • Annual probability that is between 0.01 and 0.001.	2	
	Likely	• Occasional occurrences with at least two or more documented historic events. • Annual probability that is between 0.1 and 0.01.	3	
	Highly Likely	• Frequent events with a well documented history of occurrence. • Annual probability that is greater than 0.1.	4	
Magnitude/ Severity	Negligible	• Negligible property damages (less than 5% of critical and non-critical facilities and infrastructure). • Injuries or illnesses are treatable with first aid and there are no deaths. • Negligible quality of life lost. • Shut down of critical facilities for less than 24 hours.	1	30%
	Limited	• Slight property damages (greater than 5% and less than 25% of critical and non-critical facilities and infrastructure). • Injuries or illnesses do not result in permanent disability and there are no deaths. • Moderate quality of life lost. • Shut down of critical facilities for more than 1 day and less than 1 week.	2	
	Critical	• Moderate property damages (greater than 25% and less than 50% of critical and non-critical facilities and infrastructure). • Injuries or illnesses result in permanent disability and at least one death. • Shut down of critical facilities for more than 1 week and less than 1 month.	3	
	Catastrophic	• Severe property damages (greater than 50% of critical and non-critical facilities and infrastructure). • Injuries or illnesses result in permanent disability and multiple deaths. • Shut down of critical facilities for more than 1 month.	4	
Warning Time	Less than 6 hours	Self explanatory.	4	15%
	6 to 12 hours	Self explanatory.	3	
	12 to 24 hours	Self explanatory.	2	
	More than 24 hours	Self explanatory.	1	
Duration	Less than 6 hours	Self explanatory.	1	10%
	Less than 24 hours	Self explanatory.	2	
	Less than one week	Self explanatory.	3	
	More than one week	Self explanatory.	4	

Table 4-5

Summary of CPRI values for each hazard

Hazard	Probability	Magnitude Severity	Warning Time	Duration	CPRI
Natural Hazards					
Drought	Possible	Limited	Less than 6 hours	Less than 6 hours	2.05
Earthquake	Possible	Critical	Less than 6 hours	Less than 6 hours	2.50
Extreme Cold/Heat	Possible	Limited	24+ hours	Less than one week	1.95
Flooding/Flash Flooding	Likely	Catastrophic	Less than 6 hours	Less than one week	3.45
Infestations	Likely	Limited	24+ hours	More than one week	2.50
Landslides/Mudslides	Possible	Limited	Less than 6 hours	Less than 24 hours	2.30
Monsoon	Highly Likely	Limited	12-24 hours	Less than 6 hours	2.80
Subsidence	Unlikely	Negligible	Less than 6 hours	Less than 6 hours	1.45
Thunderstorms/High Wind	Highly Likely	Limited	12-24 hours	Less than 6 hours	2.90
Tornados/Dust Devils	Possible	Limited	Less than 6 hours	Less than 6 hours	2.20
Wildfires	Highly Likely	Catastrophic	Less than 6 hours	Less than one week	3.90
Winter Storms	Possible	Critical	12-24 hours	Less than one week	2.40
Human-Caused Hazards					
Building/Structure Collapse	Unlikely	Limited	Less than 6 hours	Less than one week	1.75
Dam/Levee Failure	Possible	Limited	Greater than 24 hours	Less than 6 hours	1.75
Explosion/Fire	Unlikely	Negligible	Less than 6 hours	Less than 6 hours	1.45
Fuel/Resource Shortage	Unlikely	Negligible	Less than 6 hours	Less than one week	1.65
Hazardous Material Incidents	Highly Likely	Limited	Less than 6 hours	Less than 24 hours	3.20
Power/Utility Failure	Possible	Limited	Less than 6 hours	Less than one week	2.40
Sabotage	Unlikely	Limited	Less than 6 hours	Less than one week	1.95
Special Event	Unlikely	Limited	Less than 6 hours	Less than 24 hours	1.85
Transportation Accidents	Likely	Critical	Less than 6 hours	Less than 6 hours	2.95

For the Town of Clarkdale Hazard Mitigation Plan, the following tasks were performed as a part of the vulnerability assessment:

- ☑ **Assets Inventory**
- ☑ **Potential Loss Estimations**
- ☑ **Development Trends Analysis**

The following sections summarize the MJPT efforts to assemble and analyze the data needed for the vulnerability assessment, and present the results.

4.3.1 Asset Inventory

The State of Arizona Hazard Mitigation Plan defines assets as:

Any natural or human-caused feature that has value, including, but not limited to people; buildings; infrastructure like bridges, roads, and sewer and water systems; lifelines like electricity and communication resources; or environmental, cultural, or recreational features like parks, dunes, wetlands, or landmarks.

DMA2K Citation

Requirement §201.6(c)(2)(ii)(A):

The plan should describe vulnerability in terms of: (A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;

Assets identified by the MJPT for Yavapai County and the incorporated communities are classified as either critical or non-critical facilities and infrastructure. Critical facilities and infrastructure are those systems within the Town whose incapacity or destruction would have a debilitating impact on the Town's ability to recover following a major disaster, or to defend the people and structures of the Town from further hazards. Following the criteria set forth by the Critical Infrastructure Assurance Office (CIAO), the State of Arizona has adopted eight general categories[17] that define critical facilities and infrastructure:

1. **Telecommunications Infrastructure:** Telephone, data services, and Internet communications, which have become essential to continuity of business, industry, government, and military operations.
2. **Electrical Power Systems:** Generation stations and transmission and distribution networks that create and supply electricity to end-users.

[17] Instituted via Executive Order 13010, which was signed by President Clinton in 1996.

3. **Gas and Oil Facilities:** Production and holding facilities for natural gas, crude and refined petroleum, and petroleum-derived fuels, as well as the refining and processing facilities for these fuels.
4. **Banking and Finance Institutions:** Banks, financial service companies, payment systems, investment companies, and securities/commodities exchanges.
5. **Transportation Networks:** Highways, railroads, ports and inland waterways, pipelines, and airports and airways that facilitate the efficient movement of goods and people.
6. **Water Supply Systems:** Sources of water; reservoirs and holding facilities; aqueducts and other transport systems; filtration, cleaning, and treatment systems; pipelines; cooling systems; and other delivery mechanisms that provide for domestic and industrial applications, including systems for dealing with water runoff, wastewater, and firefighting.
7. **Government Services:** Capabilities at the federal, state, and local levels of government required to meet the needs for essential services to the public.
8. **Emergency Services:** Medical, police, fire, and rescue systems.

Other assets such as public libraries, schools, museums, parks, recreational facilities, historic buildings or sites, churches, residential and/or commercial subdivisions, apartment complexes, and so forth, are classified as non-critical facilities and infrastructure, as they are, not necessarily "critical" per the definition set forth in Executive Order 13010. They are however, very important to the County and the reader should not construe critical and non-critical to equate to important and non-important.

The MJPT performed a detailed asset inventory for each of the communities including Camp Verde, Chino Valley, Clarkdale, Cottonwood, Jerome, Prescott, Prescott Valley, Sedona, Yavapai-Prescott Tribe, and Unincorporated Yavapai County. Information collected included the facility's physical location and/or mailing address, description, contact information, replacement cost, potential economic loss, and size. Table 4-6 summarizes the number of facilities identified by category and community and Table 4-7 summarizes the total replacement costs and economic impact categorized by community. Replacement costs were generally estimated using insured values, tax assessments, or current market value estimates. The Clarkdale data sets are compiled in Appendix H, which is a separately bound technical appendix that for security reasons, will not be generally distributed to the public. Appendix H may be viewed upon appointment with and the supervision of Town of Clarkdale officials.

Table 4-6

Summary of critical and non-critical facilities in Yavapai County

Facility Type	Camp Verde	Chino Valley	Clarkdale	Cottonwood	Jerome	Prescott	Prescott Valley	[a]Sedona	Unincorporated Yavapai County	Yavapai County Totals
Critical Facilities and Infrastructure										
Communications Infrastructure	7	3	**1**	4	4	6	5	3	98	131
Electrical Power Systems	4	3	**0**	3	0	7	2	1	18	38
Gas and Oil Facilities	8	2	**2**	1	0	1	2	0	3	19
Banking and Finance Institutions	3	4	**0**	7	0	8	0	5	3	30
Transportation Networks	12	1	**3**	8	0	13	2	0	55	94
Water Supply Systems	5	5	**12**	21	8	28	49	23	62	213
Government Services	5	2	**9**	5	2	9	3	4	29	68
Emergency Services	9	5	**5**	11	3	13	10	5	10	71
Non-Critical Facilities and Infrastructure										
Residential	3	1	**5**	5	0	13	3	0	3	33
Educational	9	7	**2**	5	0	31	21	7	42	124
Cultural	20	11	**10**	9	5	3	2	4	0	64
Flood Control	10	1	**1**	1	0	2	1	0	11	27
Businesses	15	12	**7**	21	2	1	2	3	4	67

[a]*Portion of Sedona within Yavapai County Only*

Table 4-7

Summary of estimated replacement and potential economic loss costs

Community	Number of Facilities	Percent of All Yavapai County Facilities	Total Estimated Replacement Cost	Potential Annual Economic Loss
All Yavapai County	**1008**	**100%**	**[a]$2,632,951,461**	**[a]$2,112,679,763**
Camp Verde	110	11%	$141,998,038	$298,290,400
Chino Valley	57	6%	$111,230,595	$47,388,000
Clarkdale	**57**	**6%**	**$0**	**$0**
Cottonwood	101	10%	$255,922,865	$463,190,119
Jerome	24	2%	$17,807,700	$2,171,750
Prescott	136	13%	$1,205,791,346	$792,186,580
Prescott Valley	104	10%	$241,331,366	$114,287,982
Sedona	82	8%	[a]$73,623,000	[a]$46,766,000
Unincorporated County	338	34%	$658,869,551	$395,164,932

[a]*Portion of Sedona within Yavapai County Only*

Economic impact values were based on an estimate of the annual revenue attributed to that facility. It should be noted that replacement costs and economic loss values were not estimated for all structures and will require further investigation and estimates during future planning efforts. Furthermore, other community and County wide totals reflect the information available during the preparation of this report.

4.3.2 Loss Estimations

Economic and human loss estimates for each of the major hazards identified in Section 4.2 begins with an assessment of the potential exposure of critical and non-critical assets and human populations to those hazards. Estimates of exposure to critical and non-critical assets identified by Yavapai County communities is accomplished by intersecting the hazard profiles with the assets identified in Section 4.3.1. Human or population exposures are estimated by intersecting the same hazards with 2000 Census Data

DMA2K Citation

Requirement §201.6(c)(2)(ii)(B):

[The plan should describe vulnerability in terms of: …] (B) An estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate;

population statistics that have been re-organized into GIS compatible databases and distributed with HAZUS®-MH [18]. *It is duly noted that the HAZUS Data population statistics may not exactly equate to the population statistics provided in Section 1.3.3 due to GIS positioning anomalies and the way HAZUS depicts certain census block data. However, the results are representative of the general magnitude of population exposures to the various hazards discussed.* Additional loss estimations for general residential, commercial, and industrial building stock not specifically identified with the asset inventory, are also accomplished using the HAZUS®-MH database. *It is also noted that the commercial and industrial building stock estimates for each census block may severely under-predict the actual buildings present due to the rural nature of the community addressed in this plan and the disparity of the HAZUS®-MH estimates for these categories. However, without a detailed, site specific structure inventory of these types of buildings, the HAZUS®-MH database is still the best available* . Accordingly, building inventories compiled in the HAZUS®-MH databases, represent a further depiction of the community's potential exposure to hazards that is additional to the critical and non-critical assets.

Due to limited resources and time, the detailed vulnerability analysis for this planning effort is limited to the top hazards indicated in Tables 4-2 and 4-5. With regard to the community assets and population, exposure risk for thunderstorm/high winds is not readily or easily defined geographically. Instead, exposure risks to this hazard are considered to be equal across the entire County.

Table 4-7 summarizes the County-wide exposure potential of all specific critical and non-critical facilities identified by the MJPT participants and communities. Specific loss estimates for each of the top hazards in Tables 4-2 and 4-5, and descriptions of the estimation methodology, are summarized according to hazard in the following paragraphs.

Flooding/Flash Flooding – The estimation of potential exposure to flooding was accomplished by intersecting the human and facility assets with the FEMA delineated 100-year and 500-year floodplain limits. Digital floodplain mapping was provided by the Yavapai County Development Services - Flood Control District, and is based on FEMA Flood Insurance Rate Maps (FIRM) and three non-FEMA related floodplains for Yavapai County and associated communities. The 100-year floodplains (A Zones) were assumed to

[18] U.S. Department of Homeland Security, Federal Emergency Management Agency, HAZUS®-MH, build 31

be high hazard areas. The 500-year (Zone B and Shaded Zone X) floodplains were assumed to be of medium hazard. Everything else was considered as low hazard.

Loss estimates to all facilities located within the 100-year and 500-year floodplains were made based on the loss estimation tables published by FEMA[19]. Most of the assets located within high hazard flood areas will be subject to three feet or less of flooding. Using the FEMA tables, it is assumed that all specifically identified assets located within the high hazard areas will have a loss-to-exposure ratio of 0.20 (or 20%). A loss to exposure ratio of 0.05 (5%) is assumed for the HAZUS exposure data to account for the spatial variability of those data sets within the identified floodplain hazard areas. Similarly, loss to exposure ratios of 0.025 (2.5%) and 0.01 (1%) are used for the MJPT identified assets and HAZUS structures located in the medium hazard areas. For economic losses (where reported), it is assumed that high and medium flood hazard facilities will be unproductive for 30 and 7 days, respectively. Table 4-8 summarizes the MJPT identified assets that are potentially exposed to 100-year and 500-year flood events, and the corresponding estimates of losses. Table 4-9 summarizes the HAZUS human population exposure to the 100-year and 500-year flooding. Table 4-10 summarizes estimates of the exposure of HAZUS residential, commercial and industrial building stock for HAZMAT incidents, flooding, and wildfire.

In summary, $0 million in flood losses to planning team identified assets is estimated. An additional $854,000 in damages is estimated using the HAZUS data for general residential, commercial and industrial sectors. Assuming no overlap between the HAZUS data set and the asset inventory, a total potential loss exposure of $854,000 is estimated for flood losses within Clarkdale. This amount seems reasonable, especially when compared to historic flooding damages experienced during major storms.

Regarding human vulnerability, a total population of 59 people, or 1.7 percent of the total Clarkdale population, are potentially exposed to a100-year flood hazard. Similarly, a total population of 10 people, or 0.3 percent of the total Clarkdale population, are potentially exposed to a 500-year flood hazard. Given the historic record, it is feasible to assume that at least one fatality and multiple injuries are plausible. It is very likely that with a significant flood like the 100-year event, a large percentage of exposed population could be displaced for a period of time.

[19] FEMA, 2001, *Understanding Your Risks; Identifying Hazards and Estimating Losses*, FEMA Document No. 386-2

Table 4-8

Summary of Clarkdale and County-wide asset inventory loss estimates due to flooding

Community	Impacted Facilities	Impacted Facility Percentages	Estimated Replacement Cost (x1000)	Potential Economic Loss (x1000)	Estimated Structure Loss (x1000)	Estimated Economic Loss (x1000)	Total Loss Estimate (x1000)
High Flood Hazard (100-Year)							
County-Wide Totals	106	100.00%	$167,862	$171,104	$33,572	$14,063	$47,636
Clarkdale	**4**	**3.77%**	**$0**	**$0**	**$0**	**$0**	**$0**
Medium Flood Hazard (500-year Flood)							
County-Wide Totals	12	100.00%	$18,033	$50,530	$902	$969	$1,871
Clarkdale	**0**	**0.00%**	**$0**	**$0**	**$0**	**$0**	**$0**

Table 4-9

Summary of Clarkdale and County-wide population sectors exposed to flooding hazards

Community	Total Population	Population Exposed	Percent of Population Exposed	Total Population Over 65	Population Over 65 Exposed	Percent of Population Over 65 Exposed	Total Incomes Under $20K	Incomes Under $20K Exposed	Percent of Incomes Under $20K Exposed
High Flood Hazard (100-Year)									
County-Wide Totals	167,481	12,175	7.27%	36,599	2,467	6.74%	17,780	1,378	7.75%
Clarkdale	**3,442**	**59**	**1.71%**	**859**	**12**	**1.38%**	**352**	**5**	**1.56%**
Medium Flood Hazard (500-year Flood)									
County-Wide Totals	167,481	2,677	1.60%	36,599	540	1.48%	17,780	358	2.01%
Clarkdale	**3,442**	**10**	**0.30%**	**859**	**2**	**0.25%**	**352**	**1**	**0.31%**

Table 4-10

Summary of Clarkdale HAZUS Building Exposure by hazard

Clarkdale (Yavapai County) HAZUS Summary	Residential Building Count	Residential Building Value (x$1000)	Residential Content Value (x$1000)	Residential Potential Economic Impact (x$1000)	Commercial Building Count	Commercial Building Value (x$1000)	Commercial Content Value (x$1000)	Commercial Potential Economic Impact (x$1000)	Industrial Building Count	Industrial Building Value (x$1000)	Industrial Content Value (x$1000)	Industrial Potential Economic Impact (x$1000)	Total of All Building and Content Exposure (x$1000)	Total Estimated Loss (x$1000)
Community-Wide Totals	**1310**	**$145,519**	**$72,750**	**$218,268**	**8**	**$3,537**	**$3,602**	**$7,140**	**4**	**$782**	**$874**	**$1,655**	**$227,063**	
HAZMAT														
High Risk	1261	$138,706	$69,345	$208,051	8	$3,500	$3,565	$7,064	4	$767	$859	$1,626	$216,741	$22
Medium Risk	49	$6,649	$3,323	$9,972	0	$38	$38	$76	0	$15	$15	$29	$10,077	$0
Flood														
High Risk	84	$10,123	$5,060	$15,183	1	$505	$523	$1,027	1	$160	$186	$346	$16,557	$828
Medium Risk	15	$1,645	$823	$2,468	0	$46	$47	$93	0	$13	$15	$28	$2,589	$26
Wildfire														
Extreme Risk	1305	$144,862	$72,422	$217,284	8	$3,537	$3,602	$7,140	4	$782	$874	$1,655	$226,079	$113,039
High Risk	0	$0	$0	$0	0	$0	$0	$0	0	$0	$0	$0	$0	$0
Medium Risk	0	$0	$0	$0	0	$0	$0	$0	0	$0	$0	$0	$0	$0

Clarkdale (Yavapai County) HAZUS Summary	% Residential Building Count	% Residential Building Value	% Residential Content Value	% Residential Potential Economic Impact	% Commercial Building Count	% Commercial Building Value	% Commercial Content Value	% Commercial Potential Economic Impact	% Industrial Building Count	% Industrial Building Value	% Industrial Content Value	% Industrial Potential Economic Impact
HAZMAT	**99.91%**	**99.89%**	**99.89%**	**99.89%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**
High Risk	96.19%	95.32%	95.32%	95.32%	95.81%	98.93%	98.95%	98.94%	92.64%	98.12%	98.32%	98.23%
Medium Risk	3.72%	4.57%	4.57%	4.57%	4.19%	1.07%	1.05%	1.06%	7.36%	1.88%	1.68%	1.77%
Flood	**7.51%**	**8.09%**	**8.09%**	**8.09%**	**7.50%**	**15.56%**	**15.82%**	**15.70%**	**13.63%**	**22.15%**	**22.97%**	**22.58%**
High Risk	6.39%	6.96%	6.96%	6.96%	6.93%	14.27%	14.51%	14.39%	12.87%	20.50%	21.24%	20.89%
Medium Risk	1.12%	1.13%	1.13%	1.13%	0.56%	1.30%	1.32%	1.31%	0.75%	1.66%	1.73%	1.70%
Wildfire	**99.62%**	**99.55%**	**99.55%**	**99.55%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**
Extreme Risk	99.62%	99.55%	99.55%	99.55%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
High Risk	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Medium Risk	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Thunderstorms/High Winds – The entire County is assumed to be equally exposed to the damage risks associated with the non-flood hazards related to thunderstorms. Typically, incidents are fairly localized and damages associated with individual events are relatively small. According to the National Weather Service, Yavapai County typically endures 40 to 80 thunderstorm events per year with the number of events increasing as you move east in the County. A review of the historic hazards would indicate that a severe thunderstorm has the capacity to do at least $2.5 million dollars in damage. Some storms moving over the Phoenix metro area have caused $20 to $30 million dollars in damages in a single event.

It is realistic to expect that at least 10 percent of the thunderstorms passing through Yavapai County could be categorized as severe, meaning they could have a potential for wind gusts in excess of 58 mph and hail in excess of 0.75 inches. Assuming that on average, each severe storm has a potential to cause at least $10 million of damage to infrastructure and structural damage, then a possible annual loss exposure of $40 to $80 million can be estimated. Using the population statistics for the 2000 census (see Table 1-1), it is assumed that 2.0 percent, or $800, 000 to $1.6 million in non-flood related thunderstorm damages could occur on an annual basis in Clarkdale. Given the historic record, these estimates seem reasonable. Historically, no fatalities and few injuries have resulted from thunderstorm related events in the County, however, it is feasible to assume that multiple injuries and some deaths are plausible.

Wildfire – Estimates of human and asset exposure to wildfire is accomplished by intersecting the asset inventory and HAZUS data with wildfire hazards presented in Section 4.2. Exposure to three wildfire hazard types; extreme, high, and medium, were estimated for each data set. Since no common methodology is available for estimating losses from the exposed values, estimates of the loss-to-exposure ratios were assumed based on the perceived intensity of a fire hazard. The resultant losses were then compared to historic records for a level of indirect verification. The loss-to-exposure ratios for the extreme, high, and medium wildfire hazard areas were estimated to be 0.5, 0.2, and 0.05, respectively. Economic losses are estimated assuming that the facility will be unproductive for 30 days for all scenarios. Table 4-11 summarizes the asset exposures to each of the three categories and to wildfire as a whole. Table 4-12 summarizes the HAZUS human population exposure to the various wildfire hazards. HAZUS building inventories impacted by wildfire are summarized in Table 4-10.

In summary, $0 million in wildfire losses to MJPT identified assets is estimated for all communities within Yavapai County. An additional $113 million in damages is estimated using the HAZUS data for general residential, commercial and industrial sectors. Assuming no overlap between the HAZUS data set and the asset inventory, a total potential loss exposure of $113 million is estimated for wildfires. It is highly unlikely that any fire would burn across the entire community in a given event, and the incident specific damage costs are likely to be only a fraction of those presented. However, as a collective evaluation, the loss estimate seems reasonable. Regarding human vulnerability, a total population of 3,431 people, or 99.7 percent of the total Clarkdale population, is potentially exposed to and extreme wildfire hazard. Typically, deaths and injuries not related to firefighting activities are rare. However, it is feasible to assume that at least one death and/or injury is plausible. There is also a high probability of some population displacement during a wildfire event, especially considering most of the community is in the urban wildland interface.

Table 4-11

Summary of Clarkdale and County-wide asset inventory loss estimates due to wildfire

Community	Impacted Facilities	Impacted Facility Percentages	Estimated Replacement Cost (x1000)	Potential Economic Loss (x1000)	Estimated Structure Loss (x1000)	Estimated Economic Loss (x1000)	Total Loss Estimate (x1000)
Wildfire – Extreme Hazard							
County-Wide Totals	515	100.00%	$806,605	$708,151	$403,302	$58,204	$461,507
Clarkdale	**57**	**11.07%**	**$0**	**$0**	**$0**	**$0**	**$0**
Wildfire – High Hazard							
County-Wide Totals	25	100.00%	$34,795	$35,490	$6,959	$1,459	$8,418
Clarkdale	**0**	**0.00%**	**$0**	**$0**	**$0**	**$0**	**$0**
Wildfire – Medium Hazard							
County-Wide Totals	251	100.00%	$720,122	$538,630	$36,006	$10,330	$46,336
Clarkdale	**0**	**0.00%**	**$0**	**$0**	**$0**	**$0**	**$0**

Table 4-12

Summary of Clarkdale and County-wide population sectors exposed to wildfire hazard

Community	Total Population	Population Exposed	Percent of Population Exposed	Total Population Over 65	Population Over 65 Exposed	Percent of Population Over 65 Exposed	Total Incomes Under $20K	Incomes Under $20K Exposed	Percent of Incomes Under $20K Exposed
Wildfire – Extreme Hazard									
County-Wide Totals	167,481	80,460	48.04%	36,599	18,571	50.74%	17,780	8,396	47.22%
Clarkdale	**3,442**	**3,431**	**99.68%**	**859**	**855**	**99.62%**	**352**	**351**	**99.80%**
Wildfire – High Hazard									
County-Wide Totals	16,7481	7,347	4.39%	36,599	2,016	5.51%	17,780	738	4.15%
Clarkdale	**3,442**	**0**	**0.00%**	**859**	**0**	**0.00%**	**352**	**0**	**0.00%**
Wildfire – Medium Hazard									
County-Wide Totals	167,481	32,536	19.43%	36,599	6,467	17.67%	17,780	3143	17.68%
Clarkdale	**3,442**	**0**	**0.00%**	**859**	**0**	**0.00%**	**352**	**0**	**0.00%**

Hazardous Material Incidents - The estimation of potential exposure to a hazardous material incident involving extremely hazardous substances (EHS) is accomplished by intersecting the human and facility assets with the point source and transportation corridor hazard areas identified in Section 4.2. Exposure estimates are separated into two categories: high and medium hazard exposure. Estimates of high hazard exposure were made by assuming a one-mile radius or offset impact zone around each hazard facility or roadway and railway transportation corridor shown in Figure 4-4. Similarly, a two-mile impact zone radius or offset was used for the medium hazard exposure on each hazard facility or roadway and railway transportation corridor.

Structural losses due to EHS incidents are usually minor and are primarily focused on clean-up and decontamination. No readily available information exists for estimating loss-to-exposure ratios; therefore, it is conservatively estimated that no more than 0.01 percent (or 0.0001) of the exposed structure values will be realized in actual losses. For economic losses (where reported), it is assumed that impacted facilities will be unproductive for 7 days. Table 4-13 summarizes the MJPT identified assets that are potentially exposed to point source and transportation related EHS incidents. Table 4-14 summarizes the potential HAZUS human population exposure to point source and transportation related EHS incidents. HAZUS residential, commercial, and industrial building inventories potentially impacted by point source and/or transportation related EHS incidents are summarized in Table 4-10.

In summary, Clarkdale is exposed to an estimated $0 million in EHS point source and transportation corridor incident losses. An additional $22,000 in damages is estimated using the HAZUS data for general residential, commercial and industrial sectors. Assuming no overlap between the HAZUS data set and the asset inventory, a total potential loss exposure of $22,000 is estimated for the point source and transportation corridor EHS incidents. It is recognized that EHS incidents typically occur in a single localized area and do not impact an entire County or community at one time. These numbers are intended to represent the collective community or County-wide exposure. Actual losses for an individual incident are likely to be only a fraction of the numbers presented here.

The primary concern with EHS incidents is the human exposure wherein a total population of 3,322 and 117 people, or 96.5 and 3.4 percent of the total Clarkdale population, are exposed to point source and transportation corridor EHS incidents within one-mile and two-mile buffer zones, respectively. The potential for deaths and injuries is directly related to

Table 4-13

Summary of Clarkdale and County-wide asset inventory loss estimates due to potential point source and transportation corridor EHS incidents

Community	Impacted Facilities	Impacted Facility Percentages	Estimated Replacement Cost (x1000)	Potential Economic Loss (x1000)	Estimated Structure Loss (x1000)	Estimated Economic Loss (x1000)	Total Loss Estimate (x1000)
Hazardous Materials Incident High Risk (1-mile buffer)							
County-Wide Totals	799	100.00%	$2,511,168	$1,905,640	$251	$36,547	$36,798
Clarkdale	**56**	**7.01%**	**$0**	**$0**	**$0**	**$0**	**$0**
Hazardous Materials Incident Medium Risk (2-mile buffer)							
County-Wide Totals	106	100.00%	$135,513	$214,334	$0	$0	$0
Clarkdale	**1**	**0.94%**	**$0**	**$0**	**$0**	**$0**	**$0**

Table 4-14

Summary of Clarkdale and County-wide population sectors potentially exposed to point source and transportation corridor EHS incidents

Community	Total Population	Population Exposed	Percent of Population Exposed	Total Population Over 65	Population Over 65 Exposed	Percent of Population Over 65 Exposed	Total Incomes Under $20K	Incomes Under $20K Exposed	Percent of Incomes Under $20K Exposed
Hazardous Materials Incident High Risk (1-mile buffer)									
County-Wide Totals	167,481	118,263	70.61%	36,599	27,016	73.82%	17,780	13,133	73.87%
Clarkdale	**3,442**	**3,322**	**96.53%**	**859**	**826**	**96.18%**	**352**	**344**	**97.89%**
Hazardous Materials Incident Medium Risk (2-mile buffer)									
County-Wide Totals	167,481	34,773	20.76%	36,599	7,121	19.46%	17,780	3,428	19.28%
Clarkdale	**3,442**	**117**	**3.39%**	**859**	**32**	**3.73%**	**352**	**7**	**2.06%**

many factors including the type of chemical spilled, the prevailing wind pattern and speed, air temperature, humidity, and the response time. Historically for Clarkdale, there are no HAZMAT related deaths or injuries however one incident displaced 100 people. The potential for death and injury is moderate given a large or severe enough incident. For any incident, displacement of people for at least one or more days is highly probable.

Transportation Accidents – Potential losses and damages due to major transportation accidents are difficult to estimate without extensive research, compilation, and statistical analysis of often hard to obtain data. No such studies currently exist for Clarkdale or Yavapai County; therefore, no detailed estimates of potential human and property losses and damages will be made. In many instances, transportation accidents are often caused by a combination of weather related events such as high winds, dust/sand storms, rain, snow, or ice and the corresponding human reactions to them. In Clarkdale, the primary transportation accident potential comes from roadway or railway based incidents. However, air based incidents are not unlikely and could involve the failure of aircraft during take-off, flight, and/or landing sequences. For both types of incidents, it is reasonable to project that the entire Town, Town assets, and population are potentially exposed to an accident in one form or another.

High risk vehicular corridors include State Route 89A. The higher speeds and greater numbers of vehicles along this corridor combine to create an increased risk for major accidents. Figure 4-6 is an excerpt from vehicular crash statistics for Yavapai County published by the Motor Vehicle Division of the Arizona Department of Transportation[20]. It is interesting to note that there was a high number of crashes resulting in fatalities occurring on the State and other rural roads. This is likely due to the higher rates of speed and increased potential for multiple vehicle accidents.

[20] ADOT, MVD, 2003, *2003 Motor Vehicle Crash Facts for the State of Arizona*

COUNTIES Cities	Total	Number of Crashes			No. of Persons		Alcohol-Related		
		Fatal	Injury	Property Damage	Killed	Injured	Crashes	Killed	Injured
YAVAPAI COUNTY									
Camp Verde	201	3	60	138	3	94	23	2	18
Chino Valley	114	1	42	71	1	70	10	1	10
Clarkdale	7	0	3	4	0	4	2	0	2
Cottonwood	265	2	93	170	2	137	14	1	13
Jerome	19	1	2	16	1	2	4	1	1
Prescott	1,027	4	269	754	5	375	52	2	48
Prescott Valley	487	2	118	367	2	166	40	0	29
State Rural Roads	1,391	43	435	913	49	741	71	7	59
Other Rural Roads	457	9	145	303	10	240	42	5	42
TOTAL	**3,968**	**65**	**1,167**	**2,736**	**73**	**1,829**	**258**	**19**	**222**

Figure 4-6

2003 Crash Statistics for Yavapai County

The high risk railway corridors in Clarkdale are generally the more densely populated areas through Town near the Verde River. Incidents typically involve either vehicular or pedestrian contact with moving trains and are often fatal to those struck by the train. There have not been any reported vehicle/train and pedestrian/train incidents reported in Clarkdale, however it is not un-realistic to expect an incident to occur. Other hazards typically associated with railway accidents include hazardous material spills and ignition of wildfires.

4.3.3 Development Trend Analysis

Clarkdale has experienced moderate growth over the last ten years with no anticipated slowdown. The Town anticipates a steady growth rate of about 3 to 4% per year. The Town has identified several future development projects within its overall comprehensive planning area, which are depicted in Figure 4-7[21]. Various hazard potentials pose challenges to these expanding areas as discussed below.

Flooding – The Town currently regulates, and will continue to regulate, the 100-year floodplains using a Town floodplain management code, FEMA FIRM maps, and previous drainage studies. Challenges to the new growth will include the need for master drainage planning and additional floodplain delineations to identify and map the flood hazards within the growth areas where no mapping currently exists, and to update existing mapping to reflect new development.

Wildfire – As previously discussed, wildfire risks are very significant for most of the Town. Future development will likely increase the urban/wildland interface (UWI) areas and expand the potential exposure of structures to wildfire hazards. The adoption of new fire codes to regulate safe building and land-use practices in wildfire hazard areas can potentially mitigate wildfire risk.

Hazardous Materials – As the vulnerability analysis indicates, much of Clarkdale is exposed to some level of EHS threat. That exposure will only worsen as development increases. It may be advantageous to pursue designating certain roadways as EHS corridors to limit the exposure, and establishing buffer zones along corridors known to be frequent EHS transport routes.

Transportation – Any future development will require some level of expansion of the transportation systems, and will certainly increase traffic in the growth areas. Proposed development adjacent to the more heavily use corridors should strive to limit the human exposure to potential accidents through the use of setbacks and clear zones.

[21] Town of Clarkdale, 2002, *Town of Clarkdale 2002 General Plan*, Growth Area Map

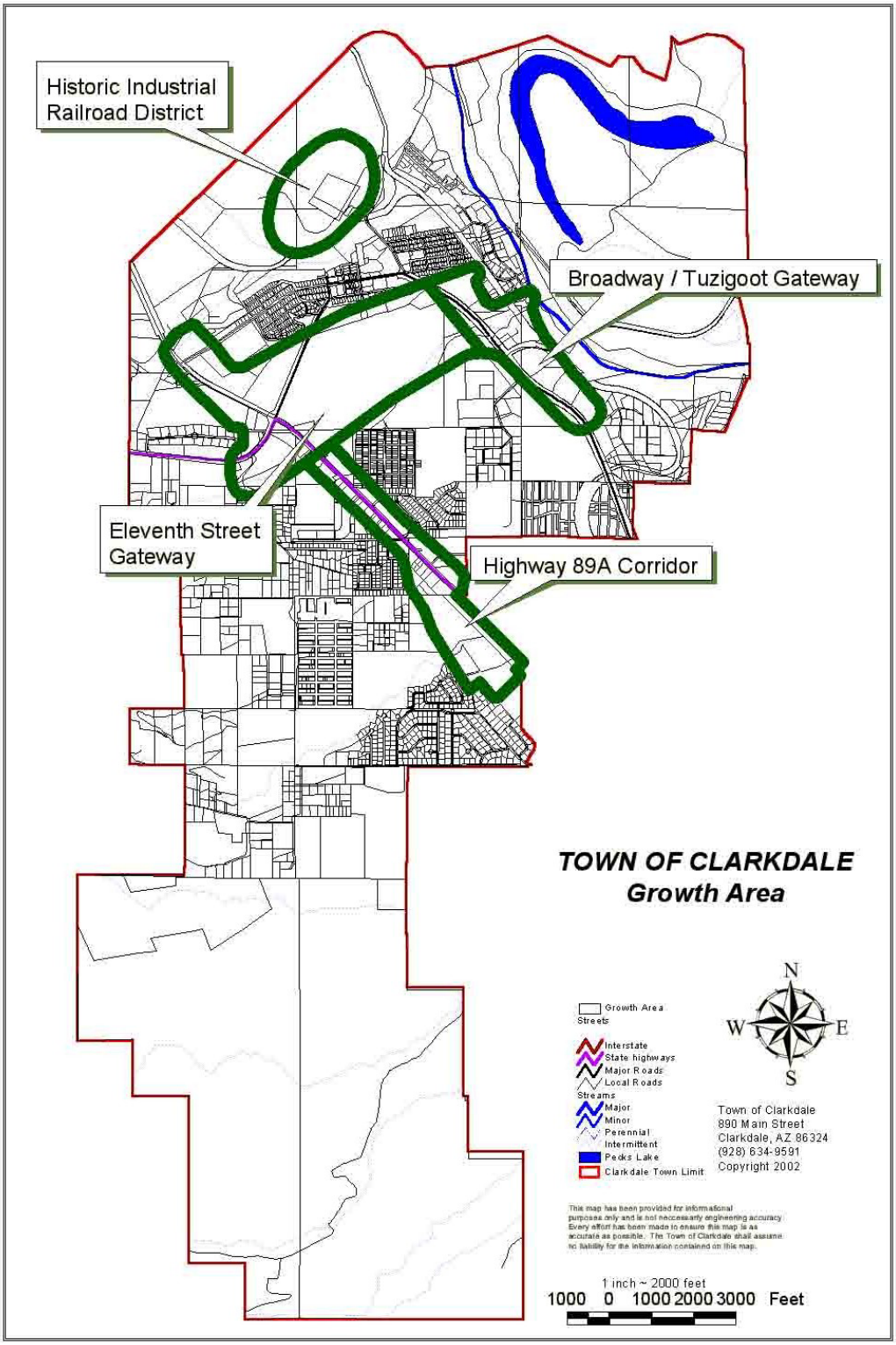


Figure 4-7

Town of Clarkdale Growth Areas

Thunderstorms/High Winds – The Town currently enforces, and will continue to enforce building codes to minimize damage to structures resulting from thunderstorms and high winds. In addition, the increased use of backup power supply systems to critical infrastructure will limit the negative effects of power outages resulting from thunderstorm and high wind events.

Other hazards identified will obviously have some impact on any future development or growth; however, due to the limited resources and time, no special considerations were conducted beyond those generally discussed in the vulnerability assessment sections of this plan.

SECTION 5: MITIGATION STRATEGY

The following section summarizes the strategy developed by Clarkdale for mitigating hazard risks identified and summarized in Section 4. The mitigation strategy provides the "*what, when, and how*" of actions that will reduce or possibly remove the community's exposure to hazard risks. According to DMA2K, the primary components of the mitigation strategy are generally categorized into the following components:

- ☑ **Capability Assessment**
- ☑ **Goals and Objectives**
- ☑ **Mitigation Actions/Projects**
- ☑ **Implementation Strategy**

DMA2K Citation

Requirement §201.6(c)(3):

[The plan shall include:…] (3) A mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.

5.1 Capability Assessment

A formal capability assessment is not required for local hazard mitigation plans under the DMA2K legislation; however, the assessment does provide information that is helpful in assessing a community's ability to mitigate against hazards. Clarkdale staff reviewed and evaluated the Town's resources and capabilities in the following general areas:

- **Existing Plans, Policies, and Ordinances**
- **Technical/Staff Resources**
- **Financial Resources**

A summary of the legal and regulatory capabilities of Clarkdale, including existing plans, ordinances, and policies, is provided in Table 5-1. A summary of the administrative and technical resources available to the Town is provided in Table 5-2. Financial capabilities, including taxing authority and grant eligibilities, are summarized in Table 5-3.

Table 5-1

Summary of Clarkdale legal and regulatory capabilities

Regulatory Tools (Ordinances, Codes, and Plans)	Local Authority (Y/N)	Does State Prohibit (Y/N)	Higher Level of Jurisdictional Authority (Y/N)	Comments
Building Code	Y	N	N	
Zoning Ordinance	Y	N	N	
Subdivision Ordinance or Regulations	Y	N	N	
Special Purpose Ordinances	Y	N	N	Minor Land Division
Growth Management Ordinances				
Site Plan Review Requirements	Y	N	N	
General or Comprehensive Plan	Y	N		Adopted 2002
Capital Improvements Plan	Y	N		
Economic Development Plan	Y	N		
Emergency Response Plan	Y	N	Y	
Post-Disaster Recovery Plan	Y	N		
Post-Disaster Recovery Ordinance	Y	N		
Real Estate Disclosure Statement	N	N	Y	State Real Estate Board/DWR
Other				

Table 5-2

Summary of Clarkdale technical staff and personnel capabilities

Staff/Personnel Resources	☑	Department/Agency - Position
Planner(s) or engineer(s) with knowledge of land development and land management practices	☑	Community Development Dep./Director & Planning Manager/Public Works Manager
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	☑	Community Development Dep./Public Works Manager/Building Official
Planner(s) or engineer(s) with an understanding of natural and/or human-caused hazards	☑	Community Development Dep. Staff generally
Floodplain Manager	☑	Yavapai County: Jim Young
Surveyors		
Staff with education or expertise to assess the community's vulnerability to hazards	☑	Community Development Dep. Staff generally
Personnel skilled in GIS and/or HAZUS	☑	Community Development Dep./Director & Planning Manager
Scientists familiar with the hazards of the community		
Emergency Manager		
Grant writer(s)	☑	Town Staff
Others		

Table 5-3

Summary of Clarkdale fiscal capabilities

Financial Resources	Accessible or Eligible to Use (Yes, No, Don't Know)
Community Development Block Grants	Yes
Capital Improvements Project funding	Yes
Authority to levee taxes for specific purposes	Yes
Fees for water, sewer, gas, or electric service	Sewer
Impact fees for homebuyers or new developments/homes	Sewer Development Fee
Incur debt through general obligation bonds	Yes
Incur debt through special tax bonds	Yes
Incur debt through private activity bonds	
Withhold spending in hazard-prone areas	
Other	

Table 5-4 provides a summary of existing plans and studies with elements of hazard mitigation that have been prepared by and for Clarkdale in the past.

Table 5-4

Summary of existing plan and study documents for Clarkdale

Plan/Study Name	Description	Plan/Study Author	Date Completed or Implemented	Plan/Study Owner
Town of Clarkdale Disaster Plan & Recovery Guide	Comprehensive, step-by-step plan that provides protocol for dealing with specific disasters.	Town of Clarkdale/Officer Tom Nester	September 2004	Town of Clarkdale
2002 General Plan	Statement of Clarkdale's vision for growth and development.	Community/Town Staff	2002	Town of Clarkdale
Wastewater Master Plan	Establishes expansion areas, identifies units and population served. Outlines objections with action steps.	Town of Clarkdale	2002	Town of Clarkdale

In summary, Clarkdale currently has in place several regulatory mechanisms for mitigation of hazards, with most being directed at new construction and development. Staff resources are available for the identification, development and implementation of mitigation measures with some overlap of expertise in the various categories. Financially, the Town has the ability to incur debt through tax and bond obligations and also to levy taxes for specific purposes. However, all of these mechanisms require political approval and are often difficult to implement. The greatest challenge faced by the Town is to try and stay ahead of the rapid development growth with regulatory, planning and review resources that lag the needs by several years.

5.2 Goals and Objectives

As a part of the mitigation strategy, DMA2K requires that each community prepare a list of mitigation goals. The State Plan defines goals and objectives as follows:

> ***Goals*** – General guidelines that explain what you want to achieve. Goals are usually broad statements with long-term perspective.
>
> ***Objectives*** – Defined strategies or implementation steps intended to attain the identified goals. Unlike goals, objectives are specific, measurable, and have a defined time horizon.

DMA2K Citation

Requirement §201.6(c)(3)(i):

[A mitigation strategy … section shall include:] (i) A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

The Clarkdale planning team met to develop goals and objectives. The team started with the goals and objectives developed by the State of Arizona for its hazard mitigation plan, and modified or revised the goals and objectives to better fit the Town's needs and vision for hazard mitigation. The following is a list of the Clarkdale goals and objectives:

Goal 1. Promote disaster-resistant future development.

Objective 1.A Update, develop, and support general plans, ordinances, and codes in accordance with state and federal regulations, to limit development in hazard areas or build to standards that will prevent or reduce damage.

Objective 1.B Adopt and support local, state and federal codes that protect assets and new development in hazard areas.

Goal 2. Promote public understanding, support, and demand for hazard mitigation.

Objective 2.A Educate the public to increase awareness of hazards and opportunities for mitigation actions.

Objective 2.B Promote partnerships among the federal, state, counties, local and tribal governments to identify, prioritize, and implement mitigation actions.

Objective 2.C Promote hazard mitigation in the business, residential, and agricultural community.

Objective 2.D Monitor and publicize the effectiveness of mitigation actions implemented community wide.

Goal 3. Build and support local capacity and commitment to become less vulnerable to hazards.

Objective 3.A Improve existing capabilities to warn the public of emergency situations.

Objective 3.B Develop mitigation programs to enhance the safety of the residents of each community during an emergency.

Objective 3.C Establish an evacuation plan and shelter facility for displaced residents in the event of an emergency.

Goal 4. Improve hazard mitigation coordination and communication with federal, state, local, and tribal governments.

Objective 4.A Establish and maintain a close working relationship with federal, state agencies and local and tribal governments.

Objective 4.B Establish and maintain intergovernmental agreements with local and tribal governments.

Goal 5. Reduce the potential level of damage and losses to people, existing and future critical facilities/infrastructure, and other community assets due to floods.

Objective 5.A Implement policies, procedures and regulations which reduce the potential exposure to flood hazards.

Objective 5.B Decrease vulnerability of community assets, especially critical facilities located in the 100-year floodplain.

Objective 5.C Maintain coordination with state and federal flood-related agencies.

Objective 5.D Maintain compliance with the National Flood Insurance Program (NFIP) requirements.

Objective 5.E Promote changes in current regulations to facilitate hazard mitigation.

Objective 5.F Protect life, improved property, and natural resources with vulnerability to the effects of flooding through advanced warning systems.

Goal 6. Reduce the level of human loss and damage and losses to existing and future critical facilities/infrastructure, and other community assets due to wildland fires.

Objective 6.A Develop a comprehensive approach to reducing the level of damage and losses due to wildland fires.

Objective 6.B Protect life, improved property, and natural resources with vulnerability to the effects of wildland fires.

Objective 6.C Maintain coordination and support existing efforts to mitigate wildland fire hazards.

Objective 6.D Educate the public about wildland fire dangers and mitigation measures.

Objective 6.E Promote changes in current regulations to facilitate hazard mitigation.

Goal 7. Reduce the level of damage and losses to people, existing and future critical facilities/infrastructure, and other community assets due to thunderstorms/high winds.

Objective 7.A Educate the public to the threat of losses due to thunderstorms/high winds.

Objective 7.B Educate/warn the public of actions and precautions to take during thunderstorms/high wind events.

Goal 8.	**Reduce the potential level of damage and losses to people, existing and future critical facilities/infrastructure, and other community assets due to hazardous materials incidents.**
Objective 8.A	Develop a comprehensive approach to reducing the level of damage and losses due to hazardous materials incidents.
Objective 8.B	Minimize vulnerability to the effects of hazardous materials incidents.
Objective 8.C	Educate the public about hazardous materials dangers and mitigation measures.
Goal 9.	**Reduce the level of damage and losses to people, existing and future critical facilities/infrastructure, and other community assets due to transportation accidents.**
Objective 9.A	Develop a comprehensive approach to reducing the level of damage and losses due to transportation accidents.
Objective 9.B	Protect existing assets with vulnerability to the effects of transportation accidents.
Objective 9.C	Coordinate with rail road companies and federal, state, county, and local transportation departments to develop accident mitigation cooperatives and agreements.
Goal 10.	**Reduce the potential level of damage and losses to people, existing and future critical facilities/infrastructure, and other community assets due to other natural and human caused hazards.**
Objective 10.A	Develop a comprehensive approach to reducing the level of damage and losses due to other hazards.
Objective 10.B	Protect life, improve property, and natural resources with vulnerability to the effects of other hazards.

5.3 Mitigation Actions/Projects

Mitigation actions/projects (A/P) are those activities identified by a community, that when implemented, will have the effect of reducing the community's exposure and risk to the particular hazard or hazards being mitigated. Using the results of the vulnerability analysis, the capability assessment, and the goals and objectives, the Clarkdale planning team formulated a list of A/Ps for mitigation of the identified hazards within the

DMA2K Citation

Requirement §201.6(c)(3)(ii):

[A mitigation strategy … section shall include: …] (ii) A section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

County. The A/Ps identified can be generally classified as either structural or non-structural. Structural A/Ps typify a traditional "bricks and mortar" approach where physical improvements are provided to effect the mitigation goals. Examples may include channels, culverts, bridges, detention basins, dams, emergency structures, and structural augmentations of existing facilities. Non-structural A/Ps deal more with policy, ordinance, and administrative changes, buy-out programs, and legislative actions.

The mitigation A/Ps developed for Clarkdale include information for the following categories:

- **Identification and Description** – Each A/P is provided with a unique identifier and a description that summarizes the type, scope, and characteristics of the A/P, and the objective or objectives addressed with the A/P.
- **Estimated Percent of Hazard or Hazards Mitigated** – Some A/Ps are directly associated with the mitigation of at least one or more hazards, and a subjective estimate of A/P effectiveness can be made in terms of the percent of hazard(s) mitigated. This percentage is then used for estimating the Benefit/Cost (B/C) ratio for that A/P. An "N/A" is coded for the A/Ps that do not apply.
- **Total A/P Cost** – For each A/P, a conceptual cost was estimated to assess the economic viability. For structural A/Ps, a conceptual construction cost estimate was made. For non-structural A/Ps, the cost was derived by estimating the approximate man-hour cost of staff time needed to implement the A/P.
- **Simplified Benefit/Cost Analysis** – The simplified B/C ratio methodology outlined in the Arizona Model Local Hazard Mitigation Plan will be employed to assess the economic viability of an A/P. For cases in which the application of this procedure is difficult or impractical, an arbitrary B/C ratio of 1.0 is assigned.
- **Evaluation and Local Prioritization** – The Clarkdale planning team evaluated and ranked each A/P using the STAPLEE [22] procedure outlined in Step 2 of FEMA 386-3.

The mitigation A/Ps for Clarkdale are summarized in Table 5-5, with each set of projects being tabulated in ranked order.

[22] FEMA, 2003, *Developing the Mitigation Plan – Identifying Mitigation Actions and Implementation Strategies*, FEMA 386-3, pp 2-12 through 2-21 and Worksheet #4.

Table 5-5

Summary of mitigation actions/projects for Clarkdale

Action/Project							STAPLEE Parameters (Scale 1=worst to 5=best)							
ID	Name	Description	Cost	Estimated Losses Due to Hazard	Percent of Hazard Mitigated	B/C Ratio	Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5.F.1	Improve Flood Warning System on Verde River	Install gage and equipment for flood warning system in the Verde River at Tuzigoot Bridge.	$10,000	$60,000,000	1%	60	5	5	5	5	3	5	4	32
5.B.1	Tuzigoot Bridge	Enlarge or replace Tuzigoot Bridge to alleviate traffic and emergency response vehicles during flooding events on the Verde River.	$28,000,000	$5,000,000	1%	0	5	5	5	5	3	5	3	31
8.A.1	First Responder and Technician Training and Equipment	Through advanced training and use of equipment first responders are better able to identify hazards and protect the public.	$75,000	$1,500,000	10%	2	5	5	3	5	5	3	5	31
9.A.1	Develop Transportation Master Plan	Hire a consultant or develop a Town transportation engineer to develop a Transportation Master Plan to identify transportation hazards in the community.	$200,000	N/A	4.00%	1	5	5	3	4	5	3	5	30
7.B.1 (6.E) (1.B)	Property Maintenance Code	Adopt International Construction Code Appendix - Property Maintenance Code to help maintain building integrity to prevent injury or loss of life and to mitigate structure damage to existing structures resulting from thunderstorms and high winds.	$35,000	$1,000,000	10%	3	4	3	5	4	3	5	5	29
5.B.2 (6.B)	Targeted Debris Removal and Wildfire Fuel Reduction	Remove overgrowth and debris around washes in the Town including the Verde River. Project to increase river capacity and reduce wildfire hazard.	$25,000	$1,000,000	1%	0	5	5	5	5	3	3	3	29
7.B.2 (1.B)	Enforce Building Codes	Enforce recently adopted International Construction Codes to prevent injury or loss of life and to mitigate structure damage to future structures resulting from thunderstorms and high winds.	$5,000	$500,000	25%	25	5	5	4	4	3	3	4	28

Table 5-5

Summary of mitigation actions/projects for Clarkdale

Action/Project							STAPLEE Parameters (Scale 1=worst to 5=best)							
ID	Name	Description	Cost	Estimated Losses Due to Hazard	Percent of Hazard Mitigated	B/C Ratio	Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
6.B.1	Wildfire Fuel Reduction	Conduct wildfire hazard fuel reduction within and surrounding Clarkdale to reduce the risk to existing and new structures.	$50,000	$10,000,000	10%	20	5	5	5	5	3	3	2	28
3.A.1	Adopt Sprinkler Ordinance	Adopt fire protection sprinkler ordinance to protect existing and new structures against potential fire hazards.	$0	$0	0%	0	4	5	5	2	3	2	2	23
7.B.3	Back up Generators	Purchase and install backup generators to provide power in the event of a power outage related to thunderstorms/high winds. Install back up power systems for critical public services and disaster shelters in the Town.	$300,000	$500,000	1%	0	3	3	3	3	3	3	3	21

5.4 Implementation Strategy

The implementation strategy outlines the *"how, when, and by whom?"* questions related to implementing an identified A/P. The Clarkdale planning team developed an implementation strategy for all of the projects in Table 5-5, by providing the following information:

- **Lead Agency** – For each A/P, a lead agency was identified. This agency will be responsible for the A/P's ultimate development and implementation.
- **Funding Source Identification** – Sources of funding for each A/P were identified.

DMA2K Citation

Requirement §201.6(c)(3)(iii):

[A mitigation strategy … section shall include: …] (iii) An action plan describing how the actions identified in paragraph (c)(2)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

- **Implementation Schedule** – For each A/P, an implementation schedule was developed to specify the anticipated completion dates. For cases in which the A/P completion is tied to the receipt of federal or state grant funds, the dates may be unknown.
- **Critical Interim or Pilot Activities** – Where necessary, information was provided to identify any activities that should be performed or investigated on an interim basis.

Table 5-6 summarizes the implementation strategy for Clarkdale's A/Ps.

Table 5-6

Summary of Clarkdale action/project implementation strategies

Mitigation Action/Project		Implementation Strategy			
ID	**Name**	**Lead Agency**	**Funding Source(s)**	**Completion Date**	**Critical Interim or Pilot Activities**
5.F.1	Improve Flood Warning System on Verde River	Yavapai County Flood Control District	Fiscal year 2005-2006 CIP	October 2006	- Obtain ADEQ Permit - Coordination with National Weather Service and Yavapai County E.M.
5.B.1	Tuzigoot Bridge	Arizona Department of Transportation	Federal government	2015	- NACOG adoption of priority item -ADOT priority project list
8.A.1	First Responder and Technician Training and Equipment	Town of Clarkdale	State Fire Grant	2010	-Identify staff and reserves employee status and past training
9.A.1	Develop Transportation Master Plan	Clarkdale Community Development Department	General Fund	2010	-Interim work with Planning Commission and ADOT to identify collector routes
7.B.1 (6.E) (1.B)	Property Maintenance Code	Town of Clarkdale	General Fund	July 2006	- Public hearings for code adoption
5.B.2 (6.B)	Targeted Debris Removal and Wildfire Fuel Reduction	Verde Valley Fire District	General Fund	May 2006	-local volunteer and Town coordination staring at areas with greatest undergrowth
7.B.2 (1.B)	Enforce Building Codes	Town of Clarkdale	General Fund	on going	-Daily action by staff
6.B.1	Wildfire Fuel Reduction	Verde Valley Fire District	General Fund	April 2006	-local volunteer and Town coordination staring at areas with greatest undergrowth
3.A.1	Adopt Sprinkler Ordinance	Town of Clarkdale	General Fund	Completed	
7.B.3	Back up Generators	Town of Clarkdale	General Fund	July 2008	-Continue to use rented genrators from United Rentals or borrowed equipment

SECTION 6: PLAN MAINTENANCE PROCEDURES

According to the DMA2K requirements, each plan must define and document processes or mechanisms for maintaining and updating the hazard mitigation plan within the established five-year planning cycle. Elements of this plan maintenance section include:

- ☑ **Monitoring and Evaluating the Plan**
- ☑ **Updating the Plan**
- ☑ **Implementing the Plan by Incorporation into Other Agency or Jurisdictional Planning Mechanisms**
- ☑ **Continued Public Participation**

Clarkdale recognizes that this hazard mitigation plan is intended to be a "living" document with regularly scheduled monitoring, evaluation, and updating.

DMA2K Citation

Requirement §201.6(c)(4):

[The plan shall include the following: …] (4) A plan maintenance process that includes: (i) A section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle. (ii) A process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate. (iii) Discussion on how the community will continue public participation in the plan maintenance process.

6.1 Monitoring and Evaluation

Clarkdale has established the following monitoring and evaluation procedures:

- **Schedule** – Each plan shall be reviewed on at least an annual basis or following a major disaster. An informal, brief memorandum documenting the review findings shall be prepared and included in Appendix G. Each review shall include an evaluation of the following:
  - ***Public Involvement*** – Public involvement successes and challenges shall be reviewed and noted, with any recommendations for changes.
  - ***Risk Assessment*** – The identified hazards and associated risks shall be evaluated with respect to the previous year's events, and any significant differences shall be noted for possible revision during the next planning cycle.
  - ***Mitigation Strategy*** – The proposed A/Ps shall be reviewed and updated regarding status and implementation (i.e. – proposed project is now fully complete). Any changes shall be noted along with the successes and/or challenges associated with the implementation.

A summary of the annual review shall also be presented as an informational item to the Clarkdale Town Council on an annual basis.

- **Responsibility** – The responsibility for ensuring that the plan monitoring and evaluation is performed at the scheduled interval shall come under the auspices of the Primary Point of Contact listed in Section 2.

6.2 Plan Update

According to DMA2K, the CMHMP will require updating and re-approval from FEMA every five years. The plan update will adhere to that set schedule using the following procedure:

- ✓ Six months prior to the plan expiration date, the Town of Clarkdale planning team will re-convene to review and assess the materials accumulated in Appendix G.
- ✓ The Town of Clarkdale planning team will update and/or revise the appropriate or affected portions of the plan and produce a revised plan document.
- ✓ The revised plan document will be presented before the Clarkdale Town Council for an official concurrence/adoption of the changes.
- ✓ The revised plan will be submitted to FEMA for review, comment and approval.

6.3 Plan Implementation

The CMHMP will function as a stand alone document subject to its own review and revision schedule presented in Sections 6.1 and 6.2. The CMHMP will also serve as a reference for other mitigation planning needs of the Town. Many of the elements and mitigation strategies presented in this plan will either directly or indirectly impact other planning and mitigation activities within the Town of Clarkdale. Whenever possible, the Town will endeavor to incorporate mitigation actions and projects identified in the CMHMP into existing Town planning mechanisms. At a minimum, the CMHMP will be reviewed and referenced with any revisions or updates to the planning documents summarized in Table 5-4, as appropriate. This process may include adding or revising building codes, adding or changing zoning and subdivision ordinances, incorporating mitigation goals and strategies into comprehensive plans, and incorporating the risk assessment results into development review processes to ensure proper hazard mitigation for future development. In addition, an implementation strategy outlining assignments of responsibility and completion schedules for specific actions/projects proposed in this plan are summarized in Table 5-6.

6.4 Continued Public Involvement

Clarkdale is committed to keeping the public informed about the Town's hazard mitigation planning efforts, actions and projects. In order to accomplish this, the Clarkdale planning team shall pursue the following opportunities for public involvement and dissemination of information whenever possible and appropriate:

- ✓ Provide periodic summary updates of hazard mitigation A/P measures being implemented using local media.
- ✓ Conduct an annual presentation of hazard mitigation planning discoveries, progress, or proposed A/P measures at the Clarkdale Town Council Meetings.
- ✓ Participate in annual events such as the County fair and other public events.
- ✓ Perform public outreach and mitigation training meetings for targeted populations known to be in higher risk hazard areas (i.e. – floodplain residents).

Appendix A

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Appendix B

Arizona Department of Commerce 2003 Community Profiles

Appendix C

Public Involvement Records

Appendix D

Glossary of Terms

GLOSSARY OF TERMS

GENERAL TERMS

Asset
Any natural or human-caused feature that has value, including, but not limited to people; buildings; infrastructure like bridges, roads, and sewer and water systems; lifelines like electricity and communication resources; or environmental, cultural, or recreational features like parks, dunes, wetlands, or landmarks.

Building
A structure that is walled and roofed, principally above ground and permanently affixed to a site. The term includes a manufactured home on a permanent foundation on which the wheels and axles carry no weight.

Critical Facilities and Infrastructure
Systems or facilities whose incapacity or destruction would have a debilitating impact on the defense or economic security of the nation. The Critical Infrastructure Assurance Office (CIAO) defines eight categories of critical infrastructure, as follows:

1. **Telecommunications infrastructure**: Telephone, data services, and Internet communications, which have become essential to continuity of business, industry, government, and military operations.
2. **Electrical power systems**: Generation stations and transmission and distribution networks that create and supply electricity to end-users.
3. **Gas and oil facilities**: Production and holding facilities for natural gas, crude and refined petroleum, and petroleum-derived fuels, as well as the refining and processing facilities for these fuels.
4. **Banking and finance institutions**: Banks, financial service companies, payment systems, investment companies, and securities/commodities exchanges.
5. **Transportation networks**: Highways, railroads, ports and inland waterways, pipelines, and airports and airways that facilitate the efficient movement of goods and people.
6. **Water supply systems**: Sources of water; reservoirs and holding facilities; aqueducts and other transport systems; filtration, cleaning, and treatment systems; pipelines; cooling systems; and other delivery mechanisms that provide for domestic and industrial applications, including systems for dealing with water runoff, wastewater, and firefighting.
7. **Government services**: Capabilities at the federal, state, and local levels of government required to meet the needs for essential services to the public.
8. **Emergency services**: Medical, police, fire, and rescue systems.

Department of Homeland Security (DHS)
Following the September 11, 2001 terrorist attacks, President George W. Bush created a new federal government department in order to bring 22 previously separate domestic agencies together. The new department's first priority is protecting the nation against further terrorist attacks. Component agencies analyze threats and intelligence, guard borders and airports, protect critical infrastructure, and coordinate the response for future emergencies. The new department is organized into five major directorates: Border and Transportation Security (BTS); Emergency Preparedness and Response

(EPR); Science and Technology (S&T); and Information Analysis and Infrastructure Protection (IAIP); Management. In addition, several other critical agencies have been folded into the new department or are newly created. The Federal Emergency Management Agency (FEMA) is the foundation of the Emergency Preparedness and Response (EPR) Directorate.

Disaster Mitigation Act of 2000 (DMA2K)
A law signed by the President on October 30, 2000 that encourages and rewards local and state pre-disaster planning, promotes sustainability as a strategy for disaster resistance, and is intended to integrate state and local planning with the aim of strengthening statewide mitigation planning.

Emergency Preparedness and Response (EPR) Directorate
One of five major Department of Homeland Security Directorates which builds upon the formerly independent Federal Emergency Management Agency (FEMA). EPR is responsible for preparing for natural and human-caused disasters through a comprehensive, risk-based emergency management program of preparedness, prevention, response, and recovery. This work incorporates the concept of disaster-resistant communities, including providing federal support for local governments that promote structures and communities that reduce the chances of being hit by disasters.

Emergency Response Plan
A document that contains information on the actions that may be taken by a governmental jurisdiction to protect people and property before, during, and after a disaster.

Federal Emergency Management Agency (FEMA)
Formerly independent agency created in 1978 to provide a single point of accountability for all Federal activities related to disaster mitigation and emergency preparedness, response and recovery. As of March 2003, FEMA is a part of the Department of Homeland Security's Emergency Preparedness and Response (EPR) Directorate.

Flood Insurance Rate Map (FIRM)
Map of a community, prepared by FEMA, that shows the special flood hazard areas and the risk premium zones applicable to the community.

Frequency
A measure of how often events of a particular magnitude are expected to occur. Frequency describes how often a hazard of a specific magnitude, duration, and/or extent typically occurs, on average. Statistically, a hazard with a 100-year recurrence interval is expected to occur once every 100 years on average, and would have a 1 percent chance – its probability – of happening in any given year. The reliability of this information varies depending on the kind of hazard being considered.

Fujita Scale of Tornado Intensity
Rates tornados with numeric values from F0 to F5 based on tornado winds peed and damage sustained. An F0 indicates minimal damage such as broken tree limbs or signs, while an F5 indicates severe damage sustained.

Geographic Information Systems (GIS)
A computer software application that relates physical features on the earth to a database to be used for mapping and analysis.

Hazard
A source of potential danger or adverse condition. Hazards include both natural and human-caused events. A natural event is a hazard when it has the potential to harm people or property and may include events such as floods, earthquakes, tornados, tsunami, coastal storms, landslides, and wildfires that strike populated areas. Human-caused hazard events originate from human activity and may include technological hazards and terrorism. Technological hazards arise from human activities and are assumed to be accidental and/or have unintended consequences (e.g., manufacture, storage and use of hazardous materials). While no single definition of terrorism exists, the Code of Federal Regulations defines terrorism as "…unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives."

Hazard Event
A specific occurrence of a particular type of hazard.

Hazard Identification
The process of identifying hazards that threaten an area.

Hazard Mitigation
Cost effective measures taken to reduce or eliminate long-term risk associated with hazards and their effects.

Hazard Profile
A description of the physical characteristics of hazards and a determination of various descriptors including magnitude, duration, frequency, probability, and extent.

HAZUS
A GIS-based nationally standardized earthquake loss estimation tool developed by FEMA.

Mitigate
To cause to become less harsh or hostile; to make less severe or painful. Mitigation activities are actions taken to eliminate or reduce the probability of the event, or reduce its severity of consequences, either prior to or following a disaster/emergency.

Mitigation Plan
A systematic evaluation of the nature and extent of vulnerability to the effects of natural hazards typically present in a defined geographic area, including a description of actions to minimize future vulnerability to hazards.

Modified Mercalli Intensity Scale
The Modified Mercalli Intensity Scale is commonly used in the United States by seismologists seeking information on the severity of earthquake effects. Intensity ratings are expressed as Roman numerals between I at the low end and XII at the high end. The Intensity Scale differs from the Richter Magnitude Scale in that the effects of any one earthquake vary greatly from place to place, so there may be many Intensity values (e.g.: IV, VII) measured from one earthquake. Each earthquake, on the other hand, should have just one Magnitude, although the several methods of estimating it will yield slightly different values (e.g.: 6.1, 6.3).

100-Hundred Year Floodplain
Also referred to as the Base Flood Elevation (BFE) and Special Flood Hazard Area (SFHA). An area within a floodplain having a 1 percent or greater chance of flood occurrence in any given year.

Planning
The act or process of making or carrying out plans; the establishment of goals, policies, and procedures for a social or economic unit.

Probability
A statistical measure of the likelihood that a hazard event will occur.

Promulgation
To make public and put into action the Hazard Mitigation Plan via formal adoption and/or approval by the governing body of the respective community or jurisdiction (i.e. – Town or City Council, County Board of Directors, etc.).

Q3 Data
The Q3 Flood Data product is a digital representation of certain features of FEMA's Flood Insurance Rate Map (FIRM) product, intended for use with desktop mapping and Geographic Information Systems technology. The digital Q3 Flood Data are created by scanning the effective Flood Insurance Rate Map (FIRM) paper maps and digitizing selected features and lines. The digital Q3 Flood Data are designed to serve FEMA's needs for disaster response activities, National Flood Insurance Program activities, risk assessment, and floodplain management.

Repetitive Loss Property
A property that is currently insured for which two or more National Flood Insurance Program losses (occurring more than ten days apart) of at least $1000 each have been paid within any 10-year period since 1978.

Richter Magnitude Scale
A logarithmic scale devised by seismologist C.F. Richter in 1935 to express the total amount of energy released by an earthquake. While the scale has no upper limit, values are typically between 1 and 9, and each increase of 1 represents a 32-fold increase in released energy.

Risk
The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage beyond a particular threshold due to a specific type of hazard event. It also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Substantial Damage
Damage of any origin sustained by a structure in a Special Flood Hazard Area whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage.

Vulnerability
Describes how exposed or susceptible to damage an asset is. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power–if an electric substation is flooded, it will affect not only the substation itself, but a number of businesses as well. Often, indirect effects can be much more widespread and damaging than direct effects.

Vulnerability Analysis
The extent of injury and damage that may result from a hazard event of a given intensity in a given area. The vulnerability analysis should address impacts of hazard events on the existing and future built environment.

Vulnerable Populations
Any segment of the population that is more vulnerable to the effects of hazards because of things such as lack of mobility, sensitivity to environmental factors, or physical abilities. These populations can include, but are not limited to, senior citizens and school children.

Goals
General guidelines that explain what you want to achieve. Goals are usually broad statements with long-term perspective.

Objectives
Defined strategies or implementation steps intended to attain the identified goals. Objectives are specific, measurable, and have a defined time horizon.

Actions/Projects
Specific actions or projects that help achieve goals and objectives.

Implementation Strategy
A comprehensive strategy that describes how the mitigation actions will be implemented.

NATURAL HAZARDS

Avalanche
Avalanches are massive downward and outward movements of slope-forming materials. These masses may range from car-size to entire mountainsides and includes movement of snow, ice, and debris moving rapidly enough to threaten life. Snow avalanches are caused by the added weight of fresh snow or by gradual weakening of older snow and are often triggered by recreational activity or the impact of small masses of snow or ice falling from above. Three main factors determine whether avalanches are likely to occur - the weather, snow pack, and terrain. There are two principal types of avalanches: a loose snow avalanche gathers more and more snow as it descends a mountainside; a slab avalanche consists of more compact, cohesive snow and ice that breaks away from the slope in a discrete mass. The latter type is responsible for the great majority of accidents.

Drought
A drought occurs when water supplies cannot meet established demands. "Severe" to "extreme" drought conditions endanger livestock and crops, significantly reduce surface and ground water supplies, increase the potential risk for wildland fires, increase the potential for dust storms, and cause significant economic loss. Humid areas are more vulnerable than arid areas. Drought may not be constant or predictable and does not begin or end on any schedule. Short term droughts are less common due to the reliance on irrigation water in arid environments.

Dust / Sand Storms
A dust or sand storm is a severe windstorm that sweeps clouds of dust across an arid region. They can be hazardous to transportation and navigation and to human health. Severe or prolonged dust and sand storms can result in disasters causing extensive economic damage over a wide area and personal injury and death. In Arizona, dust or sand storms are generally associated with the advance of a thunderstorm.

Earthquake
An earthquake is a naturally-induced shaking of the ground, caused by the fracture and sliding of rock within the Earth's crust. The magnitude is determined by the dimensions of the rupturing fracture (fault) and the amount of displacement that takes place. The larger the fault surface and displacement, the greater the energy. In addition to deforming the rock near the fault, this energy produces the shaking and a variety of seismic waves that radiate throughout the Earth. Earthquake magnitude is measured using the Richter Scale and earthquake intensity is measured using the Modified Mercalli Intensity Scale.

Extreme Cold
Extreme cold is associated with either polar regions or extreme winter storms. Communities in polar regions are less threatened as they are normally prepared to cope with extreme cold. The extreme cold associated with winter storms is a deceptive killer as it indirectly causes injury and death resulting from exhaustion and overexertion, hypothermia and frostbite from wind chill, and asphyxiation.

Extreme Heat
Extreme heat is defined as temperatures that hover ten degrees or more above the average high temperature for the region and last for several weeks. Humid conditions may also add to the discomfort of high temperatures. Excessively dry and hot conditions can provoke dust storms and low visibility.

Flooding / Flash Flooding
Flooding is an overflowing of water onto normally dry land and is one of the most significant and costly of natural disasters. Flooding tends to occur in Arizona during anomalous years of prolonged, regional rainfall (typical of an El Nino year), and is typified by increased humidity and high summer temperatures.

Flash flooding is caused by too much rain falling in a small area in a short time and are a critical natural hazard in Arizona, often a result of summer monsoon thunderstorms or the remnants of a tropical storm. Several factors contribute to flash flooding: rainfall intensity and duration, topography, soil conditions, and ground cover. Most flash flooding is caused by slow-moving thunderstorms or thunderstorms repeatedly moving over the same area and can occur within a few minutes or hours of excessive rainfall, or a quick release from a dam or levee failure. Thunderstorms produce flash flooding, often far from the actual storm and at night when natural warnings may not be noticed.

Infestations
An infestation consists of an invasion or spreading of a living organism (plant, animal, etc.) that has an adverse (unwanted) effect on the population or the environment. The effect may range from a simple nuisance to an infectious disease or destructive parasite or insect. Infestations may result from non-indigenous plants, rodents, weeds, parasites, insects, and fungi, and may adversely affect people, animals, agriculture, economy (e.g., tourism), and property.

Liquefaction
The phenomenon that occurs when ground shaking (earthquake) causes loose soils to lose strength and act like viscous fluid. Liquefaction causes two types of ground failure: lateral spread and loss of bearing strength.

Landslides / Mudslides

Landslides, like avalanches are massive downward and outward movements of slope-forming materials. The term landslide is restricted to movement of rock and soil and includes a broad range of velocities. Slow movements, although rarely a threat to life, can destroy buildings or break buried utility lines. A landslide occurs when a portion of a hill slope becomes too weak to support its own weight. The weakness is generally initiated when rainfall or some other source of water increases the water content of the slope, reducing the shear strength of the materials. A mud slide is a type of landslide referred to as a flow. Flows are landslides that behave like fluids: mud flows involve wet mud and debris.

Monsoon

A monsoon is any wind that reverses its direction seasonally. In the Southwestern U.S., for most of the year the winds blow from the west/northwest. Arizona is located on the fringe of the Mexican Monsoon which during the summer months turns the winds to a more south/southeast direction and brings moisture from the Pacific Ocean, Gulf of California, and Gulf of Mexico. This moisture often leads to thunderstorms in the higher mountains and Mogollon Rim, with air cooled from these storms often moving from the high country to the deserts, leading to further thunderstorm activity in the desert. A common misuse of the term monsoon is to refer to individual thunderstorms as monsoons.

Radon

Radon is a naturally occurring radioactive gas that is odorless and tasteless. It is formed from the radioactive decay of uranium. Uranium is found in small amounts in most rocks and soil. It slowly breaks down to other products such as radium, which breaks down to radon. Radon also undergoes radioactive decay. Radon enters the environment from the soil, from uranium and phosphate mines, and from coal combustion. Radon has a radioactive half-life and about 4 days; this means the one-half of a given amount of radon will decay to other products every 4 days. Some of the radon produced in the soil will move to the surface and enter the air. Radon also moves from the soil and enters the groundwater.

Subsidence

Land subsidence occurs when large amounts of ground water have been withdrawn from certain types of rocks, such as fine-grained sediments. The rock compacts because the water is partly responsible for holding the ground up. When the water is withdrawn, the rocks falls in on itself.

Thunderstorms / High Winds

Thunderstorms are characterized as violent storms that typically are associated with high winds, dust storms, heavy rainfall, hail, lightning strikes, and/or tornados. The unpredictability of thunderstorms, particularly their formation and the rapid movement to new locations heightens the possibility of floods. Thunderstorms, dust/sand storms and the like are most prevalent in Arizona during the monsoon season, which is a seasonal shift in the winds that causes an increase in humidity capable of fueling thunderstorms. The monsoon season in Arizona typically is from late-June or early-July through mid-September.

Tornados / Dust Devils

A tornado is a violently rotating column of air extending from a thunderstorm to the ground. The most violent tornados are capable of tremendous destruction with wind speeds in excess of 250 mph. Damage paths can exceed a mile wide and 50 miles long. Tornados are one of nature's most violent storms. In an average year, 800 tornados are reported across the United States, resulting in 80 deaths and over 1,500 injuries. The damage from tornados is due to high winds. The Fujita Scale of Tornado Intensity measures tornado / high wind intensity and damage.

A dust devil is a small but rapidly rotating column of wind made visible by the dust, sand, and debris it picks up from the surface. They typically develop best on clear, dry, hot afternoons and are

common during the summer months in the desert portions of Arizona. While resembling tornados, dust devils typically do not produce damage, although in Arizona they have done so occasionally.

Tropical Storms / Hurricane

A tropical system in which the maximum sustained surface wind ranges from 34 to 63 knots (39 to 73 mph). Tropical storms are associated with heavy rain, high wind, and thunderstorms. High intensity rainfall in short periods is typical.

A tropical storm is classified as a hurricane when its sustained winds reach or exceed 74 mph (64 knots). These storms are medium to large in size and are capable of producing dangerous winds, torrential rains, and flooding, all of which may result in tremendous property damage and loss of life, primarily in coastal populated areas. The effects are typically most dangerous before a hurricane makes landfall, when most damage occurs. However, Arizona has experienced a number of tropical storms that caused extensive flooding and wind damage.

Volcanoes

A volcano is a vent in the Earth from which molten rock (magma) and gas erupt. The molten rock that erupts from the volcano (lava) forms a hill or mountain around the vent. The lava may flow out as a viscous liquid, or it may explode from the vent as solid or liquid particles. Volcanic eruptions can be placed into two general categories: those that are explosive and those that are effusive resulting in gently flowing lava flows, spatter cones, and lava fountains. Many eruptions are highly explosive in nature. They produce fragmental rocks from erupting lava and surrounding area rock and may produce fine volcanic ash that rises many kilometers into the atmosphere in enormous eruption columns. Explosive activity can also cause widespread ash fall, pyroclastic flows, debris avalanches, landslides, pyroclastic surges, and lahars.

Wildfires

Wildfire is a rapid, persistent chemical reaction that releases heat and light, especially the exothermic combination of a combustible substance with oxygen. Wildfires present a significant potential for disaster in the southwest, a region of relatively high temperatures, low humidity, low precipitation, and during the spring moderately strong daytime winds. Combine these severe burning conditions with people or lightning and the stage is set for the occurrence of large, destructive wildfires.

Winter Storms

Winter storm is defined as a cold wind accompanied by blowing snow; freezing rain or sleet, cold temperatures, and possibly low visibility and drifting snow. The storms often make roads impassable. Residents, travelers, and livestock may become isolated or stranded without adequate food, water, and fuel supplies. The conditions may overwhelm the capabilities of a local jurisdiction. Winter storms are considered deceptive killers as they indirectly cause transportation accidents, and injury and death resulting from exhaustion/overexertion, hypothermia and frostbite from wind chill, and asphyxiation.

HUMAN-CAUSED HAZARDS

Arson

The act of willfully and maliciously burning of property, especially with criminal or fraudulent intent.

Biological Hazards

A hazard caused by the presence of any micro-organism, virus, infectious substance, or biological product that may be engineered as a result of biotechnology or any naturally occurring micro-organism, virus, infectious substance, or biological product, capable of causing death, disease, or other biological malfunction.

Building / Structure Collapse
The failure and downfall of a structure. The collapse may result from a variety of natural causes such as hurricanes, earthquakes, tornados, floods, or from manmade circumstances such as construction deficiencies, neglect, aging infrastructure, or acts of terrorism.

Civil Disobedience
The refusal to obey civil laws or decrees, usually taking the form of passive resistance. People practicing civil disobedience break a law because they consider the law unjust, want to call attention to its justice, and hope to bring about its repeal or amendment. They are also willing to accept a penalty for breaking the law.

Civil Disturbance
When individuals or segments of the population create a situation, often a result of civil unrest, requiring a response from the emergency response community to protect lives and property. The disturbance may be small and isolated to a small area or be of a larger scale and exceeding the response capabilities of a jurisdiction. Activities are normally active (demonstrations, looting, riots) rather than passive (public speeches, sit-downs, marches).

Civil Unrest
When a segment of the civil population indicates its discontent or dissatisfaction with existing political, social, or religious issues. The unrest may materialize as a civil disturbance or civil disobedience. Activities may be passive (public speeches, sit-downs, marches) or active (demonstrations, looting, riots).

Dam / Levee Failure
Dam/levee failure can be caused by natural occurrences such as floods, rock slides, earthquakes, or the deterioration of the foundation or the materials used in construction. Usually the changes are slow and not readily discovered by visual examination. Such a failure presents a significant potential for a disaster in that significant loss of life and property would be expected in addition to the possible loss of power and water resources.

Enemy Attack
The use of aggressive action against an opponent in pursuit of an objective. An "enemy attack" is considered an attack of one sovereign government against another as either a declared or undeclared act of war.

Explosion/Fire
An explosion is the sudden loud release of energy and a rapidly expanding volume of gas that occurs when a gas explodes or a bomb detonates. Explosions result from the ignition of volatile products such as petroleum products, natural and other flammable gases, hazardous materials/chemicals, dust, and bombs. While an explosion surely may cause death, injury and property damage, a fire routinely follows which may cause further damage and inhibit emergency response.

Extreme Air Pollution
Pollution is the contamination of the earth's environment with materials that interfere with human health, the quality of life, or the natural functioning of ecosystems. Air pollution is the addition of harmful substances to the atmosphere. It makes people sick, causing breathing problems and sometimes cancer, and it harms plants, animals, and the ecosystems in which they live. Some pollutants return to earth in the form of acid rain and snow that corrodes structures, damages vegetation, and makes streams and lakes unsuitable for life. "Extreme air pollution" exceeds established thresholds resulting in the need to take corrective actions and cause the public to take precautions.

Fuel / Resource Shortage
A fuel/resource shortage is defined as an actual or potential shortage of natural gas, crude and refined petroleum, petroleum-derived fuels, or other critical commodities that significantly impacts the ability to: render essential government and emergency services (medical, fire, safety); and threatens the health and safety of the public.

Hazardous Materials Incidents
A spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or disposing into the environment of a hazardous material, but excludes: (1) any release which results in exposure to poisons solely within the workplace, with respect to claims which such persons may assert against the employer of such persons; (2) emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel, or pipeline pumping station engine; (3) release of source, byproduct, or special nuclear material from a nuclear incident; and (4) the normal application of fertilizer.

Hostage Situation
A situation in which people are held hostage and negotiations take place for their release. The situation may range from a simple domestic or isolated criminal act to an attempt to impose will on a national or international scale to intimidate or coerce a government to further a political, social, or religious objective.

Hysteria (Mass)
Also known as "mass psychogenic illness" and "hysterical contagion," mass hysteria is a situation in which a symptom or set of symptoms for which there is no physical explanation spreads quickly among a group. It may occur as a reaction to an incident of domestic terrorism.

Power / Utility Failure
A power/utility failure is defined as an actual or potential shortage of electric power or the interruption of electrical power that significantly threatens health and safety. Many communities are vulnerable to many localized, short and long-term energy emergencies. Power shortages or failures do occur and may be brought on by severe weather conditions, such as blizzards, ice storms, extreme heat, thunderstorms, or events such as war, or civil disturbance.

Radiological Accident
A radiological accident is a release of radioactive materials. It can occur where radioactive materials are used, stored, or transported. Potentially nuclear power plants (fixed nuclear facilities), hospitals, universities, research laboratories, industries, major highways, railroads, or shipping yards could be the site of a radiological accident.

Sabotage
Sabotage is the deliberate destruction of property, dismantling of technology or other interference or obstruction of normal operations. "Sabotage" is normally considered an act related to war; similar acts during "non-war" conditions would be considered a terrorist act.

Special Events
An event of such a magnitude, media visibility, or importance that may require extraordinary preparations by government and possible response by emergency response agencies. Such events may be considered an opportunity or target for activist or terrorist activities.

Strike
A strike is an organized work stoppage carried out by a group of employees for the purpose either of enforcing demands relating to employment conditions on their employer or of protesting unfair labor practices. A strike may be engaged to obtain improvement in work conditions, higher wages or shorter hours, to forestall an adverse change in conditions of employment, or to prevent the employer from carrying out actions viewed by workers as detrimental to their interests.

Transportation Accident
A transportation accident is an incident related to a mode of transportation (highway, air, rail, waterway, port, harbor) where an emergency response is necessary to protect life and property.

Terrorism (Economic, Cyber, Nuclear, Biological, and Chemical)
"Terrorism is the unlawful use of force or violence, or threatened use of force or violence, against persons and places for the purpose of intimidation and/or coercing a government, its citizens, or any segment thereof for political or social goals." (Department of Justice, Federal Bureau of Investigation).

Terrorism can include computer-based (cyber) attacks and the use of weapons of mass destruction (WMD) to include chemical, biological, radiological, nuclear, or explosive (CBRNE) agents.

Appendix E

Miscellaneous Report Excerpts
and
State of Arizona Hazard Profiles

Appendix F

Detailed Historic Hazard Records

Appendix G

Plan Maintenance Review Memorandums