



# Ouray County Multi-Hazard Mitigation Plan

Comprehensive Update  
September 2013



# **Ouray County Multi-Hazard Mitigation Plan**

September 2013

Developed by Ouray County with professional planning assistance from  
AMEC Environment and Infrastructure, Boulder, CO  
Hazard Mitigation and Emergency Management Programs





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# EXECUTIVE SUMMARY

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The purpose of natural hazards mitigation is to reduce or eliminate long-term risk to people and property from natural hazards. Ouray County and participating jurisdictions first developed this multi-hazard mitigation plan in 2008 to reduce future losses to the County and its communities resulting from natural hazards. The plan was updated in 2013 in accordance with the requirements of the Disaster Mitigation Act of 2000 and to maintain eligibility for the Federal Emergency Management Agency (FEMA) Flood Mitigation Assistance, Pre-Disaster Mitigation, Hazard Mitigation Grant Programs. Since the original development of this plan, FEMA guidance for local hazard mitigation plans has been refined and updated. This plan was updated to be consistent with the new FEMA guidance and with Ouray County's current hazard mitigation priorities and risks.

The Ouray County Multi-Hazard Mitigation Plan Update is a multi-jurisdictional plan that covers the following local governments that participated in the planning process:

- Ouray County
- City of Ouray
- Town of Ridgway
- Log Hill Mesa Fire Protection District
- Ridgway School District\*

\*New participant in 2013

The County's planning process followed a methodology prescribed by FEMA, which began with the reconvening of the Hazard Mitigation Planning Committee (HMPC) comprised of key stakeholders from Ouray County, participating jurisdictions, stakeholders, and state and federal agencies. The HMPC conducted an updated risk assessment that identified and profiled hazards that pose a risk to Ouray County, assessed the County's vulnerability to these hazards, and examined the capabilities in place to mitigate them. New methodologies were used where possible to provide a more thorough risk and vulnerability assessment. The County is vulnerable to several hazards that are identified, profiled, and analyzed in this plan. Debris flows, floods, and wildfires are among the hazards that can have a significant impact on the County.

Based upon the risk assessment, the HMPC revisited the goals and objectives identified in 2008 for reducing risk to hazards. The goals and objectives of this multi-hazard mitigation plan are to:

## **Goal 1: Minimize Loss of Life and Injury from Anticipated Hazard Events**

- Educate citizens about natural hazard events and ways to protect themselves
- Complete local-level community wildfire protection plans, to include evacuation routes and procedures

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- Improve flash flood and debris flow warning and evacuation capabilities
  - Implement debris flow mitigation
  - Make travel safer on Highway 550 between Ouray and Red Mountain Pass
  - Provide training and equipment to responders and government officials
  - Update and expand all-hazard emergency response plans

**Goal 2: Reduce the Potential Impact of Natural and Manmade Disasters on Public and Private Property, the Economy, Natural Environment, and Historic Resources**

- Reduce flood impacts to the citizens of the City of Ouray, Town of Ridgway, and the County
- Reduce debris flow impacts to public, private, and historic structures in City of Ouray
- Reduce wildfire impacts to structures and response resources
- Continue to reduce impacts of wildfire to future development through land use planning, subdivision reviews, permitting, and building codes
- Update mapping of hazard areas, including flood, debris flow, and avalanche
- Use updated risk maps to improve the risk assessment in future updates to this plan and to provide public information
- Reduce drought impacts

**Goal 3: Reduce the Potential Impact of Natural and Manmade Disasters on Critical Facilities, Infrastructure, and Critical Support Services**

- Protect critical facilities and assets at risk to flood, debris flows, or landslide
- Protect critical facilities and assets at risk to wildfire
- Protect necessary communication infrastructure from multiple hazards (wildfire, lightning, windstorm, flood, extreme temperatures)
- Provide continuity of operations and continuity of government
- Provide necessary support infrastructure
- Review government capabilities for responding effectively to anticipated hazard events and upgrade where possible

To meet identified goals and objectives, the plan recommends the mitigation actions summarized in Chapter 5 of this plan and in Appendix C. The list of actions from 2008 was reviewed by the HMPC. Committee members noted which actions were completed, deleted, deferred, or ongoing and provided reasons why these decisions were made. The Committee also developed new actions which are included in Chapter 5 and Appendix C. The HMPC also developed an implementation plan for each action, which identifies priority level, background information, ideas for implementation, responsible agency, timeline, cost estimate, and potential funding sources. The multi-hazard mitigation plan has been formally adopted by the Ouray County Board of County Commissioners and the governing bodies of each participating jurisdiction and will be updated within a five-year timeframe.



# 1 INTRODUCTION

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## 1.1 Purpose

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Ouray County, including the participating jurisdictions of the City of Ouray, the Town of Ridgway, Log Hill Mesa Fire Protection District, and the Ridgway School District, has prepared this local hazard mitigation plan to guide hazard mitigation planning to better protect the people and property of the County from the effects of hazard events. This plan demonstrates the community's commitment to reducing risks from hazards and serves as a tool to help decision makers direct mitigation activities and resources. The plan is intended to be a living document through ongoing implementation and regular updates every five years. The original plan was developed in 2008 and updated in 2013.

This plan was also developed to make Ouray County and participating jurisdictions eligible for certain federal disaster assistance, specifically, the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation program, as well as to make the County more disaster resistant.

## 1.2 Background and Scope

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Each year in the United States, disasters take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. These monies only partially reflect the true cost of disasters, because additional expenses to insurance companies and nongovernmental organizations are not reimbursed by tax dollars. Many disasters are predictable, and much of the damage caused by these events can be alleviated or even eliminated.

Hazard mitigation is defined by FEMA as "any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event." The results of a three-year, congressionally mandated independent study to assess future savings from mitigation activities provides evidence that mitigation activities are highly cost-effective. On average, each dollar spent on mitigation saves society an average of \$4 in avoided future losses in addition to saving lives and preventing injuries (National Institute of Building Science Multi-Hazard Mitigation Council 2005).

Hazard mitigation planning is the process through which hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies to lessen impacts are determined, prioritized, and implemented. This plan documents Ouray County's hazard mitigation planning process, identifies relevant hazards and

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risks, and identifies the strategy the County and participating jurisdictions will use to decrease vulnerability and increase resiliency and sustainability.

The Ouray County Multi-Hazard Mitigation Plan is a multi-jurisdictional plan that geographically covers everything within Ouray County's jurisdictional boundaries (hereinafter referred to as the planning area). Unincorporated Ouray County and the following communities and special districts participated in the planning process:

- Ouray County
- City of Ouray
- Town of Ridgway
- Log Hill Mesa Fire Protection District
- Ridgway School District\*

\* New participating jurisdiction in 2013

This plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule published in the *Federal Register* on February 26, 2002 (44 CFR §201.6) and finalized on October 31, 2007. (Hereafter, these requirements and regulations will be referred to collectively as the Disaster Mitigation Act - DMA.) The 2007 amendments also incorporate mitigation planning requirements of the Flood Mitigation Assistance (FMA) program authorized by the National Flood Insurance Act of 1968. While the DMA emphasized the need for mitigation plans and more coordinated mitigation planning and implementation efforts, the regulations established the requirements that local hazard mitigation plans must meet in order for a local jurisdiction to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288). Because the Ouray County planning area is subject to many kinds of hazards, access to these programs is vital.

Information in this plan will be used to help guide and coordinate mitigation activities and decisions for local land use policy in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to the community and its property owners by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruption. The Ouray County planning area has been affected by hazards in the past and is thus committed to reducing future disaster impacts and maintaining eligibility for federal funding.

This plan addresses natural hazards and three manmade hazards—hazardous materials release, mass casualty incidents, and imminent threat. Although the members of the Ouray County Hazard Mitigation Planning Committee (HMPC) recognize that FEMA encourages communities to integrate manmade hazards into the mitigation planning process, the scope of this effort did not address other manmade hazards for several reasons. First, many of the planning activities for the mitigation of these hazards are either underway or complete and are addressed in the

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emergency operations plan for Ouray County. Second, the Disaster Mitigation Act of 2000 requires extensive public information and input, and this conflicts with the confidentiality necessary in planning for certain manmade hazards. Thus the HMPC determined it was not in the planning area's best interests to publicly share specific information about its vulnerability to manmade hazards.

## **1.3 Plan Organization**

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The Ouray County Multi-Hazard Mitigation Plan is organized in several chapters and appendices as follows. Appendix C is particularly important as it contains the details on specific mitigation actions for the participating jurisdictions.

- Executive Summary
- Chapter 1: Introduction
- Chapter 2: Community Profile
- Chapter 3: Planning Process
- Chapter 4: Risk Assessment
- Chapter 5: Mitigation Strategy
- Chapter 6: Plan Adoption
- Chapter 7: Plan Implementation and Maintenance
- Appendix A: Plan Adoption
- Appendix B: Hazard Mitigation Planning Committee
- Appendix C: Mitigation Actions
- Appendix D: References
- Appendix E: Planning Process Documentation



## 2 COMMUNITY PROFILE

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### 2.1 Geography and Climate

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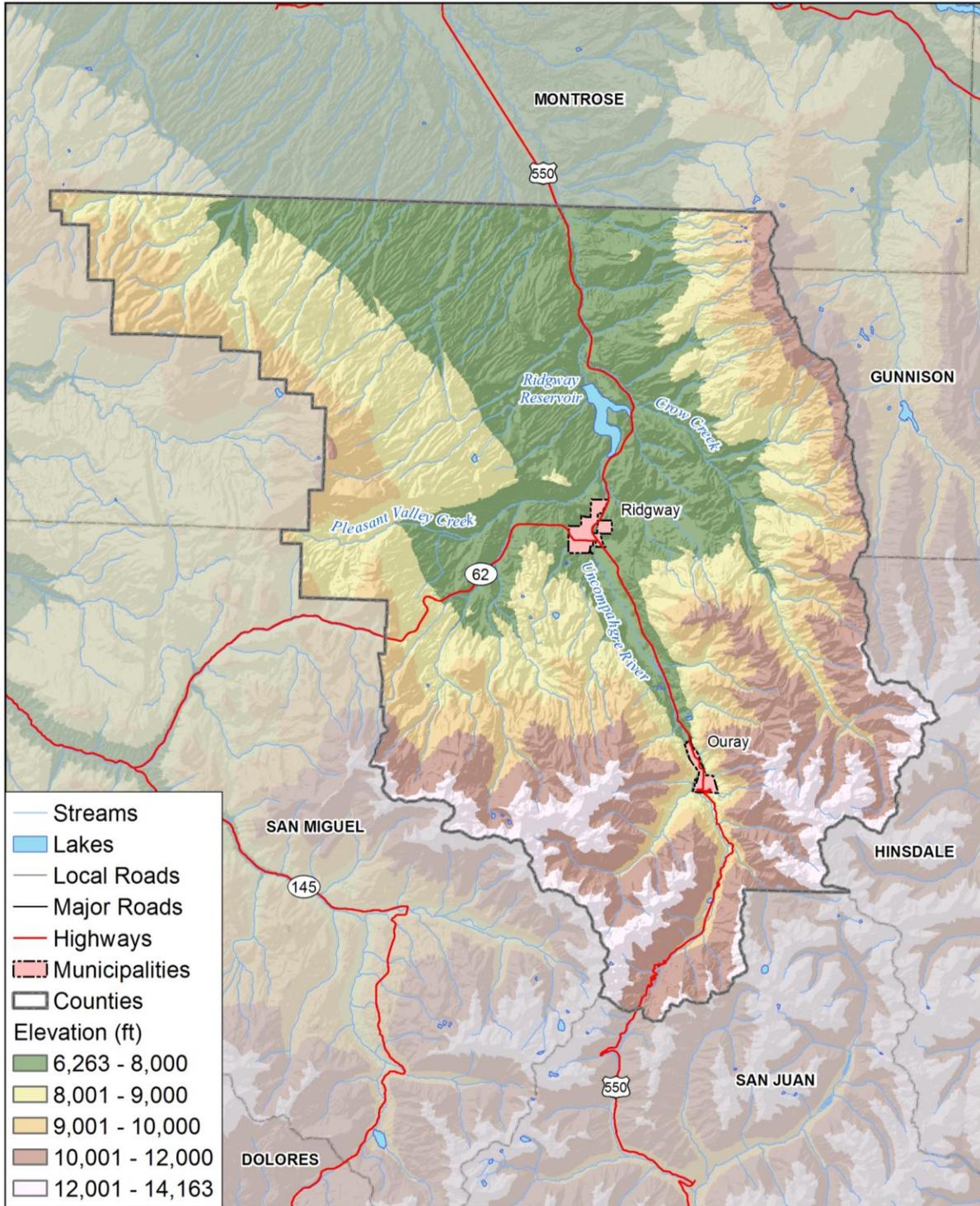
Located in the mountains of southwest Colorado, Ouray County is known as the Switzerland of America. The County's terrain ranges from the San Juan Mountains in the south, through the fertile Uncompahgre River Valley, to rolling foothills and mesa lands in the north. It is a land of steep gorges, towering peaks, tumbling waterfalls, high mesas, and green pastures. It is bordered by Montrose County to the north and northwest, San Miguel County to the west, San Juan County to the south, Hinsdale County to the southeast, and Gunnison County to the northeast. Ouray County encompasses 542 square miles (2 square miles are water), and includes two incorporated municipalities:

- The City of Ouray is located at an elevation of 7,800 feet and has a total area of .8 square miles, all of it land.
- The Town of Ridgway is located at an elevation of 6,900 feet and has a total area of 2.0 square miles, all of it land.

The Uncompahgre River flows northwesterly through the County. The climate in the river basin, which is not limited to Ouray County, is semiarid, but rainfall and temperatures vary widely. Average annual precipitation ranges from 13 inches in the Colona-Ridgway area to as much as 40 inches in the mountains. Approximately 30 to 40 percent of the precipitation is snowfall. The area is subject to cloudbursts. The frost-free period averages approximately 127 days annually, and varies from 112 days at higher elevations to 148 days in the valleys. Vegetation in the area consists of piñon, juniper, sagebrush, oak brush, and ponderosa pine, with dense spruce/fir forests in the Alpine Zone.

Ouray County is illustrated in Figure 2.1. The City of Ouray is depicted in Figure 2.2, and the Town of Ridgway is shown in Figure 2.3.

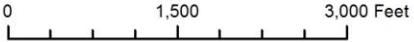
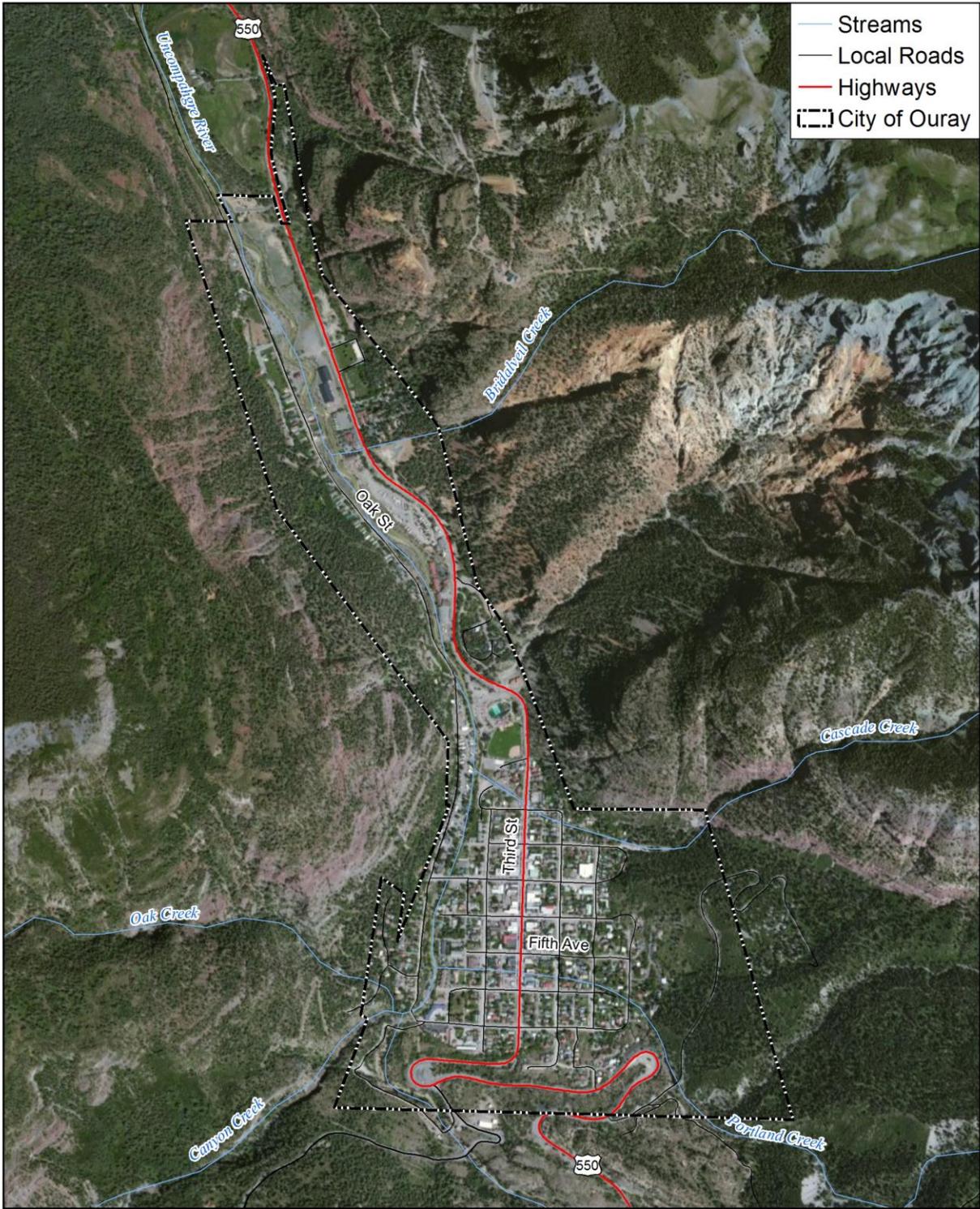
**Figure 2.1. Ouray County**



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, NHD

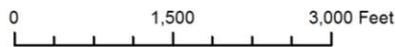
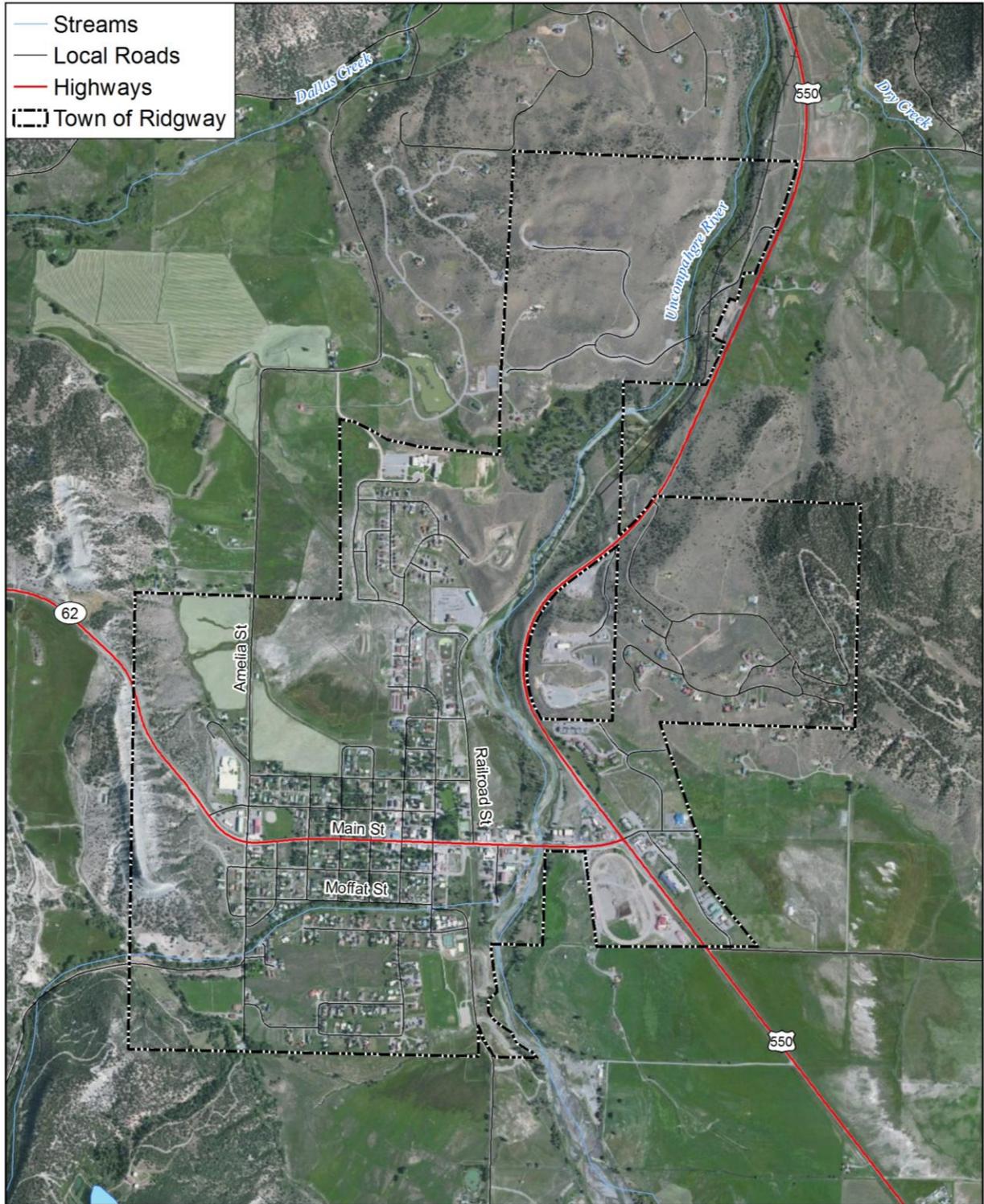


Figure 2.2. City of Ouray



Map compiled 8/2013; intended for planning purposes only.  
Data Source: Ouray County, CDOT, NHD, ESRI World Imagery

Figure 2.3. Town of Ridgway



Map compiled 8/2013; intended for planning purposes only.  
Data Source: Ouray County, CDOT, NHD, ESRI World Imagery

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## 2.2 Population

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Ouray County has grown by 16.8 percent since the 2000 U.S. Census. The estimated 2011 county population was 4,371 people. The City of Ouray and Town of Ridgway are the County's principal population centers. Population estimates for the years 2010 and 2011 for each of the incorporated cities and the unincorporated county are provided in Table 2.1. 2012 estimates were not yet available for the City and Town as of the writing of this plan update.

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**Table 2.1. Ouray County 2006 Population Estimates**

Jurisdiction	April 2000	April 2010	July 2011*
City of Ouray	813	1,000	833
Town of Ridgway	713	924	938
Unincorporated Ouray County	2,216	2,512	2,600
<b>Total Ouray County</b>	<b>3,742</b>	<b>4,436</b>	<b>4,371</b>

Source: 2010 US Census, 2011 American Community Survey, factfinder2.census.gov

\*Estimate

Select Census 2010 demographic and social characteristics for Ouray County are shown in Table 2.2.

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**Table 2.2. Ouray County Demographic and Social Characteristics**

Characteristic	Ouray County	City of Ouray	Town of Ridgway
<b>Gender/Age</b>			
Male (%)	50.1	50.4	48.6
Female (%)	49.9	49.6	51.4
Under 5 years (%)	4.1	4.8	5.5
65 years and over (%)	17.5	17	11
<b>Race/Ethnicity (one race)</b>			
White (%)	96.4	95.2	95.5
American Indian/Alaska Native (%)	0.4	0.4	0.6
Asian (%)	0.6	0.8	0.8
Black or African American (%)	0.2	0.1	0.1
Native Hawaiian or Other Pacific Islander (%)	0.1	0.0	0.4
Other (%)	1.0	1.9	0.8
Hispanic or Latino (of any race) (%)	4.4	8.2	5.0
<b>Education</b>			
High school graduate or higher (%)	95.2	94.2	92.7

Source: U.S. Census Bureau, 2010, www.factfinder2.census.gov/

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## 2.3 History

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Before the gold rush of the mid-1800s brought settlers to Ouray County, Colorado's western slope was home to the Ute Indians. The valley of the Uncompahgre River, which runs through the County, was the traditional homeland of the Uncompahgre Band of Utes. Established by the

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Colorado State Legislature in January 1877, Ouray County was actually named for the Ute chief who opened the San Juan Mountains to white settlers in 1874 with the signing of the Brunot Treaty.

The history of Ouray County is diverse. Colona, in the north, was settled in 1874 and became a supply point and old stage stop. The City of Ouray was born the next year following the discovery of gold in surrounding areas. What began as a mining camp grew into a town, which was incorporated in October 1876, the same year that Colorado became a state. By the turn of the century, all the major mining areas in the County had been developed. Ridgway was officially established as a railroad and ranching center in 1890, with the incorporation of the Rio Grande Southern Railroad Company to connect the Denver and Rio Grande Railroad's Ouray and Durango branches.

Much of the County's historic past is still evident today. The entire City of Ouray is registered as a National Historic District, with most of the buildings dating back to the late nineteenth century.

## **2.4 Government**

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The Board of Commissioners is the governing body for Ouray County. Each of the three members serves a four-year term. They are elected from each of three districts, but by the County electorate as a whole. County government has very limited legislative power per state statute.

The City of Ouray is a home rule city and the county seat of Ouray. The City may govern its own affairs within certain limits, but authority to exercise powers is derived from state statutes. It is governed by the City Council, which consists of five elected officials: two representatives are elected from each of the two precincts, and the mayor is elected at large.

The Town of Ridgway is a home rule municipality. The Town Council consists of seven members, including the mayor and the mayor pro tem, who are elected for two-year terms.

## **2.5 Economy**

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Agriculture and mining were traditionally the most important economic activities in Ouray County, but in the last few decades, recreation and tourism have taken the lead. According to the 2010 Census, the industries that employed the most people in Ouray County were educational, health, and social services (18.0 percent); construction (17.7 percent); arts, entertainment, recreation, accommodation, and food services (14.6 percent); and professional, scientific, management, administrative, and waste management services (12.4 percent).

Select economic characteristics for Ouray County from the 2010 Census are shown in Table 2.3.

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**Table 2.3. Ouray Economic Characteristics**

<b>Characteristic</b>	<b>Ouray County</b>	<b>City of Ouray</b>	<b>Town of Ridgway</b>
Families below Poverty Level (%)	5.0	12.0	0.0
Individuals below Poverty Level (%)	8.2	13.1	2.6
Median Home Value (\$)	405,800	436,700	382,100
Median Household Income (\$)	58,393	53,906	50,875
Per Capita Income (\$)	29,051	29,107	22,978
Population in Labor Force*	2,258	464	511
Unemployment (%)	7.6	6.9	1.8

Source: U.S. Census Bureau (2000), [www.census.gov/](http://www.census.gov/); Bureau of Labor Statistics, [www.bls.gov](http://www.bls.gov)

\*Population 16 years and over



# 3 PLANNING PROCESS

**Requirements §201.6(b) and §201.6(c)(1): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:**

- 1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;**
- 2) 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 nonprofit interests to be involved in the planning process; and**
- 3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.**

**[The plan shall document] 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 Background on Mitigation Planning in Ouray County

Ouray County Emergency Management recognized the need and importance of this plan and was responsible for initiating the plan's original development and 2013 update process, which included securing funding. The first version of this plan was approved by FEMA in 2008. Since the original development of the plan, FEMA guidance for local hazard mitigation plans has been refined and updated. The County contracted with AMEC Environment and Infrastructure (AMEC) in 2008 and 2013 to facilitate and develop a multi-jurisdictional, multi-hazard mitigation plan as well as its update. AMEC's role was to:

- Assist in reconvening a Hazard Mitigation Planning Committee (HMPC) for the County that incorporates key stakeholders and representatives from each participating jurisdiction
- Identify and invite new stakeholders to participate in the plan update process
- Meet all of the planning requirements of the Disaster Mitigation Act (DMA) and the Flood Mitigation Assistance program as established by federal regulations and following FEMA's planning guidance
- Facilitate the planning process
- Identify the data requirements that the HMPC can provide and conduct the research and documentation necessary to augment that data
- Develop and facilitate the public input process
- Produce the draft and final plan documents
- Coordinate the Division of Homeland Security and Emergency Management (DHSEM), Colorado Water Conservation Board (CWCB), and FEMA Region VIII reviews of the plan

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and its formal adoption by the Ouray County Board of County Commissioners and the governing bodies of each of the participating jurisdictions

The remainder of this chapter provides a narrative description of the steps taken to prepare and update the hazard mitigation plan.

### **3.2 Plan Section Review and Analysis – 2013 Update**

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This multi-jurisdictional, multi-hazard mitigation plan update involved a comprehensive review and update of each section of the 2008 plan and includes an assessment of the success of Ouray County and the participating jurisdictions in evaluating, monitoring, and implementing the mitigation strategy outlined in the initial plan. The process followed to review and revise the chapters of the plan during the 2013 update is detailed in Table 3.1. As part of this plan update, all sections of the plan were reviewed and updated to reflect new data and methodologies on hazards and risk, risk analysis process, capabilities, participating jurisdictions and stakeholders, and mitigation strategies. The plan was also revised to reflect changes in development, including using the latest version of the assessor’s office data as the basis for identifying overall and hazard exposure for developed parcels by County and jurisdiction. Only the information and data still valid from the 2008 plan was carried forward as applicable to this plan update.

The County received grant funding from the State including Emergency Management Performance Grant (EMPG) and the Colorado Water Conservation Board (CWCB) for the 2013 update. CWCB funding was used to update and enhance the flood hazard aspects of the plan. A portion of the update was funded with National Earthquake Hazard Reduction Program (NEHRP) funds to further analyze the earthquake risk and consider mitigation actions related to earthquakes.

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**Table 3.1 2013 Plan Update Summary of Changes by Chapter**

<b>Plan Section</b>	<b>Update Review and Analysis</b>
1.0 Introduction	Updated language to describe purpose and requirements of the Ouray County Multi-Hazard Mitigation Plan update process. Identified new participating jurisdictions.
2.0 Community Profile	Updated with 2010 census data and current economy description.
3.0 Planning Process	Described and documented the planning process for 2008 and 2013 update, including coordination among agencies and integration with other planning efforts. Described any changes in participation in detail. Described 2013 public participation process.

Plan Section	Update Review and Analysis
4.0 Risk Assessment	<p>Revisited former hazards list for possible modifications.</p> <p>Reviewed hazards from the 2010 Colorado State Hazard Mitigation Plan (CSHMP) for consistency.</p> <p>Updated list of disaster declarations to include 2008-2013 data.</p> <p>Updated NCDC and SHELDUS tables to include 2008-2013 data.</p> <p>Updated past occurrences for each hazard to include 2008-2013 data.</p> <p>Updated critical facilities identification from the 2008 plan.</p> <p>Updated growth and development trends to include Census 2010 and local data sources.</p> <p>Updated historic and cultural resources using Colorado State Historic Preservation Office and other local/state/national sources.</p> <p>Updated property values for vulnerability and exposure analysis.</p> <p>Estimated flood losses using improved floodplain digital mapping from Ouray County, including digitizing a substantial Letter of Map Revision for the City of Ouray</p> <p>Updated NFIP data and Repetitive Loss structure data from the previous plan. Incorporated new hazard loss estimates since 2008, as applicable.</p> <p>Used new data to assess wildfire threat to the County based on 2011 CWPP. Changes in growth and development were examined; as well as reductions in vulnerability accomplished by the County's wildfire mitigation efforts.</p> <p>A HAZUS-MH Level I earthquake vulnerability analysis data was updated and incorporated.</p> <p>Updated information regarding specific vulnerabilities to hazards, including maps and tables of specific assets at risk, specific critical facilities at risk, and specific populations at risk</p> <p>Updated maps in plan where appropriate.</p>
5.0 Mitigation Strategy	<p>Reviewed mitigation capabilities and updated to reflect current capabilities. Indicated what projects have been implemented that may reduce previously identified vulnerabilities</p> <p>Updated Chapter 5 based on the results of the updated risk assessment, completed mitigation actions, and implementation obstacles and opportunities since the completion of the previous plan.</p> <p>Reviewed goals and objectives to determine if they are still representative of the participants' mitigation strategy and aligned with CSHMP goals.</p> <p>Revised the goals and objectives based on HMPC input.</p> <p>Included more information on how actions are prioritized.</p> <p>Reviewed mitigation actions from the 2008 plan and developed a status report for each; identified if action has been completed, deleted, or deferred.</p> <p>Identified positive movement on actions identified in 2008 plan.</p> <p>Identified and detailed new mitigation actions proposed by the HMPC.</p>
6.0 Plan Adoption	<p>Update with new adoption dates.</p> <p>Revised list of participating jurisdictions.</p>
7.0 Plan Implementation and Maintenance	<p>Reviewed and updated procedures for monitoring, evaluating, and updating the plan.</p> <p>Revised to reflect current methods.</p> <p>Updated the system for monitoring progress of mitigation activities by identifying additional criteria for plan monitoring and maintenance.</p>

Plan Section	Update Review and Analysis
Appendices	Appendix A – Updated plan adoption Appendix B – Updated Hazard Mitigation Planning Committee contact information Appendix C– Updated mitigation action details Appendix D – Updated references Appendix E – Planning process documentation (new in 2013)

### 3.3 Multi-Jurisdictional Participation

**44 CFR Requirement §201.6(a)(3): Multi-jurisdictional plans may be accepted, as appropriate, as long as each jurisdiction has participated in the process and has officially adopted the plan.**

Ouray County invited every incorporated city and special district in the County to participate in the multi-jurisdictional Ouray County Multi-Hazard Mitigation Plan Update. Outreach to expand the participating jurisdictions occurred during the 2013 update. The Disaster Mitigation Act requires that each jurisdiction participate in the planning process and officially adopt the multi-jurisdictional hazard mitigation plan. Each jurisdiction that chose to participate in the planning process and development of the plan or its update was required to meet strict plan participation requirements defined at the beginning of the process, which included the following:

- Designate a representative to serve on the HMPC
- Participate in HMPC meetings
- Complete and return the AMEC Data Collection Guide
- Identify mitigation actions for the plan
- Review and comment on plan drafts
- Inform the public, local officials, and other interested parties about the planning process and provide opportunity for them to comment on the plan
- Formally adopt the mitigation plan and re-adopt every 5 years

All of the jurisdictions noted as participants in this plan met all of these requirements. An effort was made during the 2013 update to increase the multi-jurisdictional participation. One new special district was added to the plan in 2013 and is indicated in the table below. The Horsefly Volunteer Fire Department was reclassified as a stakeholder instead of a participating jurisdiction; the Department does not meet the Colorado Department of Local Affairs definition of a special district. In most cases, the representative for each jurisdiction brought together a planning team to help collect data, identify mitigation actions and implementation strategies, and review drafts. Table 3.2 shows the attendance of representatives at each HMPC meeting; sign-in sheets are included in **Appendix E: Planning Process Documentation**.

**Table 3.2 Jurisdictional Participation in 2013 HMPC Meetings**

Jurisdiction	Kickoff Meeting	Meeting #2	Meeting #3	Public Meeting
Ouray County	✓	✓	✓	✓
City of Ouray	✓	✓	✓	
Town of Ridgway	✓	✓	✓	✓
Log Hill Mesa Fire Protection District		✓	✓	
Ridgway School District*	✓	✓	✓	

\*New participating jurisdiction in 2013

### 3.4 The 10-Step Planning Process

AMEC and the Ouray County Office of Emergency Management worked together to establish the framework and process for this planning effort using FEMA’s *Local Multi-Hazard Mitigation Planning Guidance* (2008) and the *State and Local Mitigation Planning How-To Guides* (2001), which include *Multi-Jurisdictional Mitigation Planning* (2006). The guidance and this plan are structured around a four-phase process:

- 1) Organize Resources
- 2) Assess Risks
- 3) Develop the Mitigation Plan
- 4) Implement the Plan and Monitor Progress

Into this four-phase process, AMEC integrated a more detailed 10-step planning process used for FEMA’s Community Rating System and Flood Mitigation Assistance programs. Thus, the modified 10-step process used for this plan meets the requirements of six major programs: FEMA’s Hazard Mitigation Grant Program, Pre-Disaster Mitigation program, Community Rating System (CRS), Flood Mitigation Assistance Program, Severe Repetitive Loss program, and new flood control projects authorized by the U.S. Army Corps of Engineers.

Table 3.3 shows how the modified 10-step process fits into FEMA’s four-phase process.

**Table 3.3. FEMA’s Four-Phase Process and the 10-Step CRS Process Used to Develop Ouray County’s Local Hazard Mitigation Plan**

FEMA’s 4-Phase DMA Process	Modified 10-Step CRS Process
1) Organize Resources	
201.6(c)(1)	1) Organize the Planning Effort
201.6(b)(1)	2) Involve the Public
201.6(b)(2) and (3)	3) Coordinate with Other Departments and Agencies
2) Assess Risks	
201.6(c)(2)(i)	4) Identify the Hazards
201.6(c)(2)(ii)	5) Assess the Risks
3) Develop the Mitigation Plan	
201.6(c)(3)(i)	6) Set Goals

FEMA's 4-Phase DMA Process	Modified 10-Step CRS Process
201.6(c)(3)(ii)	7) Review Possible Activities
201.6(c)(3)(iii)	8) Draft an Action Plan
4) Implement the Plan and Monitor Progress	
201.6(c)(5)	9) Adopt the Plan
201.6(c)(4)	10) Implement, Evaluate, and Revise the Plan

## **Phase 1: Organize Resources**

### **Planning Step 1: Organize the Planning Effort**

AMEC worked with Ouray County's Emergency Planner to establish the framework and organization for the development of this Plan. AMEC and the Emergency Planner identified the key county, municipal, and other local government and initial stakeholder representatives. Letters of invitation were mailed to invite them to participate as a member of the HMPC and to attend a kickoff meeting. Representatives from the following County and municipal departments participated on the HMPC and the development of the plan:

#### ***Ouray County***

- Ouray County Emergency Management
- Ouray County Public Health
- Ouray County Assessor
- Ouray County Administration
- Ouray County Land Use
- Ouray County Facilities
- Ouray County Road and Bridge
- Ouray County IT/GIS
- Ouray County EMS
- Ouray County Sheriff's Office

#### ***Participating Jurisdictions***

- Town of Ridgway Manager
- City of Ouray Administration
- City of Ouray Community Development
- City of Ouray Volunteer Fire Department
- Log Hill Mesa Fire Protection District
- Ridgway School District

#### ***Other Government and Stakeholder Representatives***

- Ridgway Fire Department
- Horsefly Volunteer Fire Department
- Montrose Fire Protection District
- West Region Wildfire Council

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- Tri-County Water and Ridgway Dam/Reservoir
  - Dallas Creek Water Company
  - Division of Homeland Security and Emergency Management
  - Colorado Division of Fire Prevention and Control
  - National Weather Service
  - Colorado Water Conservation Board
  - Colorado Geological Survey
  - Colorado Department of Transportation
  - Colorado Parks and Wildlife
  - Colorado State University Extension
  - Colorado State Forest Service
  - U.S. Forest Service
  - U.S. Bureau of Land Management/Montrose Interagency Fire Management Unit (MIFMU)
  - U.S. Bureau of Reclamation
  - West Region Wildfire Council
  - FEMA Region VIII

The plan update process officially began with a kickoff meeting in Ridgway, Colorado, on May 24, 2013. Ouray Emergency Management mailed letters of invitation to the kickoff meeting to county, municipal, district, state, and other stakeholder representatives. This list is included in **Appendix B**.

The Disaster Mitigation Act requires that each jurisdiction participate in the planning process and officially adopt the multi-jurisdictional hazard mitigation plan and re-adopt during the update. A planning committee was created that includes representatives from each participating jurisdiction, departments of the County, and other local, state, and federal organizations responsible for making decisions in the plan and agreeing upon the final contents. Kickoff meeting attendees discussed potential participants and made decisions about additional stakeholders to invite to participate on the HMPC.

The HMPC contributed to this planning process by:

- providing facilities for meetings,
- attending meetings,
- collecting data,
- making decisions on plan process and content,
- submitting mitigation action implementation worksheets,
- reviewing and editing drafts, and
- coordinating and assisting with public involvement and plan adoptions.

The HMPC communicated during the planning process with a combination of face-to-face meetings, phone interviews, email correspondence, and a FTP (file transfer protocol) site hosted by AMEC. Draft documents were typically posted on the FTP site so that HMPC members could

access and review them. The HMPC met two times during the update planning period (April to September, 2013). The meeting schedule and topics are listed in Table 3.4. The HMPC covered two major topics in one 5 hour workshop on August 21<sup>st</sup>. The sign-in sheets and agendas for each of the meetings are included in **Appendix E**.

**Table 3.4. Schedule of HMPC Meetings**

HMPC Meeting	Meeting Topic	Meeting Date
1	Introduction to DMA Planning/Kickoff Meeting	May 24, 2013
2	Risk Assessment Summary/Goals Development	August 21, 2013
3	Mitigation Strategy Development	August 21, 2013

During the kickoff meeting, AMEC presented information on the scope and purpose of the plan, participation requirements of HMPC members, and the proposed project work plan and schedule. A plan for public involvement (Step 2) and coordination with other agencies and departments (Step 3) were discussed. AMEC also introduced hazard identification requirements and data. The HMPC discussed past events and impacts and future probability for each of the hazards required by FEMA for consideration in a local hazard mitigation plan. The HMPC made a few minor changes to the hazards list from the 2008 plan, such as renaming “terrorism” to “imminent threat” and combining West Nile virus and Pandemic Flu into “Public Health Emergency.” Participants were given the AMEC Data Collection Guide to facilitate the collection of information needed to support the plan update, such as data on historic hazard events, values at risk, and current capabilities. Participating jurisdictions completed and returned the worksheets in the data collection guide to AMEC. Additional information was provided at HMPC meetings and via email, over the phone, or doing draft reviews.

## Planning Step 2: Involve the Public

**44 CFR Requirement 201.6(b): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.**

At the kickoff meeting, the HMPC discussed options for soliciting public input on the mitigation plan and developed an outreach strategy by consensus. During the plan update’s drafting stage, the HMPC held a Multi-Hazards Planning Public Meeting at the Ouray Community Center in Ouray on the evening of August 20, 2013. The public was informed of the meeting through notices on the Ouray County website, flyers posted in Ouray and Ridgway community note boards, and notices distributed through the Ouray Emergency Management Facebook social media website. Advertisements were placed in the local newspapers (*Ouray County Watch*,

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*Ouray County Plaindealer*, and the *Ridgway Sun*). HMPC members were sent an electronic copy of the press release and flyer to distribute as they saw fit. A copy of the sign-in sheet from the public meeting is provided in **Appendix E**. Twenty five persons attended the two hour long meeting. The AMEC project manager provided an overview of the planning process and presented the results of the updated risk assessment. The plan goals, objectives and actions were provided on poster boards for reference, along with draft maps for the plan. Attendees were provided a feedback form to use to note specific issues for the HMPC to consider (see Appendix E). The meeting was scheduled the day before the HMPC meeting so that discussion and issues could be shared with the HMPC as they updated and considered new mitigation strategies the following day.

Twenty-two people attended the meeting, including seven members of the public, one DHSEM representative, thirteen County staff members, and the Ridgway Mayor. The planning process was introduced by the AMEC project manager, and input on hazards and specific risk concerns was solicited. This input was discussed the next day with the HMPC at the risk assessment/mitigation strategy meeting. A public survey was provided to gather feedback on the plan update initiative. Five surveys were returned. For the most part the surveys prioritized the same hazards (debris flow, flood, wildfire, avalanche, and landslide/rockfall) and identified the same mitigation projects including debris flow/mudslide mitigation, wildfire fuels treatment projects, critical facilities protection, indoor/outdoor warning, flood mitigation, avalanche mitigation, and landslide/rockfall mitigation. One additional public comment was submitted via email. The comments in this email primarily focused on back-up plans for public sheltering, power generation, and communications; sheltering in place/being isolated for extended periods of time; and limited resources in the County, such as public health staff and resources. Another public comment included an extensive review and commentary on the 2008 plan.

The public was also given an opportunity to review and comment on the draft plan. Ouray County made it available on their website at [www.ouraycountyco.gov](http://www.ouraycountyco.gov). A hard copy was also available at the Ouray Public Library and Ridgway Public Library. The public was given a two-week period to review and provide comments. Public comment was distributed to the HMPC members, and incorporated into the plan, where appropriate. Record of public advertisements, public input, HMPC responses, and sign-in sheets are on file with the County emergency planner.

### **Planning Step 3: Coordinate with Other Departments and Agencies**

**44 CFR Requirement 201.6(b): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: (2) 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. (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.**

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There are numerous organizations whose goals and interests interface with hazard mitigation in Ouray County. Coordination with these organizations and other community planning efforts is vital to the success of this plan update. Ouray Emergency Management invited other local, state, and federal departments and agencies to the kickoff meeting to learn about the hazard mitigation planning initiative. Many of the agencies participated throughout the planning process on the HMPC and were listed previously in Step 1: Organize the Planning Effort.

### ***Other Community Planning Efforts and Hazard Mitigation Activities***

Coordination with other community planning efforts is also paramount to the success of this plan. Hazard mitigation planning involves identifying existing policies, tools, and actions that will reduce a community's risk and vulnerability from natural hazards. Ouray County uses a variety of comprehensive planning mechanisms, such as master plans and ordinances, to guide growth and development. Integrating existing planning efforts and mitigation policies and action strategies into this plan establishes a credible and comprehensive plan that ties into and supports other community programs. The development of this plan incorporated information from the following existing plans, studies, reports, and initiatives as well as other relevant data from neighboring communities and other jurisdictions.

- Ouray County Master Plan, 1999
- Ouray County Community Wildfire Protection Plan, 2011
- Ouray County Land Use Code
- City of Ouray Community Plan, 2004
- Ouray City Code
- Town of Ridgway Master Plan
- Town of Ridgway Source Water Protection Plan 2012
- Ridgway Municipal Code
- Town of Ridgway Capital Improvement Plans
- Intergovernmental Agreements on Growth Management, Ouray County, Ouray and Ridgway

These documents are discussed in **Chapter 4.4 Capabilities**. Other documents were reviewed and considered, as appropriate, during the collection of data to support Planning Steps 4 and 5, which include the hazard identification, vulnerability assessment, and capability assessment. A list of references is included in **Appendix D**.

## **Phase 2: Assess Risks**

### **Planning Steps 4 and 5: Identify the Hazards and Assess the Risks**

AMEC assisted the HMPC in the process to identify and document all the hazards that have, or could, impact the planning area. At the kickoff meeting in 2008, the HMPC discussed past events and impacts and future probability for each of the hazards required by FEMA for consideration in a local hazard mitigation plan. The HMPC refined the list of hazards to make it relevant to Ouray. Data collection worksheets were used in this effort to aid in determining hazards and

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vulnerabilities and where risk varies across the planning area. Where data permitted, Geographic Information Systems (GIS) were used to display, analyze, and quantify hazards and vulnerabilities. The profile of each hazard was then developed and updated in 2013 with information from the HMPC and additional sources. The HMPC also conducted a capability assessment to review and document the planning area's current capabilities to mitigate risk and vulnerability from natural hazards. By collecting information about existing government programs, policies, regulations, ordinances, and emergency plans, the HMPC can assess those activities and measures already in place that contribute to mitigating some of the risks and vulnerabilities identified. A more detailed description of the risk assessment process and the results are included in **Chapter 4 Risk Assessment**.

### **Phase 3: Develop the Mitigation Plan**

#### **Planning Steps 6 and 7: Set Goals and Review Possible Activities**

AMEC facilitated brainstorming and discussion sessions with the HMPC that described the purpose and the process of developing planning goals and objectives, a comprehensive range of mitigation alternatives, and a method of selecting and defending recommended mitigation actions using a series of selection criteria. In 2013 the HMPC determined that the goals and objectives from the 2008 plan were still relevant.

The HMPC identified and prioritized mitigation actions at their combined second/third meeting. The group was presented with six different categories of mitigation actions and example actions for each identified hazard. The HMPC participated in a brainstorming process, in which committee members identified actions to address each of the plan's four goals. The HMPC then reviewed potential mitigation alternatives and identified new actions by hazard and jurisdiction to ensure that all of the plan's profiled hazards were addressed and that all participating jurisdictions had at least one mitigation action. This process is described in more detail in **Chapter 5 Mitigation Strategy**.

The identified agencies then completed a mitigation action implementation worksheet for each action. Each jurisdiction was responsible for completing mitigation action implementation worksheets for each action identified by the HMPC that they would need to implement on the jurisdictional level. The purpose of these worksheets is to document background information, ideas for implementation, alternatives, responsible agency, partners, potential funding, cost estimates, benefits, and timeline for each identified action. The HMPC also identified the responsible agency for implementing each action. The jurisdictions were also responsible for working with their local staff to submit additional mitigation actions unique to their jurisdiction. Each jurisdiction that participated previously provided input on the progress made on actions identified in the 2008 plan. A summary of all mitigation actions is provided in Chapter 5, with details on the actions in Appendix C using information captured from the worksheets.

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## **Planning Step 8: Draft an Action Plan**

Based on input from the HMPC regarding the draft risk assessment and the goals and activities identified in Planning Steps 6 and 7, AMEC produced a complete first draft of the plan. This complete draft was posted for HMPC review and comment on the project ftp site in September 2013. Other agencies were invited to comment on this draft as well. HMPC and agency comments were integrated into the second draft, which was advertised and distributed to collect public input and comments. AMEC integrated comments and issues from the public, as appropriate, along with additional internal review comments and produced a final draft for the Division of Homeland Security and Emergency Management and FEMA Region VIII to review and approve, contingent upon final adoption by the governing boards of each participating jurisdiction.

## **Phase 4: Implement the Plan and Monitor Progress**

### **Planning Step 9: Adopt the Plan**

In order to secure buy-in and officially implement the plan, the plan was adopted by the governing boards of each participating jurisdiction on the dates included in the adoption resolutions in **Appendix A Plan Adoption**.

### **Planning Step 10: Implement, Evaluate, and Revise the Plan**

The true worth of any mitigation plan is in the effectiveness of its implementation. Up to this point in the planning process, all of the HMPC's efforts have been directed at researching data, coordinating input from participating entities, and developing appropriate mitigation actions. Each recommended action includes key descriptors, such as a lead manager and possible funding sources, to help initiate implementation. An overall implementation strategy is described in **Chapter 7 Plan Implementation and Maintenance**.

Finally, there are numerous organizations within the Ouray County planning area whose goals and interests interface with hazard mitigation. Coordination with these other planning efforts, as addressed in Planning Step 3, is paramount to the ongoing success of this plan and mitigation in Ouray County and is addressed further in Chapter 7. A plan update and maintenance schedule and a strategy for continued public involvement are also included in Chapter 7.



# 4 RISK ASSESSMENT

**44 CFR 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 the 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.**

As defined by the Federal Emergency Management Agency (FEMA), risk is a combination of hazard, vulnerability, and exposure. “It is the impact that a hazard would have on people, services, facilities, and structures in a community and refers to the likelihood of a hazard event resulting in an adverse condition that causes injury or damage.”

The risk assessment process identifies and profiles relevant hazards and assesses the exposure of lives, property, and infrastructure to these hazards. The process allows for a better understanding of a jurisdiction’s potential risk to natural hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

This risk assessment followed the methodology described in the FEMA publication *Understanding Your Risks—Identifying Hazards and Estimating Losses* (2002), which breaks the assessment down to a four-step process:

- 1) Identify Hazards
- 2) Profile Hazard Events
- 3) Inventory Assets
- 4) Estimate Losses

Data collected through this process has been incorporated into the following sections of this chapter:

- **Section 4.1 Hazard Identification** identifies the hazards that threaten the planning area and describes why some hazards have been omitted from further consideration.
- **Section 4.2 Hazard Profiles** discusses the threat to the planning area and describes previous occurrences of hazard events and the likelihood of future occurrences.
- **Section 4.3 Assessing Vulnerability** assesses the County’s total exposure to natural hazards, considering assets at risk, critical facilities, and future development trends.

While not required by FEMA, the Hazard Mitigation Planning Committee (HMPC) also conducted a mitigation capability assessment, which inventoried existing mitigation activities and existing policies, regulations, and plans that pertain to mitigation and can affect net vulnerability. The findings from this undertaking are in **Section 4.4 Mitigation Capabilities Assessment**.

## 4.1 Hazard Identification

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**Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type...of all natural hazards that can affect the jurisdiction.**

During the 2008 planning process, the Hazard Mitigation Planning Committee (HMPC) conducted a hazard identification study to determine the hazards that threaten the planning area. The list of hazards was revisited in 2013.

### 4.1.1 Results and Methodology

Using existing hazards data, plans from participating jurisdictions, and input gained through planning and public meetings, the HMPC agreed upon a list of hazards that could affect Ouray County. Hazards data from FEMA, the Division of Homeland Security and Emergency Management (including the State of Colorado Natural Hazards Mitigation Plan), the National Oceanic and Atmospheric Administration, the Spatial Hazard Events and Losses Database for the United States (SHELDUS), and many other sources were examined to assess the significance of these hazards to the planning area. The hazards evaluated in this plan include those that have occurred historically or have the potential to cause significant human and/or monetary losses in the future.

The following natural hazards, listed alphabetically, were identified and investigated for the Ouray County Multi-Hazard Mitigation Plan in 2008:

- Avalanche
- Dam Failure
- Debris Flow
- Drought
- Earthquake
- Extreme Temperatures
- Flooding
- Landslide/Rockfall
- Lightning
- Pandemic Flu
- Severe Winter Storm
- West Nile Virus
- Windstorm
- Wildfire

Manmade hazards also exist in Ouray County. However, since they are not a FEMA planning requirement, they are not profiled to the same level of detail as the natural hazards. Manmade hazards include:

- Hazardous Materials Incident
- Mass Casualty Event
- Terrorism

This list of hazards remained largely the same in 2013. However, a few hazards were renamed combined with other related hazards. Pandemic flu and West Nile Virus were combined and renamed “Public Health Emergencies.” Terrorism was renamed “Imminent Threat” and expanded to include cyber terrorism.

Members of the HMPC used a hazards worksheet to identify and rate the significance of a variety of possible hazards. Significance was measured in general terms, focusing on key criteria such as the likelihood of the event, past occurrences, spatial extent, and damage and casualty potential. Table 4.1 represents the worksheet used to identify and rate the hazards, and is a composite that includes input from all the participating jurisdictions. Table 4.2 summarizes which hazards affect the individual entities that participated in this plan update. Only the more significant hazards (high or medium) have a more detailed hazard profile and are analyzed further in Section 4.3 Vulnerability Assessment. Note that the significance of the hazard may vary from jurisdiction to jurisdiction. The most significant hazards, based on the subjective input from the team, are listed alphabetically as dam failure, debris flow, flooding, and wildfire. Some modifications were made in 2013 to the original HMPC input based on the results of this risk assessment.

**Table 4.1 Ouray County Hazards Identification Worksheet**

Hazard	Likelihood of Event/Frequency	Hazard Extent	Potential Magnitude	Significance
Avalanche	Highly Likely	Limited	Limited	Medium
Dam Failure	Unlikely	Limited	Limited	High
Debris Flow	Highly Likely	Limited	Critical	High*
Drought	Likely	Significant	Critical	Medium***
Earthquake	Occasional	Significant	Critical	Medium
Extreme Temperatures	Highly Likely	Limited	Limited	Low
Flooding	Likely	Significant	Critical/Catastrophic	High
Hazardous Materials Incident	Occasional	Limited	Limited	Medium
Landslide/Rockfall	Likely	Limited	Limited	Medium
Lightning	Highly Likely	Limited	Limited	Medium
Mass Casualty Event	Occasional	Limited	Negligible	Low
Public Health Emergencies	Occasional/Likely**	Significant	Critical/Limited	Medium
Severe Winter Storms	Likely	Extensive	Critical	Medium
Imminent Threat	Unlikely	Limited	Limited	Low
Wildfires	Highly Likely	Significant	Critical/Catastrophic	High
Windstorms	Highly Likely	Limited	Limited	Medium

\*Based on input from City of Ouray in particular

\*\*Based on occurring anywhere in the United States

\*\*\*Considered High in Ridgway and Ouray

Likelihood of Event/Frequency

Potential Magnitude

Highly Likely: Near 100% chance of occurrence in next year, or

happens every year.

Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.

Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.

Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Hazard Extent

Limited: Less than 10% of planning area

Significant: 10-50% of planning area

Extensive: 50-100% of planning area

Catastrophic: More than 50% of area affected

Critical: 25-50% of area affected

Limited: 10-25% of area affected

Negligible: Less than 10% of area affected

Significance

Low: minimal potential impact

Medium: moderate potential impact

High: widespread potential impact

**Table 4.2 Hazards Identified for Each Participating Jurisdiction or Special District**

Hazard	Ouray County	City of Ouray	Town of Ridgway	Log Hill Mesa Fire Protection District	Ridgway School District
Avalanche	✓	✓			
Dam Failure	✓	✓	✓		✓
Debris Flow	✓	✓	✓	✓	✓
Drought	✓	✓	✓	✓	✓
Earthquake	✓	✓	✓	✓	✓
Extreme Temperatures	✓	✓	✓	✓	✓
Flooding	✓	✓	✓		✓
Hazardous Materials	✓	✓	✓		
Landslide/Rockfall	✓	✓	✓	✓	
Lightning	✓	✓	✓	✓	✓
Mass Casualty Event	✓	✓	✓	✓	✓
Public Health Emergencies	✓	✓	✓	✓	✓
Severe Winter Storms	✓	✓	✓	✓	✓
Imminent Threat	✓	✓	✓	✓	✓
Wildfires	✓	✓	✓	✓	✓
Windstorms	✓	✓	✓	✓	✓

Source: HMPC

Other hazards discussed included land subsidence, pine beetle, hail, and expansive soils. While present in the County, the HMPC indicated that there were not enough problems associated with them to warrant profiling and assessment. Ridgway construction practices mitigate minor issues with expansive soils. Thunderstorm is not identified as an individual hazard, but is recognized for its role in the flooding, lightning, and windstorm hazards. Volcano was also considered due to the presence of hot springs in the area. The hot springs are remnants of volcanic activity that occurred in the area 10 to 40 million years ago. There are no known active volcanoes within or near the planning region, so they are not discussed further. Ouray County does not experience coastal erosion, coastal storms, hurricanes, levee failure, or tsunamis.

The HMPC also noted wildlife-vehicle collisions as a hazard in 2013. The segment of Highway 550 that runs through Ouray County from the City of Ouray north to the County line is recognized as one of the most hazardous areas for wildlife-vehicle collisions in the State. The County and Colorado Department of Transportation (CDOT) have been actively mitigating the hazard with road signage and wildlife fences along the corridor. The HMPC may decide to profile this hazard in more detail during the next plan update cycle, especially if the Division of Homeland Security and Emergency Management chooses to add it to the State's hazard mitigation plan.

One method the HMPC used to identify hazards was the researching of past events that triggered federal and/or state emergency or disaster declarations in the planning area. Federal and/or state disaster declarations may be granted when the severity and magnitude of an event surpasses the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. When the local government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. Should the disaster be so severe that both the local and state governments' capacities are exceeded, a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance.

The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), and/or the Small Business Administration (SBA). FEMA also issues emergency declarations, which are more limited in scope and without the long-term federal recovery programs of major disaster declarations. The quantity and types of damage are the determining factors.

A USDA declaration will result in the implementation of the Emergency Loan Program through the Farm Services Agency. This program enables eligible farmers and ranchers in the affected county as well as contiguous counties to apply for low interest loans. A USDA declaration will automatically follow a major disaster declaration for counties designated major disaster areas and those that are contiguous to declared counties, including those that are across state lines. As part of an agreement with the USDA, the SBA offers low interest loans for eligible businesses that suffer economic losses in declared and contiguous counties that have been declared by the USDA. These loans are referred to as Economic Injury Disaster Loans.

Table 4.3 provides information on federal emergencies and disasters declared in Ouray County between 1953 and August 2013.

**Table 4.3 Federal Disaster and Emergency Declarations, 1953-2013**

Event/ Hazard	Year	Declaration Type	Remarks/Description
Flood	1965	Suspected Presidential	\$20,292 received for repair of flumes and disaster relief from Federal Office of Emergency Preparedness <sup>1</sup>
Heavy Rains and Flooding	1970	Presidential—Major Disaster Declaration	\$3.2 million (2006 dollars) statewide
Flooding and Landslides	1973	Presidential—Major Disaster Declaration	\$4.5 million (2006 dollars) statewide
Drought	1977	Presidential— Emergency Declaration	\$4.6 million (2006 dollars) statewide
Severe Storms, Mudslides, Landslides, and Flooding	1984	Presidential—Major Disaster Declaration	\$9.5 million (2006 dollars) statewide Included with 14 other Western Slope counties
Drought	2000	USDA	
Drought	2002	USDA	Included in statewide USDA declaration
Wildfire	2002	Presidential—Major Disaster Declaration	\$7.1 million (2006 dollars) <sup>1</sup> Included in statewide declaration
Late Freeze	2006	USDA	Included in declaration as a contiguous county (primary natural disaster areas were Dolores, Montezuma, and San Miguel counties)
Frost, Freezing Temperatures, and High Winds	2010	USDA	Included in declaration as a contiguous county
Drought and Early Freeze	2011	USDA	Included in declaration as a contiguous county
Drought, High Winds, Excessive Heat	2012	USDA	Included in declaration as a primary county
Frost, Freeze	2012	USDA	Included in declaration as a contiguous county
Drought	2013	USDA	Included in declaration as a contiguous county (primary natural disaster areas included Alamosa, Conejos, Delta, Garfield, Gunnison, Jackson, Jefferson, Mesa, Moffat, Montrose, Rio Blanco, Rio Grande, Routt, and Saguache counties)
Drought	2013	USDA	Included in declaration as a primary natural disaster area (other primary natural disaster areas in Colorado include Dolores, Hinsdale, La Plata, Montezuma, and San Miguel counties)

Sources: Public Entity Risk Institute Presidential Disaster Declaration Site, [www.peripresdecusa.org/](http://www.peripresdecusa.org/); Farm Service Agency, [www.fsa.usda.gov/](http://www.fsa.usda.gov/); FEMA, [www.fema.gov](http://www.fema.gov)

<sup>1</sup>Ouray Floodplain Information Report,

## 4.2 Hazard Profiles

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**Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the...location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.**

The hazards identified in Section 4.1 Hazard Identification are profiled individually in this section. Much of the profile information came from the same sources used to initially identify the hazards.

### 4.2.1 Profile Methodology

Each hazard is profiled in a similar format that is described below:

#### **Hazard/Problem Description**

This subsection gives a generic description of the hazard and associated problems, followed by details on the hazard specific to Ouray County.

#### **Past Occurrences**

This subsection contains information on historic incidents, including impacts where known. The extent or location of the hazard within or near the Ouray County Planning Area is also included here. Information provided by the HMPC is included here along with information from other data sources.

#### **Geographical Area Affected**

This subsection discusses which areas of the County are most likely to be affected by a hazard event. Spatial extent classifications are as follows:

- **Limited**—Less than 10% of planning area
- **Significant**—10 to 50 percent of planning area
- **Extensive**—50 to 100 percent of planning area

#### **Potential Magnitude**

This subsection discusses the potential magnitude of impacts from a hazard event. Magnitude classifications are as follows:

- **Catastrophic**—More than 50 percent of area affected
- **Critical**—25 to 50 percent of area affected
- **Limited**—10 to 25 percent of area affected

- **Negligible**—Less than 10 percent of area affected

## Frequency/Likelihood of Occurrence

The frequency of past events is used in this section to gauge the likelihood of future occurrences. Based on historical data, the likelihood of future occurrences is categorized into one of the following classifications:

- **Highly Likely**—Near 100 percent chance of occurrence in next year, or happens every year.
- **Likely**—Between 10 and 100 percent chance of occurrence in next year, or has a recurrence interval of 10 years or less.
- **Occasional**—Between 1 and 10 percent chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
- **Unlikely**—Less than 1 percent chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

The frequency, or chance of occurrence, was calculated where possible based on existing data. Frequency was determined by dividing the number of events observed by the number of years and multiplying by 100. This gives the percent chance of the event happening in any given year. An example would be three droughts occurring over a 30-year period which equates to 10 percent chance of that hazard occurring any given year.

## 4.2.2 Avalanche

### Hazard/Problem Description

An avalanche is a mass of snow sliding down a mountainside. An avalanche occurs when the stress (from gravity) trying to pull the snow downhill exceeds the strength (from bonds between snow grains) of the snow cover. There are four factors that contribute to an avalanche: a steep slope, a snow cover, a weak layer in the snow cover, and a trigger. About 90 percent of all avalanches start on slopes of 30-45 degrees; about 98 percent of all avalanches occur on slopes of 25-50 degrees. Avalanches release most often on slopes above timberline that face away from prevailing winds (leeward slopes collect snow blowing from the windward sides of ridges). Nevertheless, avalanches can run on small slopes well below timberline, such as gullies, road cuts, and small openings in the trees. Very dense trees can anchor the snow to steep slopes and prevent avalanches from starting; however, avalanches can release and travel through a moderately dense forest.

Avalanche hazards occur predominantly in the mountainous regions of Colorado above 8,000 feet. The vast majority of avalanches occur during and shortly after winter storms, during the winter and spring months between November and April. The most avalanche-prone months are, in order, February, March, and January. Avalanches caused by thaw occur most often in April (Source: Colorado Avalanche Information Center). The avalanche danger increases with major snowstorms and periods of thaw. About 2,300 avalanches are reported to the Colorado

Avalanche Information Center in an average winter. More than 80 percent of these occur during or just after large snowstorms.

An increase in backcountry recreation (skiers and snowmobilers) in recent years means more people in avalanche-prone areas. Another trend among backcountry skiers and snowboarders is traveling into steeper and more “extreme” terrain, which tends to be more avalanche-prone. Ouray County is known as a worldwide destination for ice climbing. Many of the climbs are at the bottom of avalanche chutes, thus climbers may not be aware of dangers lurking high above them.

This hazard generally affects a small number of people, such as the participants in backcountry recreation discussed above. Motorists along highways are also at risk of injury and death due to avalanches. Road and highway closures, damaged structures, and destruction of forests are also a direct result of avalanches. Road closures can last several days until crews can clear debris safely. Recognizing areas prone to avalanches is critical in determining the nature and type of development allowed in a given area.

## Past Occurrences

Avalanches occur naturally every winter in the County. This discussion focuses on those avalanches that have collided with people or property. A detailed account of avalanche history in Ouray has been compiled in *Avalanche Hazard in Ouray County, Colorado 1877-1976* by Betsy Armstrong. In that report, 62 lives were lost and 192 people were caught in avalanches between 1877 and 1976. Thirty-three sites of human activity, including mines and towns, have been damaged or destroyed. The sheer number of deadly events illustrates the danger of avalanches in the County. The majority of the deaths (54) occurred in the 1877-1940 time period and was associated with high country mining activity, impacting individuals in the mining area itself or individuals traveling to and from the mines. The 1940-1976 timeframe saw eight deaths, all to individuals traveling through avalanche zones. The more recent deaths have been to backcountry travelers or travelers on Highway 550. *A History of Colorado Avalanche Accidents, 1859–2006* recorded 71 avalanche-related deaths in Ouray County between 1859 and 2006. According to the Colorado Avalanche Information Center, between 1950 and 2004, the County experienced 12 fatalities due to avalanche. Detailed CAIC records indicate that an avalanche in the Camp Bird Road on February 14<sup>th</sup>, 1958 killed one miner and three rescuers responding to the initial incident. Another avalanche March 19, 1984 killed a ski tourer in the vicinity of the Dallas Divide. A February 25, 1992 avalanche killed a ski tourer in the Sneffels Range. Figure 4.1 shows the number of avalanche fatalities in Colorado between the winters of 1950-51 and 2010-11. Ouray County was ranked fifth overall for avalanche fatalities in the state during that time period. Other significant or recent events are noted below. Some of these incidents may have occurred just outside of Ouray County but may have involved Ouray first responders.

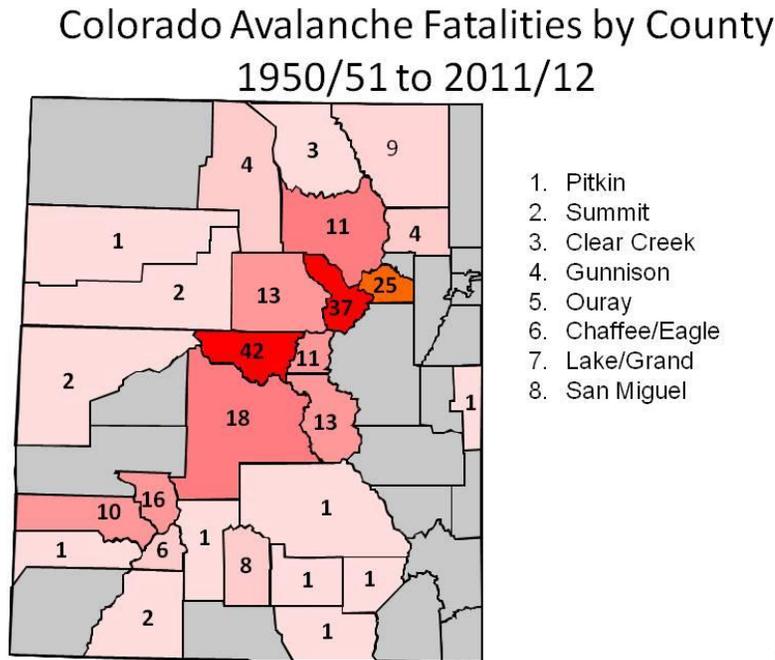
- **February 2, 2013**—Two events occurred in Cement Creek within roughly 20 minutes of each other on February 2, 2013. The first incident occurred north of Gladstone and involved

a group of three skiers. While descending, the second skier triggered an avalanche. Two of the group members were caught in the slide. None of them sustained any serious injuries. On their way out, the first group came in contact with victims of the second avalanche event that occurred nearby on Clothesline Path. The second event also involved a group of 3 skiers. Two of these individuals were partially buried by an avalanche, with one sustaining a lower leg injury and a dislocated shoulder. The third person was fully buried. One of the other group members was able to partially extricate the third person. Unfortunately the third person had no pulse and was not breathing. The uninjured skier went for help and met up with the unaffiliated first group. A member of the first group went for help and was able to flag down a Silverton Mountain shuttle bus. The bus driver radioed the ski area mountain manager with the accident information. The Silverton Mountain helicopter and Durango-based Flight for Life were called to assist with evacuation of the injured skier and recovery of the deceased skier.

- **February 25, 2012**—A group of 8 people were skiing in Big Horn Gulch south of Red Mountain Pass. The group triggered an avalanche that caught two people. One was partially buried and the other was fully buried. Both skiers were uncovered fairly quickly and neither sustained any serious injuries.
- **December 17, 2011**—Two people were skiing on Battleship, south of Red Mountain Pass, and triggered an avalanche. One skier was partially buried with his face and one hand exposed and sustained minor injuries. The second skier was able to dig his partner out, and the two left the scene together.
- **April 15, 2011**—A snowboarder in the Red Mountain Pass backcountry was caught and partially buried by an avalanche. He was able to dig himself free and did not sustain any injuries.
- **January 15, 2011**—A party of four started a tour from Red Mountain Pass. A splitboarder triggered an avalanche and was partially buried. She was uninjured and able to dig herself out.
- **March 30, 2010**—An ice climber was killed while climbing the northeast side of Baldy Peak. Details of the events leading up to the avalanche are unknown since the climber was traveling alone and no witnesses were present. Based on evidence, it is suspected that the avalanche occurred naturally.
- **March 21, 2010**—A group of eight from an advanced backcountry skiing college class was touring Peak 12,442. The group descended Peak 12,442 one at a time until the seventh person triggered an avalanche. Two people were caught but not buried. No one sustained any injuries, and the group was able to depart without rescue.
- **February 13, 2005**—An experienced backcountry skier and CAIC avalanche forecaster was caught and buried by a medium-sized avalanche near Red Mountain Pass. His companions were able to uncover him in seven minutes. He was unconscious when found but did not sustain any other serious injuries and was able to return to the trailhead under his own power.

(Source: Colorado Avalanche Information Center)

**Figure 4.1. Colorado Avalanche Fatalities by County: 1950/51 through 2011/12**



1. Pitkin
2. Summit
3. Clear Creek
4. Gunnison
5. Ouray
6. Chaffee/Eagle
7. Lake/Grand
8. San Miguel



Source: Colorado Avalanche Information Center

NCDC and SHELDUS also reported several avalanche events for Ouray County. These events are summarized in Table 4.4. Duplicates in the two data sources were deleted. Based on these sources avalanches in Ouray County caused 8 injuries, 4 fatalities, and \$201,500 in property damages according to NCDC and SHELDUS. There are two main limitations to these datasets. The first is that some incidents that were captured in CAIC are not captured by NCDC and SHELDUS. Casualties and damages estimates may be higher in reality. The second limitation is that NCDC and SHELDUS avalanche records only go back to 1998 in spite of the fact that the time periods for these datasets are 1950-2013 (NCDC) and 1960-2011 (SHELDUS).

**Table 4.4 Ouray County Avalanche Events**

Date	Injuries	Fatalities	Property Damage (\$)	Crop Damage (\$)
1/21/1998	0	1	0	0
11/8/1998	1	0	500	0
11/9/1998	0	0	0	0
2/21/2002	0	0	0	0
3/15/2002	1	1	0	0
4/5/2002	0	0	0	0
3/23/2003	1	0	0	0
2/21/2004	1	0	0	0
2/22/2004	0	0	0	0
2/29/2004	0	0	0	0

Date	Injuries	Fatalities	Property Damage (\$)	Crop Damage (\$)
2/29/2004	0	0	0	0
11/21/2004	1	0	0	0
1/4/2005	0	0	0	0
1/6/2005	0	0	200,000	0
2/13/2005	1	0	0	0
3/21/2005	0	0	0	0
3/21/2005	0	0	0	0
3/30/2005	0	0	0	0
11/16/2005	0	0	0	0
12/18/2005	0	0	0	0
12/20/2005	0	0	0	0
1/20/2006	0	0	0	0
1/26/2006	0	0	0	0
1/29/2006	0	0	0	0
2/2/2006	0	0	0	0
2/28/2006	0	0	0	0
3/10/2006	0	0	0	0
3/12/2006	0	0	0	0
3/14/2006	0	0	0	0
3/18/2006	0	0	0	0
3/29/2006	0	0	0	0
3/30/2006	0	0	0	0
4/6/2006	0	0	0	0
12/12/2006	0	0	0	0
12/18/2006	0	0	0	0
12/20/2006	0	0	0	0
1/12/2007	0	0	0	0
2/1/2007	0	0	0	0
12/14/2008	0	0	0	0
1/26/2009	0	0	0	0
1/29/2009	1	0	500	0
2/11/2010	1	1	0	0
3/30/2010	0	1	500	0
4/13/2010	0	0	0	0
2/12/2012	0	0	0	0
<b>TOTAL</b>	<b>8</b>	<b>4</b>	<b>201,500</b>	<b>0</b>

Source: NCDC (1950-2013) and SHELUDS (1960-2011)

## Geographical Area Affected

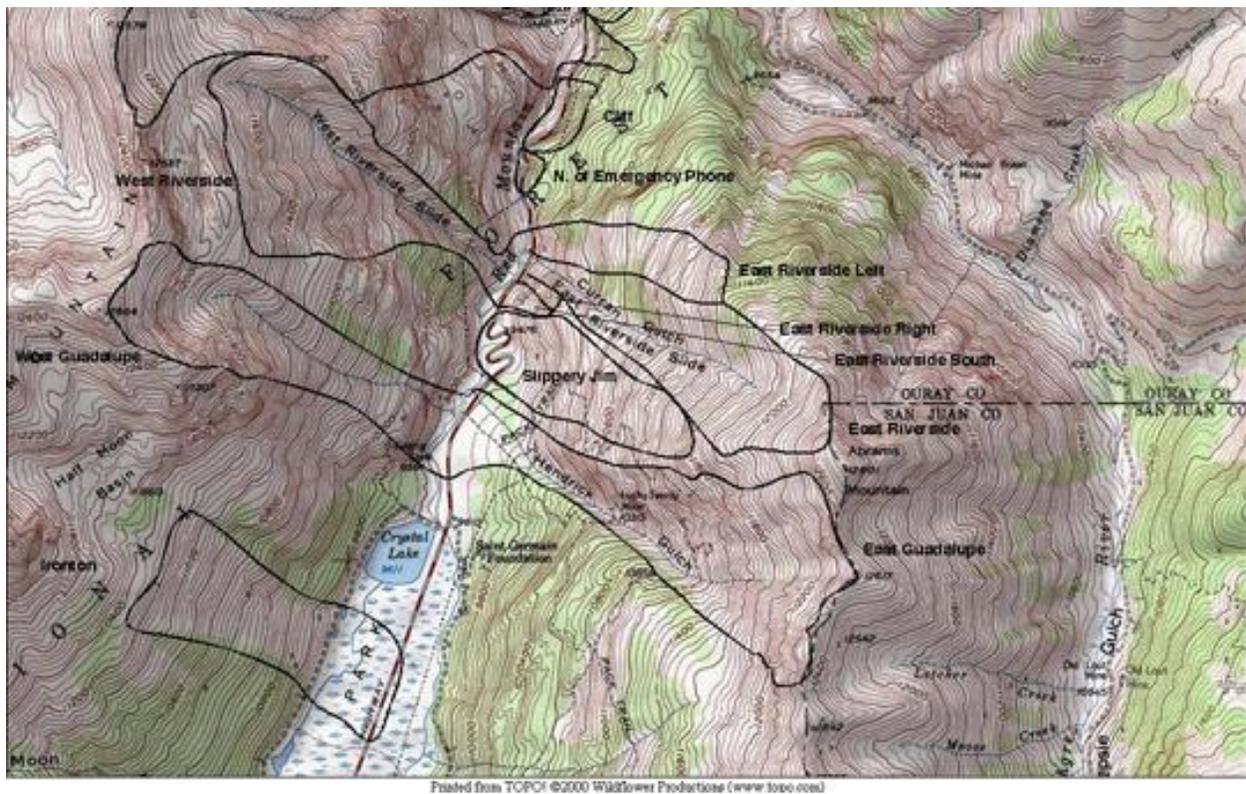
Due to the steep mountainous terrain, high elevations, and winter snows in Ouray County, there are avalanches every winter. The San Juan Mountains that form the dramatic scenery in southern Ouray County are regarded as one of the most avalanche-prone regions in Colorado and ranks high among the world's other avalanche-prone areas (Source: Colorado Avalanche Disasters, Jenkins).

**Southern Ouray County, unincorporated areas.** Avalanches have wreaked havoc with the historic mining activity in the high country areas off of Camp Bird Road.

**Southern Ouray County high country (undeveloped) and State Highway 550 over Red Mountain Pass and the Camp Bird Road area.** A map of the known avalanche paths affecting Highway 550, courtesy the Colorado Avalanche Information Center, Silverton, is provided in Figure 4.2. Avalanches pose a serious threat to backcountry recreationists, and frequently close State Highway 550 over Red Mountain Pass. The closures inconvenience travelers and commerce, but serve to minimize life safety impacts as avalanche control work is done by CDOT.

The East Riverside slide on Red Mountain Pass is notoriously dangerous because it impacts Highway 550. Six lives have been lost there since 1960. An avalanche shed was constructed in 1985, but is only one quarter of the designed size. The East Riverside and Mother Cline avalanche paths are mitigated by launching explosives into the starting zones to release avalanches while the road is closed. The East Riverside slide path and the avalanche shed are shown in Figure 4.3.

**Figure 4.2. Slide Paths in Vicinity of East Riverside Slide Affecting Highway 550**



Source: Colorado Avalanche Information Center

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**Figure 4.3. East Riverside Slide Path and Snow Shed on Highway 550**



Source: [http://geosurvey.state.co.us/Portals/0/silverton-ouray\\_web.pdf](http://geosurvey.state.co.us/Portals/0/silverton-ouray_web.pdf)

### **Potential Magnitude**

Overall, avalanche impacts would likely be **limited** in Ouray County, with 10-25 percent of the planning area affected. Avalanches can injure and kill multiple people, damage property and infrastructure, and close roads. A road closed due to avalanche activity can result in serious transportation disruptions due to the limited number of roads in the County. State Highway 145 at Lizard Head Pass in San Miguel County often experiences avalanche closures during the same time as Highway 550, thus obstructing all access to the County from the south and west. Stranded travelers or commuters are often faced with a lack of lodging availability. Backcountry avalanche incidents involve search and rescue teams and resources, which can put these personnel in areas of risk.

Data on past damages is somewhat limited but still sufficient to estimate average annualized loss. Between 1859 and 2013, avalanches caused an estimated 74 deaths, or roughly one death every other year. NCDC and SHEL DUS data recorded \$201,500 in property damages in Ouray County between 1950 and 2013. Based on this data the County could expect roughly \$3,198 in damages in any given year.

## Frequency/Likelihood of Occurrence

**Highly Likely**—Near 100 percent chance of occurrence in next year, or happens every year. Forty-five avalanche events were recorded in NCDC and SHELDUS between 1998 and 2013. This suggests that at least one notable avalanche occurs every year in Ouray County. An avalanche-related death may occur approximately every 16 years, with an injury occurring roughly every 8 years.

### 4.2.3 Dam Failure

#### Hazard/Problem Description

Dams are manmade structures built for a variety of uses, including flood protection, power, agriculture, water supply, and recreation. Dams typically are constructed of earth, rock, concrete, or mine tailings.

Dam failures can result in downstream flooding. Water released by a failed dam generates tremendous energy and can cause a flood that is catastrophic to life and property. Three factors that influence the potential severity of a full or partial dam failure are the amount of water impounded; the density, type, and value of downstream development and infrastructure; and the nature of the terrain between the dam and the downstream development. A dam failure event can dislodge trees and boulders, carrying them downstream into developed areas. The speed of onset depends on the type of failure. If the dam is inspected regularly then small leaks allow for adequate warning time. Once a dam is breached, however, failure and resulting flooding occurs rapidly. Dams can fail at any time of year, but the results are most catastrophic when the dams fill or overtop during winter or spring rain/snowmelt events.

A catastrophic dam failure could challenge local response capabilities and require evacuations to save lives. Impacts to life safety would depend on the warning time and the resources available to notify and evacuate the public and could include major loss of life and potentially catastrophic damage to roads, bridges, and homes. Associated water quality and health concerns could also be an issue.

Dam failures are often the result of prolonged rainfall and overtopping, but can happen in any conditions due to erosion, piping, structural deficiencies, lack of maintenance and repair, or the gradual weakening of the dam over time. Other factors that can lead to dam failure include earthquakes, landslides, improper operation, rodent activity, vandalism, or terrorism.

#### Past Occurrences

Colorado has a history of dam failure, with at least 130 known dam failures since 1890 (Source: Flood Hazard Mitigation Plan for Colorado, 2004). The Lawn Lake Disaster of 1982 caused four deaths and over \$31 million in property damage when a privately owned dam failed on Forest Service Property above the Town of Estes Park. The San Juan Mountains above Silverton

experienced a dam failure flood, of sorts, when a natural lake (Lake Emma) was completely drained on June 4, 1979, by a series of abandoned mine tunnels beneath the lake. There has been no history of dam failure in Ouray County.

### Geographical Area Affected

In Colorado, the state engineer classifies dams according to the projected destructive forces and impacts if a dam accidentally failed. The rating does not reflect the structural integrity or maintenance level of dams. High hazard dams are defined as those dams whose failure would result in loss of life. Significant hazard dams are defined as those dams whose failure would result in significant damage but not loss of human life.

The location of these dams is shown in Figure 4.4. Ridgway Reservoir is one of two high hazard dams in the County. If this dam were to fail the Uncompahgre River valley downstream of Ridgway Reservoir would be inundated. The greatest impacts would be in Montrose County to the north of Ouray County. The proximity of this dam to potentially active faults has led the Bureau of Reclamation to regularly monitor the dam and microseismicity of the area (see earthquake profile). Ouray Reservoir was an old power generating facility that has silted in. Crystal Lake dams a small volume of water and was drilled for testing in 2007. Crystal dam is undergoing repairs and improvements related to safety in 2013. Improvements to the outlet system will allow shutoff during an emergency and spillway improvements should double the current capacity with additional rip rap to retard future erosion. Repairs are being conducted by a Bureau of Reclamation team from Provo, Utah, that specializes in dam repair. Expenditures for the project are estimated at \$300,000<sup>1</sup>. Lake Lenore is not listed in the state or federal databases, but the HMPC feels that this dam could impact the Dexter Creek drainage if it failed. Cornerstone dam in the northern County was recently constructed in 2006-2007 and is rated as a significant hazard dam. It could impact Government Springs Road and one home below it. Other homes further downstream could be damaged, but the risk is not considered life threatening. Both Cornerstone and Ridgway have emergency action plans.

**Table 4.5 Dams in Ouray County**

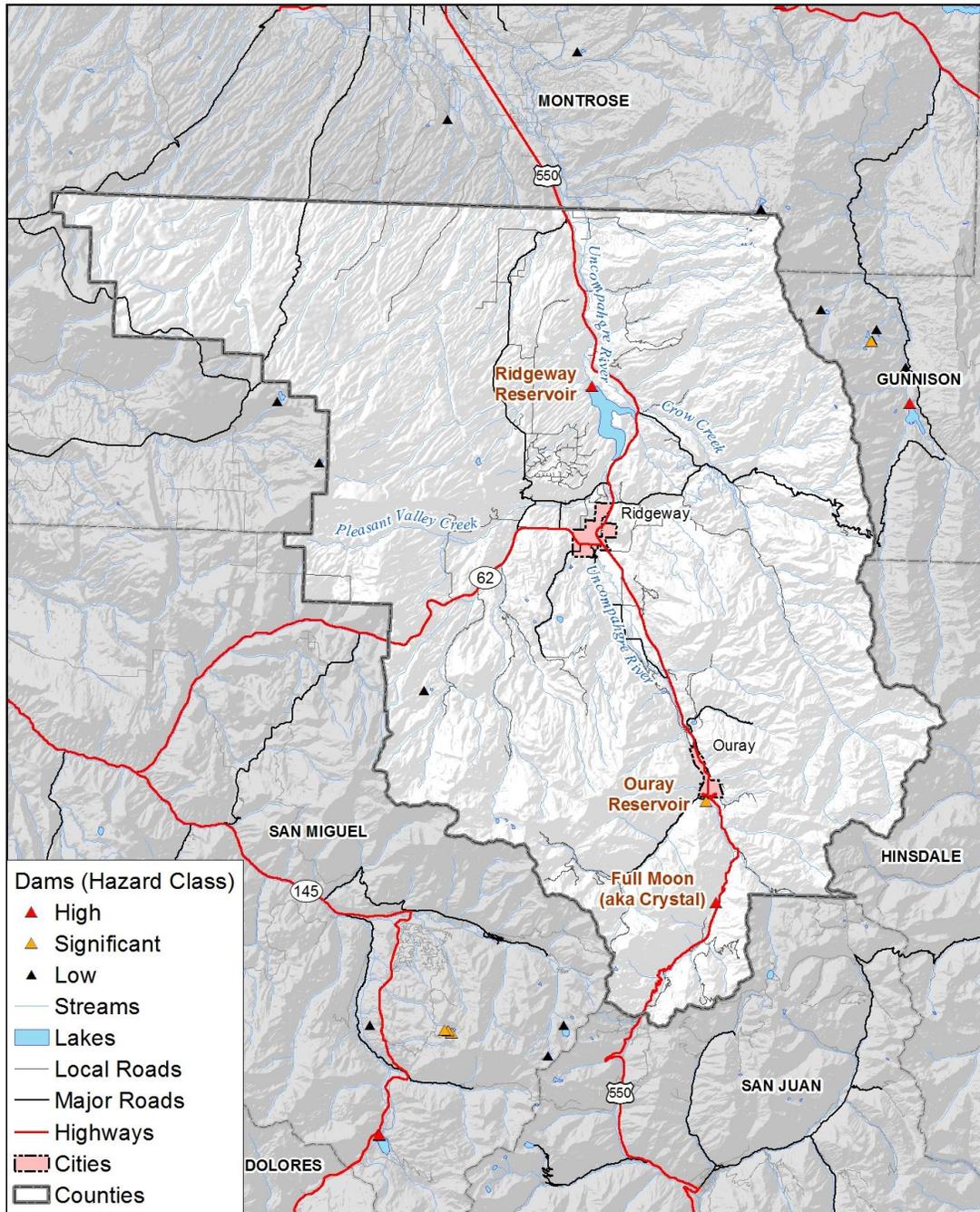
Name	Owner	River	Hazard Class	EAP (Y/N)
Carroll Brown	West Dallas Ranches, Inc.	Spring Creek	Low	
Full Moon aka Crystal	Mesa Engineering and Survey	Red Mountain Creek	High	NR
Ouray Reservoir	City of Ouray	Canyon Creek	Significant	NR
Cornerstone Pond 4	Cornerstone Metro District	Horsefly Creek	Significant	
Ridgway Reservoir	Bureau of Reclamation	Uncompahgre River	High	Y
Lake Lenore	private	Dexter Creek	Not rated	

Sources: HAZUS-MH MR3 National Inventory of Dams, HMPC,

<sup>1</sup> Ouraynews.com <http://www.ouraynews.com/index.php/component/content/article/566-crystal-lake-gets-a-dam-makeover>

The core of the Ridgway Dam has been designed to withstand a M 8.0 earthquake. Ridgway Dam has an electronic notification system that would alert the Bureau of Reclamation in the event of a problem with the dam from an earthquake. The abutments have been shored up and an inactive fault below the dam was filled in during construction. Seismic monitoring is ongoing.

**Figure 4.4. Ouray County Dams**



amec  
 Map compiled 7/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, HSIP Freedom 2012

## Potential Magnitude

Overall, dam failure impacts would likely be limited in Ouray County, with 10-25 percent of the planning area affected. Roads closed due to dam failure floods could result in serious transportation disruptions due to the limited number of roads in the County. The most serious impacts would be outside of the County in Montrose.

Specific impacts and downstream areas are listed with the Emergency Preparedness Plans for Ridgway and Cornerstone dams are on file at the County Sheriff's Office. Due to the sensitive nature of this information it is not replicated in this publicly available plan.

## Frequency/Likelihood of Occurrence

**Unlikely**—Less than 1 percent chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

There are no official recurrence intervals calculated for dam failures. The possibility for future dam failure remains, but the likelihood as a result of natural hazards is extremely low.

### 4.2.4 Debris Flow

#### Hazard Problem/Description

Debris flows are among the most destructive geologic processes that occur in mountainous areas. A debris flow is a mass of water and earth materials that flows down a stream, ravine, canyon, arroyo, or gulch. Technically if more than half of the solids in the mass are larger than sand grains (e.g., rocks, stones, boulders) the event is called a debris flow, otherwise it is called a mudslide or mudflow. For the purposes of this plan the term debris flow is meant to be a global term to include mudslides/mudflows. Many of Colorado's older mountain communities built in major mountain valleys are located on or near debris fans. A debris fan is a conical landform produced by successive mud and debris flow deposits, and the likely spot for a future event.

Debris flows can occur rapidly with little warning during torrential rains. Debris and mudflows generally occur with floods and downpours associated with the late summer monsoon season.

The debris flow problem can be exacerbated by wildfires that remove vegetation that serves to stabilize soil from erosion. Heavy rains on the denuded landscape can lead to rapid development of destructive mudflows. Nearby La Plata County experienced damaging mudflows in the area burned by the Missionary Ridge fire in 2002.

The Colorado Geological Survey's (CGS) Special Publication 30 *Debris-Flow Hazard in the Immediate Vicinity of Ouray, Colorado* (1986 Candace Jochim author), provides a detailed investigation of the debris flow hazard. The CGS has classified the debris flow hazards into the following three zones, which are shown on a hardcopy map associated with the report:

- **Very High Hazard Zone**—This is the zone of greatest hazard. It is estimated that in this area the greatest impact from, and most frequent exposure to, debris flows and floods occurs. The zone is characterized by steep slopes, deposits of large boulders (greater than two feet in diameter), tree scars and burial, channels, levees, and lobes. Damage in this zone could include structural damage, such as buildings being moved off their foundations, walls and windows being broken, large accumulations of debris being piled in and around buildings, trees being toppled or severely damaged, and severe mud and water damage. Plugs of debris should be expected in this zone, and loss of life is possible.
- **High Hazard Zone**—This is the zone of high hazard. This zone is subject to debris flows and floods, but does not experience the maximum impact of the events. However, events may be just as frequent as in the Very High Hazard Zone. The zone is generally characterized by moderate to steep slopes, boulders, levees, lobes, tree scars and burial, and channels. Damage in this zone could include moderate damage to structures resulting from the pounding of boulders and logs, broken windows, basements filled with mud and debris, piles of debris in and around structures and in yards and streets, and severe mud and water damage.
- **Moderate to Low Hazard Zone**—This hazard zone is usually subjected primarily to mud and water flooding as a result of debris-flow events. This zone is characterized by low to moderate slopes, and deposits of abundant mud, and minor debris (small boulders, one foot or less and logs). Damage is usually comparatively minor, consisting of mud and water damage to outer walls of buildings, basements, and yards.

## Past Occurrences

The City of Ouray and Ouray County have histories of damaging mud and debris flows. A detailed history of events has been compiled in the Colorado Geological Survey's (CGS) Special Publication 30 *Debris-Flow Hazard in the Immediate Vicinity of Ouray, Colorado* (1986), Candace Jochim author. Notable events occurred in 1878, 1909, 1927, 1929, 1951, 1965, 1971, 1973, 1981, 1982, 1984, 1988, 1998, 2002, 2003, 2005, 2008, 2010, and 2013 with many years having more than one event. The 1929 events were considered the most widespread and devastating. Note that this hazard is closely related to the flood hazard. All of these events included heavily sediment and debris-laden flood waters between the plugs or pulses of mud and debris. Refer to the flood hazard profile for detailed descriptions of these incidents, where both flooding and debris-flows are discussed in the historic profiles.

One of the most recent debris flow events occurred on August 6, 2013. On that day County Road 17 had to be closed due to mudslides and flooding. The road was impassible after being almost completely washed away. County Road 17 serves as one of only two northbound egress avenues for the City of Ouray. Figure 4.5 depicts the extent of damage from the event. Mudslides have also overrun and closed State Highways 62 and 145 several times a year, cutting off the County from the west.

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**Figure 4.5. Damage to County Road 17 from August 6, 2013 Debris flow**



Source: HMPC

In Jochim’s analysis of past events, the damage has been more debris than water related. The CGS report indicates that the 1981 and 1982 reports had damage and cleanup costs of \$196,000 and \$360,000, respectively. Those storms were considered to be 10 to 25 year storms, so the damage from a 100 year event would be much higher.

There is a long history of efforts to mitigate the hazard in the City of Ouray that began with the construction in 1909 of channels, or flumes, to route debris and water from Portland and Cascade creeks through the City. Over time the impacts of repeated debris flows have degraded the flumes, and often the flumes would plug and divert debris into nearby property. The most recent improvements to the flumes were made in 2005.

The CGS’ Critical Landslides in Colorado, A Year 2002 Review and Priority List was done as part of an update of the 1988 Colorado Landslide Mitigation Plan. The update is a status report on 49 locations believed to pose the most serious landslide risk in Colorado that were identified in the 1988 plan. The hazard areas (landslide/rockfall or debris flow) are categorized into three tiers. Tier one listings are serious cases needing immediate or ongoing action or attention because of the severity of potential impacts. The report lists the Ouray Town Site and vicinity debris flows in Ouray County as a Tier one debris flow area. This excerpt is from the report:

“The main town site of Ouray is located on the coalescing debris fans of Portland and Cascade Creeks. A small portion of the town lying on the west side of the Uncompahgre River is on the debris fan of Oak Creek. Recently, the fan of Skyrocket Creek at the north edge of town was subdivided into several residential sites. One or more of these fans has had debris flow and flash flood events on 22 occasions between 1874 and 1982. Efforts were made to control the debris by construction of a timber-lined channel (“flume”) with a concrete bottom that was completed in 1909. These provided some protection, but damage continued when the flumes became clogged or overflowed. Major events occurred in 1981 and 1983 and the decrepit flumes were overwhelmed, resulting in damage to many homes, businesses, and town facilities. Following these destructive events, the City received grants for design and replacement of the flumes with reinforced concrete structures. These new structures have yet to be tested by a major debris flood. They are more durable structures that will probably handle moderate-sized events, but it remains to be seen if they can tolerate the massive debris flow plugs of major events without malfunctioning. Debris plug fronts 25 to 30 ft. high have been reported, and deposits at the highway of 40 ft. depth have occurred (Jochim, 1986).”

“Some engineering studies and mitigation designs were made by private consultants to the developer before the Skyrocket fan was subdivided in 1996. A key part of the mitigation is the redesign and replacement of an old diversion structure above the fan. A wooden diversion structure at this location was built in the spring of 1929, and it failed during massive debris flows in July that same year. When the diversion failed, a drift of debris 40 ft. high was deposited on the highway below the fan. The new diversion is intended to intercept most of the debris flow volume and divert it to the north side of the Skyrocket fan. If this functions, it could minimize debris flow and flash flooding on the main fan that now contains several new homes. If it doesn’t perform as intended, these homes and older City and residential areas west of US Hwy 550 will continue to be in very high-hazard areas.”

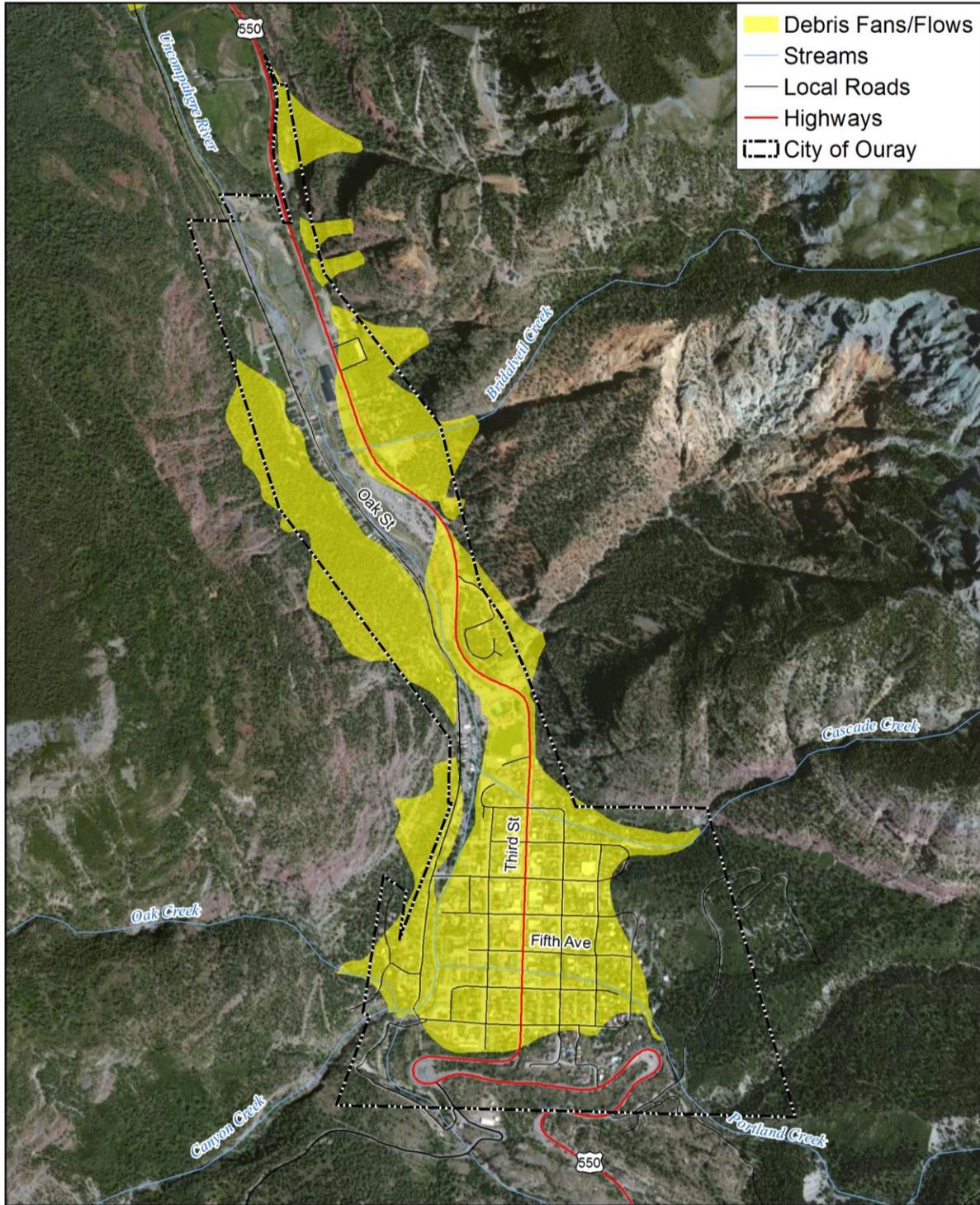
The report’s Year 2002 Evaluation and Recommendations includes: “Our recommendations in the year 2002 are that further building of homes on the Skyrocket fan be held in abeyance until adequacy of the diversion structures has been tested by a major debris event or until an independent review of the mitigation scheme confirms it to be adequate. For other parts of Ouray and vicinity, the report and maps of Jochim (1986), should be consulted for guidance in land-use decisions.”

### **Geographical Area Affected**

Due to the geology and steep topography in Ouray County, mud and debris flows and rockfalls occur in the southern portion of the County, particularly in and around the City of Ouray and the Highway 550 corridor, following heavy rains. Debris flow hazard areas have been studied and mapped in CGS Special Publication 30. Hard copy maps of the debris flow hazard are included with the CGS report. They are not available in a GIS or other digital form, based on an inquiry to the CGS made during the planning process. The maps detail very high, high, and moderate to low hazard zones. The majority of the Bridalveil Creek Fan and Skyrocket Creek Fan are

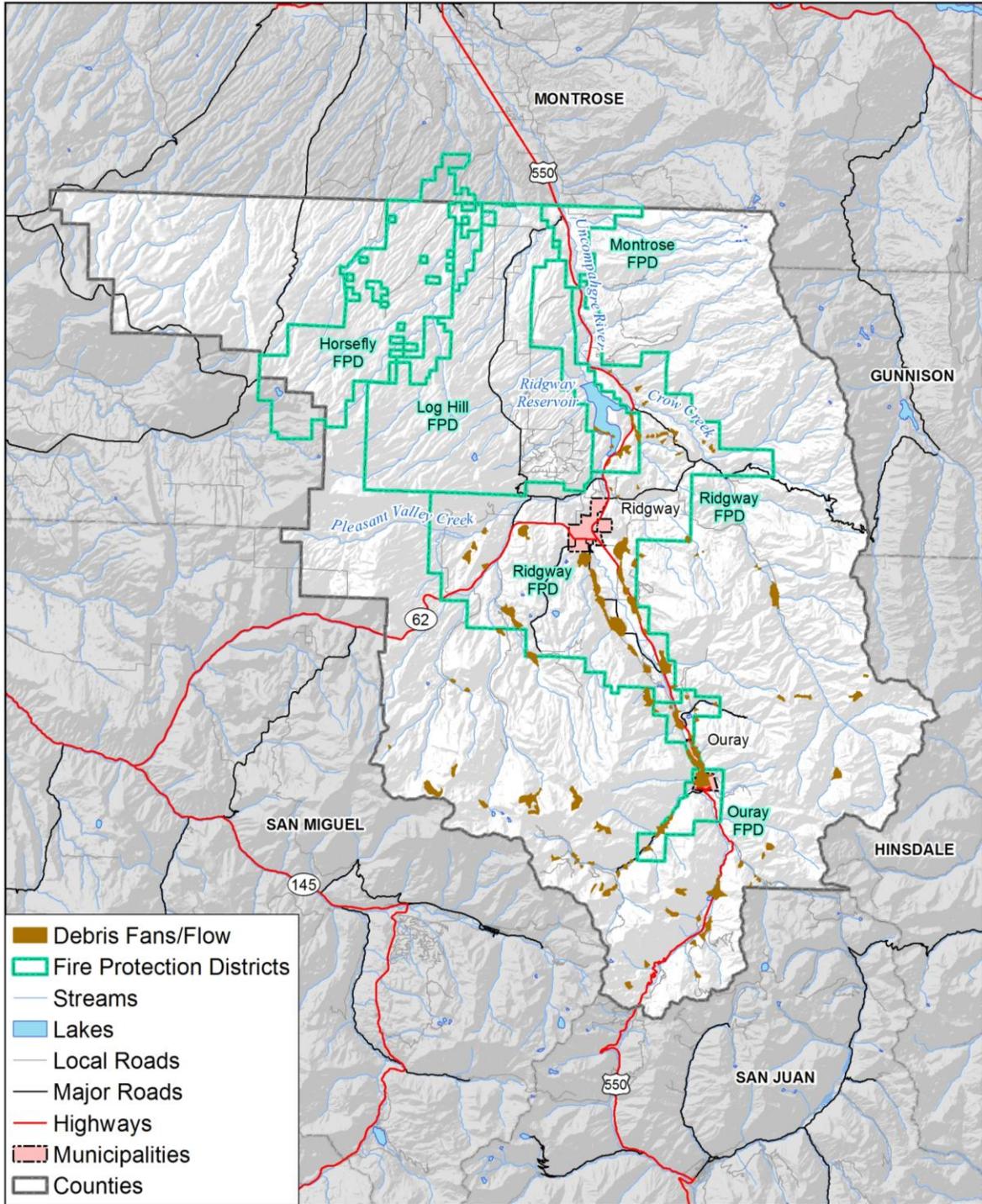
designated “very high hazard.” The Cascade Creek and Portland Creek fans, upon which most of the City of Ouray is built, are designated as “high hazards.” During the development of this plan in 2008 approximate methods were used to digitize the debris fans shown on the CGS map so they could be represented in maps and analyses (see additional analyses in Section 4.3 Assessing Vulnerability). New digital data representing debris fans and flows was made available by Ouray County GIS for the 2013 update, based on CGS and USGS mapping. Figure 4.6 shows debris fans in the City of Ouray and its vicinity, based on CGS data. The Corbett Creek fan and Dexter Creek fan are debris flow-susceptible areas in the unincorporated County. According to the HMPC, County Roads 5 and 7 southwest of Ridgway require regular repairs and inspection due to damage from debris flows. County Road 17 near Corbett Creek has also been impacted several times in the past, including the recent event on August 2013. Figure 4.7 shows the county-level view of debris fans.

Figure 4.6. Debris Fans in the City of Ouray and Vicinity



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, NHD, ESRI World Imagery

**Figure 4.7. Debris Fans in Ouray County**



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, NHD, USGS

0 5 10 Miles



## Potential Magnitude

Overall, debris flow impacts would likely be limited in Ouray County, with 10 to 25 percent of the planning area affected. However a road closed due to debris flow activity can result in serious transportation disruptions due to the limited number of roads in the County. This has happened repeatedly along County Road 17 and State Highways 62 and 145. For the City of Ouray, the magnitude could be critical, with 25-50 percent of the City affected. A debris flow within the City itself could block major streets, making movement within the City largely impossible and severely hindering emergency response.

## Frequency/Likelihood of Occurrence

**Highly Likely**—Debris flows in Ouray County have a 100 percent chance of occurrence in next year. Based on the Jochim report, which analyzed past events, damaging storms occur at intervals of approximately 10 to 25 years.

### 4.2.5 Drought

#### Hazard/Problem Description

Drought is a condition of climatic dryness that is severe enough to reduce soil moisture and water below the minimum necessary for sustaining plant, animal, and human life systems. Influencing factors include temperature patterns, precipitation patterns, agricultural and domestic water supply needs, and growth. Lack of annual precipitation and poor water conservation practices can result in drought conditions.

Drought is a gradual phenomenon. Although droughts are sometimes characterized as emergencies, they differ from typical emergency events. Most natural disasters, such as floods or forest fires, occur relatively rapidly and afford little time for preparing for disaster response. Droughts occur slowly, over a multi-year period, and can take years before the consequences are realized. It is often not obvious or easy to quantify when a drought begins and ends. Droughts can be a short-term event over several months or a long-term event that lasts for years or even decades.

Drought is a complex issue involving many factors—it occurs when a normal amount of moisture is not available to satisfy an area's usual water-consuming activities. Drought can often be defined regionally based on its effects:

- **Meteorological** drought is usually defined by a period of below average water supply.
- **Agricultural** drought occurs when there is an inadequate water supply to meet the needs of the state's crops and other agricultural operations such as livestock.
- **Hydrological** drought is defined as deficiencies in surface and subsurface water supplies. It is generally measured as streamflow, snowpack, and as lake, reservoir, and groundwater levels.

- **Socioeconomic** drought occurs when a drought impacts health, well-being, and quality of life or when a drought starts to have an adverse economic impact on a region.

Due to Colorado’s semiarid conditions, drought is a natural but unpredictable occurrence in the state. However, because of natural variations in climate and precipitation sources, it is rare for all of Colorado to be deficient in moisture at the same time. Single season droughts over some portion of the state are quite common.

Drought impacts are wide-reaching and may be economic, environmental, and/or societal. The most significant impacts associated with drought in Colorado are those related to water intensive activities such as agriculture, wildfire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. An ongoing drought may leave an area more prone to beetle kill and associated wildfires. Drought conditions can also cause soil to compact, increasing an area’s susceptibility to flooding, and reduce vegetation cover, which exposes soil to wind and erosion. A reduction of electric power generation and water quality deterioration are also potential problems. Drought impacts increase with the length of a drought, as carry-over supplies in reservoirs are depleted and water levels in groundwater basins decline.

The onset of drought in western Colorado mountainous counties is usually signaled by a lack of significant winter snowfall. Ouray County receives the majority of its precipitation as snow in the higher elevations between November and April. Hot and dry conditions that persist into spring, summer, and fall can aggravate drought conditions, making the effects of drought more pronounced as water demands increase during the growing season and summer months.

### Past Occurrences

According to the 2004 Drought and Water Supply Assessment, Colorado has experienced multiple severe droughts. Colorado has experienced drought in 2010-2013, 2000-2004, 1996, 1994, 1990, 1989, 1979-1975, 1965-1963, 1957-1951, 1941-1931, and 1905-1893 (Source: Colorado Drought Mitigation and Response Plan Draft, 2013). The most significant of the instrumented period (which began in the late 1800s) are listed in Table 4.6. Although drought conditions can vary across the state, it is likely that Ouray County suffered during these dry periods.

**Table 4.6 Significant Colorado Drought Periods of the Modern Instrumented Era**

Date	Dry	Wet	Duration (years)
1893-1905	X		12
1905-1931		X	26
1931-1941	X		10
1941-1951		X	10
1951-1957	X		6
1957-1959		X	2
1963-1965	X		2

Date	Dry	Wet	Duration (years)
1965-1975		X	10
1975-1978	X		3
1979-1999*		X	20
2000-2006*	X		6
2007-2010*		X	3
2010-2013*	X		2

Source: McKee, et al. 1999

\*Modified for the Colorado State Drought Plan 2010 revision and 2013 update based on input from the Colorado Climate Center

Southwestern Colorado and Ouray County were impacted by the multi-year drought that began in 2000 and continued into 2006. The summer of 2002 was particularly severe and negatively affected local agriculture and irrigation. The wildfires that burned that summer had a negative impact on the air quality in the region.

The 2010-2013 drought impacted Ouray County as well. In 2012 Ouray County was included as a primary county in the USDA drought declaration S3260 for drought, high winds, and excessive heat. It was included as a contiguous county in May 2013 for declaration S3548 for drought, high winds, wildfire, excessive heat, and insects, and as a primary county in June 2013 for declaration S3530 for drought, high winds, wildfire, excessive heat, and insects.

During 2012 the drought threatened the City of Ouray's municipal water supply. Downstream users with more senior water rights put a call on the City to curtail its water usage. This also happened in 2002. The City was attempting to acquire and repair the Red Mountain ditch to supplement its water supply. An augmentation plan was also in development to address this issue<sup>2</sup>.

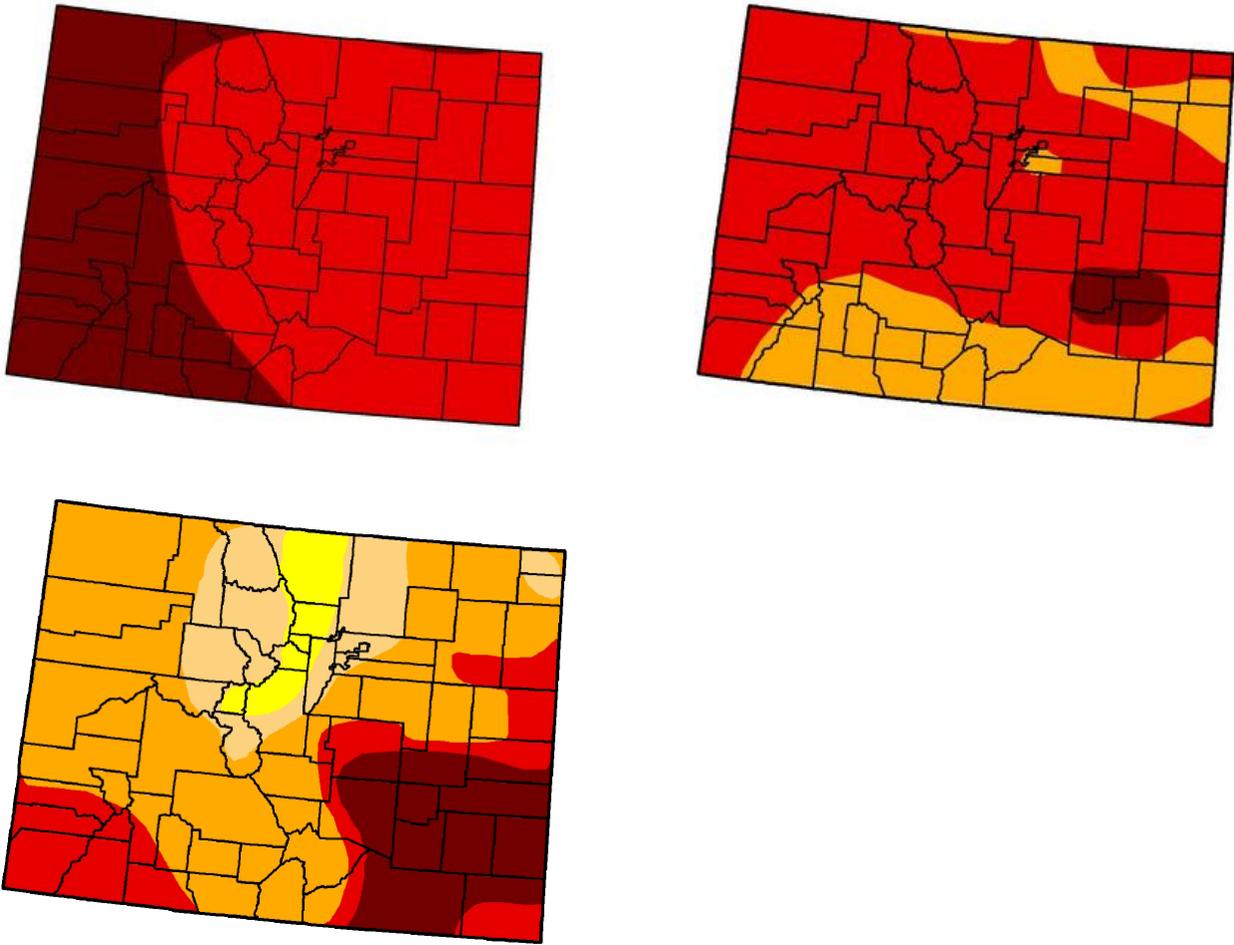
The 2010-2013 drought also affected Ouray County's tourism and recreation sector. Colorado's ski industry suffered economic losses due to the low snowpack and drought conditions in 2011 and 2012. Colorado Ski Country USA (CSCUSA) reported a decrease of 11.4 % in skier visits during the 2011-12 season as compared to the previous ski season. Climate data indicates that precipitation on Colorado's Western Slope for the 2011-12 winter was 43% below average, with the second warmest March on record. Statewide, the snowpack was 54% of average in April 2012.

Figure 4.8 compares the severity of the drought in southwest Colorado in June 2002 with the severity of the drought in late July 2012, as well as current conditions as of August 2013. The 2002 drought was the most severe for Ouray County. Current conditions in the County are severe to extreme, and clearly the County is experiencing impacts given its inclusion in USDA drought declarations.

<sup>2</sup>

[http://www.watchnewspapers.com/view/full\\_story/18539617/article-Water-Call-Threatens-Ouray%E2%80%99s-Municipal-Supply?instance=home\\_news\\_bullets](http://www.watchnewspapers.com/view/full_story/18539617/article-Water-Call-Threatens-Ouray%E2%80%99s-Municipal-Supply?instance=home_news_bullets)

**Figure 4.8. U.S. Drought Monitor for Colorado, July 23, 2002 (top left) vs. July 24, 2012 (top right) and July 30, 2013 (bottom left)**



**State drought conditions (percent area)**

Week	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
07/23/2002	0.00	100.00	100.00	100.00	100.00	33.61
07/24/2012	0.00	100.00	100.00	99.70	73.67	2.82
7/30/2013	0.00	100.00	95.26	81.43	31.51	15.32

***Intensity:***

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Source: National Drought Mitigation Center, [www.drought.unl.edu/](http://www.drought.unl.edu/)

According to SHEL DUS, Ouray experienced a drought in March 1989 that caused \$1.7 million (2012 dollars) in crop damage (note: this dollar figure represents an even distribution of damage totals across all affected counties). NCDC recorded 79 drought events in Ouray County between

2002 and 2013. 2008 was the only year without any reported drought events. No damages or casualties were reported for these events.

The Drought Impact Reporter was also referenced to identify past drought occurrences in Ouray County. The National Drought Mitigation Center developed the Drought Impact Reporter in response to the need for a national drought impact database for the United States. Information comes from a variety of sources: on-line drought-related news stories and scientific publications, members of the public who visit the website and submit a drought-related impact for their region, members of the media, and members of relevant government agencies. The database is being populated beginning with the most recent impacts and working backward in time.

The Drought Impact Reporter contains information on 210 drought impacts from droughts that affected Ouray County between 1990 and 2013. The list is not comprehensive. Most of the impacts, 104, were classified as “agriculture.” Other impacts include “business and industry” (11); “energy” (1); “fire” (21); “plants and wildlife” (18); “relief, response, and restrictions” (62); “society and public health” (33); “tourism and recreation” (11); and “water supply and quality” (19). . These categories are described as follows:

- **Agriculture**—Drought effects associated with agriculture, farming, aquaculture, horticulture, forestry, or ranching. Examples of drought-induced agricultural impacts include damage to crop quality; income loss for farmers due to reduced crop yields; reduced productivity of cropland; insect infestation; plant disease; increased irrigation costs; cost of new or supplemental water resource development (wells, dams, pipelines) for agriculture; reduced productivity of rangeland; forced reduction of foundation stock; closure/limitation of public lands to grazing; high cost or unavailability of water for livestock, Christmas tree farms, forestry, raising domesticated horses, bees, fish, shellfish or horticulture.
- **Business & Industry**—This category tracks drought’s effects on non-agriculture and non-tourism businesses, such as lawn care, recreational vehicles or gear dealers, and plant nurseries. Typical impacts include reduction or loss of demand for goods or services, reduction in employment, variation in number of calls for service, late opening or early closure for the season, bankruptcy, permanent store closure, and other economic impacts.
- **Energy**—This category concerns drought’s effects on power production, rates, and revenue. Examples include production changes for both hydropower and non-hydropower providers, changes in electricity rates, revenue shortfalls and/or windfall profits, and purchase of electricity when hydropower generation is down.
- **Fire**—Drought often contributes to forest, range, rural, or urban fires, fire danger, and burning restrictions. Specific impacts include enacting or easing burning restrictions, fireworks bans, increased fire risk, occurrence of fire (number of acres burned, number of wildland fires compared to average, people displaced, etc.), state of emergency during periods of high fire danger, closure of roads or land due to fire occurrence or risk, and expenses to state and county governments of paying firefighters overtime and paying equipment (helicopter) costs.

- **Plants & Wildlife**—Drought effects associated with unmanaged plants and wildlife, both aquatic and terrestrial, include loss of biodiversity of plants or wildlife; loss of trees from rural or urban landscapes, shelterbelts, or wooded conservation areas; reduction and degradation of fish and wildlife habitat; lack of feed and drinking water; greater mortality due to increased contact with agricultural producers, as animals seek food from farms and producers are less tolerant of the intrusion; disease; increased vulnerability to predation (from species concentrated near water); migration and concentration (loss of wildlife in some areas and too much wildlife in others); increased stress on endangered species; salinity levels affecting wildlife; wildlife encroaching into urban areas; and loss of wetlands.
- **Relief, Response & Restrictions**—This category refers to drought effects associated with disaster declarations, aid programs, requests for disaster declaration or aid, water restrictions, or fire restrictions. Examples include disaster declarations, aid programs, USDA Secretarial disaster declarations, Small Business Association disaster declarations, government relief and response programs, state-level water shortage or water emergency declarations, county-level declarations, a declared “state of emergency,” requests for declarations or aid, non-profit organization-based relief, water restrictions, fire restrictions, NWS Red Flag warnings, and declaration of drought watches or warnings.
- **Society & Public Health**—Drought effects associated with human, public and social health include health-related problems related to reduced water quantity and/or quality, such as increased concentration of contaminants; loss of human life (e.g. from heat stress, suicide); increased respiratory ailments; increased disease caused by wildland fire concentrations; increased human disease caused by changes in insect carrier populations; population migration (rural to urban areas, migrants into the United States); loss of aesthetic values; change in daily activities (non-recreational, like putting a bucket in the shower to catch water); elevated stress levels; meetings to discuss drought; communities creating drought plans; lawmakers altering penalties for violation of water restrictions; demand for higher water rates; cultural/historical discoveries from low water levels; prayer meetings; cancellations of fundraising events; cancellation/alteration of festivals or holiday traditions; stockpiling water; public service announcements and drought information websites; protests; and conflicts within the community due to competition for water.
- **Tourism & Recreation**—Drought effects associated with recreational activities and tourism include closure of state hiking trails and hunting areas due to fire danger; water access or navigation problems for recreation; bans on recreational activities; reduced license, permit, or ticket sales (e.g. hunting, fishing, ski lifts, etc.); losses related to curtailed activities (e.g. bird watching, hunting and fishing, boating, etc.); reduced park visitation; and cancellation or postponement of sporting events.
- **Water Supply & Quality**—Drought effects associated with water supply and water quality include dry wells, voluntary and mandatory water restrictions, changes in water rates, easing of water restrictions, increases in requests for new well permits, changes in water use due to water restrictions, greater water demand, decreases in water allocation or allotments, installation or alteration of water pumps or water intakes, changes to allowable water contaminants, water line damage or repairs due to drought stress, drinking water turbidity,

change in water color or odor, declaration of drought watches or warnings, and mitigation activities.

- **General Awareness**—General Awareness applies only to media reports and usually indicates that people are concerned about drought, but no specific impact has occurred yet or the information is too general to use for an impact.
- **Other**—Drought impacts that do not easily fit into any of the above categories.

## **Geographical Area Affected**

The entire County is at risk to drought conditions including the populated areas of local water supplies for the City of Ouray and Town of Ridgway (domestic needs) and widespread areas of the County (agricultural needs). The 2007 Colorado Drought Plan identified southwestern Colorado as the area with the highest drought threat based on a statewide survey of emergency managers completed in 2003.

The impacts will vary throughout the County, but a severe drought will affect the entire economy, particularly the tourism industry in the southern County and the agricultural industry in the northern half. Drought is one of the few hazards that has the potential to directly or indirectly impact each and every person within Ouray County, as well as adversely affect the local economy. The impacts would be water restrictions associated with domestic supplies, agricultural losses and economic impacts associated with those losses, economic impacts to tourism and recreation industries, increased wildland firefighting costs, and increased costs for water. For example, the Log Hill Mesa area is reliant on Dallas Creek for domestic water. If Dallas Creek were affected by drought, there would be less water available for domestic purposes and fire protection in Log Hill Village.

## **Potential Magnitude**

Overall, drought impacts could be critical in Ouray County, with 25 to 50 percent of the planning area affected. The magnitude of the drought's impact will be directly related to the severity and length of the drought. Secondary effects include increased susceptibility to wildfires and pine beetle infestations. Fire restrictions in the County and on Public Lands impact agriculture, construction, and camping/picnicking with economic consequences. Impacts to the ski industry with reduced snowpack can also have economic consequences for the County. While the County does not have a major ski area it does provide lodging and lift ticket packages for nearby Telluride. The 2013 Colorado Drought Mitigation and Response Plan Update identified Ouray County as having high drought vulnerability for aquatic habitat/species and the socioeconomic sector. Ouray County has had significant impacts from several droughts in the past, though the losses are difficult to quantify.

## **Frequency/Likelihood of Occurrence**

**Likely**—Between 10 and 100 percent chance of occurrence in next year, or has a recurrence interval of 10 years or less.

According to information from the Colorado Drought Mitigation and Response Plan, including recent drought conditions, Colorado was in drought for 50 of the past 120 years (1893-2013). Thus, there is a 41.7% chance that a drought will happen in Colorado in any given year, and a drought can be expected somewhere in the state every 2.4 years.

## 4.2.6 Earthquake

### Hazard Problem/Description

An earthquake is caused by a sudden slip on a fault, which is a plane of weakness in the earth's crust. Stresses in the earth's outer layer push the sides of the fault together. Stress builds up and the rocks slip suddenly, releasing energy in waves that travel through the earth's crust and cause the shaking that is felt during an earthquake. The amount of energy released during an earthquake is usually expressed as a Richter magnitude and is measured directly from the earthquake as recorded on seismographs. Another measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking, typically the greatest cause of losses to structures during earthquakes, at any given location on the surface as felt by humans and defined in the Modified Mercalli Intensity Scale. Table 4.7 features abbreviated descriptions of the 12 levels of intensity.

**Table 4.7 Modified Mercalli Intensity (MMI) Scale**

MMI	Felt Intensity
I	Not felt except by a very few people under special conditions. Detected mostly by instruments.
II	Felt by a few people, especially those on upper floors of buildings. Suspended objects may swing.
III	Felt noticeably indoors. Standing automobiles may rock slightly.
IV	Felt by many people indoors, by a few outdoors. At night, some people are awakened. Dishes, windows, and doors rattle.
V	Felt by nearly everyone. Many people are awakened. Some dishes and windows are broken. Unstable objects are overturned.
VI	Felt by everyone. Many people become frightened and run outdoors. Some heavy furniture is moved. Some plaster falls.
VII	Most people are alarmed and run outside. Damage is negligible in buildings of good construction, considerable in buildings of poor construction.
VIII	Damage is slight in specially designed structures, considerable in ordinary buildings, great in poorly built structures. Heavy furniture is overturned.
IX	Damage is considerable in specially designed buildings. Buildings shift from their foundations and partly collapse. Underground pipes are broken.
X	Some well-built wooden structures are destroyed. Most masonry structures are destroyed. The ground is badly cracked. Considerable landslides occur on steep slopes.
XI	Few, if any, masonry structures remain standing. Rails are bent. Broad fissures appear in the ground.
XII	Virtually total destruction. Waves are seen on the ground surface. Objects are thrown in the air.

Source: Multi-Hazard Identification and Risk Assessment, FEMA 1997

Earthquakes can cause structural damage, injury, and loss of life, as well as damage to infrastructure networks, such as water, power, communication, and transportation lines. Damage and life loss can be particularly devastating in communities where buildings were not designed to withstand seismic forces (e.g., historic structures). Other damage-causing effects of earthquakes include surface rupture, fissuring, settlement, and permanent horizontal and vertical shifting of

the ground. Secondary impacts can include landslides, rock falls, liquefaction, fires, dam failure, and hazardous materials incidents.

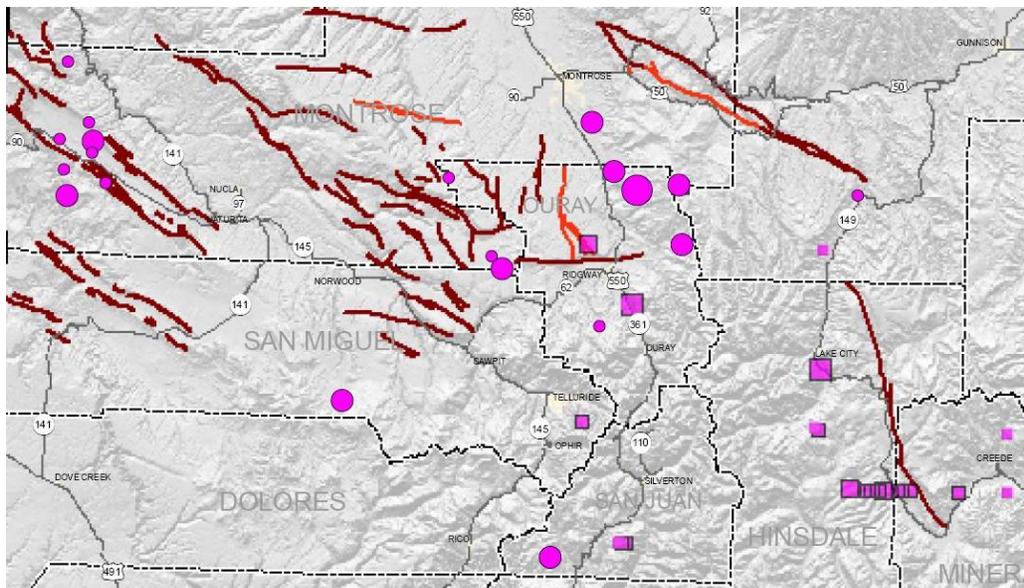
Part of what makes earthquakes so destructive is that they generally occur without warning. The main shock of an earthquake can usually be measured in seconds, and rarely lasts for more than a minute. Aftershocks can occur within the days, weeks, and even months following a major earthquake.

By studying the geologic characteristics of faults, geoscientists can often determine when the fault last moved and estimate the magnitude of the earthquake that produced the last movement. Because the occurrence of earthquakes is relatively infrequent in Colorado and the historical earthquake record is short, accurate estimations of magnitude, timing, or location of future dangerous earthquakes in Colorado are difficult to estimate.

### Past Occurrences

Although not as frequent or as large as California, Colorado has experienced earthquakes in its relatively short period of historic record. Colorado's Earthquake and Fault Map developed by the Colorado Geological Survey in 2007 depicts the location of historic epicenters and potentially active faults (see Figure 4.9).

**Figure 4.9. Earthquake Hazard Map Showing Southwestern Colorado**



## EARTHQUAKE EPICENTERS

Instrumentally located epicenters (~1962 to 2006)  
Size of dot indicates magnitude.

-  5-5.5
-  4-4.9
-  3-3.9

Approximate location of pre-instrumental earthquake epicenters (~1867 to 1961). Square size indicates the maximum Modified Mercalli intensity for the earthquake (see back of map for intensity scale).

-  VII
-  VI
-  V
-  IV
-  I-III



1882 Earthquake; magnitude estimated at 6.6 +/- 0.6 (Spence and others, 1996)

## QUATERNARY FAULTS

Geologically young faults that displace sediments or rocks deposited during the Quaternary Period (approximately past 2 million years).

-  Known or suspected fault displacement of late Quaternary deposits (approximately past 130,000 years)
-  Known or suspected fault displacement of middle to early Quaternary deposits (approximately past 130,000 to 2 million years old)

Source: Colorado Geological Survey

The strongest earthquakes experienced in the County occurred in 1913 and 1960. Descriptions of these and other quakes are described below (Source: Colorado Earthquake Information, 1867-1996, Colorado Geological Survey). While the following earthquakes had epicenters in Ouray County, it is likely that the County was also shaken by earthquakes in neighboring San Miguel and Hinsdale counties.

- **May 2, 2013**—Two small earthquakes centered east of Ridgway Reservoir occurred at 7:11am and 7:16am. The first earthquake had a magnitude of 2.9 and the second had a magnitude of 2.7. According to the HMPC an abandoned house near Highway 24 suffered some minor damage from these events.
- **November 21, 2006**—Magnitude 3.3, near intersection of Montrose, San Miguel, and Ouray county lines, no damage
- **January 17, 1994**—Ridgway, Magnitude 2.8, Intensity unknown
- **November 22, 1989**—Ouray
- **November 19, 1989**—Ridgway
- **April 4, 1967**—Montrose
- **March 17, 1962**—Ridgway Area, Magnitude 3.0, Intensity unknown
- **February 5, 1962**—Ridgway-Montrose, Intensity V
- **November 12, 1960**—Magnitude unknown, no damage

- **October 11, 1960**—Montrose-Ridgway, Intensity VI, M 5.5; this quake was one of the largest historic quakes to occur in Colorado. Intensity VI damage was reported in Cimarron, Lake City, Montrose, Ophir, Ouray, Placerville, Powderhorn, Ridgway, and Telluride. Plaster, chimneys, and windows were cracked in many of these locations. Perhaps the hardest hit was Montrose, where a foundation was cracked in three places.
- **November 11, 1913**—Ridgway Area, Intensity VI; this quake was strong at Montrose, Ouray, and Telluride, and that objects were thrown from shelves and rocks rolled down cliffs at Ouray. Ridgway was hardest hit in the area and that the quake centered near Portland, about 10 km south of Ridgway. Pictures fell from walls, dishes were broken, and the Ridgway school ceiling was damaged during the earthquake. Similar types of damage were reported over a wide area.
- **August 3, 1897**—Ridgway, Intensity V; felt violently in Ridgway

### ***Past Quakes in Neighboring Counties***

#### **Montrose County:**

- **April, 4, 1967**—Magnitude 4.5, Intensity unknown

#### **San Miguel County:**

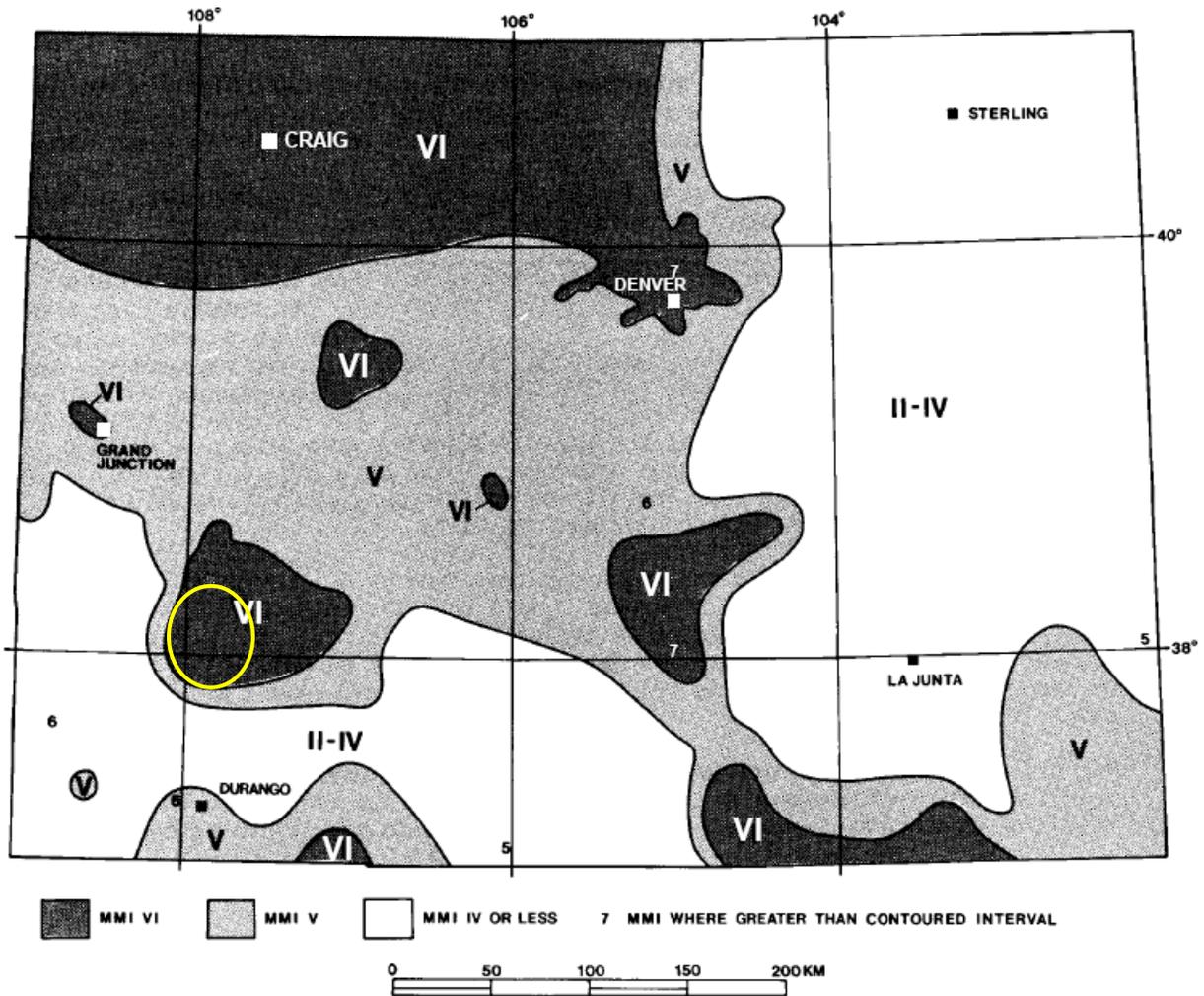
- **September 13-15, 1994**—Norwood
- **February 3, 1970**—South of Norwood
- **January 1, 1894**—Telluride, Intensity IV

#### **Hinsdale County:**

- **August 3, 1955**—Lake City, Intensity VI

Maximum historical earthquake Intensities felt in Colorado between 1867 and 1996 are shown in Figure 4.10. This map includes past earthquakes that have affected neighboring counties. The yellow oval represents the approximate location of Ouray County, which indicates Intensity VI shaking.

Figure 4.10. Maximum Historical Earthquake Intensities in Colorado



Source: Colorado Earthquake Information, 1867-1996, Colorado Geological Survey; planning area circled in yellow

### Geographical Area Affected

All of Ouray County, including the incorporated areas, could be impacted by earthquakes. The City of Ouray and Town of Ridgway, due to the nature of the historic building stock as well as being population centers, could endure the greatest losses if a significant earthquake were to occur.

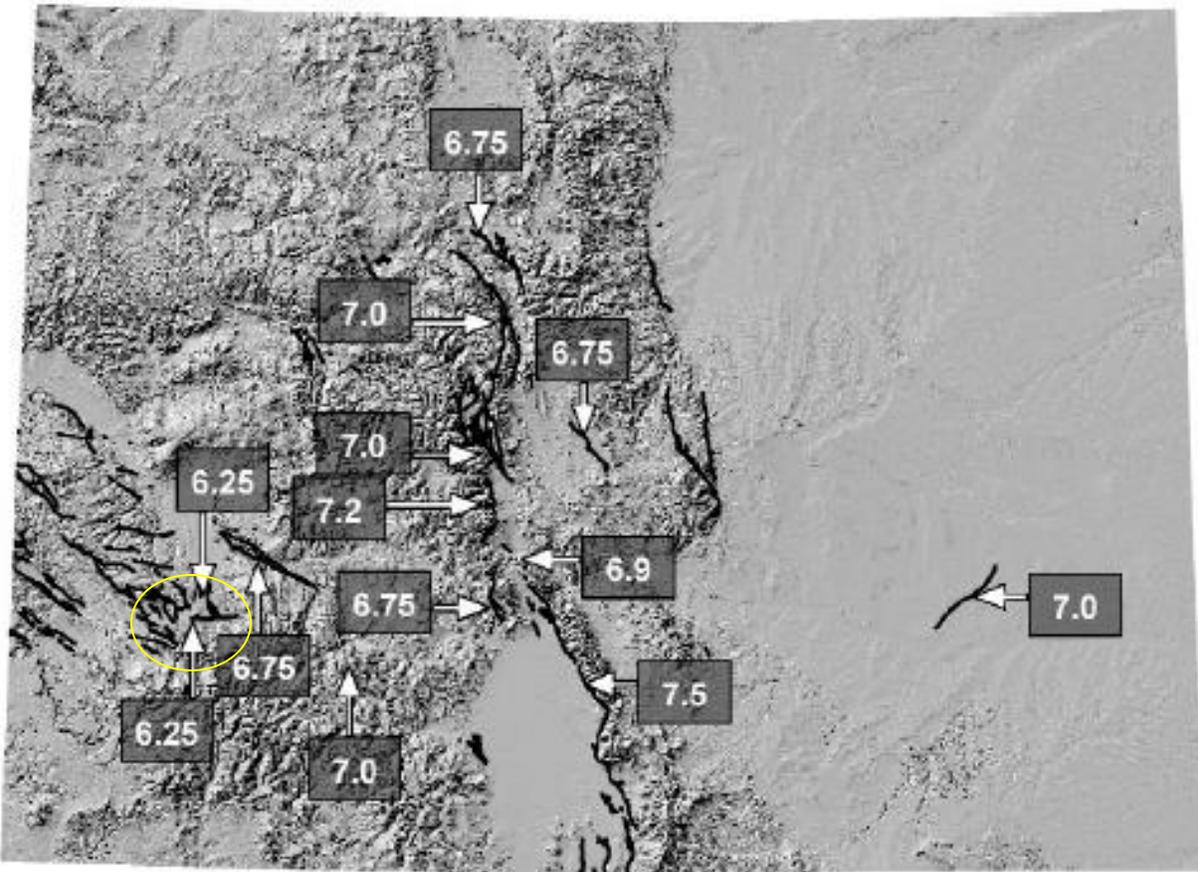
Geological research indicates that faults capable of producing earthquakes are prevalent in Colorado. There are about 90 potentially active faults in Colorado with documented movement within the last 1.6 million years. The map in Figure 4.11 indicates that potentially active faults exist in the vicinity of Ouray County that are capable of producing damaging earthquakes of magnitude 6.25.

Faults have been classified based on the time frame of their latest suspected movement (in order of activity occurrence, most recent is listed first):

- **H**—Holocene (within past 15,000 years)
- **LQ**—Late Quaternary (15,000-130,000 years)
- **MLQ**—Middle to Late Quaternary (130,000 - 750,000 years)
- **Q**—Quaternary (approximately past 2 million years)
- **LC**- Late Cenozoic (approximately past 23.7 million years)

Faults that are considered by the CGS to be sources of damaging earthquakes that could affect the County are the Busted Boiler (LQ), Cannibal (LQ), Cimarron (LQ,Q), Roubideau Creek (H). The Busted Boiler is suspected of movement within the Late Quaternary (within past 130,000 years) and the Roubideau Creek fault moved in the Holocene or past 15,000 years. Other faults within the County: Cow Creek (LC), Log Hill Mesa Graben Faults (LQ), Montrose Faults SW (Q), Ridgway (Q), Ridgway Quarry Faults (LC). Faults in neighboring San Miguel County that are suspected to have had movement with the Quaternary age (past 1.6 million years) are the Big Gypsum Valley Graben Faults, the Dolores Fault Zone, and the San Miguel Canyon Faults (Source: State of Colorado Natural Hazards Mitigation Plan 2004 Earthquake Evaluation Report).

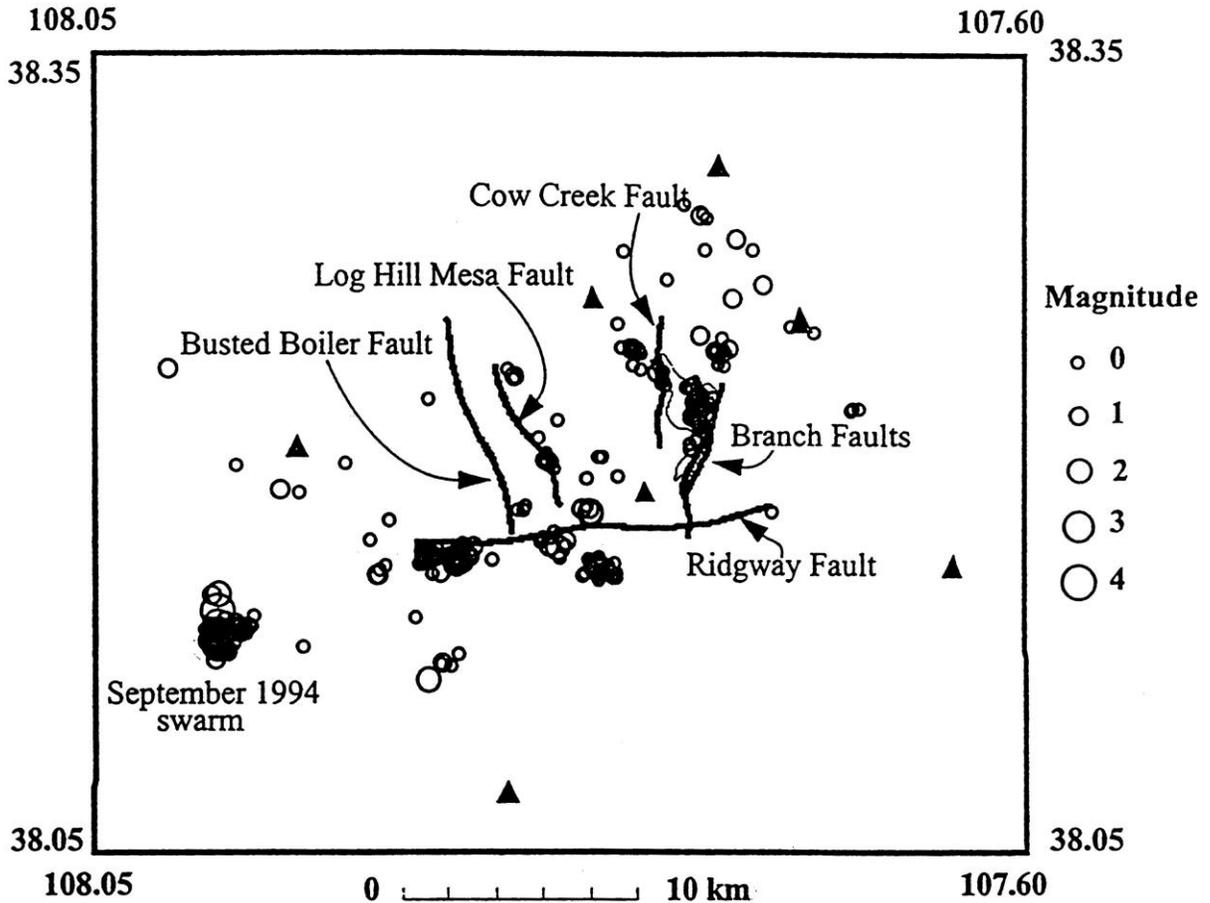
**Figure 4.11. Potentially Active Faults in Colorado with Maximum Credible Earthquake Determinations from the Colorado Geological Survey**



Yellow circle is approximate location of Ouray County (Source: CGS RockTalk Pub Volume 5, No. 2 April 2002)

According to *Colorado Earthquake Information, 1867-1996*, the U.S. Bureau of Reclamation, in cooperation with the USGS, has monitored seismicity near Ridgway Dam since 1985. Seismicity near Ridgway Dam increased about seven-fold subsequent to reservoir filling, which may be associated with north-trending branch faults of the Ridgway Fault. The most persistent seismicity observed in the region occurs near Cimarron Ridge, an area that includes the 1960 magnitude ML 5.5 event. Figure 4.12 shows the faults and seismicity in the vicinity of this network. Shaded triangles indicate seismograph stations. The Ridgway Reservoir Dam is the middle of the three triangles shown on the right side of the figure. According to the report a good correlation occurs between the fault locations and recorded seismicity.

Figure 4.12. Seismicity and Faults in the Vicinity of Northwestern Ouray County



Source: Colorado Earthquake Information, 1867-1996

### Potential Magnitude

Overall, earthquake impacts in Ouray County could be **critical**, with 25 percent to 50 percent of the planning area affected.

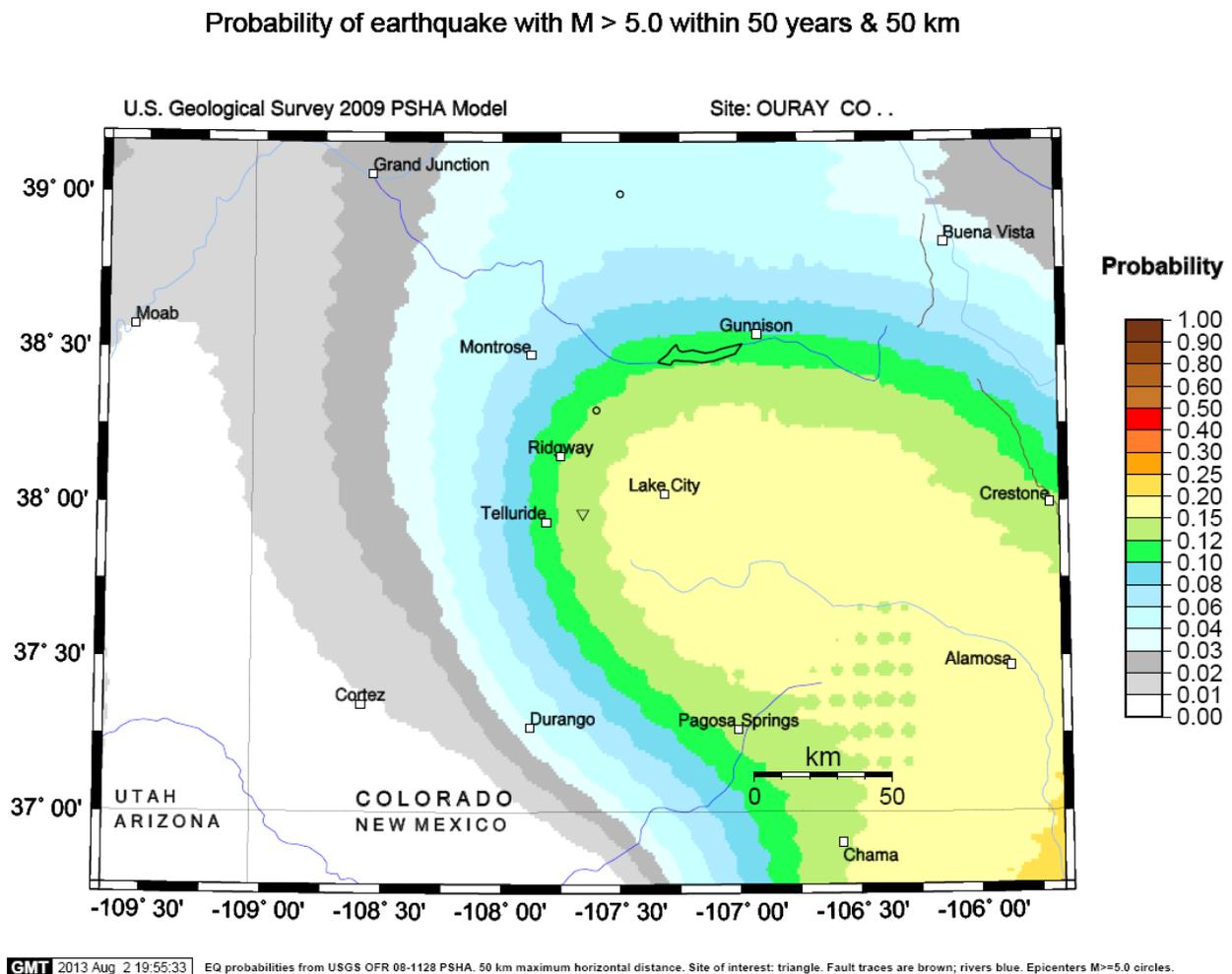
Specific details about the earthquake potential in Ouray County and Colorado in general remain largely unknown. A 2,500 year probabilistic HAZUS earthquake scenario was performed as part of this mitigation plan development. The results can be referenced in Table 4.44. This scenario takes into account worst case ground shaking from a variety of seismic sources. According to this probabilistic scenario, there is the potential for roughly 430 buildings to experience at least moderate damage. This is over 13% of the buildings in the County. This analysis is discussed in greater detail in Section 4.3.4. It is important to note that areas with high water tables are more susceptible to liquefaction from earthquakes.

## Frequency/Likelihood of Occurrence

**Occasional**—Between 1 and 10 percent chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.

Research based on Colorado's earthquake history suggests that an earthquake of 6.3 or larger has a one percent (1 percent) probability of occurring each year somewhere in Colorado (Charlie, Doehring, Oaks Colorado Earthquake Hazard Reduction Program Open File Report 93-01, 1993). Figure 4.13 from the USGS shows the probability that a magnitude 5 or greater earthquake will occur in the next 50 years. Most of Ouray County is in the 10-15 percent probability range.

**Figure 4.13. Probability of Magnitude 5 or Greater Earthquake in 50 years**



Source: USGS 2009 Earthquake Probability Mapping

## 4.2.7 Extreme Temperatures

### Hazard/Problem Description

Extreme temperature events, both cold and hot, can have severe impacts on human health and mortality, natural ecosystems, agriculture, and the economy. Temperature extremes cause more deaths every year than any other disaster, including hurricanes.<sup>3</sup>

#### **Extreme Cold**

Extreme cold often accompanies a winter storm or is left in its wake. It is most likely to occur in the winter months of December, January, and February. On average, January is the coolest month. The average last freeze/frost day in Ouray is May 29.

Prolonged exposure to the cold can cause frostbite or hypothermia and can become life-threatening. Infants and the elderly are most susceptible. Pipes may freeze and burst in homes or buildings that are poorly insulated or without heat. Extreme cold can disrupt or impair communications facilities. It can also destroy crops and cause utility outages, leaving people without water or power until utility companies are able to restore service.

What constitutes extremely cold temperatures varies across different areas of the United States, based on normal climate temperatures for the time of year. In Colorado, cold temperatures are normal during the winter. When temperatures drop at least 20 degrees below normal winter lows, the cold is considered extreme and begins to impact the daily operations of the county. Extreme cold/wind chill impacts inanimate objects, plants, animals, and water supplies.

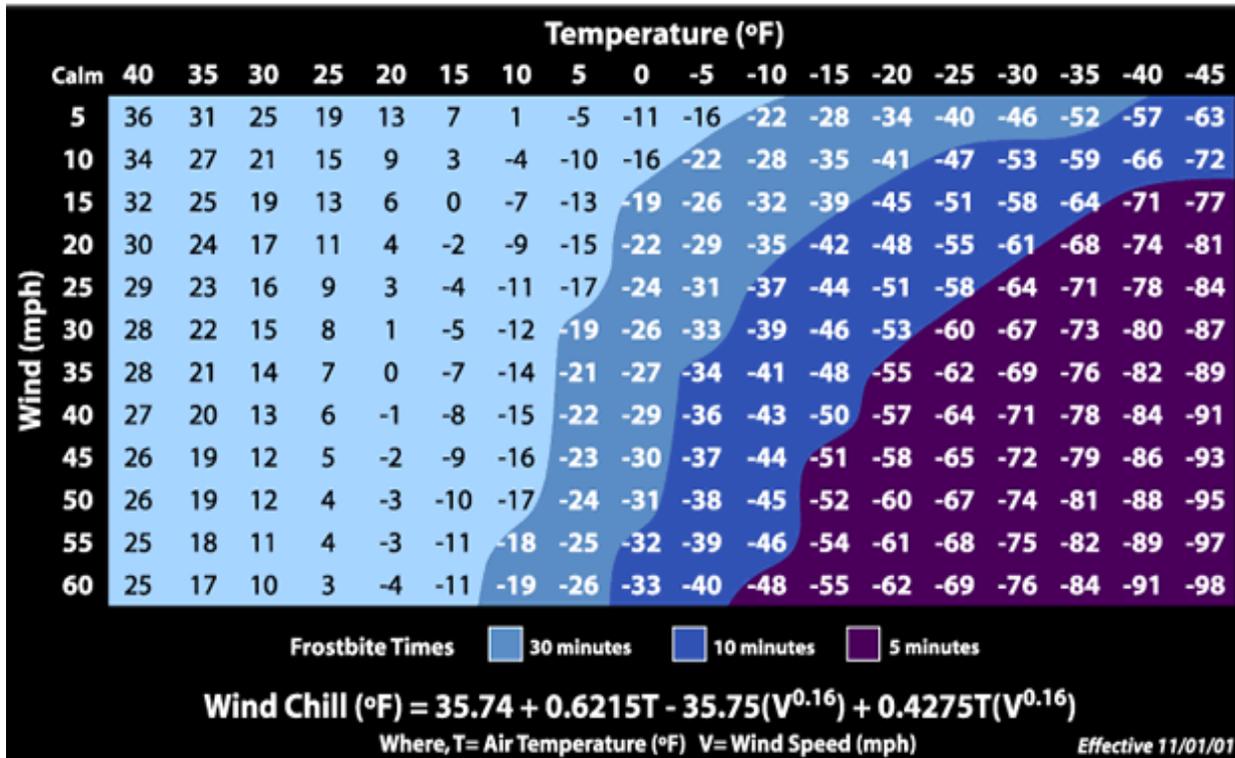
The effects of extremely cold temperatures are amplified by strong to high winds that can accompany winter storms. Wind-chill measures how wind and cold feel on exposed skin and is not a direct measurement of temperature. As wind increases, heat is carried away from the body faster, driving down the body temperature, which in turn causes the constriction of blood vessels, and increases the likelihood of severe injury or death to exposed persons. Animals are also affected by wind-chill; however cars, buildings, and other objects are not.

In 2001, the NWS implemented an updated Wind Chill Temperature index (see Figure 4.14). This index was developed to describe the relative discomfort/danger resulting from the combination of wind and temperature. Wind chill is based on the rate of heat loss from exposed skin caused by wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature and eventually the internal body temperature.

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<sup>3</sup> Kevin A. Borden and Susan L. Cutter "Spatial Patterns of Natural Hazards Mortality in the United States." *International Journal of Health Geographics* 2008, 7:64. Available online at <http://www.ij-healthgeographics.com/content/7/1/64> last accessed July 13, 2009.

Figure 4.14. National Weather Service Wind Chill Chart



Source: National Weather Service, [www.nws.noaa.gov/om/windchill/index.shtml](http://www.nws.noaa.gov/om/windchill/index.shtml)

The NWS will issue a Wind Chill Advisory for Ouray County (valley locations) when wind and temperature combine to produce wind chill values of -18 to -24°F.

**Extreme Heat**

According to information provided by FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. Extreme heat is most likely to occur in the summer months of June, July, and August. On average, July is the warmest month.

Heat kills by taxing the human body beyond its abilities. In a normal year, about 175 Americans succumb to the demands of summer heat. According to the National Weather Service (NWS), among natural hazards, only the cold of winter—not lightning, hurricanes, tornadoes, floods, or earthquakes—takes a greater toll. In the 40-year period from 1936 through 1975, nearly 20,000 people were killed in the United States by the effects of heat and solar radiation. In the heat wave of 1980, more than 1,250 people died.

Heat disorders generally have to do with a reduction or collapse of the body’s ability to shed heat by circulatory changes and sweating or a chemical (salt) imbalance caused by too much sweating. When heat gain exceeds the level the body can remove, or when the body cannot compensate for fluids and salt lost through perspiration, the temperature of the body’s inner core

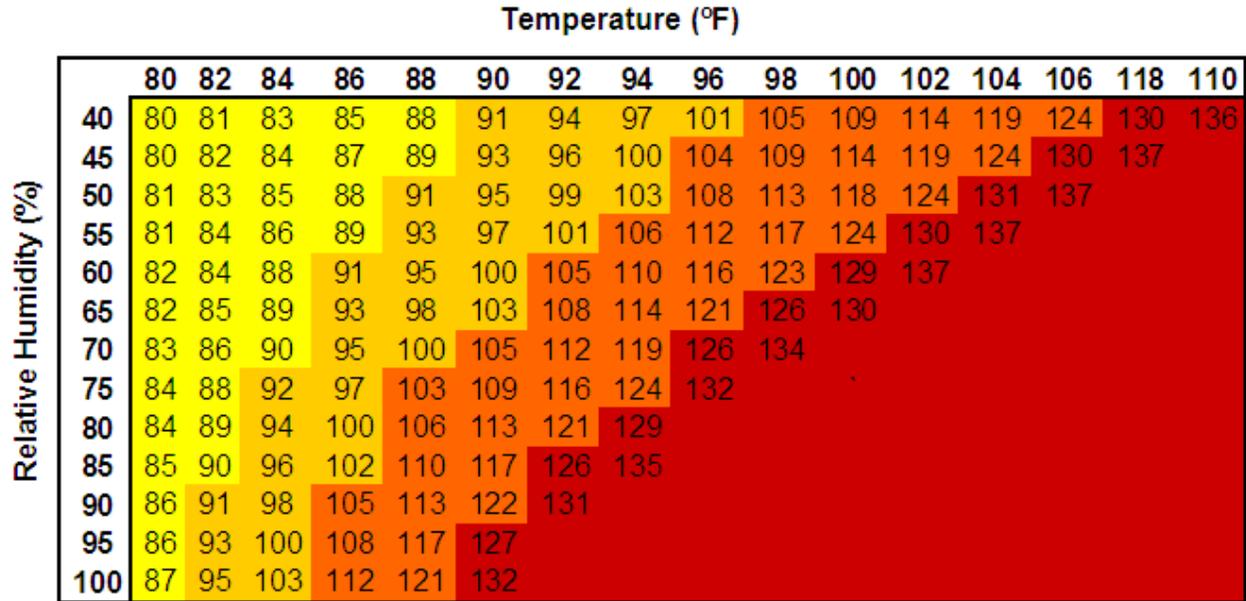
begins to rise and heat-related illness may develop. Elderly persons, small children, chronic invalids, those on certain medications or drugs, and persons with weight and alcohol problems are particularly susceptible to heat reactions, especially during heat waves in areas where moderate climate usually prevails.

Heat emergencies are often slower to develop, taking several days of continuous, oppressive heat before a significant or quantifiable impact is seen. Heat waves do not strike victims immediately, but rather their cumulative effects slowly take the lives of vulnerable populations. Heat waves do not cause damage or elicit the immediate response of floods, fires, earthquakes, or other more “typical” disaster scenarios. While heat waves are obviously less dramatic, they are potentially more deadly.

Figure 4.15 and Figure 4.16 show the Heat Index (HI) as a function of heat and relative humidity. The Heat Index describes how hot the heat-humidity combination makes it feel. As relative humidity increases, the air seems warmer than it actually is because the body is less able to cool itself via evaporation of perspiration. As the HI rises, so do health risks.

- When the HI is 90°F, heat exhaustion is possible with prolonged exposure and/or physical activity.
- When it is 90°-105°F, heat exhaustion is probable with the possibility of sunstroke or heat cramps with prolonged exposure and/or physical activity.
- When it is 105°-129°F, sunstroke, heat cramps or heat exhaustion is likely, and heatstroke is possible with prolonged exposure and/or physical activity.
- When it is 130°F and higher, heatstroke and sunstroke are extremely likely with continued exposure. Physical activity and prolonged exposure to the heat increase the risks.

**Figure 4.15. Heat Index**



**Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity**

- Caution
- Extreme Caution
- Danger
- Extreme Danger

Source: National Weather Service

Note: Since HI values were devised for shady, light wind conditions, exposure to full sunshine can increase HI values by up to 15°F. Also, strong winds, particularly with very hot, dry air, can be extremely hazardous.

**Figure 4.16. Possible Heat Disorders by Heat Index Level**

Heat Index	Category	Possible heat disorders for people in high risk groups
130°F or higher	Extreme Danger	Heatstroke risk extremely high with continued exposure.
105° - 129°F	Danger	Sunstroke, Heat Cramps and Heat Exhaustion likely, Heatstroke possible with prolonged exposure and/or physical activity.
90° - 105°F	Extreme Caution	Sunstroke, Heat Cramps and Heat Exhaustion possible with prolonged exposure and/or physical activity.
80° - 90 °F	Caution	Fatigue possible with prolonged exposure and/or physical activity.

Source: National Weather Service

The NWS has in place a system to initiate alert procedures (advisories or warnings) when the Heat Index is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. A common guideline for the issuance of excessive heat alerts is when the maximum daytime high is expected to equal or exceed 105°F and a nighttime minimum high of 80°F or above is expected for two or more

consecutive days. The NWS office in Grand Junction can issue the following heat-related advisory as conditions warrant.

- **Excessive Heat Outlook:** are issued when the potential exists for an excessive heat event in the next 3-7 days. An Outlook provides information to Heat Index forecast map for the contiguous United States those who need considerable lead time to prepare for the event, such as public utilities, emergency management, and public health officials.
- **Excessive Heat Watch:** is issued when conditions are favorable for an excessive heat event in the next 12 to 48 hours. A Watch is used when the risk of a heat wave has increased, but its occurrence and timing is still uncertain. A Watch provides enough lead time so those who need to prepare can do so, such as cities that have excessive heat event mitigation plans.
- **Excessive Heat Warning/Advisory:** are issued when an excessive heat event is expected in the next 36 hours. These products are issued when an excessive heat event is occurring, is imminent, or has a very high probability of occurring. The warning is used for conditions posing a threat to life or property. An advisory is for less serious conditions that cause significant discomfort or inconvenience and, if caution is not taken, could lead to a threat to life and/or property.

Extreme heat can impact livestock and pets, causing heat stress and possibly death. It can exacerbate droughts, which in turn depletes water supplies for livestock and crops. Droughts and extreme heat also increase wildfire risk. The combination of hot, dry weather and dry thunderstorms ignite wildfires that can quickly become devastating and overwhelm local firefighting capabilities.

## Past Occurrences

The Western Regional Climate Center reports data from two weather stations in Ouray County: Ouray and Ridgway. The Ouray station is located southwest of the City of Ouray. This station has not reported new data since 2006. Table 4.8 contains temperature summaries for the two stations. Figure 4.17 and Figure 4.18 graph the daily temperature averages and extremes.

**Table 4.8 Ouray County Temperature Summaries**

Station	Winter <sup>1</sup> Average Minimum Temperature	Summer <sup>1</sup> Average Maximum Temperature	Maximum Temperature	Minimum Temperature	# Days >90°F	# Days <32°F/ Year
Ridgway <sup>2</sup>	7.7°F	80.6°F	98°F July 31, 2002	-36°F February 1, 1985	4.6	227.7
Ouray <sup>3</sup>	16.1°F	76.1°F	96°F June 28, 1896	-22°F January 13, 1963	0.6	181.5

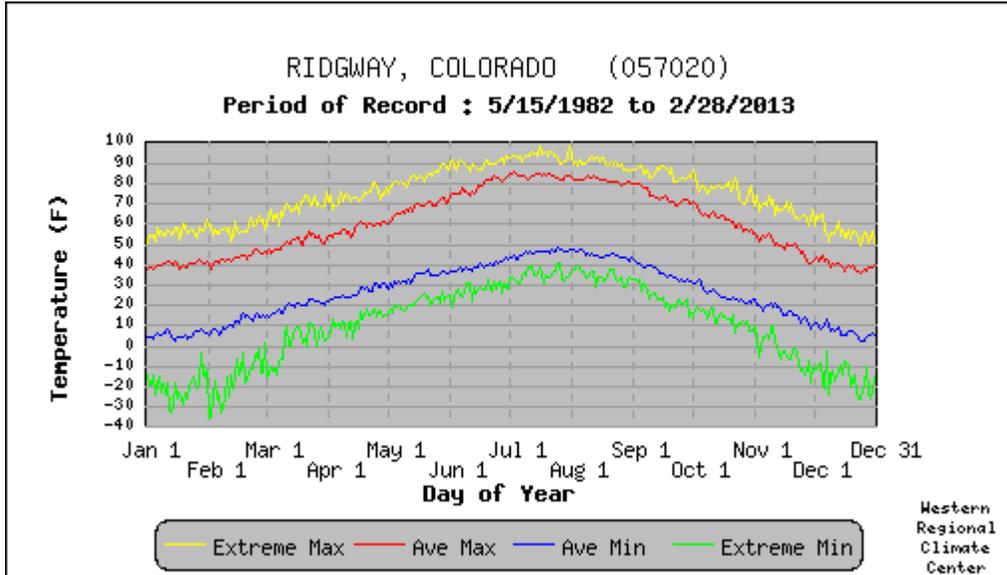
Source: Western Regional Climate Center, [www.wrcc.dri.edu/](http://www.wrcc.dri.edu/)

<sup>1</sup>Winter: December, January, February; Summer: June, July, August

<sup>2</sup>Period of record May 15, 1982-February 28, 2013

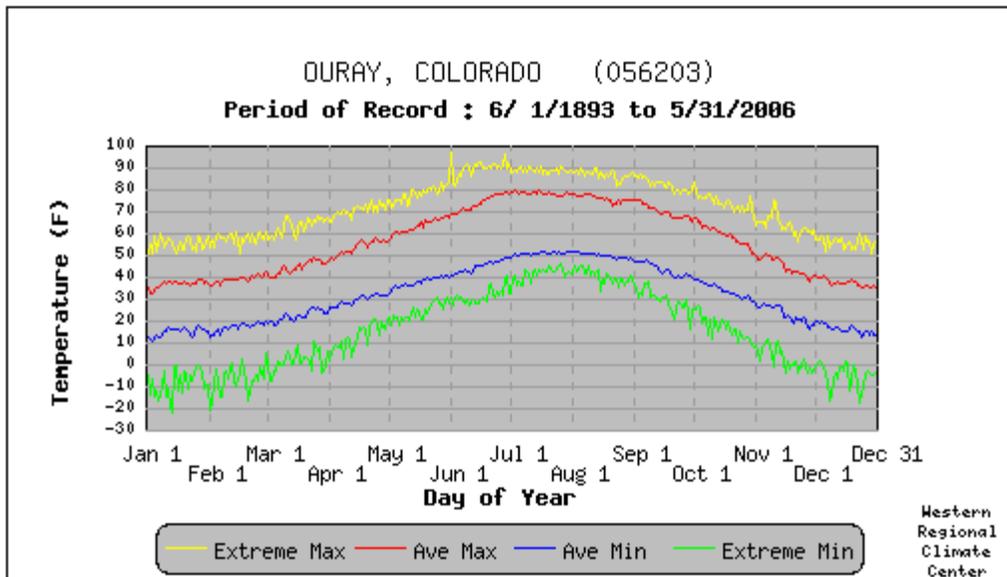
<sup>3</sup>Period of record June 1, 1893-May 31, 2006

**Figure 4.17. Ridgway Station Daily Temperature Averages and Extremes**



Source: Western Regional Climate Center, [www.wrcc.dri.edu/](http://www.wrcc.dri.edu/)

**Figure 4.18. Ouray Station Daily Temperature Averages and Extremes**



Source: Western Regional Climate Center, [www.wrcc.dri.edu/](http://www.wrcc.dri.edu/)

NCDC reported two extreme cold/wind chill events in Ouray County between 1950 and 2013. The first event occurred on December 4, 2005 and caused \$100,000 in property damages. Arctic air spilled down mainly into the lower elevations of western Colorado in early December and remained trapped for about two weeks. Overnight low temperatures dropped below zero Fahrenheit throughout the area, with many locations breaking all-time record cold readings for

particular days. Frozen water pipes burst in many areas resulting in water damage to numerous homes and businesses. The exact amount for the cost of repairing the damage likely exceeds a hundred thousand dollars. The second NCDC extreme cold event occurred on February 1, 2011. There were no damages or casualties reported with this event.

SHELDUS recorded ten extreme cold events for Ouray County between 1960 and 2011. Events that occurred along with snow were not included. The ten events caused 0.32 injuries, 0.8 fatalities, \$150,932 in property damages (inflated to 2012 dollars), and \$5,637,114 in crop damages (inflated to 2012 dollars).

Water supply pipes on Log Hill Mesa have been known to freeze at the valves, despite being buried several feet underground.

### **Geographic Area Affected**

Extreme cold temperatures can impact the entire county. The Ridgway area is a known “cold sink.” Extreme heat could impact the lower elevations of the County and the municipalities, but generally the relatively high elevation of Ouray County is not prone to extreme heat.

### **Potential Magnitude**

Overall, extreme temperature impacts would likely be limited in Ouray County, with 10 to 25 percent of the planning area affected. Extreme cold can occasionally cause problems with communications facilities and freeze-thaw cycles can severely damage roads. Several parts of the County, including Ridgway, Ouray, Elk Meadows, and Log Hill Mesa, experience problems with frozen water lines. Water consumption in the City of Ouray can become excessive in wintertime as the City advises residents to leave water running to help prevent frozen pipes which are not buried deeply enough or not insulated properly. The Ridgway School District noted that extreme cold once caused the school to close as school buses would not start in temperatures of minus 37 below zero. The only extreme cold event with reported impacts in Ouray County resulted in \$100,000 in property damages from burst water pipes. This damage estimate may include other counties impacted by the event. The SHELDUS data is more useful for calculating average annualized losses from extreme cold. Ten events caused a total of \$5,788,046 in combined crop and property damages (inflated to 2012 dollars) between 1960 and 2011. Based on this data Ouray County could expect roughly \$113,491 in damages from extreme cold in any given year. This figure is only a rough estimate; SHELDUS damages are frequently average across several counties impacted by a given event and may not accurately represent damages in an individual county.

### **Frequency/Likelihood of Occurrence**

**Highly Likely**—Near 100 percent chance of occurrence in next year, or happens every year. SHELDUS and NCDC data would indicate that the frequency of occurrence is closer to likely or occasional. However, the HMPC asserts that extreme temperatures, and extreme cold in

particular, are highly likely to occur in any given year. The data in NCDC and SHELDUS may represent a lack of reporting rather than a lack of occurrence. Ouray County's residents are accustomed to dealing with extreme temperatures and may be less likely to report events unless they cause significant damage. It would be more accurate to say that extreme temperature events are highly likely to occur in the County in any given year, but the frequency of damaging events is only likely.

## 4.2.8 Flooding

### Hazard/Problem Description

Riverine flooding is defined as when a watercourse exceeds its "bank-full" capacity and is usually the most common type of flood event. Riverine flooding generally occurs as a result of prolonged rainfall, or rainfall that is combined with soils already saturated from previous rain events. The area adjacent to a river channel is its floodplain. In its common usage, "floodplain" most often refers to that area that is inundated by the 100-year flood, the flood that has a 1 percent chance in any given year of being equaled or exceeded. Other types of floods include general rain floods, thunderstorm generated flash floods, alluvial fan floods, snowmelt and rain on snow floods, dam failure floods, and local drainage floods. The 100-year flood is the national standard to which communities regulate their floodplains through the National Flood Insurance Program.

The potential for flooding can change and increase through various land use changes and changes to land surface. A change in environment can create localized flooding problems inside and outside of natural floodplains by altering or confining watersheds or natural drainage channels. These changes are commonly created by human activities. These changes can also be created by other events such as wildfires. Wildfires create hydrophobic soils, a hardening or "glazing" of the earth's surface that prevents rainfall from being absorbed into the ground, thereby increasing runoff; erosion, and downstream sedimentation of channels.

Ouray County is susceptible to the following types of flooding:

- Rain in a general storm system
- Rain in a localized intense thunderstorm
- Melting snow
- Rain on melting snow
- Dam failure
- Urban stormwater drainage
- Rain on fire damaged watersheds

Slow rise floods associated with snowmelt and sustained precipitation usually are preceded with adequate warning, though the event can last several days. Flash floods are more typical in the County. Flash floods, by their nature, occur very suddenly but usually dissipate within hours.

Even flash floods are usually preceded with warning from the National Weather Service in terms of flash flood advisories, watches, and warnings.

The total annual precipitation in northern Ouray County (Colona-Ridgway) is approximately 13 inches to as much as 40 inches in the southern mountainous area. Approximately 30 to 40 percent of the precipitation is snowfall. Generally, the flood season extends from late spring to fall. Much of the rainfall occurs with thunderstorms during April, May, June, July, and August. Ouray County is affected by a seasonal wind shift and moisture increase known as the “southwest monsoon.” The monsoon typically begins every year in mid July and ends by mid August, but has been known to vary in duration and intensity. During La Nina years the monsoon can be particularly wet and enduring. This seasonal rainfall is the most common cause of flooding in Ouray County. The fall months can also be wet and rainy in southwest Colorado.

Ouray County’s flood events are typically flash floods from intense cloudburst storms over small and steep watersheds in the summer and fall and snowmelt driven floods in June. Sources of riverine flooding in the County include the Uncompahgre River, Dallas Creek, Cedar Creek, Cuddigan Gulch, Coal Creek, and Unnamed Creek. Steep, rocky tributaries of the Uncompahgre River draining relatively small confined basins flood frequently and intensely. These areas are notable in Portland, Cascade, Skyrocket, Corbett, Oak, Canyon, Cutler, Dexter, Forsman, Blowout, Plummer, Coal, Bridalveil, and Cottonwood creeks, and numerous other intermittent creeks and drainages. The Uncompahgre River’s headwaters lie south of the City of Ouray in the high peaks of the San Juan Mountains. The river flows through an extremely narrow gorge just south of the City and then flattens into a broad and gentle floodplain between Ouray and Ridgway. This floodplain tends to absorb floodwaters and debris coming from floods on nearby tributaries.

Ouray has six very steep and rocky drainages that discharge in the immediate vicinity of the City. These drainages have a long history of intense and devastating floods. The primary problem drainages are Portland, Cascade, and Skyrocket creeks. Portland and Cascade creeks drain from the “Amphitheater,” a dramatic confined drainage east of the City, and continue through the City toward the Uncompahgre River. Since the early 1900s, attempts have been made to confine these drainages to “flumes.” These flumes channel the flow to prevent the natural wanderings over the cumulative alluvial fans on which much of the City of Ouray has been built. Originally constructed with wood, these flumes were replaced with concrete following a flood in 1906. These flumes have been repaired and altered over the years and often require maintenance to clean out debris. Often it is the debris more than the water that causes the most problems in the City of Ouray (see discussion on Debris Flow hazard). More detail on past flood problems is described in the following section.

## **Past Occurrences**

Ouray County and most notably the City of Ouray has witnessed several major floods on the Uncompahgre River and its tributaries, with the tributaries causing the most problems. Notable

floods have occurred in 1874, 1884, 1905, 1906, 1909, 1912, 1914, 1921, 1922, 1923, 1927, 1929, 1950, 1951, 1952, 1958, 1965, 1971, 1970, 1973, 1981, 1982, 1983, 1984, 1998, 1999, 2000, 2001, 2002, 2003, 2005, 2008, 2010, 2011, and 2013. Some of these years the County experienced multiple flash flood events. According to the 1985 Ouray County Flood Insurance Study and a 1978 Floodplain Information Report the more significant floods occurred in August 1909, June 1921, July 1927, July 1929, August 1951, July 1965, and July 1973. Some of the more noteworthy floods and more recent floods are profiled in the following text based on NCDC event narratives.

- **August 6, 2013**— On August 6, 2013, County Road 17 had to be closed due to mudslides and flooding. The road was impassible after being almost completely washed away. Figure 4.5 depicts the extent of damage from the event.
- **August 2, 2011**—Deep subtropical moisture in a light southwest flow aloft resulted in some thunderstorms with heavy rainfall in southwest Colorado. Flash floods deposited 1 to 2 feet of mud, rocks, and other debris onto Highway 550 on the north side of Red Mountain Pass. Highway 550 was closed until crews were able to clear the road.
- **July 27, 2010**—Heavy rainfall caused flash flooding in the area of Dexter Creek and Skyrocket Creek north of Ouray, as well as along Cascade Creek in Ouray. In some sections of Dexter Creek, the flash flood waters were nearly 20 feet deep. A section of road was washed out and the remaining buildings from the abandoned Old Maid Mine and town, built in the late 1800s, were completely obliterated with only some foundations remaining. An enormous amount of debris flowed through and collected in sections of Dexter Creek, which is the main water source for many residents in Ouray County. In particular, log jams and boulders the size of large trucks clogged a quarter-mile section of Dexter Creek, filling the creek up to 20 feet deep from the original creek bed elevation. Skyrocket Creek flowed up to a foot deep across Highway 550 as the highway culvert was filled beyond capacity. A motel on the west side of the highway experienced flooding in the parking lot and to some lower level motel rooms. Skyrocket Creek deposited about 8,000 cubic yards of debris, mostly rocks and boulders, in a catch basin just above the Uncompahgre River. About 2,000 cubic yards of debris filled up a catch basin near Highway 550 just before Cascade Creek dumps into the Uncompahgre River. The Uncompahgre River gage near Ridgway measured a stage jump of nearly 2 feet that evening due to the upstream inflow from the flooding creeks. Radar storm total rainfall estimates over the mountains near Ouray ranged from 1.5 to 1.75 inches, most of which fell within 60 minutes.
- **August 9, 2008**—A flash flood came down Corbett Creek leaving a debris fan several hundred yards long, 300 feet wide, and five feet deep. A house on Whispering Pines Drive sustained extensive damage to the foundation and exterior, with the deck having been ripped off. Another house on Chipmunk Way had debris up to a half foot deep into the basement and garage, and a deposit of debris up to 2 feet deep on the deck and against the house. A family of hikers on the Dallas Trail became stranded when their parked car was washed away. Their car was a total loss. Another car was carried away from a driveway and dropped over a short cliff. A boulder the size of a small car fell onto nearby Highway 550.

County Road 17 was washed out and another nearby private road was washed out in places. The flash flood resulted in Corbett Creek carving out a new channel. A local official said this was the worst flash flood he had seen in that area since 1991.

- **July 28, 2008**—Heavy rain on the mountains adjacent to the southeast part of the City of Ouray produced flash flooding on Oak Creek and Canyon Creek. The wall of water was six feet deep at the Box Canyon geothermal water plant where sediment got into the water line. Sediment carried by the water line was an inch deep at the Ouray Hot Springs. The Hot Springs had to be closed around 4 PM MDT and remained closed for the rest of that day to clean out the sediment. Six feet of South Pinecrest Road was washed out, and a culvert under that road was damaged. Debris up to a foot-and-a-half deep was deposited on other roads.
- **August 11, 2005**—Heavy rain producing thunderstorms caused flash flooding in the City of Ouray. Flooding from Skyrocket Creek resulted in water and mud 1 foot deep for a 1/2 mile stretch along Highway 550. Highway 550 was closed from the hot springs pool to Timber Ridge Campground in Ouray for approximately five hours. The visitor center had some water in it and lots of mud was reported in some parking lots. The City of Ouray noted that the diversion structure built following the 1929 flood was destroyed in this event. Now drainage can flow toward the City’s Hot Springs Pool.
- **August 10, 2005**—Runoff from heavy rain producing thunderstorms caused flooding around Ridgway. Highway 550 was closed for a period of time and a pedestrian bridge spanning the Uncompahgre River in Ridgway was damaged.
- **August 28, 2003**—A wall of water 2 to 3 feet deep and 200 feet wide came down the Corbett Creek drainage. The flash flood carried numerous large logs and boulders up to 4 feet in diameter. The flash flood resulted in the creek forming a new channel about a fifth of a mile away from the original creek bed which became clogged with logs and boulders. 1 to 2 feet of mud, boulders, logs, and other debris were deposited on a 200 foot stretch of County Road 17. Mud and water flowed into the basement of a residence in the Whispering Pines subdivision. The flash flood also carved out a 15 foot deep gorge along another County road. Additionally, several inches of mud and water flowed across Highway 550.
- **August 13, 2003**—Flash flood waters deposited about a foot of mud on Highway 550 over Red Mountain Pass, which closed the highway for a while.
- **July 25, 2002**—Heavy rainfall resulted in a mudslide which closed U.S. Highway 550 over the San Juan Mountains for about five hours. The mud covered both lanes up to 4 feet deep along a 100 foot stretch of road.
- **July 12, 2001**—Slow moving thunderstorms caused flooding of small creeks after nearly 2 inches of rainfall.
- **July 11, 2001**—Slow moving thunderstorms produced heavy rain resulting in 6 to 8 inches of water running across County Road 1. The road was closed temporarily due to the flooding.
- **August 30, 2000**—5 Miles East North East of Ridgway—A slow moving thunderstorm dropped very heavy rainfall to the northeast of Ridgway. The runoff from the heavy rainfall washed away a portion of County Road 10 and a rancher’s head gate.

- **August 17, 1999**—Two miles south southeast of Ouray, a flash flood deposited a large amount of rock and mud across a road at the head of Engineer Trail near U.S. Highway 550. The road closure stranded a number of tourists who were traveling in Jeeps.
- **July 31, 1999**—Heavy rainfall at the headwaters of Dallas Creek and Pleasant Valley Creek resulted in flash flooding all the way downstream to Ridgway Reservoir. In some areas the rushing water was nearly 20 feet higher than the normal stream flow. The flash flooding damaged or destroyed several County bridges, destroyed a foot bridge, damaged about two miles of County Road 24, flooded a few residences, damaged a number of outbuildings, and carried away or flooded several vehicles. The water also flooded part of a golf course. A family was rescued from the loft of a barn from which they were trapped by the rising flood waters. Miraculously, the only livestock fatalities were a chicken and an ostrich. The USGS stream gage on Dallas Creek was washed away and never found. The estimated peak flow of water in Dallas Creek was 2300 cubic feet per second (cfs), which is more than double the previous record flow of 1120 cfs previously set in August of 1923. Rainfall measurements in the area ranged from 1.84 inches in Ridgway to 3.77 inches in Pleasant Valley, most of which came within a two hour period. \$1.3 Million in property damage. (a separate account of this event by the National Weather Service in Grand Junction noted that the rainfall exceeded a 100-year event and that 5 bridges were damaged, one isolating Log Hill Mesa residents. Total public damage was over \$750,000, half of the County’s highway budget and nearly a quarter of the entire County annual budget. Private property damage included \$100,000 to bridges and structures and \$20,000 to livestock and hay.)
- **July 28, 1999**—Two miles south southeast of Ouray, flash flooding across US Highway 550 deposited a large amount of rocks and other debris on the road. A section of the road shoulder was washed down the cliffs to the river 400 feet below the road. A crib wall along the cliff which is used to reinforce the road was partially washed out. \$50k property damage.
- **July 26, 1998**—One mile southwest of Ouray, heavy rainfall caused a wall of water filled with boulders, logs, and sediment to race down Weehawken Creek, then into Canyon Creek, and finally into Box Canyon. A parked car near the Weehawken trailhead was half buried in mud and a 20-foot section of catwalk near Box Canyon Falls was destroyed. The flash flood also cut out a new channel near Box Canyon Falls.
- **July 21, 1998**—Six miles southwest of Ouray, a flash flood washed a large quantity of debris and rocks onto Camp Bird Road at six places and stranded eight vehicles loaded with tourists.
- **Spring 1984**—Western Colorado received a Presidential Disaster Declaration in 1984 after one of the most severe and extensive snowmelts in the history of Colorado that spring. Widespread flood and landslide damage on the Western Slope impacted populated areas causing damage to roads and bridges, public facilities, and agricultural lands. Damage totaled over \$29 million dollars. Ouray County was one of 15 counties included in the disaster declaration. The County incurred \$59,024 in Public Assistance eligible damage, and the City of Ouray \$31,280. According to the *1984 Western Slope Disaster after Action Report* from the Colorado Division of Disaster and Emergency Services (Now Colorado DEM) the County and City of Ouray were able to avert damage to public and private property using

emergency protective measures. County road crews constructed a 1,000 foot levee to protect Highway 23 from floodwaters of the Uncompahgre River. Along Highway 23 near Coal creek a levee was constructed to protect the embankment and roadway from erosion. Heavy flood flows over the shoulder of Engineer Pass Road closed the road for an extended period of time. The City of Ouray prepared for the flood by increasing the capacity of Cascade Creek and the Uncompahgre River. Channel material was removed and deposited on the banks to provide protection to streambanks and property nearby. The City's efforts cost more than \$35,000 but saved thousands more in damage to public and private property.

- **Summers of 1981 and 1982**—Extensive flooding and debris flows impacted the City of Ouray from the Cascade Creek and Portland flume. Minor property damage occurred to homes and businesses and some bridges needed to be replaced. Main Street was closed. The event occurred during the busy summer tourist season and took days to clean up and reopen some businesses (Source: City of Ouray).
- **July 1973**—This flash flood resulted after nearly an inch of rain fell in half an hour. Heavy runoff in Cascade Creek ultimately clogged the flume near the Uncompahgre River, backing up debris 300 feet to the Main Street overpass. Vacant lots received the worst of the flooding and debris.
- **July 1965**—A cloudburst high up Portland and Cascade Creeks washed down tons of rocks, trees, and mud from the mountainsides east of Ouray. Both creeks became plugged with debris in town, spreading water through the City and flooding several homes. The next day another storm caused more flooding on Portland Creek, affecting homes that had previously escaped damage. Damage from the storms was considerable, and Ouray received \$20,292 for the repair of the flumes and disaster relief from the Federal Office of Emergency Preparedness.
- **July 1929**—The most devastating flood hit Ouray as a result of three consecutive days of heavy rainfall. 50 to 60 houses in Ouray were impacted by water and debris, and the Ouray Power Company was under about three feet of water. Several bridges were washed away and roads closed. A significant flood and debris flow descended Skyrocket creek in the City of Ouray and filled the hot springs pool with mud and debris (Source: City of Ouray). The event closed the pool, which is a significant revenue generator for the City, during the busy tourist season. Damage was estimated at \$150,000 in 1929 dollars.
- **July 1927**—This flood washed out the highway and railway between Ouray and Ridgway, and submerged the power company station a foot or more. Simultaneous flooding occurred on Canyon, Skyrocket, Cascade, Corbett, and Dexter Creeks. Damage was estimated to be \$25,000 to \$40,000 in 1927 dollars.
- **August 1909**—This flood on Portland and Cascade creeks impacted the City of Ouray heavily. The portion of the City adjacent to Portland Creek channel that extends east and west through town between Fourth and Fifth streets was damaged the worst. Damage was estimated at \$50,000 in 1909 dollars.

The National Climatic Data Center Storm Events Database includes 17 significant flood events between 1993 and March 2013. Most of these events were accompanied with debris flows and rockslides. These incidents are noted in Table 4.9.

**Table 4.9 National Climatic Data Center Storm Event Database Ouray Flood Records, 1993-March 2013**

Location or County	Date	Time	Type	# of Deaths	# of Injuries	Damage in 2012 (\$)
Ouray	8/2/2011		Flash flood	0	0	0
Ouray	7/27/2010		Flash flood	0	0	102,069
Ouray	8/9/2008		Flash flood	0	0	85,310
Ouray	7/28/2008		Flash flood	0	0	4,000
Ouray	8/11/2005	8:00 PM	Flash flood	0	0	18,198
Ouray	8/10/2005	5:35 PM	Flash flood	0	0	18,198
Ouray	8/28/2003	2:00 PM	Flash flood	0	0	20,500
Ouray	8/13/2003	8:00 PM	Flash flood	0	0	0
Ouray	7/25/2002	1:00 PM	Flash flood	0	0	0
Ridgway	7/12/2001	4:00 PM	Urban/small stream flood	0	0	0
Ridgway	7/11/2001	3:20 PM	Urban/small stream flood	0	0	0
Ridgway	8/30/2000	5:00 PM	Flash flood	0	0	7,806
Ouray	8/17/1999	3:00 PM	Flash flood	0	0	1,669
Ridgway	7/31/1999	2:00 PM	Flash flood	0	0	2,168,947
Ouray	7/28/1999	1:30 PM	Flash flood	0	0	83,421
Ouray	7/26/1998	4:00 PM	Flash flood	0	0	34,822
Ouray	7/21/1998	3:00 PM	Flash flood	0	0	1,741
<b>Totals</b>				<b>0</b>	<b>0</b>	<b>\$2,546,681</b>

Source: National Climatic Data Center Storm Events Database, [www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms](http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms)

The following damage is documented in the 1978 Floodplain Information Report for Ouray County. The damage is converted to 2012 dollars. These damage estimates are not all inclusive, so they should be considered as a low estimate.

**Table 4.10 Ouray County Flood Losses Prior to 1978**

Flood Event Date	Description	Damage in 2012 (\$)
7/25/1974	Mudslides blocked roads	23,242
7/12/1973	Cloudburst hit Ouray	86,979
9/2/1971	Cloudburst on Whitehorse Mountain	14,167
9/5/1970	Cloudburst hit Ouray	53,391
7/18/1969	Debris over highway	6,259
7/10/1965	Cloudburst flooded Ouray	148,158
9/1958	Bridges washed out near Camp Bird	23,895
1957	Heavy spring runoff	0
8/1/1951	Cloudburst hit Ouray	17,659
5/1950	Snowmelt caused flooding in Ouray	47,459
6/22/1938	Numerous railroad washouts	0
9/9/1933	Railroad blocked by debris	0
8/8/1931	Railroad tracks flooded	0

Flood Event Date	Description	Damage in 2012 (\$)
8/10/1930	Railroad tracks flooded	0
7/18/1930	Railroad tracks flooded	0
7/14/1930	2 railroad bridges washed out	27,445
7/27/1929	Heavy flooding in Ouray	2,010,000
7/27/1927	Heavy flooding in Ouray	529,767
7/1/1927	6.2' M&D headgate	0
7/21/1923	28 railroad washouts below Ouray	67,001
7/29/1922	Cloudburst on Corbett Creek	0
6/16/1921	Flood in Ouray	25,596
1914	Heavy spring runoff	0
10/1912	Railroad washed out	22,780
5/23/1912	High water due to snowmelt	0
8/21/1909	Cloudburst flooded Ouray	1,211,702
7/27/1906	2 miners drowned	0
6/26/1906	Ouray Skyd washed out	0
5/28/1906	Bridge washed out, engineer killed	24,235
6/8/1905	2 Bridges washed out	49,521
1884	Widespread flooding due to snowmelt	
1874	Flood on Corbett Creek	
<b>Total</b>		<b>4,366,013</b>

Source: Floodplain Information Report for Ouray County, 1978

Adding the total damage from the two data tables (NCDC and *Floodplain Information Report for Ouray County*) shows that at a minimum floods have caused \$5,568,399 in damage in the County (adjusted to 2006 dollars). Dividing this value by the 101 year time period (1905-2005) results in an average annual loss of \$55,133 from flooding per year. It is noted that some of the damage reflected in this total is from debris flows, particularly where the City of Ouray was involved.

Flooding in the business section of Ridgway is not uncommon due to the absence of storm drains. Much of the Town was built on a relatively flat area, making natural drainage insufficient. This area can become very wet or flooded following heavy rainstorms. In the past, cattle were only brought into the barns after the water-logged ground froze or hardened. Heavy rains have also flooded Highway 550 near the cemetery south of Ridgway. These floods are often accompanied by mud and debris that can potentially close Highway 550.

The HMPC noted that flash flood events on Canyon Creek or Weehawken Creek have repeatedly damaged the Weehawken Spring transmission line that delivers water to the City of Ouray's water storage tanks and water treatment facility. This line has also been damaged by landslide events (see Section 4.2.9 for further details).

Despite the frequency and ferocity of the flood events, loss of life from flooding in Ouray County has been rare. Four incidents have been documented, three in 1906 and one in 1927. The 1906 incident involved a train engineer who died when his locomotive went over a chasm where the bridge was washed out. The other two were miners seeking shelter in a small tunnel that

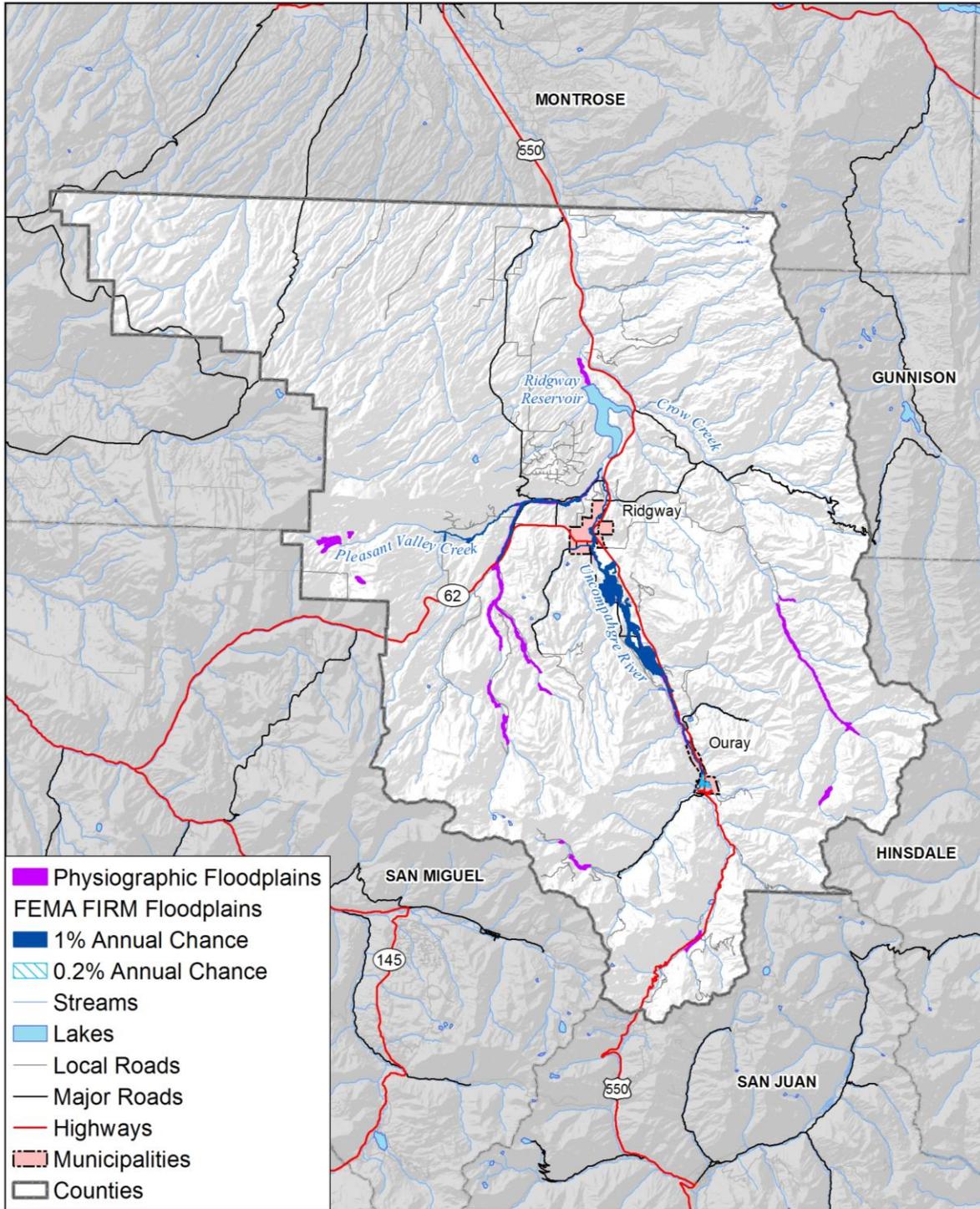
became filled with debris. The 1927 incident involved a rancher who was found in a field near his cabin following flooding on the Uncompahgre River.

### **Geographical Area Affected**

The Uncompahgre River corridor and its tributaries are the main sources of flood problems, but Pleasant Valley Creek and other drainages in the County are prone to damaging floods as well. Several figures follow that show maps of known flood hazard areas and critical facilities for the County, City of Ouray, and the Town of Ridgway (Figure 4.19 through Figure 4.23).

It is important to note the various sources of flood hazard data shown in this plan. Flood hazards were first mapped in 1978 by A&S consultants in the report titled “Floodplain Information Report, Uncompahgre River-Ouray to Dallas Creek-Ouray County, Colorado.” This formed the basis of the flood hazard that went into the development of the Flood Insurance Rate Map (FIRM) that became effective in 1985. This map was digitized into GIS by the Southwest Data Center and is represented on the maps created for this plan, though it is not an official Digital Flood Insurance Rate Map. The FIRM for the City of Ouray has changed considerably since the 1985 FIRM was published, and is reflected in two Letters of Map Revision (LOMR) dated December 9, 2005 and November 9, 1998. The original FIRM shows most of the City in an approximate A zone, or 100-year floodplain, and was also developed to represent an envelope of flood and debris flow hazard. The LOMR of 2005 removes much of the A zone from the City, confining it to the flumes for Portland and Cascade Creeks. The shaded area remaining is largely B zone, which is considered to be between the 100 and 500 year floodplain or where the average depth of flooding is less than 1 foot. This was based on improved topographic data, hydraulic and hydrology studies, and improvements to the flumes. This LOMR was digitized as part of the 2013 update to improve the flood vulnerability analysis discussed in Section 4.3.

**Figure 4.19. Ouray County Flood Hazards**



**amec**

0 5 10 Miles

N

Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, FEMA FIRM: Ridgway 9/27/1985  
 & Ouray City and County 7/3/1985 w/LOMRs, NHD



Figure 4.21. City of Ouray Flood Hazards Based on 1998 Letter of Map Revision

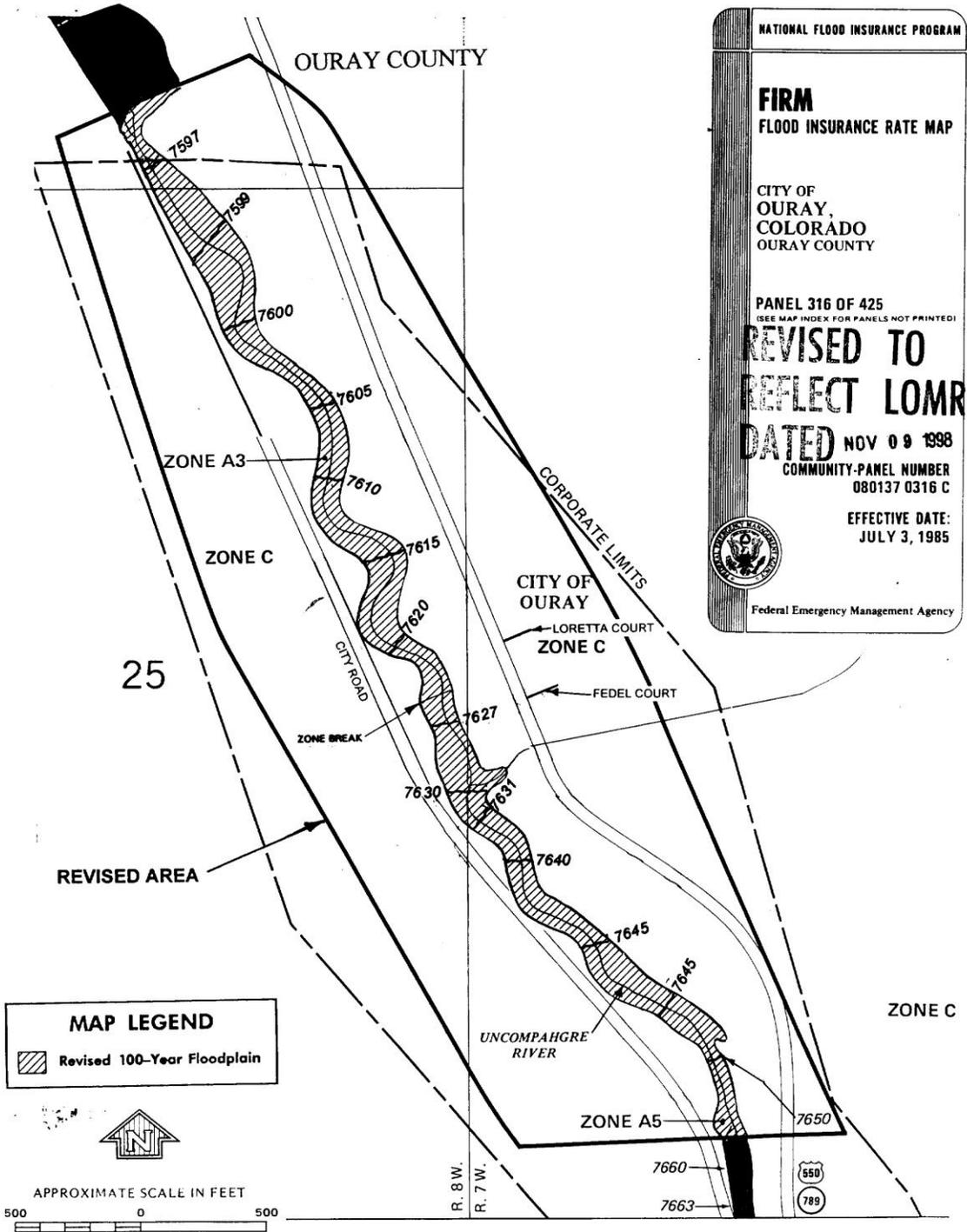
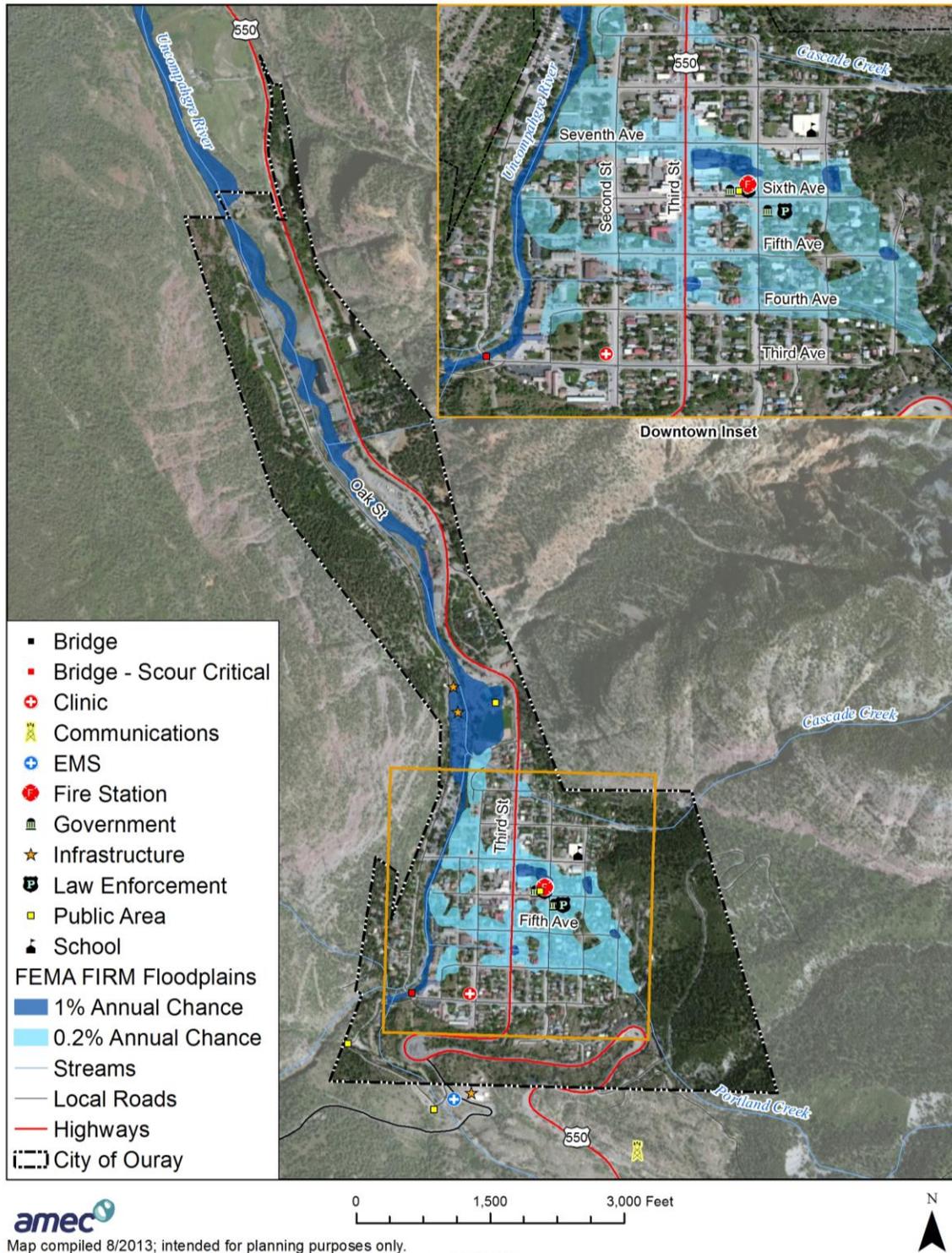


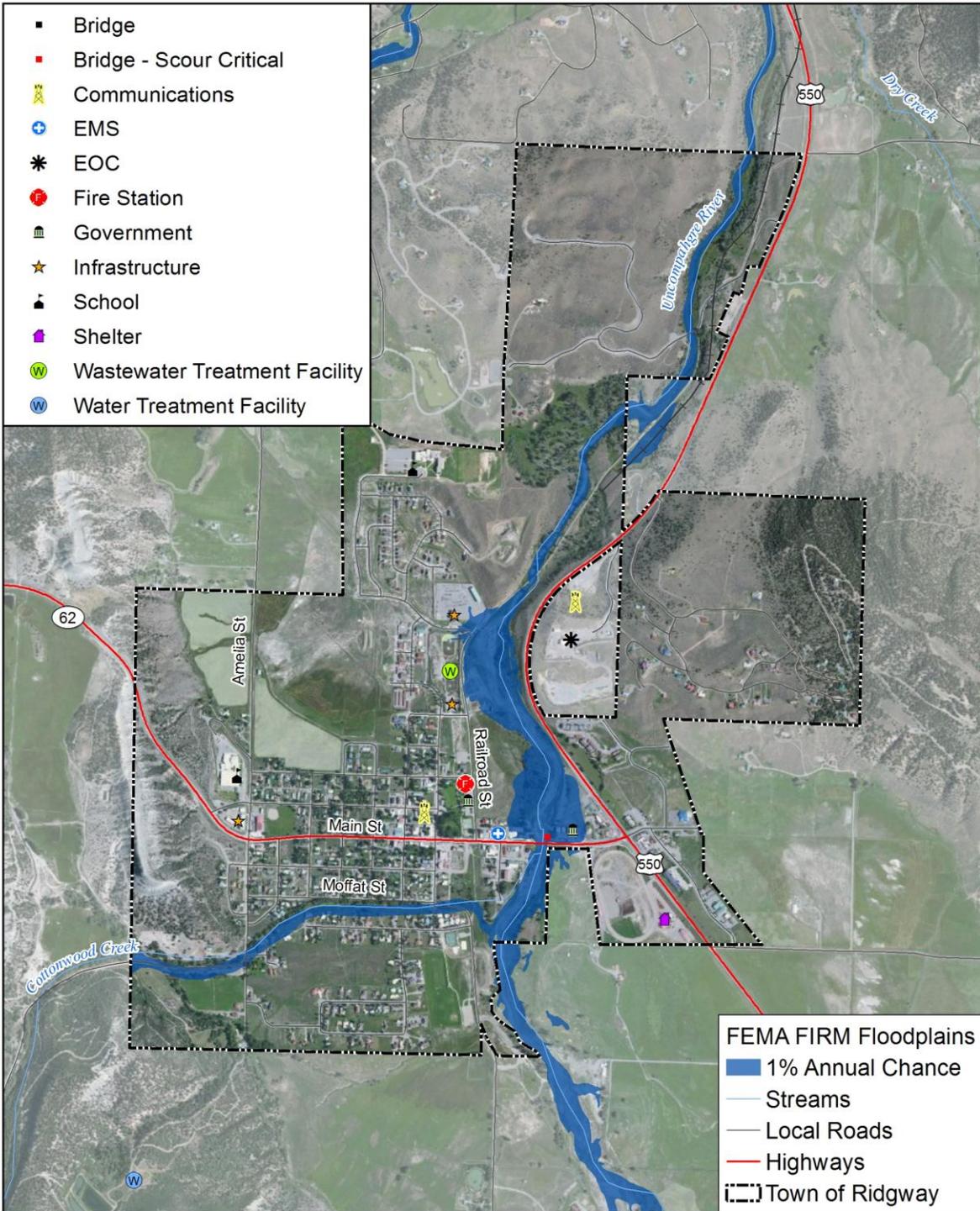
Figure 4.22. City of Ouray Flood Hazards and Critical Facilities



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, NHD, FEMA FIRM: Ridgway 9/27/1985  
 & Ouray City and County 7/3/1985 w/LOMRs, ESRI World Imagery

Note: Skyrocket and Bridalveil Creeks are known flood hazard areas that are not mapped.

**Figure 4.23. Town of Ridgway Flood Hazards and Critical Facilities**



0 1,500 3,000 Feet



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, FEMA FIRM: Ridgway 9/27/1985  
 & Ouray City and County 7/3/1985, ESRI World Imagery, NHD

## Potential Magnitude

Floods have the potential to damage the City of Ouray (significant areas), Town of Ridgway (minor areas), and the unincorporated areas along the Uncompahgre River and its tributaries. While the City of Ouray has mitigated much of the impact of the 1% annual chance flood, the less likely 0.2% annual chance event could still cause significant impacts. Many tourist facilities are located along this river and could be at risk during a flood event. These cause damaging mud and debris flows. Damage to the Weehawken Spring water transmission line can also have serious impacts to the City of Ouray given the City's limited supply of water in storage. Over the years the County has made bridge and drainage improvements in areas prone to flash flooding and debris flow. Cutler Creek could be a source of potential problems with new housing developed in vicinity of its debris fan. Ridgway frequently has drainage problems from thunderstorm runoff depositing shale and plugging culverts.

Overall, flooding impacts would likely be critical in Ouray County, with 25-50 percent of the planning area affected. For the City of Ouray, the magnitude is potentially catastrophic, since more than 50 percent of the City is in the floodplains of Cascade and Portland Creeks, and development has occurred on the flood-prone debris fans of Skyrocket and Bridalveil Creeks. Ridgway has little flood potential from the Uncompahgre River, but has minor stormwater drainage problems. Roads closed due to floods can result in serious transportation disruptions due to the limited number of roads in the County. Mud and debris flows often accompany floods.

NCDC data between 1993 and March 2013 was used to calculate an average annualized loss estimate for flooding in Ouray County. Flood events in that time period caused \$2,546,681 in damages. The County could expect roughly \$127,334 in flood damages in any given year.

## Frequency/Likelihood of Occurrence

**Likely**—Between 10 and 100 percent chance of occurrence in next year, or has a recurrence interval of 10 years or less. Based on 35 flood years in the past 139 years (1874-2013), a flood occurs somewhere in the County about every four years, on average.

### 4.2.9 Landslide/Rockfall

#### *Landslide*

A landslide is a general term for a variety of mass-movement processes that generate a downslope movement of soil, rock, and vegetation under gravitational influence. Some of the natural causes of ground instability are stream and lakeshore erosion, heavy rainfall, and poor quality natural materials. In addition, many human activities tend to make the earth materials less stable and, thus, increase the chance of ground failure. Human activities contribute to soil instability through grading of steep slopes or overloading them with artificial fill, by extensive irrigation, construction of impermeable surfaces, excessive groundwater withdrawal, and removal of stabilizing vegetation. Landslides typically have a slower onset and can be predicted

to some extent by monitoring soil moisture levels and ground cracking or slumping in areas of previous landslide activity.

### **Rockfall**

A rockfall is the falling of a detached mass of rock from a cliff or down a very steep slope. Weathering and decomposition of geological materials produce conditions favorable to rockfalls. Rockfalls are caused by the loss of support from underneath through erosion or triggered by ice wedging, root growth, or ground shaking. Changes to an area or slope such as cutting and filling activities can also increase the risk of a rockfall. Rocks in a rockfall can be of any dimension, from the size of baseballs to houses. Rockfall occurs most frequently in mountains or other steep areas during the early spring when there is abundant moisture and repeated freezing and thawing. Rockfalls are a serious geological hazard that can threaten human life, impact transportation corridors and communication systems, and result in other property damage.

Spring is typically the landslide/rockfall season in Colorado as snow melts and saturates soils and temperatures enter into freeze/thaw cycles. Falling ice is sometimes a hazard on Highway 550 just north or south of Ouray. Rockfall and landslides are influenced by seasonal patterns, precipitation and temperature patterns. Earthquakes could trigger rockfalls and landslides too.

### **Past Occurrences**

According to the 1984 *Western Slope Disaster after Action Report* from the Colorado Division of Disaster and Emergency Services (Now Colorado OEM), landslides and debris covered County Road 17 in numerous places during the spring runoff that year, creating access problems for residents. A motorist was killed by a rockfall on Camp Bird Road in 2005. That same year a semi truck was hit by a boulder near the East Riverside Slide. The HMPC noted two other deaths from rockfall in the Camp Bird Rd area, one in 2008 and another in 2012. One of these may have involved a climber. According to the HMPC a person was injured by rockfall at the base of the coxcomb in Ridgway in 2012.

Other rockfall incidents include a rock breaking the rear window of a State Patrol car parked near mile marker 90 during a rescue of a vehicle that went off the road at that location. Rockfall incidents on Highway 550 have dropped rocks large enough to force vehicles into the opposing traffic lane in order to proceed.

Slippage events on Forest Service property and along County Road 361 have damaged the Weehawken Spring water transmission line. This transmission line delivers water to the City of Ouray's water storage tanks and water treatment facility. The City has a limited supply of water in storage, so damage to the Weehawken Spring transmission line can quickly become serious.

A massive rockslide that began on January 12, 2014 closed Highway 550 at Red Mountain Pass. Rocks continued to fall for several days after the slide first began. Rocks were piled up eight feet deep in one spot on Highway 550, and a power line was severed. The event was believed to

be caused by a freeze-thaw pattern, rare for that time of year. The pass was closed for roughly one month while CDOT crews worked to repair the damages and mitigate future rockslides in that area. Local businesses in Ouray County claimed economic losses of up to 60% while the pass was closed and traffic was forced to take a 201-mile detour.<sup>4</sup> Colorado Governor John Hickenlooper signed an executive order on March 3, 2014 declaring the event an emergency disaster.<sup>5</sup> Repairs, which were still underway as of April 2014, cost over \$1 million. Mitigation measures included rock scaling and rockfall panels that had to be placed by helicopters. In May 2014 the Mayor of the City of Ouray declared an “Economic Emergency” for the City due to the extreme economic hardships caused by Red Mountain Pass rockfall closure.

NCDC and SHELDUS recorded 17 landslide events in Ouray County since 1960. These events are summarized in Table 4.11. Duplicate events were deleted.

**Table 4.11 Ouray County Landslide Events**

Date	Injuries	Fatalities	Property Damage (2012 \$)	Crop Damage (2012 \$)
2/6/2003	0	0	0	0
8/15/2003	0	0	0	0
8/7/2005	0	0	0	0
8/11/2005	0	0	0	0
11/18/2005	0	0	0	0
7/2/2006	0	0	0	0
7/21/2006	0	0	0	0
7/30/2006	0	1	11,389	0
7/31/2006	0	0	0	0
7/31/2006	0	0	0	0
8/1/2006	0	1	0	0
8/24/2006	0	0	0	0
8/5/2007	0	0	0	0
7/24/2008	0	0	0	0
7/26/2008	0	0	0	0
8/16/2010	0	0	0	0
8/16/2010	0	0	0	0
<b>TOTAL</b>	<b>0</b>	<b>2</b>	<b>11,389</b>	<b>0</b>

Source: NCDC, SHELDUS

### Geographic Area Affected

The CGS report “Debris-Flow Hazard in the Immediate Vicinity of Ouray, Colorado” contains a hardcopy map showing known landslide deposits near the City of Ouray. The deposits are limited and none of them affect developed areas or roads. A landslide has caused occasional problems to Highway 550 near Colona. One other landslide problem area includes the 11000

<sup>4</sup> Personal communication with Ouray County Emergency Manager Glenn Boyd.

<sup>5</sup> “Gov. Hickenlooper declares disaster emergency for rockslide near Ouray.” March 3, 2014. <http://www.colorado.gov/cs/Satellite/GovHickenlooper/CBON/1251651268631>. Accessed May 1, 2014.

block of County Road 1 as it climbs the escarpment. The road is showing possible damage due to sliding of the foundation.

Rockfall hazard areas in Ouray County usually are marked by the presence of fist to boulder-sized rocks that accumulate below cliff areas, steep slopes, or talus fields on mountainsides. Steep slopes in the southern half of the County are prone to this hazard, particularly around the City of Ouray, the Camp Bird Road area, and along Highway 550. Red Mountain Pass on Highway 550 was the site of a major landslide that closed the highway for roughly a month in between January and February 2014. CDOT has plans to shore up failing crib walls to mitigate rockfalls near mile post 89 on Highway 550 (Mother Cline area).

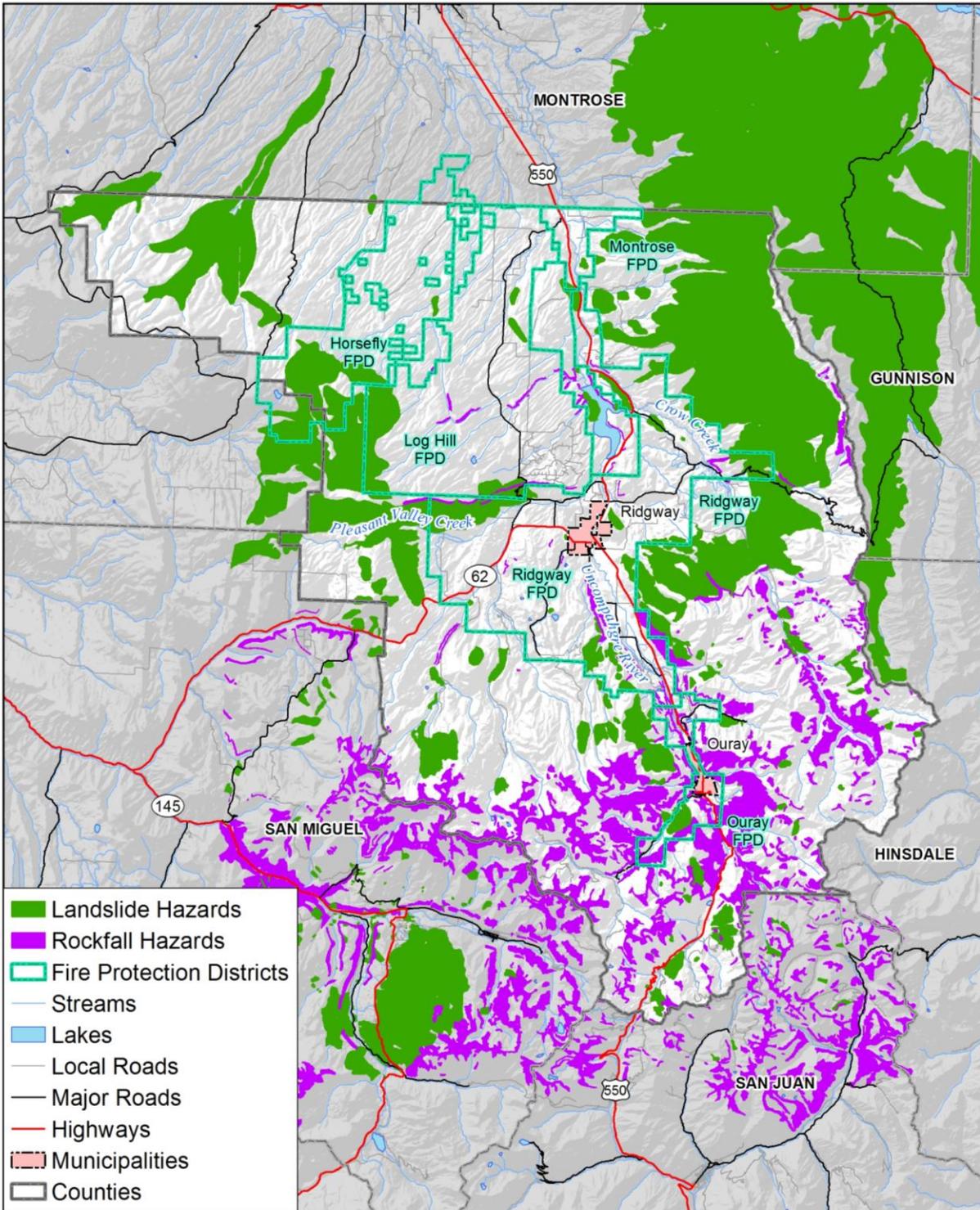
CDOT identified 756 sites throughout Colorado that have ongoing issues with rockfall. There are 14 such sites in Ouray County. CDOT identifies these areas using the Colorado Rockfall Hazard Rating System (CRHRS) which combines traffic data, geology information, and slope measurements to determine a hazard ranking score. Table 4.12 below details the 14 rockfall hazards in the County by mile marker. Motorists should be particularly careful and aware of the rockfall hazards along that stretch of highway. Figure 4.24 and Figure 4.26 depict landslide and rockfall hazard in the County and areas near the City of Ouray and the Town of Ridgway based on GIS layers developed by CGS and provided by County GIS.

**Table 4.12 Rockfall Hazard Areas in Ouray County**

Route	Segment ID	Beginning Mile Marker	Ending Mile Marker
550	US550-SB80.9A	80.901	80.963
550	US550-NB88.0A	88.058	88.116
550	US550-NB88.1B	88.131	88.239
550	US550-NB88.2C	88.250	88.424
550	US550-NB88.4D	88.424	88.588
550	US550-NB88.6E	88.641	88.749
550	US550-NB88.8F	88.816	88.881
550	US550-NB88.9G	88.890	89.257
550	US550-NB89.3A	89.350	89.415
550	US550-NB89.9B	89.907	90.264
550	US550-NB90.3A	90.290	90.341
550	US550-NB90.6B	90.600	90.630
550	US550-NB90.6C	90.653	90.692
550	US550-NB106.3A	106.250	106.381

Source: Colorado Department of Transportation

Figure 4.24. Landslide and Rockfall Hazards in Ouray County

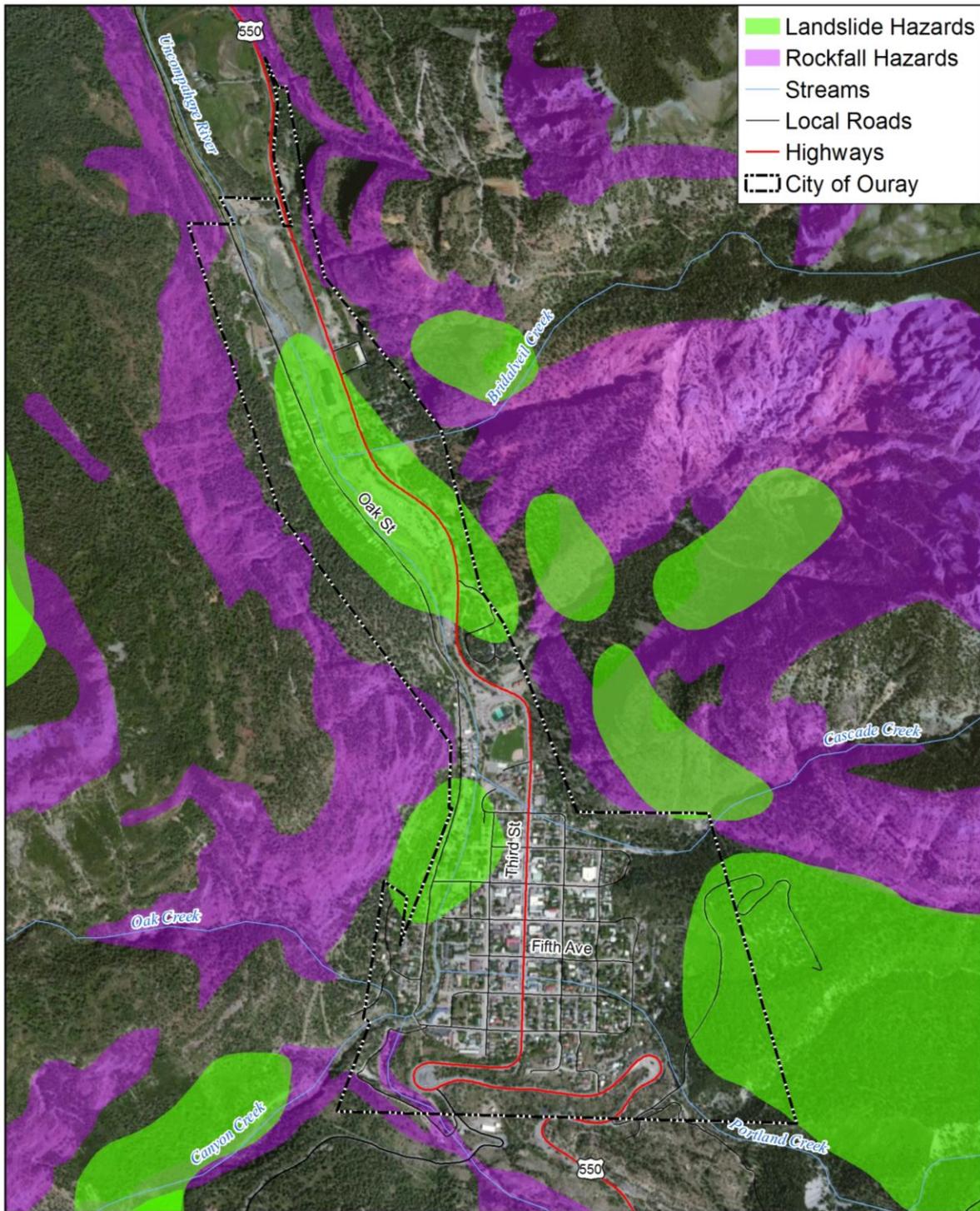


Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, NHD, CGS

0 5 10 Miles



Figure 4.25. Landslide and Rockfall Hazards near the City of Ouray

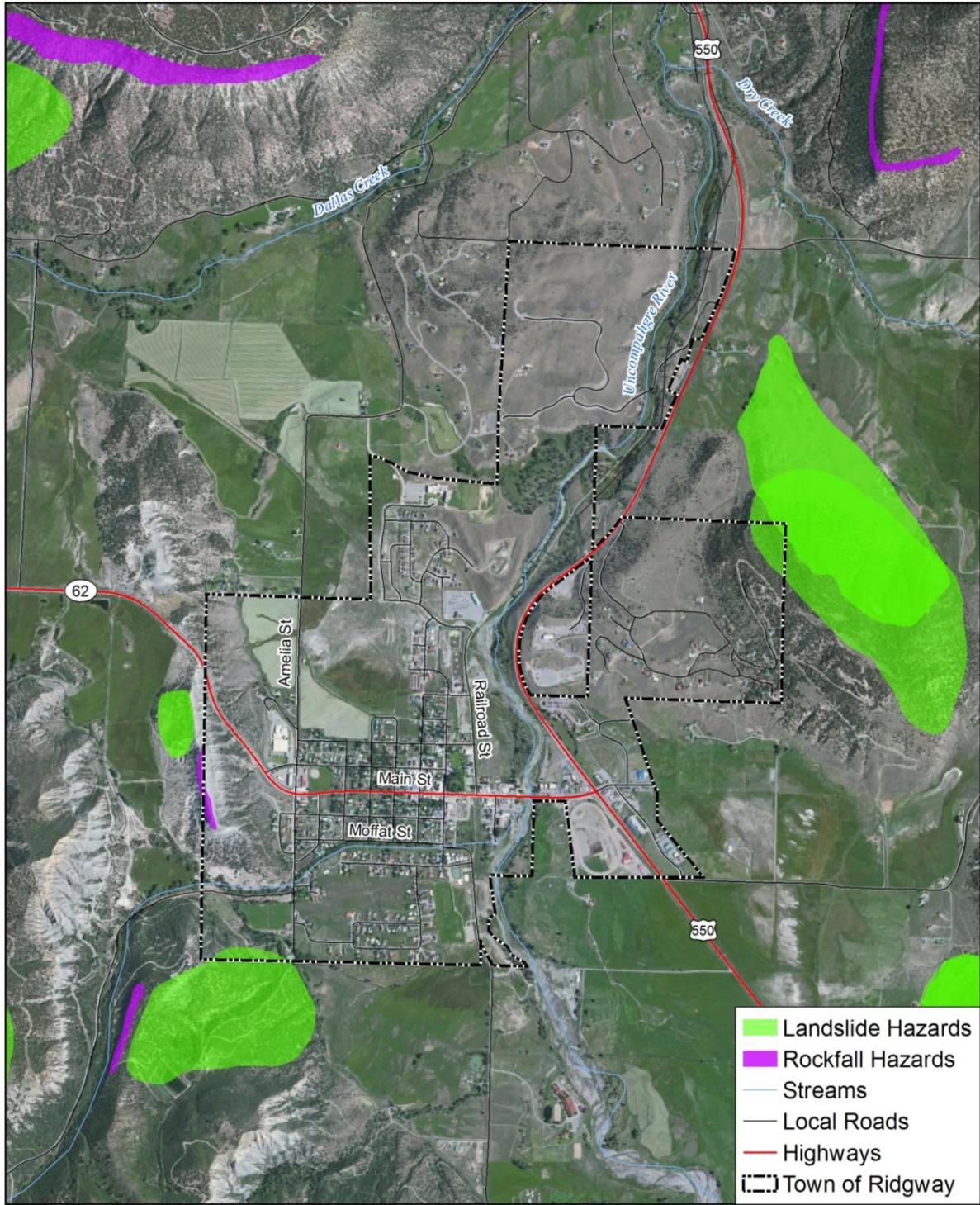


0 1,500 3,000 Feet



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, NHD, ESRI World Imagery, CGS

Figure 4.26. Landslide and Rockfall Hazards near the Town of Ridgway



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, NHD, ESRI World Imagery,  
 CGS

## Potential Magnitude

Overall, landslide/rockslide impacts would likely be limited in Ouray County, with 10-25 percent of the planning area affected. The impacts are typically isolated, and many of the issues can be mitigated with proper awareness and engineering design. Landslides could create flood hazards by blocking up rivers or by contributing to dam failures. Landslides and rockfall hazards threaten several transportation corridors in the County. Rockfall can cause severe injuries and fatalities. If a landslide event were to cut off a major roadway, people could become stranded, deliveries of supplies could be delayed, emergency response could be hindered, etc. Landslides within and outside of the County also pose a threat to power lines and infrastructure. A landslide could impact power line infrastructure and thus contribute to extended power outages.

Based on available data, the event of record occurred on January 12, 2014. Repairs for this event were still ongoing as of April 2014, and the cost at the time was estimated at over \$1 million, not including the significant economic impact caused by the detoured traffic. Data from SHELDCUS, NCDC, and the County indicates that Ouray County's average annual loss from landslide and rockfall events is roughly \$15,803. This does not include indirect economic impacts caused by road closures and forced detours. The County should not necessarily rely on this estimate to plan for annual expenses though, as a single landslide event can be extraordinarily expensive, and the SHELDCUS and NCDC data is mostly devoid of specific loss details.

## Frequency/Likelihood of Occurrence

**Likely**—Between 10 and 100 percent chance of occurrence in next year, or has a recurrence interval of 10 years or less.

### 4.2.10 Lightning

#### Hazard/Problem Description

Lightning is an electrical discharge between positive and negative regions of a thunderstorm. A lightning flash is composed of a series of strokes with an average of about four. The length and duration of each lightning stroke vary, but typically average about 30 microseconds.

Lightning is one of the more dangerous weather hazards in the United States and in Colorado. Each year, lightning is responsible for deaths, injuries, and millions of dollars in property damage, including damage to buildings, communications systems, power lines, and electrical systems. Lightning also causes forest and brush fires and deaths and injuries to livestock and other animals. According to the National Lightning Safety Institute, lightning causes more than 26,000 fires in the United States each year. The institute estimates property damage, increased operating costs, production delays, and lost revenue from lightning and secondary effects to be in excess of \$6 billion per year. Impacts can be direct or indirect. People or objects can be directly struck, or damage can occur indirectly when the current passes through or near it.

Intracloud lightning is the most common type of discharge. This occurs between oppositely charged centers within the same cloud. Usually it takes place inside the cloud and looks from the outside of the cloud like a diffuse brightening that flickers. However, the flash may exit the boundary of the cloud, and a bright channel can be visible for many miles.

Although not as common, cloud-to-ground lightning is the most damaging and dangerous form of lightning. Most flashes originate near the lower-negative charge center and deliver negative charge to earth. However, a large minority of flashes carry positive charge to earth. These positive flashes often occur during the dissipating stage of a thunderstorm's life. Positive flashes are also more common as a percentage of total ground strikes during the winter months. This type of lightning is particularly dangerous for several reasons. It frequently strikes away from the rain core, either ahead or behind the thunderstorm. It can strike as far as 5 or 10 miles from the storm in areas that most people do not consider to be a threat. Positive lightning also has a longer duration, so fires are more easily ignited. And, when positive lightning strikes, it usually carries a high peak electrical current, potentially resulting in greater damage.

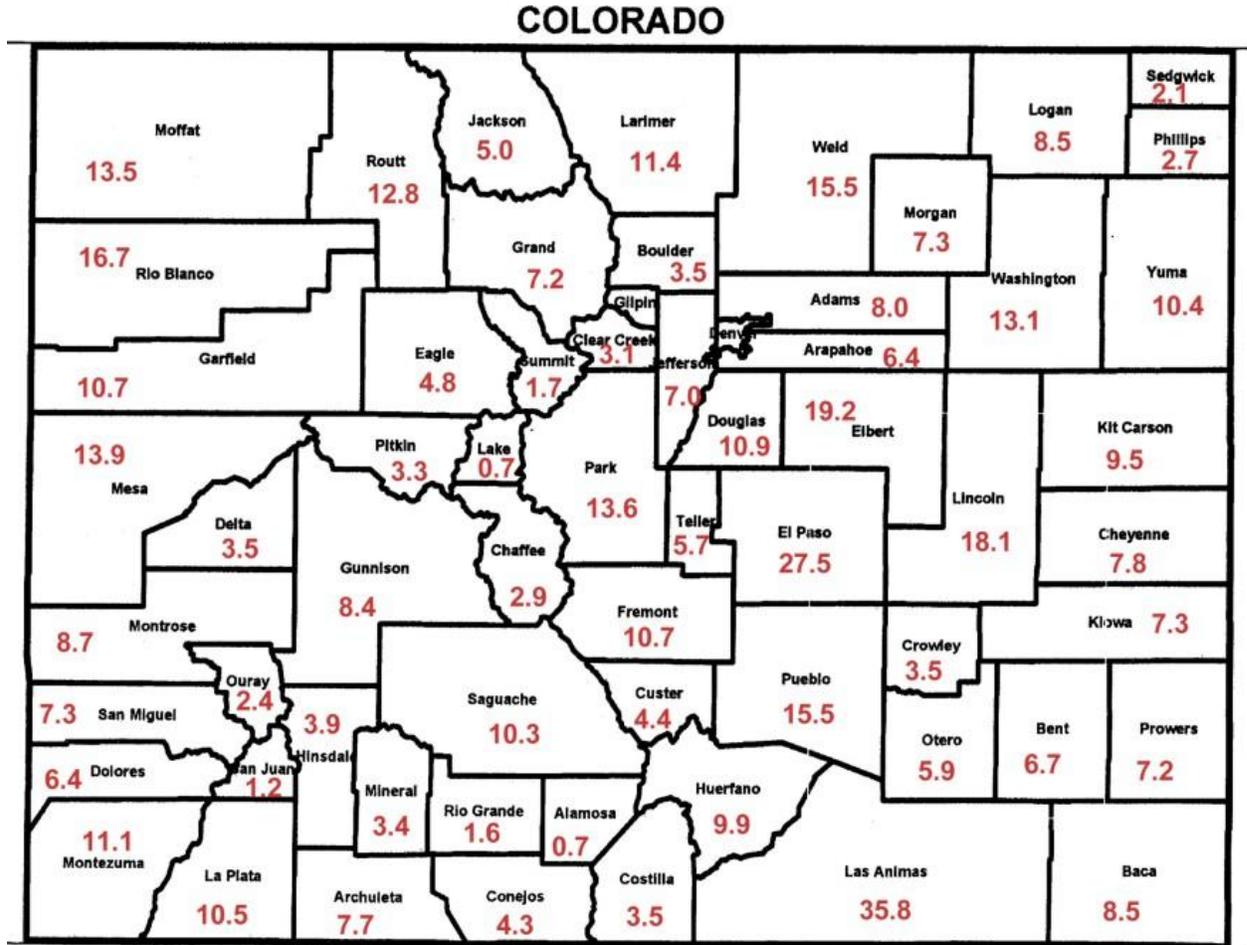
The ratio of cloud-to-ground and intracloud lightning can vary significantly from storm to storm. Depending upon cloud height above ground and changes in electric field strength between cloud and earth, the discharge stays within the cloud or makes direct contact with the earth. If the field strength is highest in the lower regions of the cloud, a downward flash may occur from cloud to earth. Using a network of lightning detection systems, the United States monitors an average of 25 million strokes of lightning from the cloud-to-ground every year.

U.S. lightning statistics compiled by the National Oceanic and Atmospheric Administration between 1959 and 1994 indicate that most lightning incidents occur during the summer months of June, July, and August and during the afternoon hours from between 2 and 6 p.m.

## **Past Occurrences**

Data from the National Lightning Detection Network ranks Colorado 31st in the nation (excluding Alaska and Hawaii) with respect to the number of cloud-to-ground lightning flashes with an average number of 517,217 flashes per year (based on data collected between 1996 and 2005). Figure 4.27 shows the estimated number of cloud-to-ground lightning flashes (in thousands) by Colorado county per year. Ouray County has an average of 2,400 flashes per year.

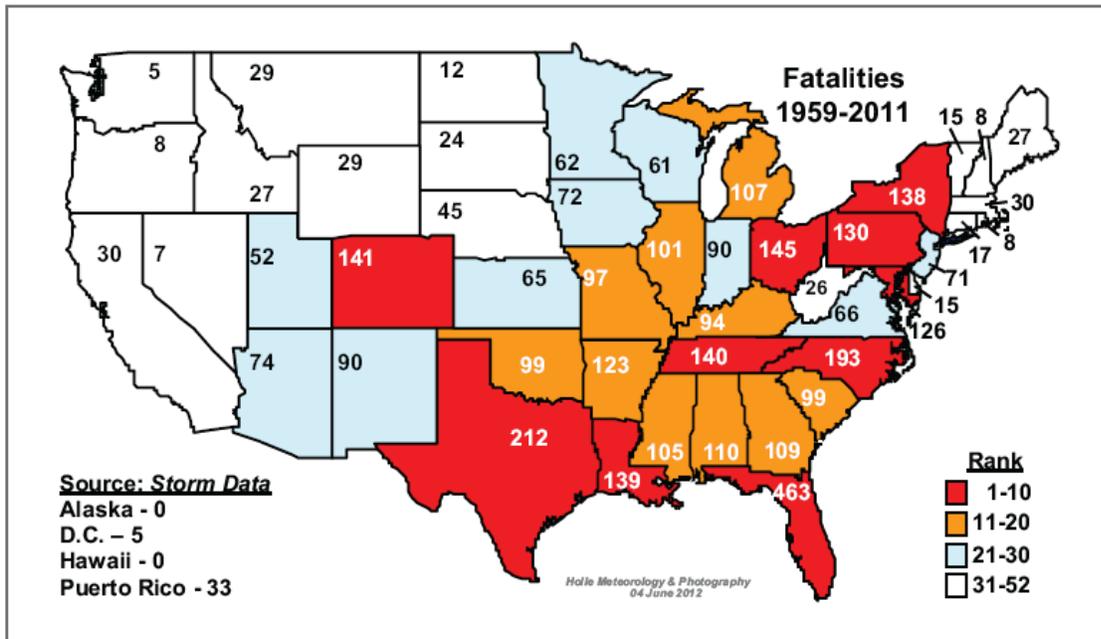
Figure 4.27. Cloud-to-Ground Lightning Flashes in Colorado per Year (in thousands), 1996-2004



Source: National Weather Service, [www.crh.noaa.gov/pub/?n=/ltg/cg\\_county\\_co.php](http://www.crh.noaa.gov/pub/?n=/ltg/cg_county_co.php)

Figure 4.28 shows state-by-state lightning deaths between 1959 and 2011. Colorado ranks fourth for the number of deaths at 141. Florida (463), Texas (212), and Virginia (193) were ranked higher. From 2002 to 2011, Colorado ranked second in lightning fatalities with 24 deaths. Florida again ranked first with 56 deaths. Fifteen lightning deaths occurred in Colorado between 2006 and 2012. None of these were in Ouray County. In an average year in Colorado, 3 people are killed and 13 are injured.

**Figure 4.28. Lightning Fatalities in the United States, 1959-2011**



Source: National Weather Service, [www.lightningsafety.noaa.gov/](http://www.lightningsafety.noaa.gov/)

While lightning is a regular occurrence in Ouray County, damaging lightning is not. According to the National Climatic Data Center Storm Event Database, there were two notable lightning events in Ouray County between 1993 and March 2013:

- **August 17, 1999**—Lightning struck a power substation. Insulators were destroyed and fuses were blown on a transformer, which resulted in a power outage to the entire community for about one hour. Damage was estimated at \$1,367 (2012 dollars).
- **June 13, 1996**—A man was struck and killed by lightning while hiking near the summit of Mt. Sneffles. Shortly before the lightning strike he was warned of the potential lightning danger from other hikers who were coming down from the summit.

SHELDUS recorded two additional lightning events between 1960 and 2011:

- **August 10, 1960**—No injuries or fatalities, \$1,251.05 in property damage (2012 dollar value)
- **August 5, 1964**—0.1 injuries, no fatalities or damages

### Geographical Area Affected

The entire County is susceptible to lightning. The southern County high country area is most susceptible to this hazard.

## Potential Magnitude

Overall, lightning impacts in Ouray County would likely be limited, with 10-25 percent of the planning area affected.

Lightning can cause deaths, injuries, and property damage, including damage to buildings, communications systems, power lines, and electrical systems. It also causes wildland and structural fires. Damage from lightning occurs in four ways:

- Electrocutation, severe electrical shock, and burns of humans and animals
- Vaporization of materials in the path of the strike
- Fire caused by the high temperatures associated with lightning
- Power surges that can damage electrical and electronic equipment

When people are struck by lightning, the result is deep burns at the point of contact (usually on the head, neck, and shoulders). Approximately 70% of lightning survivors experience residual effects such as vision and hearing loss or neuropsychiatric issues. These effects may develop slowly and only become apparent much later. Death occurs in 20% of lightning strike victims.

Lightning strikes cause intense but localized damage. In contrast to other hazards, lightning does not cause widespread disruptions with the community. Structural fires, localized damage to buildings, damage to electronics and electrical appliances, and electrical power and communications outages are typical consequences of a lightning strike. Additionally, indirect fatalities may result via electrocution when a person steps from a vehicle into standing water that was previously “charged” by a live power-line that was knocked loose by a lightning strike.

The indirect social and economic impacts of lightning damage are typically associated with the loss of electrical power. Since society relies heavily on electric power, any disruption in the supply, even for a short time period, can have significant consequences. Wildland fires can also be an indirect result of a lightning strike.

It is difficult to calculate an average annualized loss estimate for lightning events in Ouray County given the lack of historical data. Based on NCDC data, the County could expect roughly \$68 in damages in any given year. Calculations from SHELDUS data were also quite small, with an average annualized loss estimate of \$24.

## Frequency/Likelihood of Occurrence

**Highly Likely**—Near 100 percent chance of occurrence in next year, or happens every year. Damaging lightning events may happen less frequently.

## 4.2.11 Public Health Emergencies

### Hazard/Problem Description

This section examines public health emergencies in Ouray County including pandemic flu and West Nile Virus.

#### ***Pandemic Influenza***

A pandemic is a global disease outbreak. A pandemic flu is a virulent human flu that causes a global outbreak, or pandemic, of serious illness. A flu pandemic occurs when a new influenza virus emerges for which people have little or no immunity, and for which there is no vaccine. This disease spreads easily person-to-person, causes serious illness, and can sweep across the country and around the world in very short time. The U.S. Centers for Disease Control and Prevention has been working closely with other countries and the World Health Organization to strengthen systems to detect outbreaks of influenza that might cause a pandemic and to assist with pandemic planning and preparation.

An especially severe influenza pandemic could lead to high levels of illness, death, social disruption, and economic loss. Impacts could range from school and business closings to the interruption of basic services such as public transportation, health care, and the delivery of food and essential medicines.

#### ***West Nile Virus***

The impact to human health that wildlife, and more notably, insects, can have on an area can be substantial. Mosquitoes transmit the potentially deadly West Nile virus to livestock and humans alike. West Nile virus first struck the western hemisphere in Queens, New York, in 1999 and killed four people. Since then, the disease has spread across the United States. In 2003, West Nile virus activity occurred in 46 states and caused illness in over 9,800 people.

Most humans infected by the virus have no symptoms. A small proportion develops mild symptoms that include fever, headache, body aches, skin rash, and swollen lymph glands. Less than 1 percent of those infected develop more severe illness such as meningitis or encephalitis, symptoms of which include headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, and paralysis. Of the few people who develop encephalitis, fewer than 1 out of 1,000 infections die as a result.

There is no specific treatment for the infection or a vaccine to prevent it. Treatment of severe illness includes hospitalization, use of intravenous fluids and nutrition, respiratory support, prevention of secondary infections, and good nursing care. Medical care should be sought as soon as possible for persons who have symptoms suggesting severe illness. People over 50 years of age appear to be at high risk for the severe aspects of the disease.

## Past Occurrences

There were three acknowledged pandemics in the twentieth century and one in the twenty-first century:

- 1918-19 Spanish flu (H1N1)**—This flu is estimated to have sickened 20-40 percent of the world’s population. Over 20 million people lost their lives. Between September 1918 and April 1919, 500,000 Americans died. The flu spread rapidly; many died within a few days of infection, others from secondary complications. The attack rate and mortality was highest among adults 20-50 years old; the reasons for this are uncertain.

This flu impacted Ouray County. There is evidence that 15 persons or more died during this outbreak. The far reaching affects of this pandemic were significant, considering the remoteness of Ouray at this point time.
- 1957-58 Asian flu (H2N2)**—This virus was quickly identified due to advances in technology, and a vaccine was produced. Infection rates were highest among school children, young adults, and pregnant women. The elderly had the highest rates of death. A second wave developed in 1958. In total, there were about 70,000 deaths in the United States. Worldwide deaths were estimated between 1 and 2 million.
- 1968-69 Hong Kong flu (H3N2)**—This strain caused approximately 34,000 deaths in the United States and more than 700,000 deaths worldwide. It was first detected in Hong Kong in early 1968 and spread to the United States later that year. Those over age 65 were most likely to die. This virus returned in 1970 and 1972 and still circulates today.
- 2009-2010 Swine flu (H1N1)**—This flu strain was first detected in the U.S. in California in April 2009. It was identified as H1N1 but was not the exact strain that appeared in 1918. Worldwide health response quickly ramped up in April in preparation for a pandemic. All 50 U.S. states reported cases of 2009 H1N1 by June 19, 2009. This strain caused 14,286 deaths worldwide and 2,117 laboratory-confirmed deaths in the U.S. according to the CDC.

Information from the U.S. Geological Survey (USGS) indicated that West Nile virus was first detected in Colorado in 2002. The virus was first reported in the County in 2003. Since then there have been two reports of the virus in birds and one veterinary case within the County. There have not been any reported human cases in the County. Table 4.13 summarizes historical West Nile virus information in Colorado and Ouray County.

**Table 4.13 Summary of West Nile Virus Cases in Colorado and Ouray County 2001- 2012**

Year	Humans		Birds		Mosquitoes		Veterinary		Sentinel Flock	
	CO	Ouray	CO	Ouray	CO	Ouray	CO	Ouray	CO	Ouray
2001	0	0	0	0	0	0	0	0	0	0
2002	14	0	137	0	15	0	380	0	3	0
2003	2,947 (63)	0	766	1	639	0	393	0	213	0
2004	291	0	55	1	168	0	30	0	0	0
2005	106	0	40	0	122	0	0	0	0	0
2006	345 (7)	0	50	0	419	0	7	1	0	0
2007	555 (6)	0	46	0	618	0	29	0	0	0
2008	71 (1)	0	4	0	44	0	1	0	0	0

Year	Humans		Birds		Mosquitoes		Veterinary		Sentinel Flock	
	CO	Ouray	CO	Ouray	CO	Ouray	CO	Ouray	CO	Ouray
2009	103 (3)	0	2	0	78	0	21	0	0	0
2010	81 (4)	0	13	0	53	0	7	0	0	0
2011	7	0	0	0	59	0	0	0	0	0
2012	131 (5)	0	8	0	209	0	15	0	0	0
<b>TOTAL</b>	<b>4,651 (89)</b>	<b>0</b>	<b>1,121</b>	<b>2</b>	<b>2,424</b>	<b>0</b>	<b>883</b>	<b>1</b>	<b>216</b>	<b>0</b>

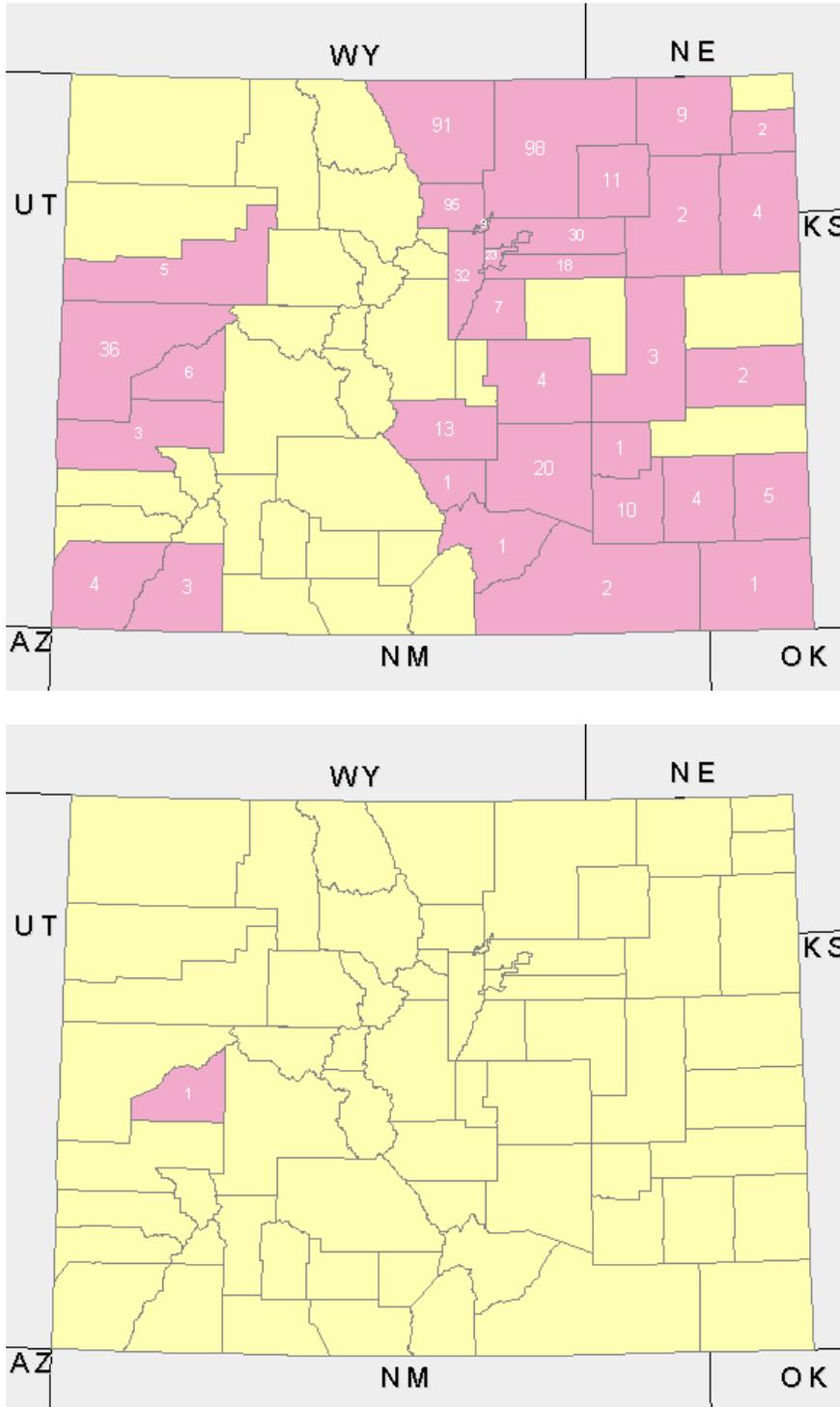
Source: U.S. Geological Survey, <http://diseasemaps.usgs.gov/>; Colorado Department of Public Health and Environment, [www.cdphe.state.co.us/dc/zoonosis/](http://www.cdphe.state.co.us/dc/zoonosis/)

Notes: Numbers in parentheses indicate deaths.

Data from the Colorado Department of Public Health and Environment (CDPHE) indicates that there have been five WNV cases in Colorado in 2013 (as of August 9, 2013): one in Broomfield County, two in Delta County, and two in Larimer County. Although there have never been any confirmed cases in humans in Ouray County, the high number of cases across the state suggests that is likely just a matter of time. The map in Figure 4.29 compares the distribution of human cases by county in Colorado in 2007 and 2013. Note that the data in this map from USGS does not show the five cases recorded by CDPHE in 2013. The incidence of WNV in Colorado has decreased dramatically in the past several years, though there have been recent recurrences in 2013. Colorado had approximately 555 human cases in 2007; the majority of the cases were in the eastern half of the state. The most severe year was 2003, when there were 2,947 reported human cases of West Nile Virus, including 63 deaths, in Colorado. Ouray County has not had any confirmed cases.

The Town of Ridgway and Ouray County have had an aggressive mosquito program in place for several years which includes mitigation, education, and tracking. The control methods used emphasize treatments with minimal environmental impact but proven effectiveness.

**Figure 4.29. Colorado West Nile Virus 2007 (top) vs 2013\* (bottom) Human Cases within Each County**



Source: U.S. Geological Survey, <http://diseasemaps.usgs.gov/>  
 \*As of August 6, 2013

## Geographical Area Affected

The entire County and population could potentially be affected by a pandemic flu outbreak.

According to the HMPC the relatively higher elevations of the County are less prone to have the mosquito that carries West Nile. Thus the lower elevations in the northern County are possibly more prone this hazard.

## Potential Magnitude

Overall, the impacts from a pandemic flu outbreak in Ouray County could be critical, with 25-50 percent of the planning area's population affected. The exact rate of infection is highly dependent on the individual flu strain. The infection rate of the 2009 H1N1 pandemic was estimated to be between 19% and 24% by the CDC and World Health Organization, respectively. The 1918 pandemic was far more virulent with estimated infection rates ranging from 30-50% and mortality rates estimated at 10-20% of infected people. The typical flu epidemic mortality rate is 0.1%. Precise infection and mortality rates can be difficult to obtain, especially for older pandemics, due to lack of reporting, inaccurate record-keeping, and misdiagnosis.

In an influenza pandemic the elderly and infants would likely be impacted the most, but again, this is dependent on the exact nature of the flu strain. The 1918 flu pandemic disproportionately affected younger, healthier people. Local medical facilities and staff could be quickly overwhelmed in a pandemic event.

The impacts of West Nile Virus would likely be less severe. Overall, West Nile virus impacts to Ouray County could be negligible, with less than 10 percent of the planning area's population affected.

## Frequency/Likelihood of Occurrence

**Occasional**—Between 1 and 10 percent chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Based on four worldwide outbreaks in the past years that affected the United States between 1918 and 2013, a 95 year period, a pandemic outbreak occurs on average about every 24 years.

The frequency of occurrence for West Nile Virus was estimated to be **likely**—between 10 and 100 percent chance of occurrence in next year, or has a recurrence interval of 10 years or less.

## 4.2.12 Severe Winter Storm

### Hazard/Problem Description

Winter storms can include heavy snow, ice, and blizzard conditions. Heavy snow can immobilize a region, stranding commuters, stopping the flow of supplies, and disrupting emergency and

medical services. Accumulations of snow can collapse roofs and knock down trees and power lines. In rural areas, homes and farms may be isolated for days, and unprotected livestock may be lost. The cost of snow removal, damage repair, and business losses can have a tremendous impact on cities and towns.

Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers. Communications and power can be disrupted for days until damage can be repaired. Even small accumulations of ice may cause extreme hazards to motorists and pedestrians.

Some winter storms are accompanied by strong winds, creating blizzard conditions with blinding wind-driven snow, severe drifting, and dangerous wind chills. Strong winds with these intense storms and cold fronts can knock down trees, utility poles, and power lines. Blowing snow can reduce visibilities to only a few feet in areas where there are no trees or buildings. Serious vehicle accidents can result with injuries and deaths.

Winter storms in Ouray County, including strong winds and blizzard conditions, can result in property damage, localized power and phone outages and closures of streets, highways, schools, businesses, and nonessential government operations. People can also become isolated from essential services in their homes and vehicles. A winter storm can escalate, creating life threatening situations when emergency response is limited by severe winter conditions. Other issues associated with severe winter weather include hypothermia and the threat of physical overexertion that may lead to heart attacks or strokes. Snow removal costs can also impact budgets significantly. Heavy snowfall during winter can also lead to flooding or landslides during the spring if the area snowpack melts too quickly. Avalanche danger is greatly increased during and immediately after heavy snowfall.

## Past Occurrences

The Western Regional Climate Center reports data from two weather stations in Ouray County: Ouray and Ridgway. The Ouray station is located southwest of the City of Ouray. Table 4.14 contains snowfall and snowdepth summaries for the two stations. Figure 4.30 through Figure 4.33 show Ridgway and Ouray stations daily snowfall and snowdepth averages and extremes.

**Table 4.14 Ouray County Snowfall and Snowdepth Summaries<sup>1</sup>**

Station	Average Annual Snowfall	Snowiest Month/Average Snowfall	Highest Daily Snowfall	Highest Monthly Snowfall	Highest Seasonal Snowfall	Average Snow Depth
Ridgway <sup>2</sup>	84.9	March/17.1	18 February 18, 1984	39 March 2010	87 2004	1
Ouray <sup>3</sup>	140.1	March/25.9	20 December 24, 1973	71.5 December 1973	141.6 1974	4

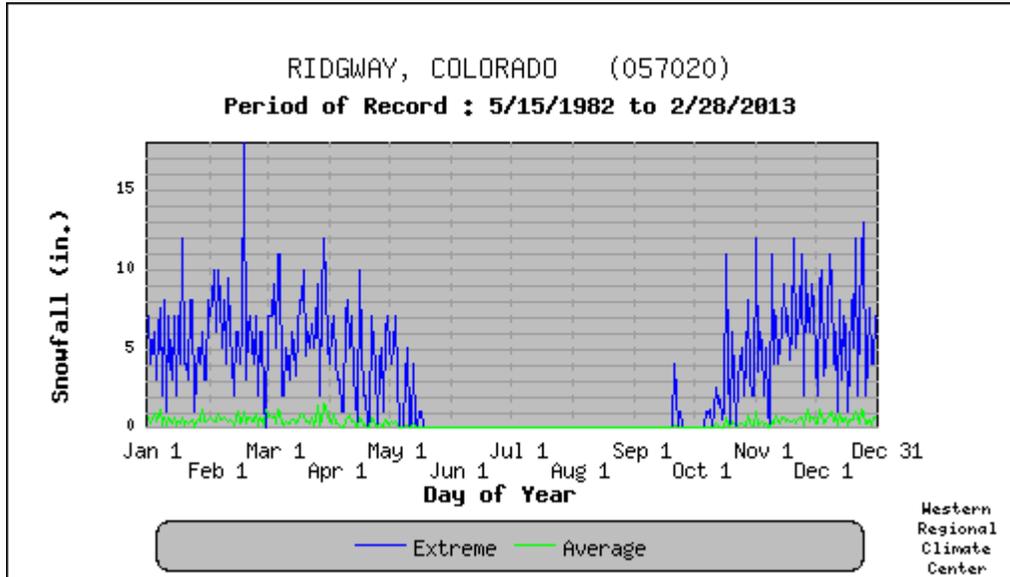
Source: Western Regional Climate Center, [www.wrcc.dri.edu/](http://www.wrcc.dri.edu/)

<sup>1</sup>All snowfall and snowdepths are reported in inches

<sup>2</sup>Period of record May 15, 1982-February 28, 2013

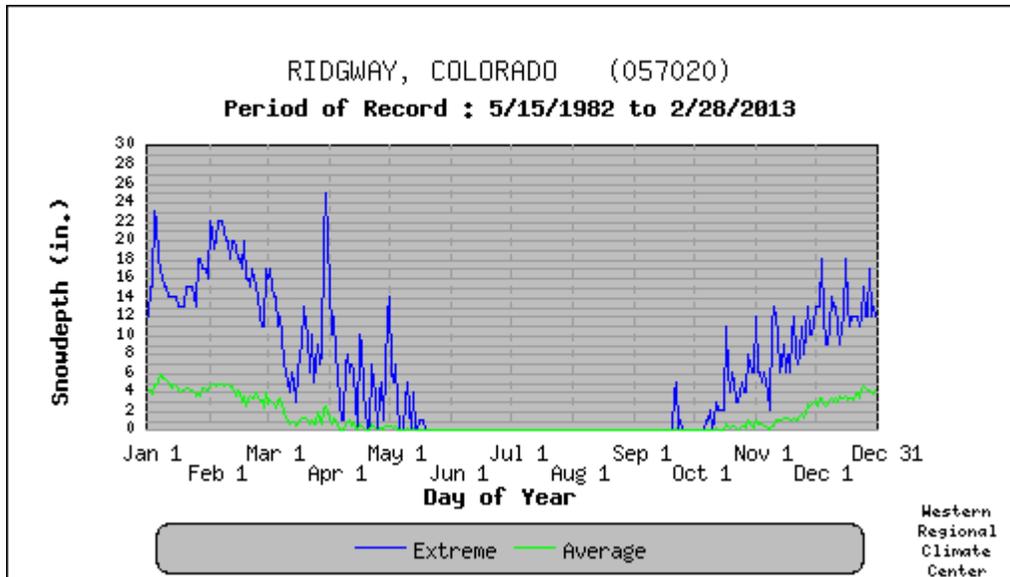
<sup>3</sup>Period of record June 1, 1893-May 31, 2006

**Figure 4.30. Ridgway Station Snowfall Average and Extreme, May 18, 1982-February 28, 2013**



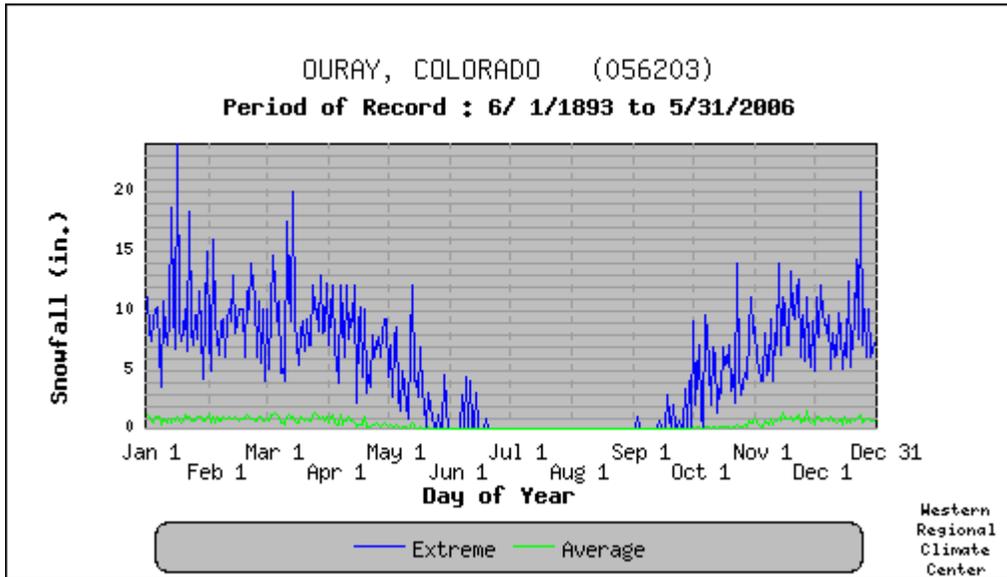
Source: Western Regional Climate Center, [www.wrcc.dri.edu/](http://www.wrcc.dri.edu/)

**Figure 4.31. Ridgway Station Snowdepth Average and Extreme, May 18, 1982-February 28, 2013**



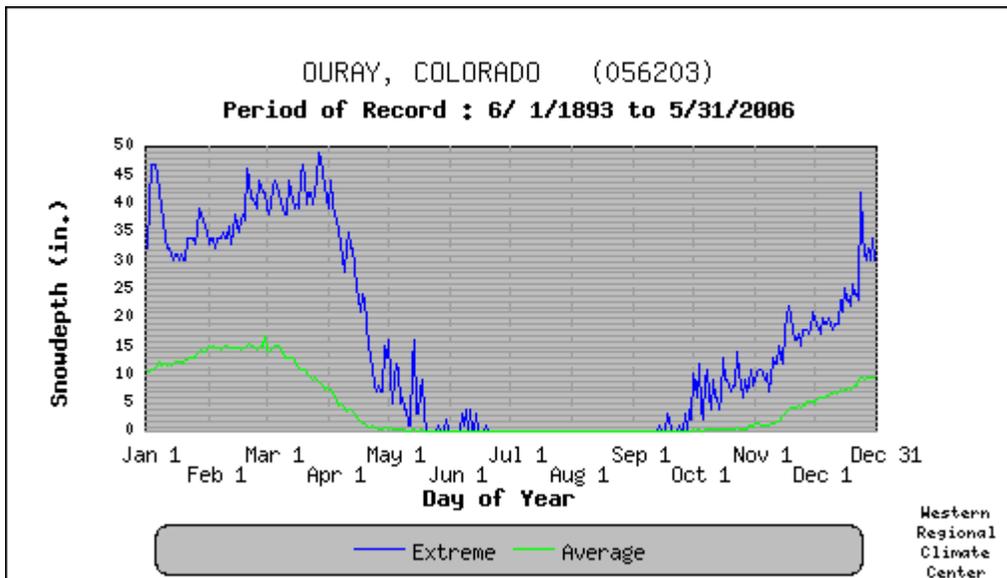
Source: Western Regional Climate Center, [www.wrcc.dri.edu/](http://www.wrcc.dri.edu/)

**Figure 4.32. Ouray Station Snowfall Average and Extreme, June 1, 1893-May 31, 2006**



Source: Western Regional Climate Center, [www.wrcc.dri.edu/](http://www.wrcc.dri.edu/)

**Figure 4.33. Ouray Station Snowdepth Average and Extreme, June 1, 1893-May 31, 2006**



Source: Western Regional Climate Center, [www.wrcc.dri.edu/](http://www.wrcc.dri.edu/)

According to SHELDUS, there were 60 notable winter weather events between 1960 and 2011. These events are captured in Table 4.15.

**Table 4.15 Ouray Winter Weather Events, 1960-2011**

Date	Details	Injuries	Fatalities	Total Property and Crop Damage(\$)*
1/14/1960	Snow	0	0	95
4/30/1960	Freeze	0	0	6,156
9/2/1961	Snow	0	0	20,207
1/8/1962	Cold, snow, and wind	0	0	60,337
1/8/1962	Wind, winter weather	0	0.16	60,337
1/10/1963	Cold	0	0	596
3/2/1963	Heavy snow	0	3	0
9/15/1965	heavy snow	0	0	2,144
10/15/1965	Heavy snow	0	0	2,430
4/18/1966	Snow and cold	0	0	56,802
4/20/1967	Freezing Temperatures	0	0	5,456
12/13/1967	Snow	0.12	0	2,022
1/25/1969	Snow	0.06	0	174
10/11/1969	Snow, cold, wind	0.03	0	9,930
10/13/1969	Cold	0	0	4,965
3/1/1970	Heavy snow	0	1	1,849
9/16/1971	Snow, cold	0	0	4,499
11/24/1975	Heavy snow, wind	0	0	93
2/19/1976	Winter storm	0	0.02	0
4/18/1978	Freeze	0	0	11,004
12/5/1978	Heavy snow, cold	0	0.02	0
12/17/1978	Ice, heavy snow	0	0.14	0
11/19/1979	Blizzard	0.02	0	2,510
3/4/1981	Heavy snow	0	0	35
2/1/1982	Snow, cold	0	0	189
3/12/1982	Heavy snow, high winds	0	0	374
12/23/1982	Blizzard	0	0.1	1,907,147
3/14/1983	Heavy snow	0	0	1,829
11/26/1983	Snow, wind	0	0	18,295
12/20/1983	Severe storm-snow	0	0	4,269
4/19/1984	Snow/wind	0	0	1,754
4/25/1984	Wind, snow	0	0	30
1/30/1985	Extreme cold	0	0.08	1,693
1/31/1985	Extreme cold	0	0	1,693
3/27/1985	Heavy snow	1	0	0
4/25/1985	Rain, snow	0	0	169
10/10/1986	Snow	0	0	1,953
10/31/1986	Snow	0	0	166
3/16/1987	Heavy snow	0	0	225
1/17/1988	Heavy snow, wind	0	0	353
2/1/1988	Heavy snow	0	0	26
2/1/1989	Cold	0.32	0	293,899
2/1/1989	Snow	0.05	0	1,469
3/5/1990	Winter storm, blizzard	0	0	231

Date	Details	Injuries	Fatalities	Total Property and Crop Damage(\$)*
3/13/1990	Snow	0	0	214
5/1/1990	Heavy snow	0.1	0	0
3/4/1991	Winter storm, high winds	0	0	183
3/2/1992	Heavy snow	0.02	0.02	1,779
3/7/1992	Heavy snow	0.03	0	0
2/17/1993	Heavy snow	0.06	0	234
2/21/1993	Heavy snow	0	0	234
2/8/1995	Heavy snow	0	0	61,312
2/20/1996	Heavy snow	0.1	0.05	0
2/22/1996	Winter storm	0.36	0	0
4/29/1996	Freeze	0	0	3,316,846
4/12/1997	Freeze	0	0	2,145,738
12/8/1998	Winter storm	0	0	21,128
10/18/2005	Winter Weather/Mix	0	0	452
10/25/2006	Winter Weather	0	0	797
12/1/2008	Winter Weather	0	0	3,199
<b>Total</b>		<b>2.27</b>	<b>4.59</b>	<b>8,039,521</b>

Source: SHELDUS, [www.cas.sc.edu/geog/hrl/SHELDUS.html](http://www.cas.sc.edu/geog/hrl/SHELDUS.html)

\*2012 dollars, events may have occurred over multiple counties so damage may represent only a fraction of the total event damage and may be not specific to Ouray County

NCDC recorded 599 winter weather events between 1993 and March 2013. These events caused four fatalities, seven injuries, and \$382,750 in property damages. The property damages should be considered a broad estimate based on the best available data at the time the event was reported to NCDC.

Research yielded little in details about specific damage and impacts. In 1984, part of the roof of the then defunct Beaumont Hotel collapsed in a snow storm and caused extensive interior damage. It is not known how much of the state of disrepair of the hotel may have contributed to the damage. The March 1992 event dumped 30 inches of snow in Ouray and closed Highway 550 for several days. A snow plow operator was killed by an avalanche on Highway 550 and another was buried for 18 hours before digging himself out from next to his snow plow.

It is also difficult to calculate a reasonable average annual loss estimate, as the damage noted in SHELDUS may reflect only a fraction of the total event damage and may be not specific to Ouray County. Based on the information in the table above, the average annualized loss is \$151,689. The average annualized loss based on NCDC data is roughly \$19,138.

For more information about other events associated with winter weather see Section 4.2.2 Avalanche and Section 4.2.7 Extreme Temperatures.

## **Geographical Area Affected**

The entire County is susceptible to severe winter storms. The southern County high country area and City of Ouray is susceptible to the heaviest snow.

## **Potential Magnitude**

Overall, severe winter storm impacts could be critical in Ouray County, with isolated deaths and/or multiple injuries and illnesses, major or long-term property damage that threatens structural stability, and/or interruption of essential facilities and services for 24 to 72 hours. However, past damage appears to be limited, and the residents appear to take the weather in stride as part of mountain living. Most problems with winter storms are related to vehicle accidents. The highest risk will be to travelers that attempt to drive during adverse conditions. Economic impacts occur as a result of closing Highway 550 for snow removal and avalanche control. Severe winter weather can cause power outages and other utility disruptions. Heavy snow and ice can down power lines, and extremely cold temperatures can cause water and sewer lines to freeze or burst. Based on SHELDUS data, the average annualized loss is \$157,638. The average annualized loss based on NCDC data is roughly \$19,138.

## **Frequency/Likelihood of Occurrence**

**Likely**—Between 10 and 100 percent chance of occurrence in next year, or has a recurrence interval of 10 years or less. Based on the SHELDUS table, damaging severe winter storms occur about every year (53 year period of record divided by 60 events). It is important to note that winter storms in general will probably occur in the County every year, but damaging winter storms may be somewhat less frequent. It is also possible that damages from winter storms are not always reported to NCDC or SHELDUS given that Ouray County residents are accustomed to dealing with severe winter weather.

## **4.2.13 Wildfire**

### **Hazard/Problem Description**

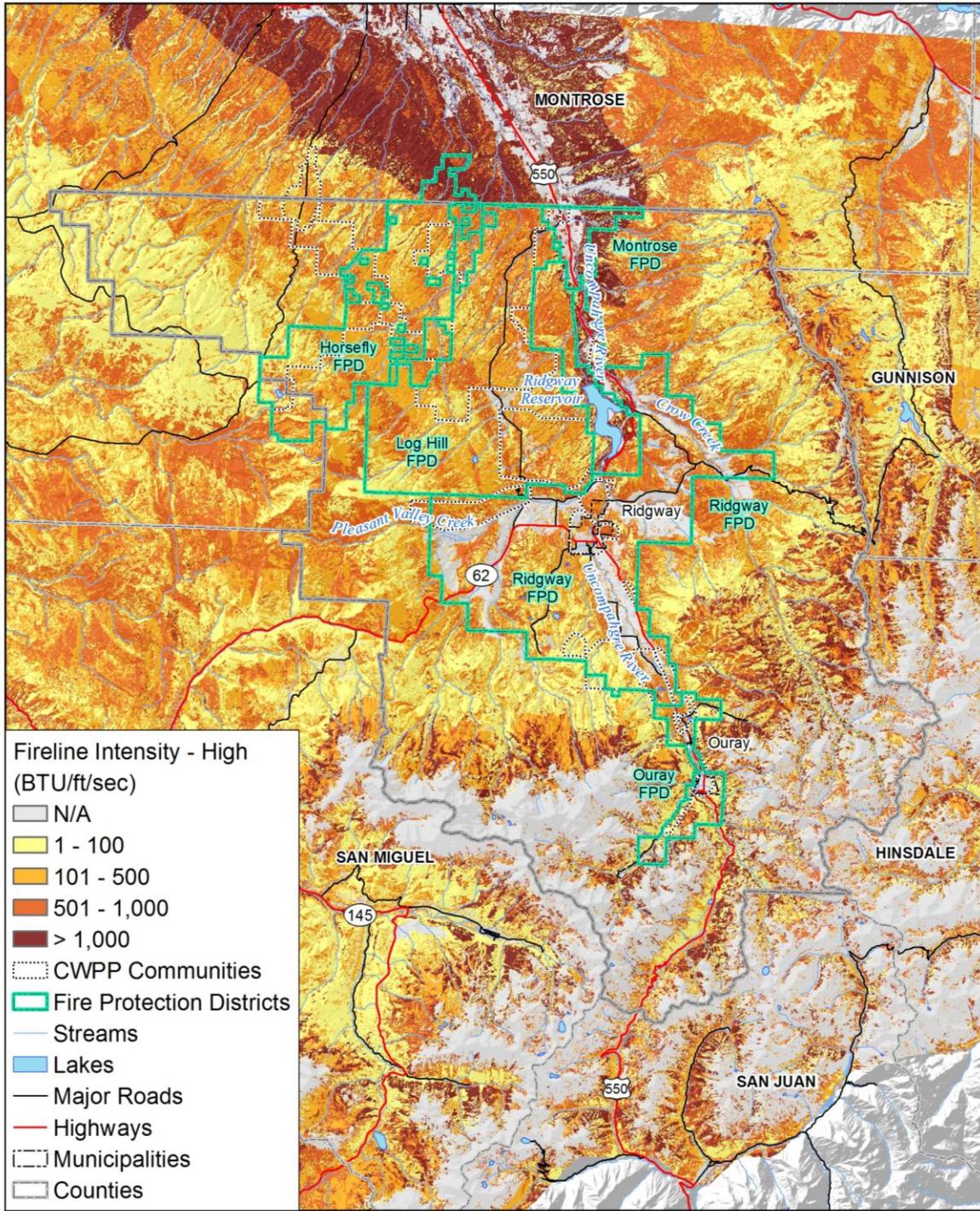
Wildfires are an ongoing concern for Ouray County. Fire conditions arise from a combination of hot weather, an accumulation of vegetation, and low moisture content in the air. These conditions, when combined with high winds and years of drought and beetle killed trees increase the potential for a wildfire to occur. A fire along the urban/rural interface can result in major losses of property and structures. Limited access in some parts of the County complicates evacuation and control options and constitutes serious life risk to residents and firefighters alike.

In wildland fire vernacular, hazard is described in terms of fuel characteristics, i.e. the vegetation available for combustion. Risk is considered in terms of probability and analyzed through historic fire records, while values at risk are determined by potential loss in a wildland fire. Fire danger refers to a combination of fuel moisture and weather conditions that combine with

topography and other fuel characteristics to determine fire behavior as manifested in fire intensity and rate of spread. Figure 4.34 through Figure 4.36 from the County CWPP depicts the predicted fireline intensity in the County, City of Ouray, and Town of Ridgway under high fire weather conditions. Fireline intensity is a function of rate of spread and heat per unit area; it is directly related to flame length and relates to the heat felt by a person standing next to the flames.

- **Fuel**—Vegetative fuels are characterized by size, continuity, and quantity and are often classified in terms of fire behavior fuel models (FBFM). These fuel characteristics determine responsiveness to weather conditions and ignition. Fuel sources are diverse and include ground fuels (roots, duff), surface fuels (forest litter, dead and down twigs and branches, grass, shrubs), and aerial fuels (the canopies of forest and brush). Manmade structures and other associated combustibles are also considered fuel sources. Light surface and canopy fuels, such as cured grasses and drought stressed tree crowns, burn quickly and serve as a catalyst for rapid fire spread.
- **Topography**—An area's terrain and land slopes affect its susceptibility to wildland fire spread. Fire intensities and rates of spread increase as slope increases due to the tendency of heat from a fire to rise via convection. The natural arrangement of vegetation throughout a hillside can also contribute to increased fire activity on slopes.
- **Weather**—Weather components such as temperature, relative humidity, wind, and lightning also affect the potential for wildland fire. High temperatures and low relative humidity dry out the fuels that feed the wildland fire creating a situation where fuel will more readily ignite and burn more intensely. Wind is the most influential weather factor for fire intensity and the direction and rate of fire spread. Winds can be significant at times in Ouray County. In addition to high winds, wind shifts can occur suddenly due to frontal passage, temperature changes, or the interaction of wind with topographical features such as slopes or steep hillsides. Seasonal and episodic drought effects fuels' susceptibility for combustion.
- **Ignitions**—Wildland fires are ignited by natural causes, predominately lightning, or human causes. Federal agencies categorize human caused fires based on their source including equipment, smoking, campfires, debris burning, railroads, and arson. Human caused ignitions are associated with travel corridors, population centers, recreational use, and commercial activities. A concern in Ouray County is that structure fires in rural areas may actually be sources of wildland fires, as response times can be significant in the more remote areas of the County.

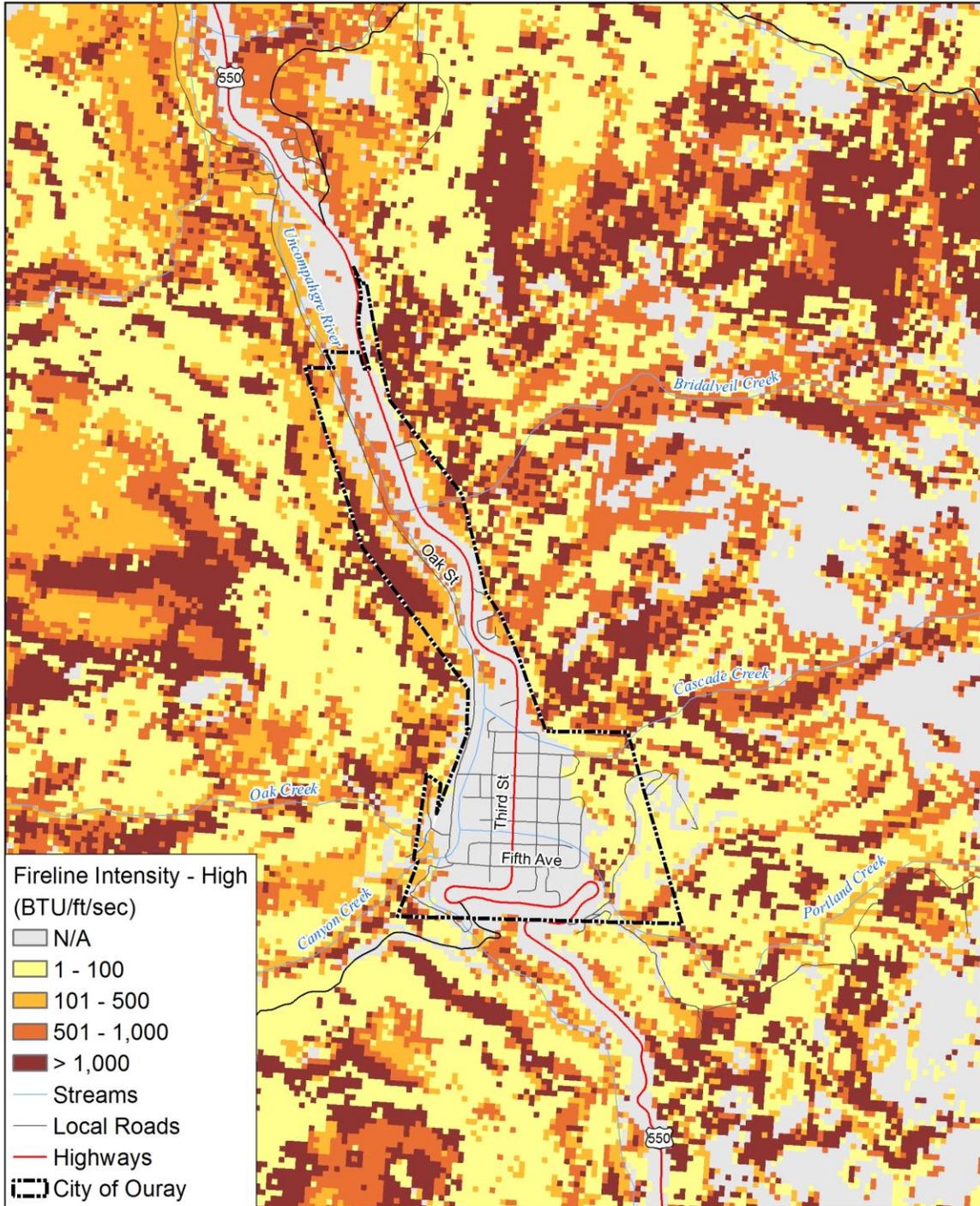
**Figure 4.34. Ouray County Predicted Fireline Intensity Under High Weather Conditions**



**amec**  
 Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, NHD, Anchor Point, County CWPP

Source: Ouray County CWPP

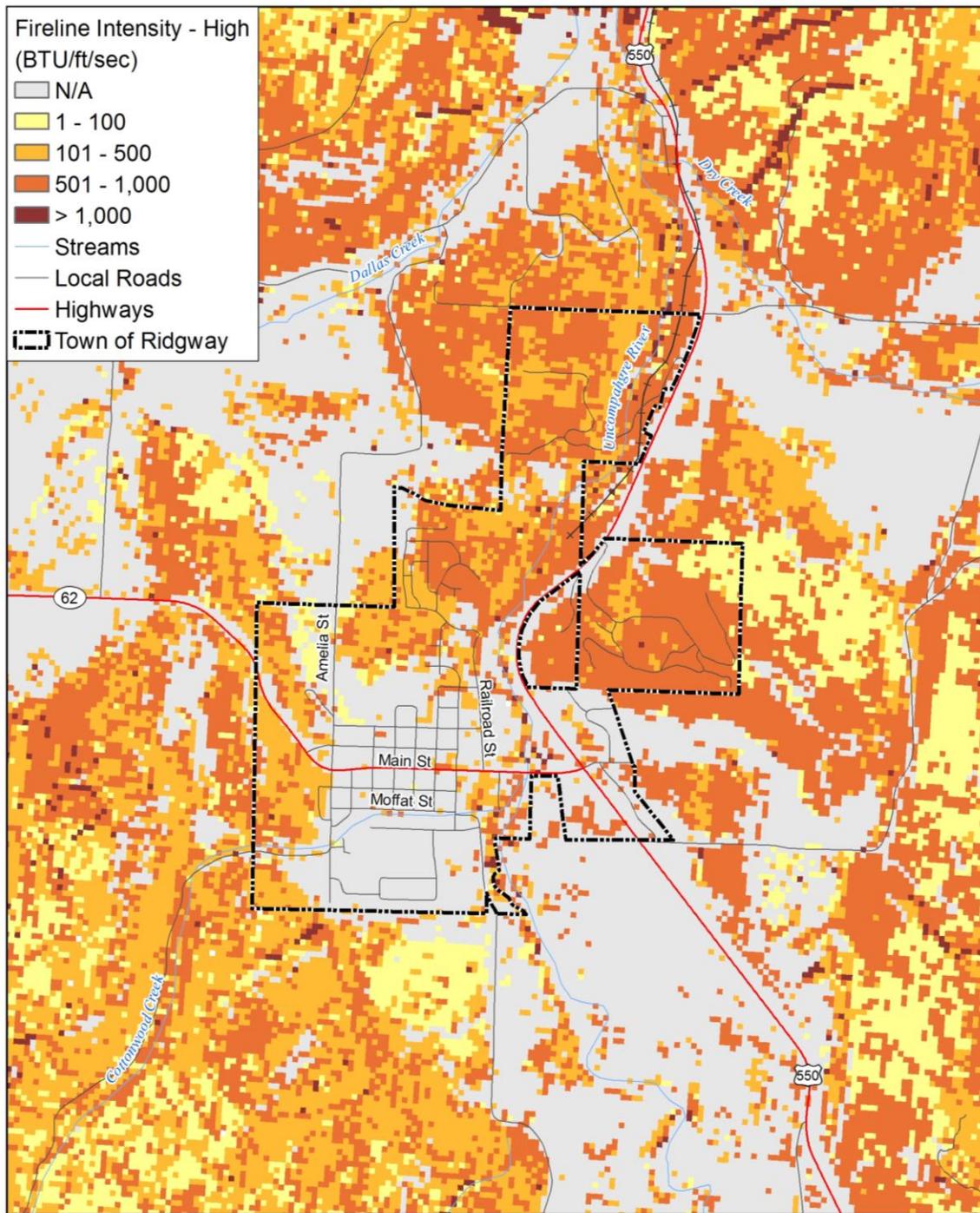
**Figure 4.35. City of Ouray Predicted Fireline Intensity Under High Weather Conditions**



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, NHD

Source: Ouray County CWPP

**Figure 4.36. Town of Ridgway Predicted Fireline Intensity Under High Weather Conditions**



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, NHD, Anchor Point, County CWPP

Source: Ouray County CWPP

Additional causes for wildland fires in Ouray County are increased drought conditions, additional subdivisions, increase in aircraft accidents, and increase in outdoor activity, timber density, and reduction in quantity of water shed and run off.

Small fires can grow rapidly when adequate fuels coincide with weather and topography favorable to fire. Wildfires can last from several hours to several months. Generally, the fire season extends from early spring to late fall. Another contributing factor to fuel loads in the forest are standing trees killed by insects, which have been affecting the forests of southwest Colorado since 2002. The Ips beetle has killed a large number of Pinon Pine in the north end of the County. An upswing in beetle-killed pines in and around the City of Ouray has been witnessed since 2012. Locals have observed increases in the numbers of dead or dying white fir trees due to a fir engraver beetle infestation. USFS experts note that this issue has reached epidemic levels, and the fir engraver beetles are infesting the trees more aggressively than normal. Fir engraver beetles first attack the tops of the white firs, making pesticide application difficult. Spruce beetles could pose an even greater threat in coming years due to the prevalence of Engelmann spruce in the area. <sup>6</sup>

## **Past Occurrences**

The majority of wildland fires in Ouray County occur between June and October. Most wildland fires in Ouray County are relatively small and never make the list of large fires. However, even small fires can threaten life safety and property. The size of a fire will largely be dependent on the availability of fuels plus location in the WUI, which can dictate emergency response times and availability of water.

An analysis of historic fire records helps to define the area's fire season and patterns of fire occurrence over time and by jurisdiction. The most comprehensive fire data was available from the Federal Wildland Fire Occurrence website maintained by the Departments of Agriculture and Interior as processed by the USGS (<http://wildlandfire.cr.usgs.gov/firehistory/data.html>). The Federal Wildland Fire Occurrence data recorded 13 wildland fires in Ouray County between 1980 and 2012. All but 2 of these wildland fires were over 10 acres in size. The largest wildland fire in Ouray County was the May 1999 Baldy fire at 1,326 acres. Figure 4.37 depicts the location of the wildland fires greater than or equal to 10 acres in the County between 1980 and 2012.

NCDC recorded three wildfire events in Ouray County. The Red Creek Fire occurred on June 27, 2006 about 8 miles northeast of Ridgway. The fire consumed 350 acres of timber and resulted in the closure of trails in a wilderness area. Smoke from the fire impacted communities to the north, including Montrose. The second fire began on May 22, 2010. Around 2:30 pm on the afternoon of Saturday, May 22, strong winds downed a power line which sparked a wildfire near the border of San Miguel and Montrose Counties along Good Enough Road. The fire spread

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<sup>6</sup> Samantha Wright. "Beetle Infestation Threatens Ouray's White Fir Forests." *The Watch*, May 9, 2013. Accessed September 23, 2013.

rapidly with dry conditions and very strong southwest winds in place. Highway 145 was closed for a period of time on May 5th due to the fire. Portions of the San Miguel River were also closed due to the wildfire hazard. The fire continued for several days and eventually burned through roughly 2,500 acres of the Uncompahgre National Forest and nearly 430 acres of BLM land. There were no injuries or personal property damage reported, but the estimated cost of fighting the fire was \$1,500,000. The third fire in the NCDIC database began on October 9, 2010. A controlled burn at a farm became a wildfire when breezy winds developed and blew embers beyond the planned burn area. A 100 foot by 50 foot area of baled hay burned up, and a number of vehicles and farm implements were destroyed. Winds gusts in the west-central valleys of Colorado were measured at 20 to 25 mph. A firefighter incurred minor injuries.

SHELDUS reported only one wildland fire event in Ouray County between 1960 and 2011. A wildland fire on October 9, 2010 resulted in zero injuries, zero fatalities, \$5,265 in property damages, and \$4,212 in crop damages. Other notable fires include the Log Hill Fire and the Log Hill RC fire. The September 20, 1999 Log Hill Fire originated by human causes and burned 165 acres. The July 15, 2001 Log Hill RC fire originated by human causes and burned 750 acres. The Log Hill Mesa FPD estimated that they deal with four to five wildfires a year in their district. They are typically small but are capable of causing a catastrophic event.

The 2013 fire season brought several smaller fires to Ouray County, most of them caused by lightning. On June 17, 2013, BLM, Log Hill and Montrose fire crews worked together to put out a fire roughly three acres in size at the Mackenzie Butte area. At 6:25 pm on June 23, 2013, Ouray Fire was paged to a structure fire at the Camp Bird Mine with surrounding trees catching fire. According to Adam Kunz of Ouray Fire (Former Chief), the fire had spread out about 5 acres. Crews from USFS, Ouray Fire Department, Ridgway Fire District, Ouray County Sheriff, Ouray PD, Ouray County EMS, and Ouray County Communications all responded. Crews were able to get the fire contained to about 1 acre.

The West Fork Fire Complex began June 5<sup>th</sup>, 2013 in Mineral and Archuleta counties. The West Fork Complex consisted of three lightning-caused wildfires: West Fork, Windy Pass, and Papoose. The fires were severe, burning over 100,000 acres and causing air quality issues in Ouray County. Roughly 1,500 people were displaced. Tourism in southwest Colorado suffered with evacuations, road closures, and closures of the Rio Grande National Forest and Weminuche Wilderness.

On July 2, 2013 between 7:00am and 9:00am, six different fires were sparked by a lightning storm. Crews worked very quickly, and by 11:00am all of the fires were put out. The largest of those fires only consumed a few trees. At approximately 2:00pm that same day, Ouray Fire was paged to smoke investigation at Ironton Park (Mt Hayden). That fire was a few acres in size. BLM/USFS crews and Ouray Fire crews responded to the incident.

The 2002 wildfire season in Colorado was the worst on record. It began in April and continued until early fall, with the peak activity in June and July when several large and damaging fires

burned simultaneously across the state. Southwest Colorado had its share of fires and close calls. Most damaging was the Missionary Ridge fire in nearby La Plata County that resulted in 70,485 acres burned, 56 structures lost, and 52 injuries.

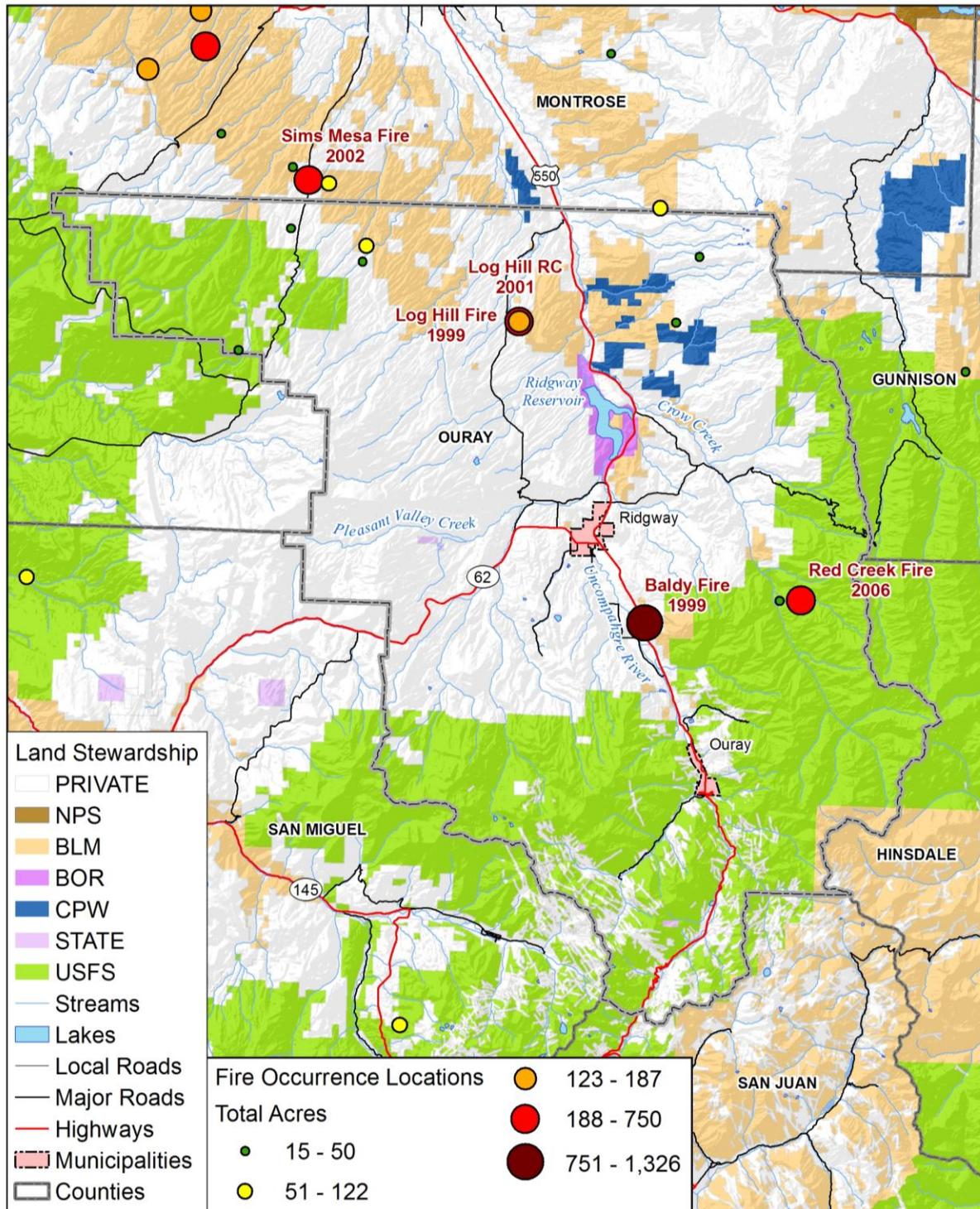
Ouray County was largely spared from fires in 2002, but experienced haze and air quality issues from fires elsewhere in southwest Colorado.

**Table 4.16 Summary of Wildfires in Ouray County 1980 - 2012\***

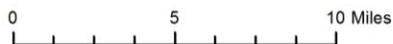
Fire Name	Cause	Acres Burned	Date
Longstreet	Human	50.0	07/15/1982
-	Lightning	25.5	10/30/1986
Cotton Creek	Natural	5.0	11/11/1989
-	Lightning	16.0	08/03/1990
Dave Wood	Natural	20.0	07/03/1994
Sneva Mountain	Human	40.0	10/21/1995
Billy Creek	Natural	20.0	06/11/1996
Baldy	Human	1326.0	05/11/1999
Log Hill	Human	165.0	09/20/1999
Corbett	Lightning	6.0	07/29/2000
Loghill RC	Human	750.0	07/15/2001
Tappan	Natural	83.0	07/03/2004
Red Creek	Lightning	401.0	06/27/2006

Source: Federal Wildland Fire Occurrence Data,  
<http://wildfire.cr.usgs.gov/firehistory/data.html>

**Figure 4.37. Ouray County Fires that Burned 15 Acres or More 1980-2012**



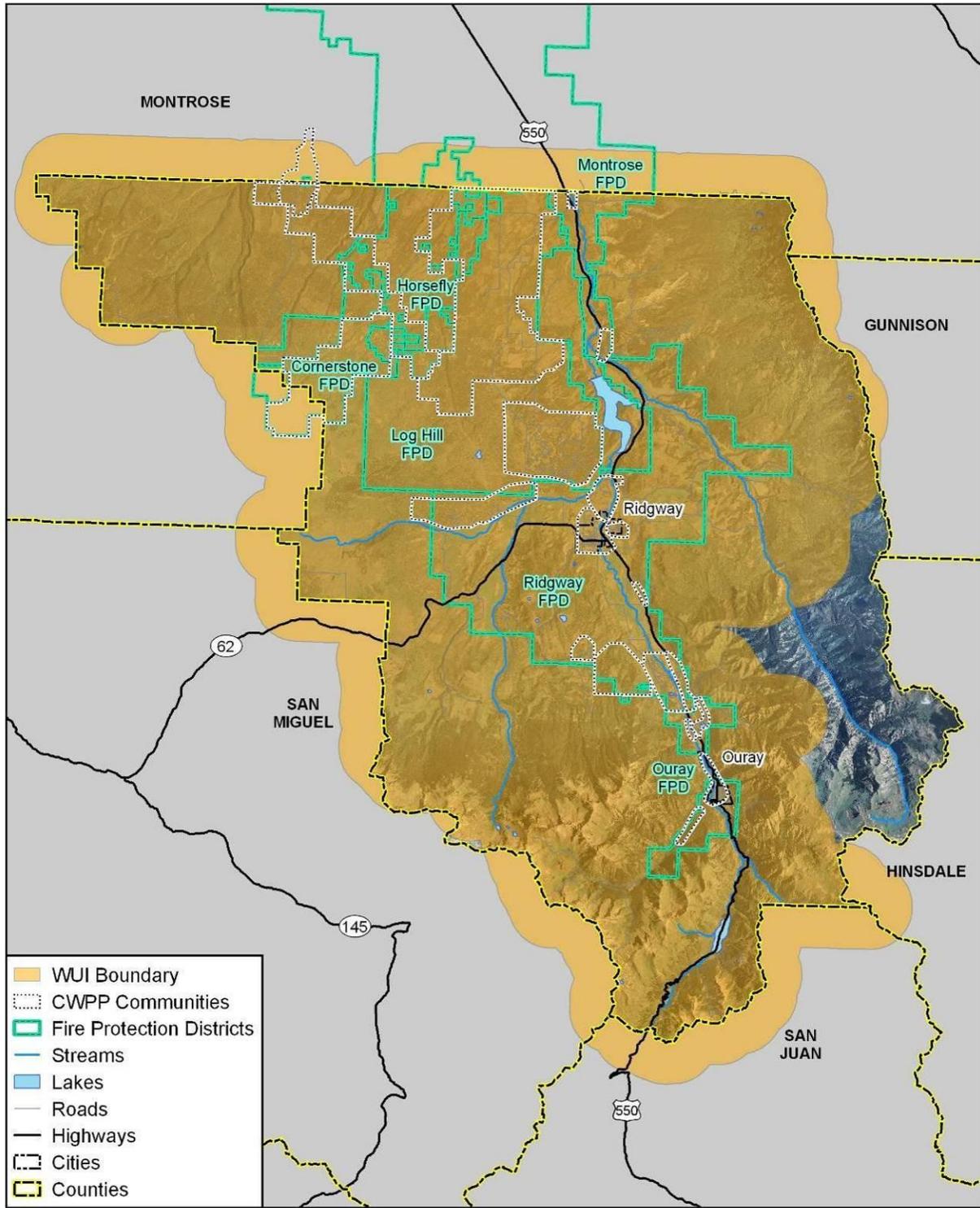
Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, NHD, COMap v9, BLM, USFS



## Geographical Area Affected

The 2011 Ouray County CWPP identifies the WUI as areas where people and values exist in areas susceptible to wildland fires. The WUI was determined using a 1.5 mile buffer surrounding all private lands within the county boundary that are at risk from wildland fire. The CWPP identified 21 communities and 7 areas of special interest (ASIs) within the WUI. A CWPP community is typically a single geographic area that shares similar infrastructure, vegetation, topography, and as a result, similar recommendation needs for wildland fire mitigation. ASIs refer to places that may not contain residences but do contain critical infrastructure, buildings, seasonal/temporary populations, or other structures that would necessitate fire mitigation action. The boundaries of the WUI communities are depicted in Figure 4.38. ASIs are shown on a map in Section 4.3 of this plan where other critical facilities and assets at risk are discussed. Most of Ouray County is in the WUI; wildland fires affect an **extensive** portion of the response area.

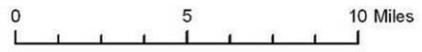
Figure 4.38. Ouray County WUI Boundary



- WUI Boundary
- CWPP Communities
- Fire Protection Districts
- Streams
- Lakes
- Roads
- Highways
- Cities
- Counties

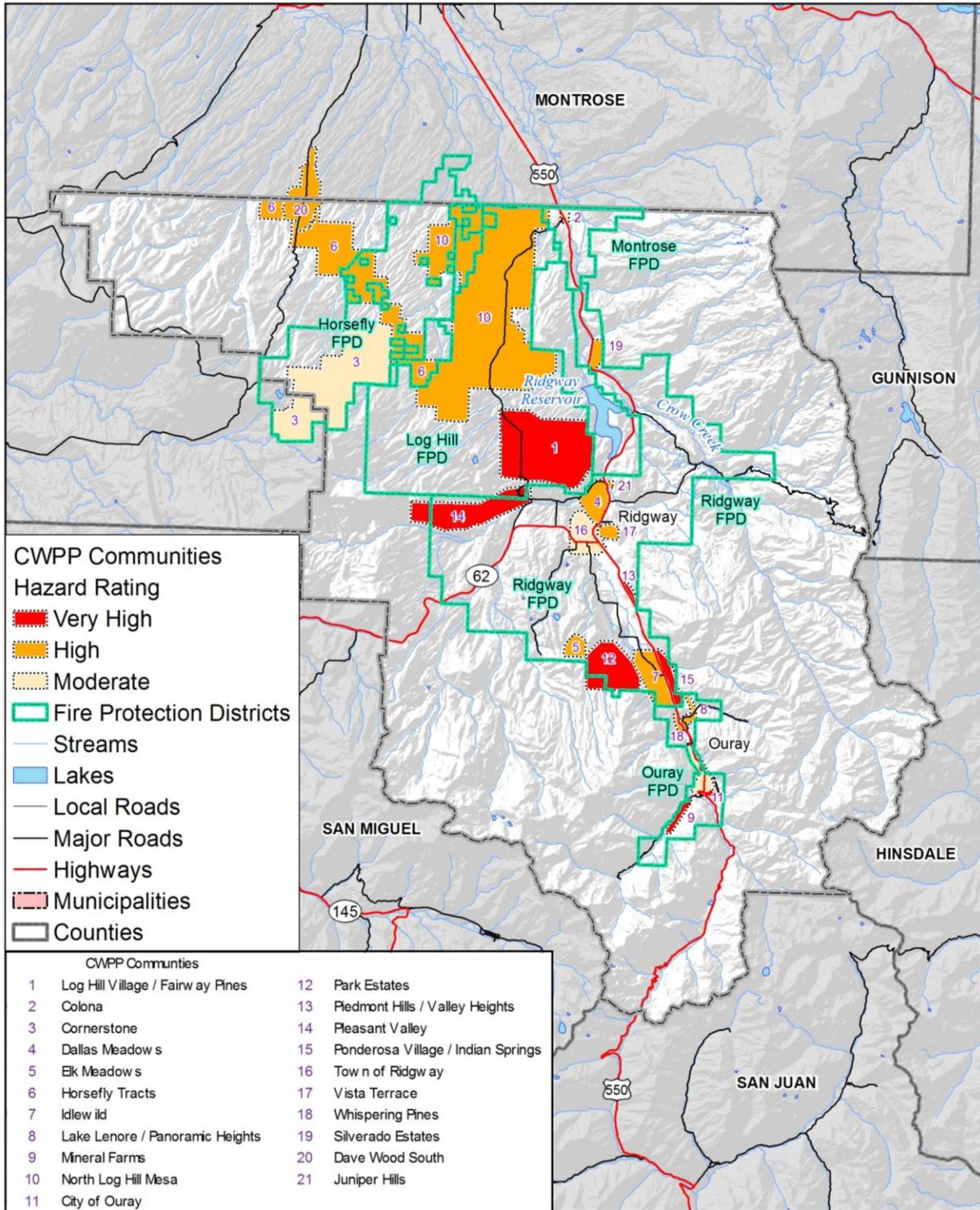


Map compiled 2/2011; intended for planning purposes only.  
 Data Source: Ouray County, Anchor Point, CDOT

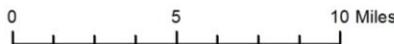


\*Ouray County data shown on this map is to be considered a draft and subject to revision.

**Figure 4.39. Ouray County CWPP Communities and Hazard Rating**



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, NHD, County CWPP



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## Potential Magnitude

The magnitude of a wildland fire in Ouray County could be **critical to catastrophic**. It is a practical certainty that at least small wildland fires will occur every year in the County. The alignment of ignition, fuel and weather conditions, and values at risk that will produce a catastrophe is impossible to predict. But, as fuels become more hazardous and the County more populous, the potential for significant loss continues to increase. The potential magnitude of wildfires in the County is also complicated by limited access and the lack of readily accessible water for firefighting in many communities. Even in communities where water is available, water pressure may be insufficient for firefighting purposes. Aging water systems do not meet the current and projected future water needs of some communities in the WUI. These issues are further addressed in the 2011 Ouray County CWPP.

Wildland fire poses a major public safety hazard in Ouray County. Life safety and human health are serious concerns since most of the County is considered a wildland urban interface area, and there is a high influx of visitors during the prime wildland fire months. Wildfire has the potential to cause widespread and severe damage to watersheds and property in the planning area. Although a natural process, wildfires can mar scenic view-sheds and watersheds, potentially reducing property values and negatively impacting the tourism-based economy that much of the southern half of the County depends on. Life safety and human health are serious concerns due to the limited evacuation routes and high influx of visitors to the eastern County during summer festivals. Fires can be intensified by drought, as was observed during the 2002 statewide drought. Fires can also contribute to higher risk of debris flows by destroying vegetation that anchors the soil. Fires can destroy wildlife habitat, potentially leading to more human-wildlife vehicle collisions as wildlife migrates during or after wildfires.

The 21 CWPP communities in Ouray County were organized by hazard rating in the 2011 Ouray County CWPP. The rating system was based on five criteria: topographic position; fuels and fire behavior; construction and infrastructure; suppression factors; and other factors, including frequent lightning, railroads, campfires, etc. The magnitude of a wildland fire could conceivably be worse in communities with higher hazard ratings. Table 4.17 lists the 21 communities, their hazard rating, and the fire protection district that would respond to each community.

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**Table 4.17 WUI Community Hazard Ratings**

Community Name	Fire Protection District	Hazard Rating
City of Ouray	Ouray	Moderate
Colona	Montrose	Moderate
Cornerstone	Horsefly	Moderate
Town of Ridgway	Ridgway	Moderate
Dallas Meadows	Ridgway	High
Dave Wood South	Montrose	High

Community Name	Fire Protection District	Hazard Rating
Elk Meadows	Ridgway	High
Horsefly Tracts	Horsefly	High
Idlewild	Ridgway	High
Juniper Hills	Ridgway	High
Lake Lenore/Panoramic Heights	Ouray	High
North Log Hill Mesa	Log Hill Mesa	High
Silverado Estates	Ridgway	High
Vista Terrace	Ridgway	High
Whispering Pines	Ouray	High
Log Hill Village/Fairway Pines	Log Hill Mesa	Very High
Mineral Farms	Ouray	Very High
Park Estates	Ridgway	Very High
Piedmont Hills/Vista Heights	Ridgway	Very High
Pleasant Valley	Ridgway	Very High
Ponderosa Village/Indian Springs	Ridgway	Very High

Source: Ouray CWPP

## Frequency/Likelihood of Occurrence

**Highly Likely**—Near 100 percent in next year, or happens every year. The number, extent, and severity of these fires are subject to numerous climatic, weather, and stochastic factors. Historic trends and the condition of the local forests indicate that the occurrence of a large fire is a matter of time.

### 4.2.14 Windstorm

#### Hazard/Problem Description

High winds, often accompanying severe thunderstorms, can cause significant property and crop damage, threaten public safety, and have adverse economic impacts from business closures and power loss. Windstorms in Ouray County are typically straight-line winds. Straight-line winds are generally any thunderstorm wind that is not associated with rotation (i.e., is not a tornado). It is these winds, which can exceed 100 miles per hour, that represent the most common type of severe weather and are responsible for most wind damage related to thunderstorms. Since thunderstorms do not have narrow tracks like tornadoes, the associated wind damage can be extensive and affect entire (and multiple) counties. Objects like trees, barns, outbuildings, high-profile vehicles, and power lines/poles can be toppled or destroyed, and roofs, windows, and homes can be damaged as wind speeds increase. One type of straight-line wind is the downburst,

which can cause damage equivalent to a strong tornado and can be extremely dangerous to aviation.

Air pressure differences during cold and warm seasons cause high winds in Colorado. The western part of the State typically doesn't experience the Chinook winds that impact the Front Range, but Bora winds are common in western Colorado. Bora winds are cold winds caused by a strong low pressure system coupling with a high pressure system to the west (2011 Colorado Natural Hazard Mitigation Plan, pg. 3-87).

FEMA recognizes four wind zones in the U.S., depicted in Figure 4.40. Ouray County falls into Zone I. Winds speeds reach up to 130 miles per hour in Zone I.

**Figure 4.40. Wind Zones in the United States**



Source: FEMA

## Past Occurrences

According to SHELDUS, there were 37 notable wind events between 1960 and 2011. These events are captured in Table 4.18. Since the type of wind events that are of the greatest concern to Ouray County occur mostly between April and the end of September, events from other

months were excluded here. Nonetheless, winter winds can also cause damage and contribute to avalanches. See Table 4.15 in Section 4.2.12 Severe Winter Storm for more information about wind events associated with winter weather.

**Table 4.18 Ouray Wind Events, 1960-2011**

Date	Details	Injuries	Fatalities	Total Property and Crop Damage(\$)*
4/16/1960	Wind	0.08	0	6,156
4/7/1961	Wind	0	0	2,258
1/8/1962	Cold, snow, wind	0	0	60,337
1/8/1962	Wind - Winter weather	0	0.16	60,337
4/7/1962	Wind	0.02	0	5,939
4/21/1963	Wind	0	0	2,207
6/17/1964	Wind	0	0	588
4/6/1969	Wind	0.02	0	497
10/11/1969	Snow, cold, wind	0.03	0	9,930
4/14/1970	Damaging wind	0	0	470
11/30/1970	Wind	0	0	4,696
3/17/1971	Wind	0	0	450
5/19/1974	Wind	0	0	1,370
6/8/1974	Snow, wind, rain	0	0	370
11/24/1975	Heavy snow, wind	0	0	93
11/30/1975	Wind	0	0	9,277
2/17/1976	High winds	0	0	7,205
4/18/1978	High winds	0	0	692
3/12/1982	Heavy snow, high winds	0	0	374
11/26/1983	Snow, wind	0	0	18,295
4/19/1984	Snow, wind	0	0	1,754
4/25/1984	Wind, snow	0	0	30
5/4/1986	High winds	0	0	873
9/24/1986	Wind	0.02	0	16,626
1/17/1988	Heavy snow, wind	0	0	353
5/1/1988	Wind	0	0	24,260
5/6/1988	Wind	0	0	30,806
2/1/1989	High winds	0	0	1,469
12/14/1990	High winds	0	0	225
3/4/1991	Winter storm, high winds	0	0	183
2/14/1995	High wind	0	0	10,043
4/18/2000	High wind	0	0	105,260
5/21/2002	Wind	0	0	31,906
5/11/2004	Wind	0	0	270
2/15/2006	Strong wind	0	0	2,278
3/26/2007	Strong wind	0	0	664
6/6/2007	Strong wind	0	0	201
<b>Total</b>		<b>0.17</b>	<b>0.16</b>	<b>418,742</b>

Source: SHEL DUS, [www.cas.sc.edu/geog/hrl/SHEL DUS.html](http://www.cas.sc.edu/geog/hrl/SHEL DUS.html)

\*2012 dollars, events may have occurred over multiple counties so damage may represent only a fraction of the total event damage and may be not specific to Ouray County

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NCDC recorded 22 high wind events between 1993 and March 2013. These events resulted in \$206,500 in property damages but no casualties or crop damage. Descriptions from the National Climatic Data Center Storm Events Database for some of the events mentioned in Table 4.18 are included below:

- **December 31, 2011**—Wind gusts of 50 to 80 mph were measured across parts of western Colorado. Even stronger winds were measured at some high elevation locations, including 99 mph on Mount Abrams.
- **March 26, 2007**—Strong southwest winds buffeted the Northwest San Juan Mountains with numerous gusts to near 50 mph. Locally stronger gusts included 86 mph and 80 mph at Mount Abrams and Bald Mountain, respectively. Numerous trees were blown down or snapped off at high elevations above Telluride.
- **May 11, 2004**—Gradient winds ahead of a cold front gusted to 60 mph or greater, mainly at mountain locations. Tree limb damage was reported at several locations.
- **May 21, 2002**—Strong gradient winds gusting in excess of 80 knots snapped off several large ponderosa pine trees and blew them onto U.S. Highway 550 just south of Ouray. The highway was blocked until the trees could be removed. The strong winds also blew rocks off cliffs onto the highway below.
- **April 18, 2000**—An approaching cold front induced strong winds across western Colorado. Gusts of 50 to 60 miles per hour were common. The strong winds downed many trees and a number of power poles in the region. Several vehicles were smashed or damaged by fallen trees. Several mobile homes were destroyed when they were blown from their moorings. Many houses and businesses sustained damage, mostly as a result of being struck by fallen trees or by having the roofs blown off. Within one particular community in La Plata County, 20 houses were damaged. Electrical power and telephone service was disrupted in many areas for up to several hours. Many controlled burns became out-of-control fires.

More recently, on January 28, 2008, a weather station on the ridge between Red Mountain 3 and McMillan Peak recorded wind of 102 mph and on February 8, 2008 it recorded wind of 96 mph. Another weather station in Senator Beck basin west of Highway 550 recorded a peak over 130 mph, but it is in a location where terrain probably affected the wind speed.

A suspected microburst incident occurred northwest of Colona on May 28<sup>th</sup>, 2013. The Ouray County Sheriff's Office responded to a report of damage from a tornado. The responding officer found a mobile home that had rolled over and landed on its roof. Other damages included shingles blown off a roof and a roof ripped off of a pole barn. No one witnessed or heard a tornado, so it was suspected that the damages may have been caused by a microburst instead. A tornado was reported on June 3, 2013 in Montrose County, so tornadoes are technically possible in the area but highly unlikely.

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## **Geographical Area Affected**

Windstorms could occur anywhere in Ouray County. The unpopulated high country areas will experience the highest wind events. The windstorms themselves can also occur over a large area. Bora winds can cause widespread rather than localized damage.

## **Potential Magnitude**

Overall, windstorm impacts in Ouray County would likely be limited, with 10-25 percent of the planning area affected.

According to SHELDUS, 37 damaging wind events caused a total of \$418,742 in damages over a 51 year span between 1960 and 2011. This averages out to \$8,211 in damages per year. Therefore, Ouray County could expect to sustain roughly \$8,211 in damages from severe winds in any given year.

## **Frequency/Likelihood of Occurrence**

**Highly Likely**—Near 100 percent in next year, or happens every year.

## **4.2.15 Hazardous Materials Incident**

### **Hazard/Problem Description**

Ouray County is susceptible to accidents involving hazardous materials on roads, highways, and at fixed facilities that manufacture, use, or store dangerous chemical substances. A hazardous materials incident may occur at any time during routine business operations or as a result of a natural disaster. The release of hazardous materials can threaten people and natural resources in the immediate vicinity of the accident. Air releases can prompt large-scale population evacuations and spills into water or onto the ground can adversely affect public water and sewer systems.

A transportation incident refers to accidental and uncontrolled releases of chemicals or other hazardous materials during transport (i.e., highways, pipelines, and airways). There are no designated routes for hazardous materials transporters, but illicit transport of materials has been known to occur on Highways 550 and 62. Fuel trucks traveling over Highway 550 are a concern to the County and trucking industry shortest route requirements may be routing more trucks over the pass. Since Ouray County is surrounded by mountains and diverse terrain, transportation of hazardous materials is at higher risk to accidents on high mountain passes with severe weather conditions and ice, wildlife, and debris on the roadways.

A fixed-facility incident is an uncontrolled release of chemicals or other potentially hazardous materials from a facility. Fixed facilities include companies that store hazardous waste at their facility and also all hazardous waste sites. Begun in 1988, the Toxics Release Inventory (TRI) is

a federal program established by the U.S. Environmental Protection Agency that contains information on releases of nearly 650 chemicals and chemical categories from industries including manufacturing, metal and coal mining, electric utilities, and commercial hazardous waste treatment, among others. TRI facilities are required to file reports of their disposal or other environmental releases as well as other waste management quantities of regulated chemicals if they manufacture, process, or otherwise use more than the established threshold quantities of these chemicals. Ouray County has no reported TRI data. Increasing interest in mining activity could result in an influx of more explosives and chemicals associated with that industry, as well as an increase in fuel transport and storage.

**Note:** The TRI does not cover all toxic chemicals that have the potential to adversely affect human health or the environment. The data does not include emissions from mobile sources nor releases of pesticides, volatile organic compounds, or fertilizers from many nonindustrial sources.

### Past Occurrences

Hazardous materials incidents in Ouray County have been relatively insignificant. Statistics from the National Response Center, which serves as the sole national point of contact for reporting all oil, chemical, radiological, biological, and etiological discharges into the environment anywhere in the United States and its territories, indicate that between 1990 and the end of 2012, seven incidents were reported in Ouray County. No incidents were reported to the NRC in 2009, 2010, 2011, or 2012. Of the incidents, three were fixed and four were mobile (transportation on land). Although injuries/fatalities were associated with some of the mobile events, they were not associated with the hazardous material released. None of the incidents had recorded impacts on the environment or the community. According to the HMPC, a fireman was killed in the 1950s when a fire burned in a shed that was filled with explosives.

**Table 4.19 Hazardous Materials Incidents in Ouray County, 1990-2012**

Incident Date	Description of Incident	Type Of Incident	Nearest City	Location	Suspected Responsible Company	Medium Affected	Materials
9/10/2008	The caller reported a milky discoloration in a creek. The caller suspected that employees of a local mine were dumping products into the creek.	Fixed	Ouray	Governor Basin, Camper Road	Unknown	Water	Unknown
11/11/2007	Caller stated there was a toxic cloud in the area due to materials being burned by an unknown company. Caller stated this was a controlled fire that had been going	Fixed	Ouray	Highway 550, north end of town	n/a	Air	Paints, Plastics, PVC pipes, rubber, unknown material

Incident Date	Description of Incident	Type Of Incident	Nearest City	Location	Suspected Responsible Company	Medium Affected	Materials
	on for four days.						
8/15/2007	Caller reported that an owner dumped 55 gallon barrels of diesel onto the ground and was burying metal as well. The owner also had workers washing out paint brushes in the creek.	Fixed	Ouray	Ruby Trust Mine below the Yankee Boy Basin	Mount Sneffels Mining Company	Water	Oil, fuel: no. 2-d Paint,
8/22/2005	A vehicle accident caused the release of radioactive materials from a pickup truck that was carrying a DOT shipping container.	Mobile	Ouray	Mile marker 89 on Highway 550	Protechnics	Soil	Radioactive material (ir-192, sc-46 & sb-124)
5/30/2001	A vehicle accident caused the release of asphalt from a tanker truck.	Mobile	Ridgway	Mile marker 111 on Highway 550	Groendyke Transport	Land	Asphalt
11/22/1993	55 gallon drums fell into a lake as a result of a vehicle accident	Mobile	Ouray	Highway 550 summit of Red Mountain Pass	Western Tube and Conduit	Water	Zinc ash
5/1/1990	Dump truck / truck went off the road and rolled, spilling 8,000 pounds of lead sulfide.	Mobile	Ridgway	On Highway 550	San Juan County Mining	Land	Lead sulfide
2/2008	A truck went off the road and rolled, spilling a small quantity of methanol.	Mobile	Ouray	On Highway 550		Land	Methanol

Source: National Response Center, [www.nrc.uscg.mil/](http://www.nrc.uscg.mil/); HMPC

Natural gas pipelines are another source of hazmat events in the County. According to the HMPC there have been a number of incidents in which a pipeline was breached. Depending on the location of the incident and extent of damage to the pipeline, impacts could be serious.

### Geographical Area Affected

Unincorporated and incorporated areas (both City of Ouray and Ridgway) along Highways 550 and 62 could potentially be affected by hazardous materials transportation accidents.

### Potential Magnitude

Overall, impacts from a hazardous materials incident in Ouray County would likely be limited, with 10-25 percent of the area affected.

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## Frequency/Likelihood of Occurrence

**Occasional**—Between 1 and 10 percent chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.

### 4.2.16 Mass Casualty Events

#### Hazard/Problem Description

In general, a mass casualty event is defined as an incident in which local emergency response capabilities are overwhelmed by the number and severity of casualties. While many of the hazards profiled in this plan could result in such an incident, this hazard is specifically concerned with transportation incidents that involve large numbers of people (e.g., a plane or bus crash). These incidents could be primary hazards or secondary effects of another hazard (e.g., an avalanche along a transportation corridor could bury vehicles). A plane crash in the rugged terrain of Ouray County is likely to have few survivors, whereas a tour or school bus crash could result in multiple injuries and fatalities. The mining industry has seen growth in Ouray County since the 2008 plan was written. Mass casualty events sometimes occur in the mining industry due to cave-ins or explosions.

Ouray County is particularly concerned that a tour/motor coach bus could go over the side of Highway 550. Greyhound has changed their route and no longer goes through the City of Ouray.

According to the Centers for Disease Control and Prevention, the most severe injuries in mass casualty events are fractures, burns, lacerations, and crush injuries. However, the most common injuries are eye injuries, sprains, strains, minor wounds, and ear damage. Additionally, it is normal for people to suffer emotional and physical stress after a mass casualty event, even if they are not at or near the scene. This additional stress can make existing health conditions worse or trigger a new health problem.

#### Past Occurrences

Since 2005, emergency services in Ouray County have responded to five incidents where a vehicle has gone over the side of the highway. Impacts ranged from minor injuries to fatalities. One of these incidents, which received national attention, occurred in February 2005 when a van carrying six passengers hit a patch of black ice, flipped sideways, started rolling, and plunged approximately 400 feet down the mountain ravine (all passengers were able to walk away from the accident). Although none of these five events were mass casualty events, they are indicative of what could happen given the right combination of circumstances.

An airplane crash in the winter of 2004 killed four people on Whitehouse Mountain and the bodies could not be recovered until the following spring. On March 22, 2014, a small plane

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carrying five people crashed into Ridgway Reservoir.<sup>7</sup> No one survived the crash. The passengers, all from Alabama, were on their way to Montrose for a skiing trip.

On November 17, 2013 two miners at the Revenue-Virginus Mine died from carbon monoxide poisoning.<sup>8</sup> Twenty other miners were taken to regional hospitals to be treated for carbon monoxide exposure. An area of the mine was contaminated with lethal levels of CO from a previous explosive detonation.

### **Geographical Area Affected**

An event such as an airplane crash could occur anywhere in the County. Traffic and bus accidents are most likely to occur along the Highway corridors of 550 and 62. The steeper, curvy sections of Highway 550 above and south of Ouray are particularly prone to accidents. The section of Highway 550, also known as the Million Dollar Highway, extending south from the City of Ouray to Silverton is 27 twisty mountain miles with very few guard rails. The first section up to the Ironton Park meadows runs along an eastern cliff side with up to 410 foot drops down to the bottom and the Uncompahgre River. Mass casualty events could also occur in the County's active mines.

### **Potential Magnitude**

Overall, mass casualty impacts in Ouray County would likely be negligible, with less than 10 percent of the planning area's population affected.

In May 2010, Ouray County EMS produced a full-scale exercise that simulated an estimated worst-case scenario event. The scenario involved a school bus going off the side of County Road 1 down a 50-60 foot embankment, resulting in 20-30 patients and no fatalities. Emergency responders also had to address the needs of family members of the exercise "victims," making the exercise much larger in scope. An estimated 120 people were involved on the emergency response side of the exercise. A similar training exercise was conducted in May 2008.<sup>9</sup> These exercises serve as guidelines for the potential magnitude of a mass casualty incident in Ouray County.

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<sup>7</sup> "Ridgway Reservoir plane crash: 5 believed to be dead in sunken wreckage." March 23, 2014. <http://www.thedenverchannel.com/news/local-news/ridgway-reservoir-plane-crash-search-for-victims-continues-sunday>. Accessed May 2, 2014.

<sup>8</sup> Joey Bunch and Tom McGhee. "Two miners dead in Colorado, 20 others injured after Ouray blast." *The Denver Post*, November 17, 2013. Available online at [http://www.denverpost.com/breakingnews/ci\\_24542891/two-miners-trapped-20-others-injured-after-ouray?source=pkg](http://www.denverpost.com/breakingnews/ci_24542891/two-miners-trapped-20-others-injured-after-ouray?source=pkg). Accessed November 26, 2013.

<sup>9</sup> Gus Jarvis. "Bus Crash Training Exercise Set for May 8 Near Ridgway." *The Watch*, May 3, 2010. Available online at [http://www.watchnewspapers.com/view/full\\_story/7281608/article-Bus-Crash-Training-Exercise-Set-for-May-8-Near-Ridgway](http://www.watchnewspapers.com/view/full_story/7281608/article-Bus-Crash-Training-Exercise-Set-for-May-8-Near-Ridgway). Last accessed September 10, 2013.

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Response to the March 22, 2014 plane crash in Ridgway Reservoir took over 1,500 labor hours. The overall cost of the plane recovery was approximately \$75,000.<sup>10</sup>

### **Frequency/Likelihood of Occurrence**

**Occasional** - Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.

Tour bus crashes are more likely to occur during the tourist season which is most busy between June through August and when vans and buses are transporting people between the Telluride ski area and Montrose Airport during the winter.

## **4.2.17 Imminent Threat**

### **Hazard/Problem Description**

Imminent threat includes the potential for violent attacks, including but not limited to domestic and international terrorism. The Federal Bureau of Investigation (FBI) defines terrorism as “the unlawful use of force or 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.” The threat of terrorism, both international and domestic, is ever present, and an attack is likely to occur when least expected. Incidents of mass shootings in public areas around the United States, notably in 2012, have shown that individuals can inflict severe damage. These individuals’ motives may vary, from terrorism to random or criminal acts.

Imminent threats to public safety are a growing concern worldwide that must be addressed through security and awareness. Needs associated with imminent threats include training and equipping of local emergency response personnel in cooperation with state and federal agencies.

Ouray County could be a source of explosives for imminent threats to public safety. These sources could be from active mines (dynamite) or hand charges and shells for howitzers used for avalanche control by the Colorado Department of Transportation. The mines themselves could be targets from radical environmental groups. There are families and individuals in Ouray County with a history of strong anti-governmental statements, action, and signage.

It is these latter groups that are of particular concern to Ouray County. Ecoterrorism is a form of domestic terrorism that the FBI defines as “the use or threatened use of violence of a criminal nature against innocent victims or property by an environmentally-oriented, subnational group for environmental-political reasons, or aimed at an audience beyond the target, often of a symbolic nature.” According to the Southern Poverty Law Center, extremists within the environmental and animal rights movements have committed thousands of violent criminal acts

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<sup>10</sup> Personal communication with Ouray County Emergency Manager Glenn Boyd

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in recent decades, more than those from any other radical sector. These acts have included arsons, firebombings, assaults, and attacks on animal-based businesses and laboratories. The leading ecoterrorist groups are the Animal Liberation Front and the Earth Liberation Front. Since 1996, these groups have had committed more than 600 criminal acts, causing more than \$43 million in damage nationwide.

Imminent threats may also include cyber terrorism, or cyber security incidents more generally. Cyber-security incidents are a growing concern as many energy delivery systems are managed by computers. There are many threats, some more serious than others. For example, many power plants and other infrastructure are remotely controlled by supervisory control and data acquisition (SCADA) systems. SCADA systems are vulnerable to attack through hackers who could access the system and sabotage the target facility.

Some examples of how computers and systems could be affected by a cyber security incident—whether because of improper cyber security controls, manmade or natural disasters, or malicious users wreaking havoc—include the following:

- **Denial-of-service:** This refers to an attack that successfully prevents or impairs the authorized functionality of networks, systems, or applications by exhausting resources. This type of attack could shut down a government agency's website, thereby preventing citizens from accessing information or completing transactions. This type of attack could also impede business operations or critical services such as emergency medical systems, police communications, or air traffic control.
- **Malware, worms, and Trojan horses:** These spread by email, instant messaging, malicious websites, and infected non-malicious websites. Some websites will automatically download the malware without the user's knowledge or intervention. This is known as a "drive-by download." Other methods will require the users to click on a link or button.
- **Botnets and zombies:** A botnet, short for robot network, is an aggregation of compromised computers that are connected to a central "controller." The compromised computers are often referred to as "zombies." These threats will continue to proliferate as the attack techniques evolve and become available to a broader audience, with less technical knowledge required to launch successful attacks. Botnets designed to steal data are improving their encryption capabilities and thus becoming more difficult to detect.
- **"Scareware" - fake security software warnings:** In this type of scam cyber criminals use pop-up warnings telling users that their system is infected. Many users are then lured into downloading and paying for unnecessary software to "protect" their system.

## **Past Occurrences**

Ouray County has had some incidents in the past that could be considered terrorist activities today. A suicide bomber blew himself up on Highway 550, near the East Riverside avalanche shed, in the 1970's. In 1920 there was an incident in Ridgway that involved unknown perpetrators blowing up some buildings in the downtown area with dynamite. Their motives

were unknown. Also in the 1920's there were Ku Klux Klan rallies in Ridgway and Ouray. The Idarado Mine in Ouray was the source of explosives for terrorist activity in Boulder County during the 1980's.

### Geographical Area Affected

The following areas of the County are potential terrorist targets:

- Active mines
- Resort development in northwest corner of County
- Ridgway Reservoir and Dam
- Ouray Hydroelectric Power Plant
- Power grid, substations, and communications facilities

### Potential Magnitude

Overall, imminent threat impacts in Ouray County would likely be limited, with 10-25 percent of the area affected.

### Frequency/Likelihood of Occurrence

**Occasional** - Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years. This is based on information previously profiled.

## 4.2.18 Hazard Profiles Summary

This section summarizes the results of the hazard profiles and assigns a level of overall planning significance to each hazard of low, moderate, or high. Significance was determined based on the hazard profile, focusing on key criteria such as frequency and resulting damage, including deaths/injuries and property, crop, and economic damage. This assessment was used by the HMPC to prioritize those hazards of greatest significance to the planning area; thus enabling the County to focus resources where they are most needed. Those hazards that occur infrequently or have little or no impact on the planning area were determined to be of low significance. Those hazards determined to be of high and moderate significance were characterized as priority hazards that required further evaluation in Section 4.3 Vulnerability Assessment.

**Table 4.20 Summary of Hazard Profiles**

Hazard Type	Geographic Location*	Probability*	Magnitude*	Overall Vulnerability
Avalanche	Highly Likely	Limited	Limited	Medium
Dam Failure	Unlikely	Limited	Limited	High
Debris Flow	Highly Likely	Limited	Critical	High
Drought	Likely	Significant	Critical	Medium
Earthquake	Occasional	Significant	Critical	Medium
Extreme Temperatures	Highly Likely	Limited	Limited	Low

Hazard Type	Geographic Location*	Probability*	Magnitude*	Overall Vulnerability
Flooding	Likely	Significant	Critical/Catastrophic	High
Hazardous Materials	Occasional	Limited	Limited	Medium
Landslide/Rockfall	Likely	Limited	Limited	Medium
Lightning	Highly Likely	Limited	Limited	Medium
Mass Casualty Event	Occasional	Limited	Negligible	Low
Public Health Emergencies	Occasional/Likely**	Significant	Critical/Limited	Medium
Severe Winter Storms	Likely	Extensive	Critical	Medium
Imminent Threat	Unlikely	Limited	Limited	Low
Wildfires	Highly Likely	Significant	Critical/Catastrophic	High
Windstorms	Highly Likely	Limited	Limited	Medium

Source: HMPC

\*See section 4.2 for definitions of these factors

\*\*Based on occurring anywhere in the United States

The following tables summarize the results of the hazard profiles for incorporated communities and special districts that participated in the hazard mitigation plan.

**Table 4.21 Probability of Future Occurrence of Identified Hazards by Jurisdiction**

Hazard Type	Ouray County	City of Ouray	Town of Ridgway	Log Hill Mesa FPD	Ridgway School District
Avalanche	Highly Likely	Unlikely	Unlikely	Unlikely	Unlikely
Dam Failure	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely
Debris Flow	Highly Likely	Highly Likely	Likely	Unlikely	Likely
Drought	Highly Likely	Highly Likely	Highly Likely	Likely	Highly Likely
Earthquake	Occasional	Occasional	Likely	Occasional	Occasional
Extreme Temperatures	Highly Likely	Highly Likely	Likely	Likely	Highly Likely
Flooding	Highly Likely	Occasional	Occasional	Unlikely	Occasional
Hazardous Materials	Occasional	Occasional	Unlikely	Occasional	Occasional
Landslide/Rockfall	Likely	Likely	Unlikely	Unlikely	Unlikely
Lightning	Highly Likely	Likely	Unlikely	Likely	Highly Likely
Mass Casualty Event	Occasional	Unlikely	Unlikely	Unlikely	Unlikely
Public Health Emergencies	Likely	Unlikely	Unlikely	Unlikely	Unlikely
Severe Winter Storms	Likely	Likely	Occasional	Likely	Highly Likely
Imminent Threat	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely
Wildfires	Highly Likely	Likely	Likely	Highly Likely	Likely
Windstorms	Highly Likely	Likely	Likely	Occasional	Likely

Source: HMPC

\*See section 4.2 for definitions of these factors

**Table 4.22 Magnitude/Severity of Identified Hazards by Jurisdiction**

Hazard Type	Ouray County	City of Ouray	Town of Ridgway	Log Hill Mesa FPD	Ridgway School District
Avalanche	Limited	Limited	Limited	Negligible	Limited
Dam Failure	Limited	Critical	Critical	Negligible	Critical
Debris Flow	Critical	Critical	Limited	Negligible	Negligible
Drought	Critical	Critical	Critical	Critical	Critical
Earthquake	Critical	Limited	Limited	Negligible	Limited

Hazard Type	Ouray County	City of Ouray	Town of Ridgway	Log Hill Mesa FPD	Ridgway School District
Extreme Temperatures	Limited	Limited	Limited	Limited	Limited
Flooding	Critical/ Catastrophic	Limited	Limited	Negligible	Limited
Hazardous Materials	Limited	Limited	Negligible	Limited	Limited
Landslide/Rockfall	Limited	Limited	Limited	Negligible	Negligible
Lightning	Limited	Negligible	Negligible	Limited	Negligible
Mass Casualty Event	Negligible	Critical	Catastrophic	Limited	Critical
Public Health Emergencies	Critical	Critical	Catastrophic	Limited	Critical
Severe Winter Storms	Critical	Critical	Critical	Limited	Limited
Imminent Threat	Negligible	Critical	Critical	Limited	Critical
Wildfires	Critical/ Catastrophic	Critical	Catastrophic	Critical	Critical
Windstorms	Limited/ Catastrophic	Limited	Negligible	Limited	Limited

Source: HMPC

\*See section 4.2 for definitions of these factors

**Table 4.23 Planning Significance of Identified Hazards by Jurisdiction**

Hazard Type	Ouray County	City of Ouray	Town of Ridgway	Log Hill Mesa FPD	Ridgway School District
Avalanche	Medium	Low	Low	Low	Low
Dam Failure	High	Low	Low	Low	Low
Debris Flow	High	High	Low	Low	Low
Drought	Medium	High	High	Medium	High
Earthquake	Medium	Medium	Medium	Low	Medium
Extreme Temperatures	Low	Low	Low	Medium	Medium
Flooding	High	Medium	Medium	Low	Low
Hazardous Materials	Medium	Low	Low	Low	Low
Landslide/Rockfall	Medium	Medium	Low	Low	Low
Lightning	Medium	Low	Low	Medium	Low
Mass Casualty Event	Low	Low	Low	Low	Medium
Public Health Emergencies	Medium	Low	Low	Low	Low
Severe Winter Storms	Medium	Medium	Medium	Medium	Medium
Imminent Threat	Low	Low	Low	Low	High
Wildfires	High	High	High	High	Medium
Windstorms	High	Low	Low	Low	Low

Source: HMPC

\*See section 4.2 for definitions of these factors

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## 4.3 Assessing Vulnerability

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**Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction’s vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.**

**Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.**

**Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of 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.**

**Requirement §201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.**

With Ouray County’s hazards identified and profiled, the HMPC conducted a vulnerability assessment to describe the impact that the more significant hazards would have on the County. The vulnerability assessment quantifies assets at risk to hazards and estimates potential losses, to the extent possible.

This vulnerability assessment followed the methodology described in the FEMA publication *Understanding Your Risks—Identifying Hazards and Estimating Losses*. The vulnerability assessment first describes the communities’ assets exposed and then discusses vulnerability by hazard.

### 4.3.1 Methodology

This vulnerability assessment is an attempt to quantify assets at risk, by jurisdiction where possible, to further define populations, buildings, and critical facilities at risk to hazards identified in this plan. The hazards included in this assessment are those that were considered medium or high in planning significance, based on HMPC input and the hazard profiles, and for which suitable information was available for analysis. The methods of analysis vary by hazard type and data available.

Table 4.24 lists the hazards profiled in Section 4.2 that were excluded from this vulnerability assessment and explains why. Generally, hazards were excluded because they were of low planning significance, research did not discover noteworthy damage in the past, or they have a very low probability of future occurrence or are difficult to quantify losses. Manmade hazards are not a required element of this plan under DMA 2000 regulations and were excluded because

they are difficult to predict when and where they will occur and it is difficult to estimate potential losses.

**Table 4.24 Hazards Omitted from Vulnerability Assessment**

Hazard	Rationale for Omitted Vulnerability Assessment
Dam Failure	Low probability and low potential impact within County, sensitive information
Extreme Temperatures	Low significance and research in the hazard profile did not result in significant loss information for this hazard
Hazardous Materials	Manmade hazard and limited potential impacts based on hazard profile
Lightning	Difficult to quantify potential losses due to random nature of hazard, low impact history
Mass Casualty Event	Low significance and manmade hazard. Difficult to quantify potential losses
Imminent Threat	Manmade hazard and difficult to quantify potential losses
West Nile Virus	Research in the hazard profile did not result in significant loss information for this hazard
Windstorm	Research in the hazard profile did not result in significant loss information for this hazard

Data to support the vulnerability assessment was collected and compiled from the following sources:

- County GIS data (hazards, base layers, critical facilities and assessor’s data)
- Written descriptions of inventory and risks provided by participating jurisdictions
- Existing plans and studies
- Personal interviews with planning team members, hazard experts, and County and City staff

The scope of the vulnerability assessment was to describe the risks to the County as a whole. Where possible, data specific to each participating jurisdiction was also evaluated and is integrated here in an effort to illustrate where risk differs across the planning area in order to summarize vulnerability for each participating jurisdiction. If a particular municipality or district is not noted it is in indication that significant vulnerabilities have not been identified or the entity does not have jurisdiction over the hazard. For example Log Hill Mesa FPD does not have jurisdiction over debris flow, landslide/rockfall hazards, and certain manmade hazards.

The vulnerability assessment first describes the assets in Ouray County, including the total exposure of people and property; critical facilities and infrastructure; natural, historic, and cultural resources; and economic assets. Development trends, including population growth and land status, are analyzed in relation to hazard-prone areas. Next, where data was available, hazards of high and medium significance are evaluated in more detail and potential losses are estimated.

### 4.3.2 Assets Exposed

This section assesses the population, structures, critical facilities and infrastructure, and other important assets in Ouray County at risk to hazards identified in this plan. It begins with an inventory of people and buildings (total exposure) in the County to provide a baseline for evaluating vulnerability by hazard.

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## Total Exposure to Hazards

Table 4.25 shows the population exposure to hazards based on estimates from the 2010 U.S. Census.

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**Table 4.25 Population Exposure by Jurisdiction**

Jurisdiction	2010 Population Estimate
City of Ouray	1,000
Town of Ridgway	924
Unincorporated Areas	2,512
<b>Total County</b>	<b>4,436</b>

Source: 2010 U.S. Census, factfinder2.census.gov

Note that the information above does not take in account the seasonal populations surges due to tourism. According to visitor counts from the Ouray Chamber Resort Association, more than 5,000 people may pass through the Visitor Center in one month (roughly 179 people per day) during the height of the summer tourist season. Lodging occupancy trends from the City of Ouray paint a different and more accurate picture. In July 2007 alone, 16,813 rooms were available for rent. Given similar rental capacity and assuming full capacity and double occupancy, on any given day (June-September), the population of the City of Ouray could swell by more than 1,000 (16,813 rooms/31 nights x 2), more than doubling its population. These numbers may still be on the low side since they do not include day-trippers and campers. Information from the City of Ouray Community Plan suggests that peak population in the City could approximate 3,000 people, including all overnight visitors and day visitors.

The City has some hazard-related concerns or issues regarding special needs populations, such as the elderly and disabled. Some of the concerns are related to:

- Getting people up and down stairs (there are only four elevators in the City – at the Community Center, the County Courthouse, the Beaumont Hotel, and at a private residence)
- Dust – respiratory issues
- Heat related (Almost no air-conditioning in buildings – both commercial and residential)

## Exposure/Potential Dollar Loss

Building inventories and values in this plan are based on assessments from the Ouray County's Assessor's Office (July 1, 2013). Table 4.26 and Table 4.27 show the value of parcels with improvements. According to the assessor's data the sum of all improvements in the County, based on actual value, is \$748,262,560 (total building exposure). In order to get a complete estimate of building exposure the building content value is estimated and added. Contents exposure is estimated as a percent of the improvement value (specifically, 50% of the improvement value for residential structures, 100% for agricultural structures, 100% for commercial and utility structures, 100% for unknown structures, 0% for vacant land, and 100%

for exempt structures), based on standard FEMA methodologies. Total exposure (building and contents) is estimated at \$1,188,636,905. Land values are not included in this analysis, because land remains following disasters, and subsequent market devaluations are frequently short-term and difficult to quantify. Additionally, state and federal disaster assistance programs generally do not address loss of land or its associated value.

**Table 4.26 Total Exposure of 2013 Assessor Parcel Data by Jurisdiction**

Jurisdiction	Total Parcel Count	Improved Parcel Count	Improved Actual Value	Contents Exposure	Total Exposure
City of Ouray	896	629	\$119,152,980	\$74,360,000	\$193,512,980
Town of Ridgway	941	575	\$145,115,410	\$100,551,165	\$245,666,575
Unincorporated Areas	3,770	1,696	\$483,994,170	\$265,463,180	\$749,457,350
<b>Total County</b>	<b>5,607</b>	<b>2,900</b>	<b>\$748,262,560</b>	<b>\$440,374,345</b>	<b>\$1,188,636,905</b>

Source: Ouray County Assessor's Office 2013

\* Improved Values are based on Actual Values in the Assessor's Database.

**Table 4.27 Total Exposure of 2013 Assessor Parcel Data by Property Type**

Property Type	Total Parcel Count	Improved Parcel Count	Improved Actual Value	Contents Exposure	Total Exposure
Agriculture	113	112	\$27,900,490	\$27,900,490	\$55,800,980
Commercial	268	251	\$74,214,360	\$74,214,360	\$148,428,720
Exempt	50	3	\$470,480	\$470,480	\$940,960
Residential	2,536	2,491	\$607,916,990	\$303,958,495	\$911,875,485
Unknown	62	4	\$553,360	\$553,360	\$1,106,720
Utilities	4	4	\$33,277,160	\$33,277,160	\$66,554,320
Vacant Land	2,574	35	\$3,929,720	\$0	\$3,929,720
<b>Total</b>	<b>5,607</b>	<b>2,900</b>	<b>\$748,262,560</b>	<b>\$440,374,345</b>	<b>\$1,188,636,905</b>

Source: Ouray County Assessor's Office 2013

\* Improved Values are Actual Values in the Assessor's Database.

## Critical Facilities, Infrastructure, and Other Important Community Assets

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. FEMA's HAZUS-MH loss estimation software uses the following three categories of critical assets. Essential facilities are those that if damaged would have devastating impacts on disaster response and/or recovery. High potential loss facilities are those that would have a high loss or impact on the community. Transportation and lifeline facilities are a third category of critical assets. Examples of each are provided below.

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**Essential Facilities**

- Hospitals and other medical facilities
- Police stations
- Fire station
- Emergency Operations Centers

**High Potential Loss Facilities**

- Power plants
- Dams and levees
- Military installations
- Hazardous material sites
- Schools
- Shelters
- Day care centers
- Nursing homes
- Main government buildings

**Transportation and Lifelines**

- Highways, bridges, and tunnels
- Railroads and facilities
- Airports
- Water treatment facilities
- Natural gas and oil facilities and pipelines
- Communications facilities

HMPC members were asked to identify the assets in their respective jurisdictions that they considered to be critical facilities or of particular importance/value. Table 4.28-Table 4.32 summarize the inventory of these assets in Ouray County, by jurisdiction, as provided by the HMPC. The locations of the critical facilities are illustrated in Figure 4.41.

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**Table 4.28 Ouray County Asset Inventory**

Name of Asset	Type	Replacement Value (\$)	Hazard Specific Info
Emergency Operations Center / Land Use Building / Road and Bridge	LL / LS	10 Million	Wildfire
Buckhorn Radio Site	LL	10 million	Wildfire
Storm King Radio Site	LL	10 million	Wildfire
Waterdog radio Site	LL	1 Million	Wildfire
Log Hill Radio Site	LL	2 Million	Wildfire
Blowout Radio Site	LL	1.5 Million	Wildfire
Golden Crystal Radio Site	LL	500k	Wildfire
230 KV Power Transmission	EA	10 Million	Wildfire
Ridgway Substation	EA	3 Million	Wildfire
Ouray Substation	EA	3 Million	Flooding
44KV Power Distribution	EF	1 Million	Wildfire
Natural Gas Pump Station	LL	1 Million	Wildfire
Courthouse	EF	6 Million	Fire, Flooding
4H Event Center / Shelter	LL	2 Million	Flooding
Ouray School	EF	10 Million	Flooding, Earthquake
Ridgway School elementary School	EF	5 Million	Hazmat, Earthquake
Ridgway Secondary School	EF	5 Million	Earthquake
Ouray County Public Health	LL	2 million	Flooding
Ouray County Historic Museum	Historic/Cultural/EA	10 million	Flooding, Earthquake
Ouray County Mountain Rescue Barn	LS	5 Million	Fire, Earthquake
Ridgway Medical Clinic	EF	5 Million	Flooding

\*EF: Essential Facilities; LS: Life Safety Facilities; LL: Life line facilities; HCNA: Historic, cultural or natural assets; EA: Economic Asset

**Table 4.29 City of Ouray Asset Inventory**

Name of Asset	Type	Replacement Value (\$)	Occupancy/ Capacity #	Hazard Specific Info
County Health Offices	Essential	300,000	20	
City of Ouray Police Department	Essential	500,000	20	Flooding, debris flow
City of Ouray Fire Department	Essential	1 million	50	Flooding, debris flow
Ouray County Sheriff Offices	Essential	1.5 million	20	Flooding, debris flow
County Emergency Operations Center	Essential	2 million	50	
Hydroelectric Plant	High Potential Loss	2 million	10	Flooding Drought
Ouray School	High Potential Loss	7 million	300	
Community Center (Shelter)	High Potential Loss	5 million	300	
City Hall	High Potential Loss/Historic	2 million	50	
County Courthouse	High Potential Loss/Historic	6 million	150	
City/County Shop and Yard	High Potential Loss	1 million	40	
City Water Main, Springs, and Facilities	Lifeline	5 million	0	Fire, debris flow, terrorism
City Waste Water Treatment Plant	Lifeline	3 million	0	
Highway 550	Transportation			Flooding
Two Bridges on Main Street	Transportation	1 million each		Flooding
Culvert at Skyrocket Drainage	High Potential Loss	800,000		Flooding, debris flow
7 <sup>th</sup> Avenue Bridge	Transportation	800,000		Flooding
3 <sup>rd</sup> Avenue Bridge	Transportation	500,000		Flooding
Whispering Pines Bridge	Transportation	500,000		Flooding
Natural Gas Substation	Lifeline			
Electric Transmission Line Substation	Lifeline			Wildfire
Qwest Central Office	High Potential Loss			
Golden Crystal Towers	High Potential Loss			
Uncompahgre Riverway (trail, fences, toilets)	High Potential Loss	500,000	20	Flooding
County Search and Rescue Building	High Potential Loss	800,000	50	Flooding, debris flow
Box Canyon Park Building/Facilities	High Potential Loss	400,000	100	
Hot Springs Line	High Potential Loss	500,000		Terrorism, flooding
Ouray County Historical Society	Historic	4 million	50	
City's Hot Springs Pool	Historic/ Economic	3 million	150	Flooding, debris flow

**Table 4.30 Town of Ridgway Asset Inventory**

Name of Asset	Type	Replacement Value (\$)	Hazard Specific Info
Ridgway Elementary School	EF		
Ridgway High School	EF		
Medical Center	EF		
Fire Department	LS		
Town Hall/ Police Station	LS		
Water Utility Facilities	LL		Wildfire and impact to watershed, treatment and delivery; Drought and water availability
Wastewater Utility Facilities	LL		Wildfire and impact to watershed, treatment and delivery; Drought and water availability
San Miguel Power Assn Facility	LL		
Uncompahgre River Corridor – restoration project	HCNA EA		
Historic Building – Fire Dept/Old Town Hall	HCNA		
Historic Building – Bank Building	HCNA		
Historic Building – Ridgway Sun Building	HCNA		
Historic Building – Old Creamery	HCNA		
Historic Building – Train Depot	HCNA		
Historic Building- Jenny Phillips			
Historic Buildings – specific homes along Clinton Street	HCNA		
Historic Building – Liquor Store	HCNA		
Ouray County Social Services facility	LS		
Uncompahgre River Bridge (State HWY 62)	LL		

\*EF: Essential Facilities; LS: Life Safety Facilities; LL: Life line facilities; HCNA: Historic, cultural or natural assets; EA: Economic Asset

**Table 4.31 Log Hill Mesa Fire Protection District Asset Inventory**

Name of Asset	Type	Replacement Value (\$)	Hazard Specific Info
LHVFD Station 2	EF	\$2.8M	wildfire mitigation completed
LHVFD Station 1	EF	\$500K	wildfire mitigation completed
Dallas Creek Water	LL	\$1M	
Fairway Pines Sanitation Dist	LL	\$1M	
Source Gas Pipeline	LL	unknown	
Divide Ranch Golf Course	EA	unknown	
Log Hill Mesa Communications Site	LL	\$2M	

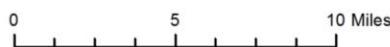
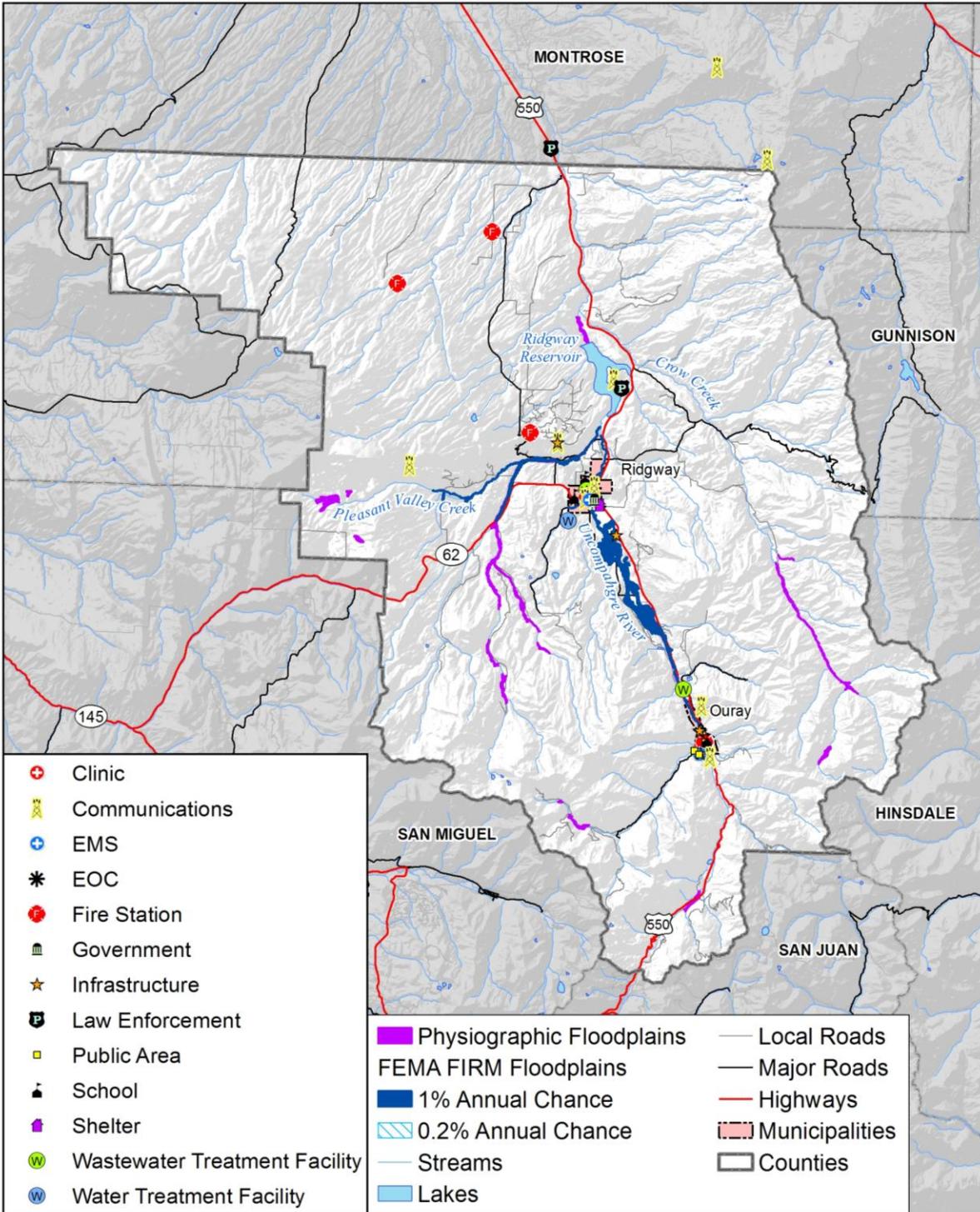
\*EF: Essential Facilities; LS: Life Safety Facilities; LL: Life line facilities; HCNA: Historic, cultural or natural assets; EA: Economic Asset

**Table 4.32 Ridgway School District Asset Inventory**

Name of Asset	Type	Replacement Value (\$)	Hazard Specific Info
Elementary School	EF	\$10,000,000	
Secondary School	EF	\$15,000,000	
Busses and vehicles	LL	\$700,000	

\*EF: Essential Facilities; LS: Life Safety Facilities; LL: Life line facilities; HCNA: Historic, cultural or natural assets; EA: Economic Asset

**Figure 4.41. Ouray County Critical Facilities**



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, FEMA FIRM: Ridgway 9/27/1985  
 & Ouray City and County 7/3/1985 w/LOMRs, NHD

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## **Natural, Historic, and Cultural Assets**

Assessing the vulnerability of Ouray County to disaster also involves inventorying the natural, historical, and cultural assets of the area. This step is important for the following reasons:

- The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

### ***Natural Resources***

Natural resources are important to include in benefit-cost analyses for future projects and may be used to leverage additional funding for projects that also contribute to community goals for protecting sensitive natural resources. Awareness of natural assets can lead to opportunities for meeting multiple objectives. For instance, protecting wetlands areas protects sensitive habitat as well as attenuates and stores floodwaters.

A number of natural resources exist in Ouray County. This includes wetlands, endangered species, and imperiled plant communities. Also, the scenery itself, and access to the scenic backcountry, are economic drivers for the County and both towns.

### **Wetlands**

Wetlands are a valuable natural resource for communities, due to their benefits to water quality, wildlife protection, recreation, and education, and play an important role in hazard mitigation. Wetlands reduce flood peaks and slowly release floodwaters to downstream areas. When surface runoff is dampened, the erosive powers of the water are greatly diminished. Furthermore, the reduction in the velocity of inflowing water as it passes through a wetland helps remove sediment being transported by the water. They also provide drought relief in water-scarce areas where the relationship between water storage and streamflow regulation are vital.

### **Endangered Species**

To further understand natural resources that may be particularly vulnerable to a hazard event, as well as those that need consideration when implementing mitigation activities, it is important to identify at-risk species (i.e., endangered species) in the planning area. An endangered species is any species of fish, plant life, or wildlife that is in danger of extinction throughout all or most of its range. A threatened species is a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Both endangered and

threatened species are protected by law and any future hazard mitigation projects are subject to these laws. Candidate species are plants and animals that have been proposed as endangered or threatened but are not currently listed.

According to the U.S. Fish and Wildlife Service, as of August 2013, there were seven federal endangered, threatened, or candidate species in Ouray County. These species are listed in Table 4.33 along with state listed species. State special concern is not a statutory category, but suggests a species may be in danger. (If available, location information is indicated in the “Quad Name” column, which corresponds to Figure 4.42).

Other significant wildlife species with limited suitable habitat include the designated “state animal,” the Rocky Mountain bighorn sheep, and elk or wapiti, mule deer, black bear, mountain lion, bobcat, and the occasional moose and mountain goat.

**Table 4.33 Select List of Important Species Found in Ouray County**

Common Name	Scientific Name	Type of Species	Status	Quad Map
Bald eagle	<i>Haliaeetus Leucocephalus</i>	Bird	State Threatened	
Bonytail*	<i>Gila elegans</i>	Fish	Federal Endangered	
Canada lynx	<i>Lynx canadensis</i>	Mammal	Federal Threatened	Ironton
Colorado pikeminnow*	<i>Ptychocheilus lucius</i>	Fish	Federal Endangered	
Ferruginous Hawk	<i>Buteo regalis</i>	Bird	State Special Concern	
Greater sandhill crane	<i>Grus Canadensis tabida</i>	Bird	State Special Concern	
Greenback Cutthroat trout	<i>Oncorhynchus clarki stomias</i>	Fish	Federal Threatened	
Humpback chub*	<i>Gila cypha</i>	Fish	Federal Endangered	
Gunnison sage-grouse	<i>Centrocercus minimus</i>	Bird	Proposed Endangered	
Kit Fox	<i>Vulpes macrotis</i>	Mammal	State Endangered	
Mexican spotted owl	<i>Strix occidentalis lucida</i>	Bird	Federally Threatened, State Threatened	
North American wolverine	<i>Gulo gulo luscus</i>	Mammal	Proposed Threatened	
Northern leopard frog	<i>Rana pipiens</i>	Amphibian	State Special Concern	
Northern pocket gopher	<i>Thomomys talpoides</i>	Mammal	State Special Concern	
Northern river otter	<i>Lutra Canadensis</i>	Mammal	State Threatened	
Plains sharp-tailed grouse	<i>Tympanuchus phasianellus jamesii</i>	Bird	State Endangered	
Razorback sucker*	<i>Xyrauchen texanus</i>	Fish	Federal Endangered	
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	Bird	State Endangered	
Uncompahgre fritillary butterfly	<i>Boloria acrocneema</i>	Insect	Federal Endangered	Handies Peak
Western Burrowing Owl	<i>Athene cunicularia</i>	Bird	State Threatened	
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	Bird	Federal Candidate	

Source: Endangered, Threatened, Proposed, and Candidate Species Colorado Counties (August 2013), U.S. Fish and Wildlife Service Mountain-Prairie Region, [www.fws.gov/mountain-prairie/endspp/](http://www.fws.gov/mountain-prairie/endspp/); Natural Diversity Information Source of the Colorado Division of Wildlife, <http://ndis.nrel.colostate.edu/>

\* Water depletions in the Upper Colorado River and San Juan River Basins, may affect the species and/or critical habitat in downstream reaches in other states.

Note: State status information is from the NDIS, which does not track county occurrence of fish or insects at this time.

## Imperiled Natural Plant Communities

According to the Colorado Natural Heritage Program, there are a number of natural plant communities in Ouray County that have been identified as critically imperiled, imperiled, or rare/uncommon. These communities are listed in Table 4.34 along with the quad map location that corresponds to Figure 4.42.

**Table 4.34 Imperiled Natural Plant Communities in Ouray County**

Plant Community	State Status	Quad Map
Lower Montane Forests ( <i>Pseudotsuga menziesii</i> / <i>Acer glabrum</i> forest)	Critically Imperiled	Telluride
Iron Fen	Imperiled	Ironton
Lower Montane Riparian Forests ( <i>Pseudotsuga menziesii</i> / <i>Cornus sericea</i> woodland)	Imperiled	Ouray, Telluride
Montane Riparian Forests ( <i>Populus tremuloides</i> / <i>Acer glabrum</i> forest)	Imperiled	Telluride
Narrowleaf Cottonwood Riparian Forests ( <i>Populus angustifolia</i> / <i>Crataegus rivularis</i> woodland)	Imperiled	Ouray
Lower Montane Forests ( <i>Pseudotsuga menziesii</i> / <i>Paxistima myrsinites</i> forest)	Imperiled/ Rare or Uncommon	Mount Sneffels, Telluride
Montane Riparian Forests ( <i>Populus angustifolia</i> - <i>Juniperus scopulorum</i> woodland)	Imperiled/ Rare or Uncommon	Ouray
Beaked Sedge Perched Wetland	Rare or Uncommon	Telluride
Cottonwood Riparian Forest	Rare or Uncommon	Mount Sneffels, Ouray
Lower Montane Forests ( <i>Pseudotsuga menziesii</i> / <i>Carex geyeri</i> forest)	Rare or Uncommon	Telluride
Lower Montane Willow Carrs	Rare or Uncommon	Ironton, Wetterhorn Peak
Montane Floating/Submergent Palustrine Wetlands	Rare or Uncommon	Ouray
Montane Riparian Forests ( <i>Abies lasiocarpa</i> - <i>Picea engelmannii</i> - <i>Populus angustifolia</i> / <i>Lonicera involucrata</i> forest)	Rare or Uncommon	Ironton, Telluride
Montane Riparian Forests ( <i>Populus angustifolia</i> / <i>Alnus incana</i> woodland)	Rare or Uncommon	Telluride, Wetterhorn Peak
Montane Riparian Forests ( <i>Populus angustifolia</i> - <i>Picea pungens</i> / <i>Alnus incana</i> woodland)	Rare or Uncommon	Ironton, Ouray, Telluride
Montane Riparian Willow Carr	Rare or Uncommon	Ouray, Telluride
Montane Wet Meadows	Rare or Uncommon	Ouray
Narrowleaf Cottonwood Riparian Forests ( <i>Populus angustifolia</i> / <i>Salix ligulifolia</i> - <i>Shepherdia argentea</i> woodland)	Rare or Uncommon	Ouray, Wetterhorn Peak
Thinleaf Alder/Mesic Forb Riparian Shrubland	Rare or Uncommon	Telluride
Wet Meadow-Perched Wetland	Rare or Uncommon	Telluride

Source: Colorado Natural Heritage Program, [www.cnhp.colostate.edu/](http://www.cnhp.colostate.edu/)

## Ecologically Sensitive Areas

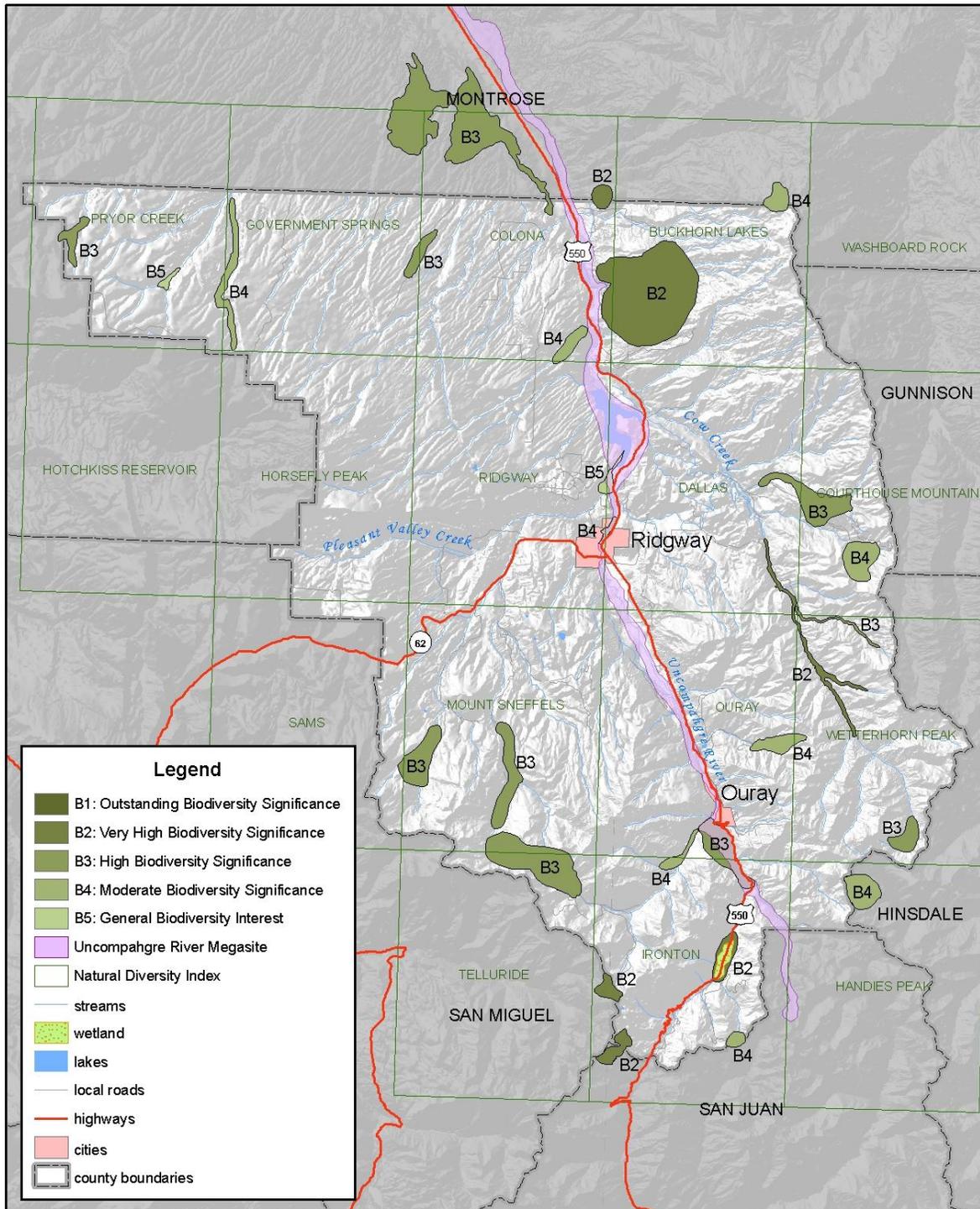
Figure 4.42 is a map of ecologically sensitive areas that displays the areas where in Ouray County threatened and endangered species and imperiled natural plant communities are most likely to be found. The map shows statewide potential conservation areas identified by the Colorado Natural Heritage Program. These are best estimates of the primary areas required to support the long-term survival of targeted species or natural communities. Each conservation area is given a biodiversity rank of B1 (most significant) through B5 (general interest) based on

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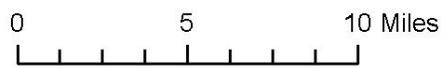
observed occurrences in the area. Part of the City of Ouray has a biodiversity rank of B3 (high). Other areas of high and very high (B2) biodiversity significance are scattered throughout the County as indicated on the map.

The map also shows statewide network of conservation areas (NCA) identified by the Colorado Natural Heritage Program that are located in Ouray County. A NCA may represent a landscape area that encompasses potential conservation areas that share similar species or natural communities and ecological processes. It may also represent a mostly intact, lightly fragmented landscape that supports wide-ranging species and large scale disturbances and include unoccupied or unsurveyed areas that demonstrate the connectivity of the landscape. The only currently designated NCA in Ouray County is the Uncompahgre River Megasite. It includes a portion of western and northern Ouray (City) and has a protection urgency level of P1, immediately threatened/outstanding opportunity, and a management urgency level of M1, essential within one year to prevent loss.

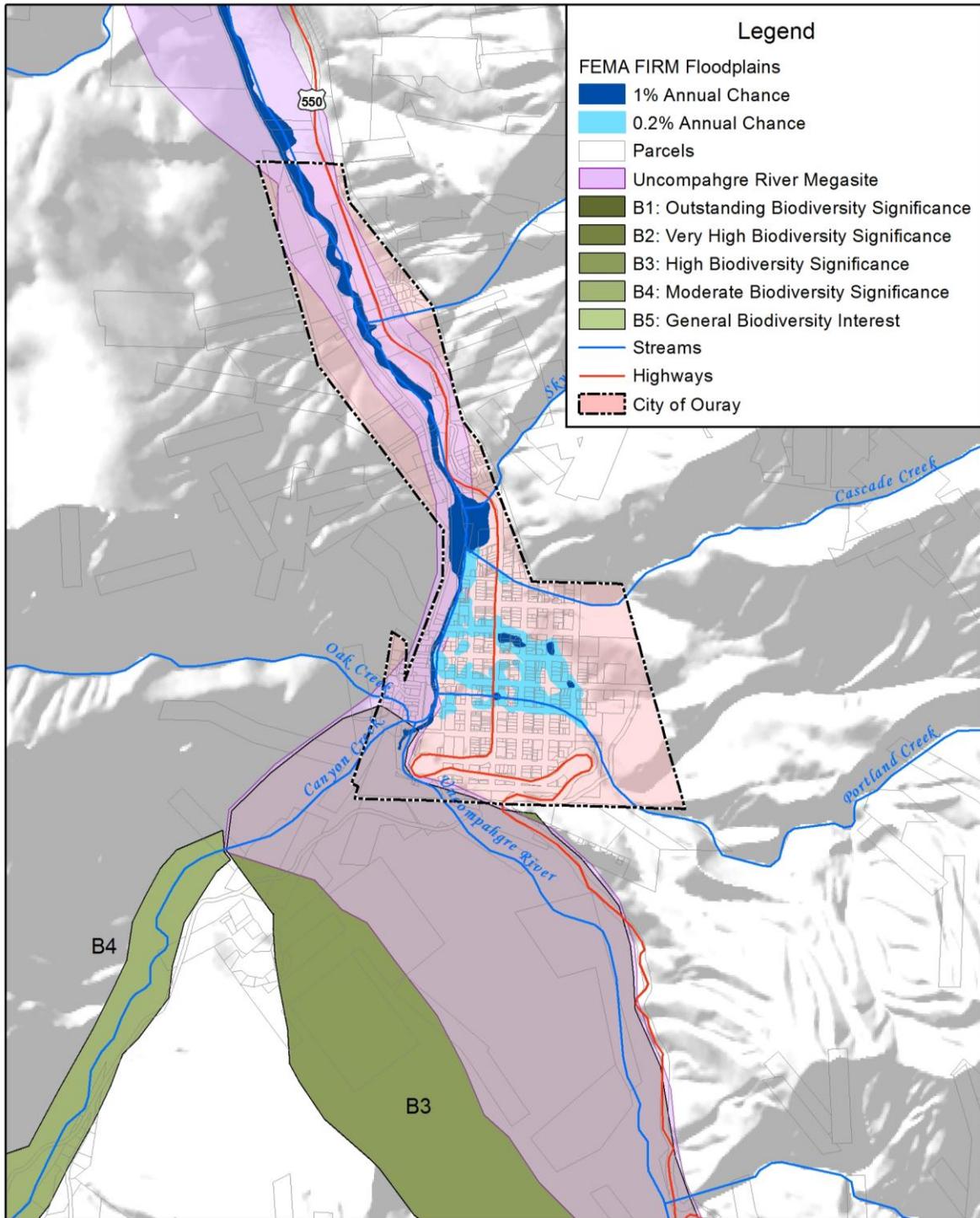
**Figure 4.42. Ouray County Sensitive Areas**



**amec**  
 Map Compilation: AMEC



**Figure 4.43. City of Ouray Flood Hazard and Sensitive Areas**

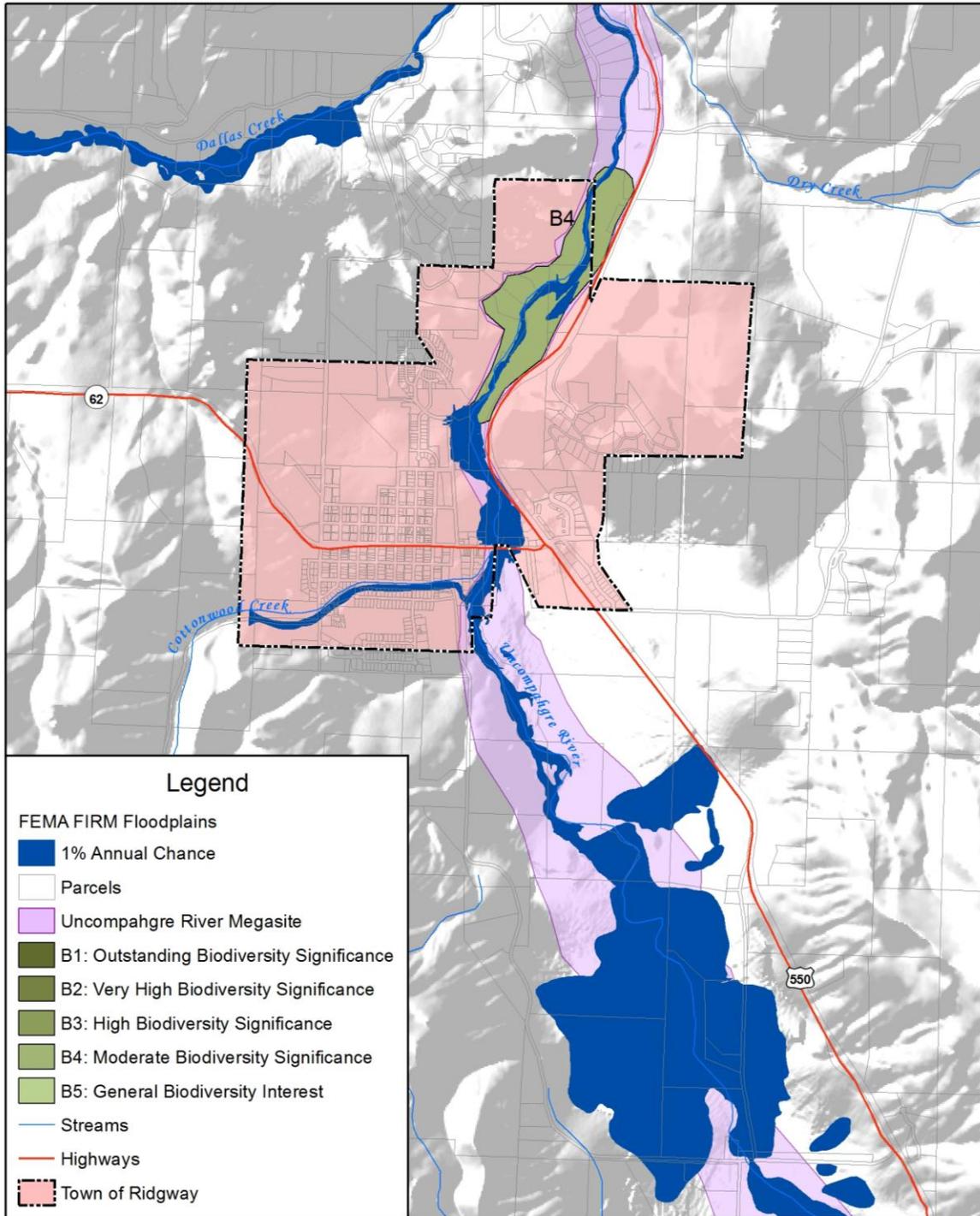


0 0.5 1 Miles



Map Compilation: AMEC  
 Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, NHD, FEMA FIRM: Ridgway 9/27/1985  
 & Ouray City and County 7/3/1985 w/LOMRs, CNHP

**Figure 4.44. Town of Ridgway Flood Hazard and Sensitive Areas**



0 0.5 1 Miles



Map Compilation: AMEC  
 Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, NHD, FEMA FIRM: Ridgway 9/27/1985  
 & Ouray City and County 7/3/1985 w/LOMRs, CNHP

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## **Award Winning Scenery**

Ouray County was the scenic model for establishment of the “All-American Road” designation due to the extraordinary scenery on the San Juan Skyway. Back country “jeep” roads and historic trails are in abundance in Ouray County and are a legacy of mining and railroad pioneers as well as the Utes who preceded them. Access to these routes and associated history are the main economic attraction to Ouray County.

## **Historic and Cultural Resources**

There are many important historic resources within Ouray County and in particular the City of Ouray and Town of Ridgway. By definition, a historic property not only includes buildings or other types of structures, such as bridges and dams, but also includes prehistoric or Native American sites, roads, byways, historic landscapes, and many other features. Given the history of the County, these types of historic properties exist; some are inventoried and listed in this plan.

Information about historic assets in Ouray County came from local sources as well as three historic inventories:

- The **National Register of Historic Places** is the Nation’s official list of cultural resources worthy of preservation. The National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect historic and archeological resources. Properties listed include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. The National Register is administered by the National Park Service, which is part of the U.S. Department of the Interior.
- The **Colorado State Register of Historic Properties** is a listing of the state’s significant cultural resources worthy of preservation for the future education and enjoyment of Colorado’s residents and visitors. Properties listed in the Colorado State Register include individual buildings, structures, objects, districts, and historic and archaeological sites. The Colorado State Register program is administered by the Office of Archaeology and Historic Preservation within the Colorado Historical Society. Properties listed in the National Register of Historic Places are automatically placed in the Colorado State Register.
- **Ouray County Designated Historical Sites** are established by the County based on recommendations of the Ouray County Historical Society. This status protects historically important properties from demolition and provides a basis for historic grant funding to stabilize and preserve these valuable assets. Mines and townsite buildings comprise a portion of these designated sites but the Colona Grange is also noted due to its early status as a school and then as a grange hall.

Table 4.35 lists the properties and districts in Ouray County that are on the Colorado State Register of Historic Properties. Those properties that are also on the National Register of Historic Places are indicated with an asterisk. In addition to these properties, several other

structures have been placed on the Ouray County Historic Register. These properties are listed in Table 4.36.

**Table 4.35 Ouray County Historic Properties/Districts in State and National Registers**

Property	Jurisdiction	Address	Date Listed
Bank Building	Ridgway	523 West Clinton	8/14/1991
Beaumont Hotel*	Ouray (city)	3 <sup>rd</sup> Street and 5 <sup>th</sup> Avenue	10/30/1973 (n)
Colona School	Colona	County Road No. 1	12/13/2000
Fort Peabody*	Uncompahgre National Forest, Ouray Vicinity	Ouray-San Miguel county line	3/30/2005
Hartwell Park	Ridgway	Bounded by Sherman, Lena, Clinton Street and Denver & Rio Grande right-of-way	8/14/1991
Herran House	Ridgway	146 N. Cora Street	8/14/1991
Holmes-Duckett House	Ridgway	810 Clinton	8/14/1991
Jackson, George, House*	Ridgway	129 Citadel Drive	1/11/1996 (n)
Ouray City Hall and Walsh Library*	Ouray (city)	6 <sup>th</sup> Avenue between 3 <sup>rd</sup> and 4 <sup>th</sup> streets	4/16/1975 (n)
Ouray Historic District*	Ouray (city)	U.S. Highway 550	10/6/1983 (n)
Phillips House	Ridgway	282 S. Mary	8/14/1991
Rasmussen House	Ridgway	191 S. Charlotte	8/14/1991
Sherbino Building/Theater	Ridgway	604 N. Clinton	8/14/1991
Stanwood-Carmichael House	Ridgway	709 W. Clinton	8/14/1991
Walther House	Ridgway	755 Clinton	8/14/1991

Sources: Directory of Colorado State Register Properties, <http://www.historycolorado.org/oahp/ouray-county>; National Register Information System, [www.nr.nps.gov/](http://www.nr.nps.gov/)

\*On both the Colorado State Register of Historic Properties and the National Register of Historic Places  
n=national

**Table 4.36 Ouray County Historic Register**

Property	Date Listed
American Girl Mine	3/1/1999
Atlas Mill	2/9/2004
Bachelor House (F-2) at Red Mountain Overlook	11/24/2003
Barber Shop/Pioneer Grocery, 616, 618, and 620 Clinton Street, Ridgway	9/12/2005
Colona Community Church (formerly Ouray Methodist Church)	3/19/2001
Colona Grange (Colona School)	4/24/2000
Colorado Boy Mine	3/1/1999
Corkscrew Gulch Turntable	9/11/2000
Couchman House	9/24/2007
D&RGW Caboose 0575	10/3/2005
Diana Mine	3/29/1999
Genessee-Vanderbilt Mine	3/29/1999
Griffiths/Noel House (F-4) at Red Mountain Overlook	11/24/2003
Guston Mine Site	3/29/1999
Halfway House (Olin House, Stage stop built before 1900), 32016 U.S. Highway 550	3/22.2004
Hammetts Hotel (F-3) at Red Mountain Overlook	11/24/2003

<b>Property</b>	<b>Date Listed</b>
Hyde (Arthur B.) Building 509 Moffat Street, Ridgway	11/8/2004
Idarado Mining Company's former property (3,056 acres) in the Red Mountain Mining District (purchased by the Trust for Public Lands)	1/28/2002
Ironton (Town of)	3/1/1999
Joker Boarding House	9/11/2000
Joker Tunnel	9/11/2000
Joker Tunnel Complex (Also known as Liverpool)	9/11/2000
Mineral Farm Mine Loading Station	11/14/2005
National Belle Mine	3/1/1999
Newlywed House (F-1) at Red Mountain Overlook	11/24/2003
Ouray County Historical Museum, 420 6 <sup>th</sup> Avenue, Ouray	9/13/1999
Ouray Livery Barn, 9 <sup>th</sup> Avenue and Main (lots 13 and 14, block 8)	2/13/2006
Ouray Lodge No. 492	8/28/2006
Quist Home	8/28/2006
Red Mountain Town	3/29/1999
Revenue Powder House	12/11/2006
Robinson Mine	3/29/1999
Scotch Girl Mine	3/6/2000
White House (Feature #4), Town of Ironton	3/6/2000
Silverton Railroad bed in the Red Mountain Mining District (as recorded by the Ouray County Clerk, Reception No. 72016, Book 114, p. 150)	9/11/2000
Three Houses at Camp Bird Mine	2/9/2004
Twin House, 703 5 <sup>th</sup> Avenue, Ouray	11/8/2004
Yankee Girl Mine	3/1/1999

Source: Ouray County

The City of Ouray's architectural heritage started in 1875 with its mining and distribution center era. In 1983, the Ouray Historic District was listed in the National Registry of Historic Places. The district includes 97 historical buildings built before 1956, most of which were built between 1875 and 1915. More information about the district and these buildings, including a map of the district, is available online at [www.ouraycountyhistoricalsociety.org/HeritagePage.html](http://www.ouraycountyhistoricalsociety.org/HeritagePage.html).

It should be noted that as defined by the National Environmental Policy Act (NEPA), any property over 50 years of age is considered a historic resource and is potentially eligible for the National Register. Thus, in the event that the property is to be altered, or has been altered, as the result of a major federal action, the property must be evaluated under the guidelines set forth by NEPA. Structural mitigation projects are considered alterations for the purpose of this regulation.

## **Cultural Assets**

Ouray County's cultural assets are largely contained in three museums: Ouray County Museum, Ridgway Ranching History Museum, and Ridgway Railroad Museum.

## Economic Assets

Much of Ouray's, in particular the City of Ouray's, economy is tourism based due to Ouray's location in the San Juan mountains of southwest Colorado. Much of the tourism is in the summer months, which coincides with the wildfire, flood, and debris flow season. Flood or debris flow could cause a short term negative economic impact. A large wildfire could impact the scenic viewshed and have longer term negative economic and environmental impacts. The City of Ouray's Hot Springs pool is a popular tourist draw, and is vulnerable to flood and debris flows. The Ouray Ice Park helps bring in visitors worldwide during the quieter winter months.

### 4.3.3 Development Trends

As part of the planning process, the HMPC looked at growth and development trends. These trends are examined further in the context of each significant hazard, and how the changes in growth and development affect loss estimates and vulnerability.

According to the U.S. Census Bureau, the 2010 estimated population of Ouray County was 4,436. This is an increase of 18.5 percent from the 2000 census population of 3,742. Based on this information, between 2000 and 2010, Ouray County ranked 16<sup>th</sup> in percent of growth and 32<sup>nd</sup> in numerical growth among Colorado's 63 counties (Broomfield County is not counted since it was not created until 2001). Table 4.37 shows the total population, number of housing units, and percent change for each by jurisdiction between 2000 and 2010.

**Table 4.37 Maximum Population and Housing Unit Exposure by Jurisdiction**

Jurisdiction	2000 Population	2010 Population	# Change	% Change	2000 Housing Units	2010 Housing Units	# Change	% Change
City of Ouray	813	1,000	+187	+23	583	800	+217	+37.2
Town of Ridgway	713	924	+211	+29.6	318	511	+193	+60.7
Unincorporated Areas	2,216	2,512	+296	+13.4	1,245	1,772	+527	+42.3
<b>Total County</b>	<b>3,742</b>	<b>4,436</b>	<b>+694</b>	<b>+18.5</b>	<b>2,146</b>	<b>3,083</b>	<b>+937</b>	<b>+43.7</b>

Source: U.S. Census, factfinder2.census.gov

As indicated above, Ouray County has grown substantially in recent years. Growth is projected to continue at a steadily decreasing pace through 2040. Table 4.38 shows the population projections for the County as a whole through 2040.

**Table 4.38 Population Projections for Ouray County, 2015-2040**

	2015	2020	2025	2030	2035	2040
Population	4,971	5,571	5,770	5,908	6,017	6,108
Percent Change (%)		+2.3	+0.7	+0.5	+0.4	+0.3

Sources: Colorado Department of Local Affairs Demography Section, www.dola.colorado.gov/dlg/demog/

Table 4.39 shows the number of new building permits in the County between 2000 and 2013. The data shows a rise in the number of permits between 2000 and 2003, a steady decline over the next few years, and a sharp drop from 2008 through 2013. The drop in recent years is likely related to the nationwide economic recession that began in 2008.

**Table 4.39 Building Permit Totals: 2000-2013**

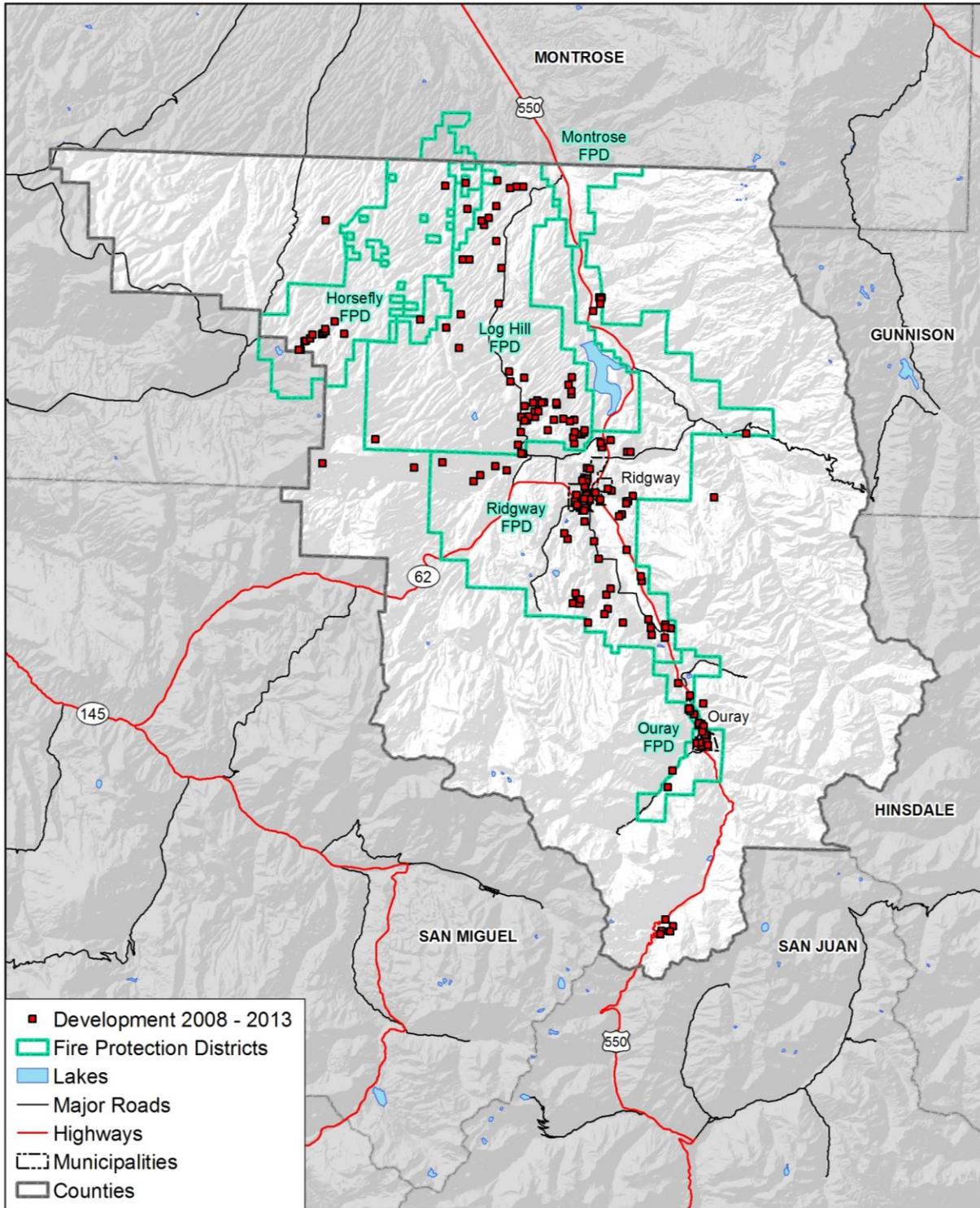
Year	Total Permits
2000	170
2001	186
2002	199
2003	209
2004	187
2005	167
2006	134
2007	120
2008	94
2009	61
2010	86
2011	62
2012	74
2013*	33

Source: Ouray County Planning Department

\*As of 7/31/2013

An analysis of development between 2008 and 2013 was performed during the 2013 update of this plan to determine if growth is occurring in known hazard areas. A data field containing the ‘year built’ was extracted from the County Assessor’s database and joined to the GIS layer of parcels. A total of 216 structures were built in this timeframe including 196 residential and 20 commercial. The locations of these developed parcels are shown in Figure 4.45 as an illustration of the development trends. Some of this growth occurred in potential hazard areas, which is discussed further in the ‘Analyzing Development Trend’ sub-sections in Section 4.3.4 Vulnerability by Hazard.

Figure 4.45. Ouray County Development: 2008-2013



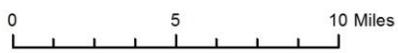
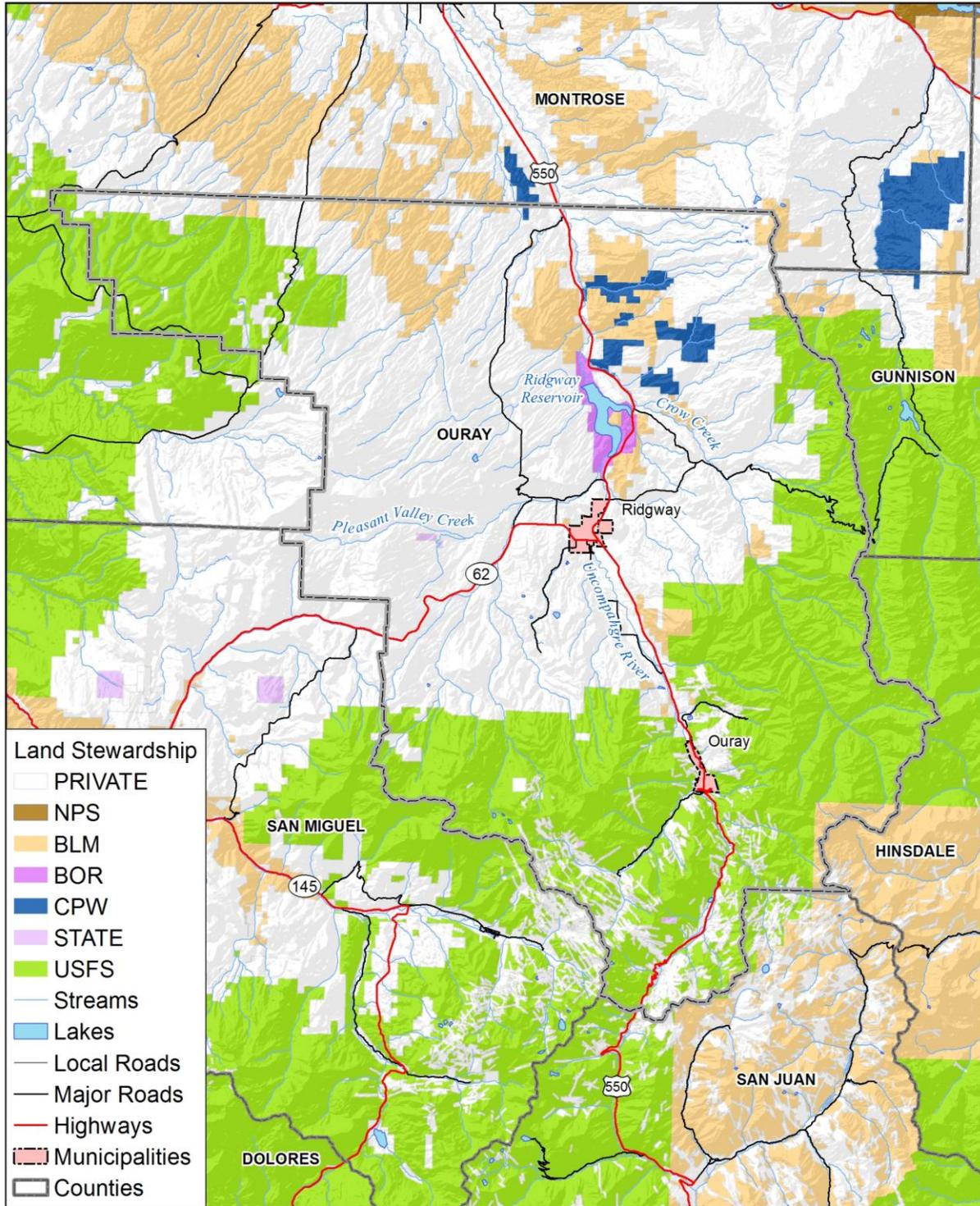
Map compiled 9/2013; intended for planning purposes only.  
Data Source: Ouray County, CDOT

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A concerted effort has been made to focus growth in the County to the existing incorporated areas of Ridgway and the City of Ouray. Growth is restricted due to the large amount of public land in the County, notably around the City of Ouray. Roughly half of Ouray County is privately owned, while the U.S. Forest Service owns 42 percent and the Bureau of Land Management owns 7 percent. Land stewardship is shown in Figure 4.46.

Growth in the City of Ouray is confined to a large extent by geography. The City is nearly surrounded by public lands (U.S. Forest Service). Growth has been toward the north end of the City that extends into the Uncompahgre River Canyon. The confines of this canyon has limited development potential and is bordered by flood hazard areas from the Uncompahgre River to the west and debris flows from Skyrocket and Bridalveil creeks and other smaller drainages to the east. There has been some growth on steep hillsides around the City that could be prone to rockfall hazards and have difficult or limited access for emergency vehicles.

**Figure 4.46. Ouray County Land Status**



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, NHD, COMap v9

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## **Town of Ridgway**

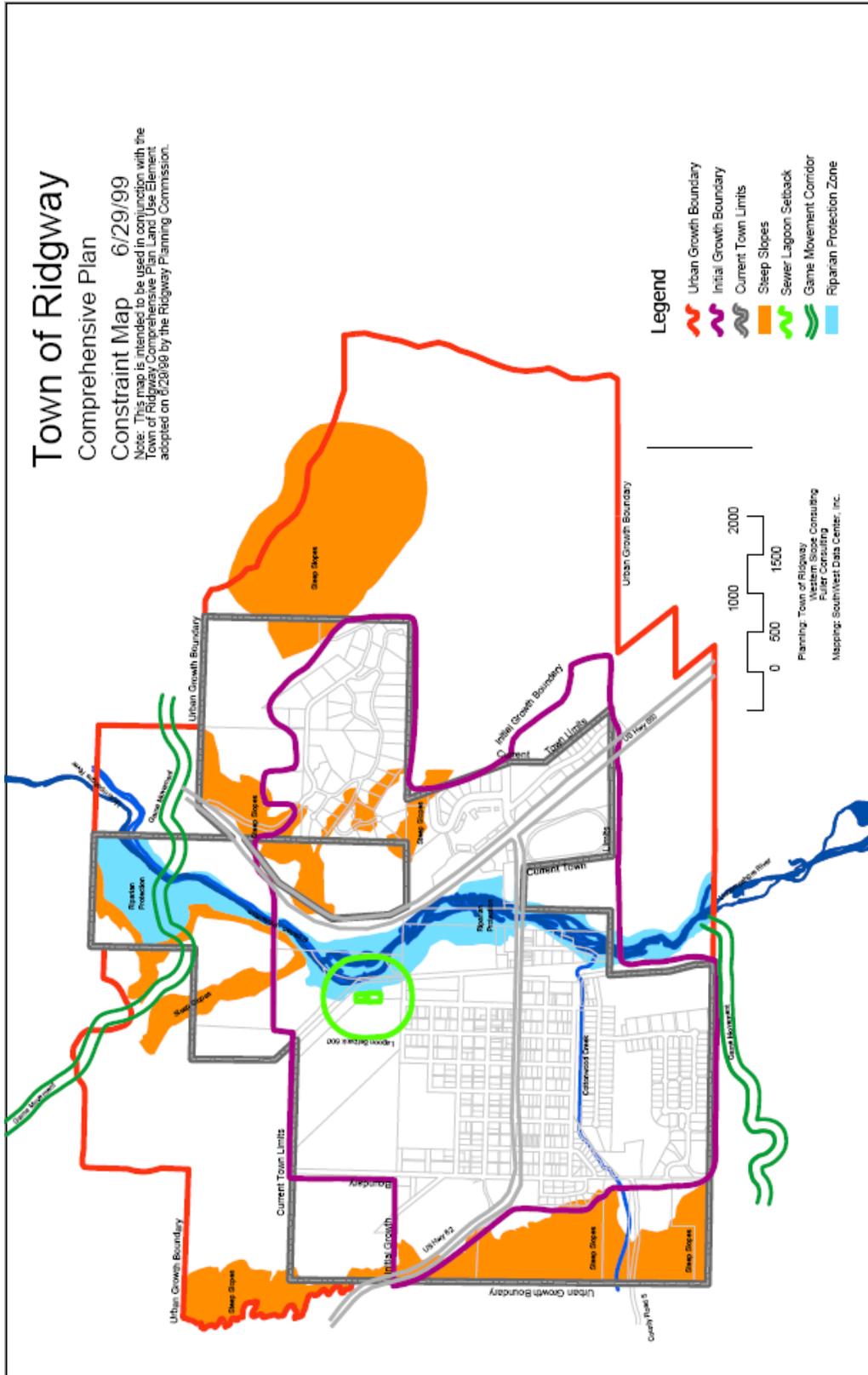
The Town of Ridgway's Constraint Map (Figure 4.47) indicates the Town's preferences and priorities for future development on lands within the Initial Growth Boundary and the Urban Growth Boundary. The Initial Growth Boundary delineates the area within which the town will encourage urban levels of growth in the short term (10-20 years). This area is contiguous to developed areas currently served by town utilities and services and to those areas where utility extensions can be provided efficiently and logically. The Urban Growth Boundary is intended to represent areas outside of the current town limits where Ridgway expects to annex land and to grow over time. It also shows environmental constraint areas and areas of special concern.

## **Ouray County**

Ouray County has a Master Plan and derived Land Use Code that requires identification of hazardous conditions, and mitigation plans if necessary, prior to construction. These regulations often require considerable mitigation depending on hazards present. Ouray County has particularly strict regulations on new development regarding wildfire which is considered the primary life and property threat.

Ouray County has also signed Intergovernmental Agreements with the two towns specifying that virtually all commercial or industrial development will be left to the towns and that the County will maintain low density growth.

Figure 4.47. Town of Ridgway Constraint Map



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## 4.3.4 Vulnerability by Hazard

### Avalanche

Based on the information collected for the hazard profile, avalanche has historically been Ouray County's deadliest hazard. Nevertheless, it is only a problem in the southern unincorporated County, as the municipalities do not have avalanche-prone areas.

At the time this plan was developed, there were not any structures located in identified avalanche hazard areas. It is public safety that is threatened by this hazard. Those most vulnerable include individuals recreating in and traveling through or under avalanche hazard areas. While road closures help to mitigate impacts to travelers on Highway 550, Colorado Department of Transportation snowplow drivers can still be exposed while clearing roads of snow or avalanche debris. Additionally, avalanches inside and outside of the County can disrupt transportation in and out of the County, which could result in a wide range impacts, as further discussed in the hazard profile. The keys to limiting impacts to individuals recreating in the area are knowledge and awareness of the hazard and being properly equipped for self-rescue, if necessary, with tools such as locator beacons, shovels, and probes.

### *Analyzing Development Trends*

The County's vulnerability to this hazard has fluctuated with development trends in the County, specifically as they relate to the mining industry. When the mining activity subsided considerably, so did the deaths and damage from avalanches. A renewed interest in mining is occurring in the Camp Bird Road area, and the County has been pressured to keep the road plowed year round to allow access to the high country area. This has the potential to put County road crews, and miners and mining infrastructure, at risk. As of 2013 roughly 85 miners traverse the Camp Bird Road on a daily basis. Mining companies contract with Helitrax for avalanche control by helicopter, but the HMPC noted that safety concerns remain. Data on past damages is somewhat limited but still sufficient to estimate average annualized loss. Between 1950 and 2013, avalanches caused eight injuries, four deaths, and \$201,500 in property damages in Ouray County. Based on this data the County could expect roughly \$3,198 in damages in any given year. Based on the data in the hazard profile an avalanche-related death may occur approximately every 16 years, with an injury occurring roughly every 8 years. Close calls with backcountry enthusiasts occur on a much more frequent basis.

### Debris Flow

In Ouray County debris flows are most likely to occur in southern areas of Ouray County, particularly in and around the City of Ouray and the Highway 550 corridor. Figure 4.6 in Section 4.2.4 Debris Flow shows debris flow hazard areas in the City of Ouray and its vicinity.

During the 2013 update to this plan the debris flow hazard analysis was refined and expanded. Colorado Geological Survey geologic hazard data representing debris fan/flow hazard areas was

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provided by Ouray County. This was used to supplement a debris fan layer created for the previous version of this plan to fill in areas to create a more complete layer for analysis. The original layer was created using GIS software to approximate debris fan hazard zones in the City of Ouray and north of the City in the Uncompahgre Canyon. The location, size, and shape of the debris fan polygons were approximated using both a debris flow map created by the Colorado Geological Survey (Jochim, 1986) and a hillshade and contour layer created from a 10 meter resolution Digital Elevation Model of the area as reference. The Jochim mapping classifies the fans into very high, high, and moderate to low hazard zones. Due to the approximate nature of the GIS mapping, these designations were not included, but it should be noted that large portions of the Skyrocket, Bridalveil and Corbett Creek fans are designated very high hazard, with the Portland, Cascade and Oak Creek fans being mostly high hazard areas. The new CGS debris fan layer did not have debris fan names within the data; these were included for analysis purposes where the old layer's named debris fans overlapped.

GIS was used to join the assessor's building improvement valuation data into the structure location points for analysis. Only structure points with improvement values greater than zero were used in the analysis. The CGS debris fan/flow layers were overlaid in GIS on the structure point locations to identify what could be potentially exposed to a debris fan/flow event. Building improvement values for those points were then extracted from the parcel/assessor's data and summed for the unincorporated county and for the City of Ouray and the Town of Ridgway. Results of the overlay analysis area shown in Table 4.40 and Table 4.41, and are sorted by jurisdiction and the structure's occupancy type. Occupancy type refers to the land use of the parcel and includes residential, commercial, agricultural, vacant land, and exempt. Contents values were estimated as a percentage of building value based on their occupancy type, using FEMA/HAZUS estimated content replacement values. This includes 100% of the structure value for agricultural, commercial, and exempt structures, 50% for residential structures, and 0% for vacant land use classifications.

Potential losses from debris flows are related to a variety of factors, including debris depth, velocity, and building type, contents, and construction. FEMA's flood benefit-cost module models flood damage based on building type and flood depth. While there are several limitations to this methodology, it does provide an estimate of potential damage, which includes the following assumptions:

- Total value was estimated as structure plus contents.
- Loss estimate damage was estimated at 25 percent of the total value based on FEMA flood depth-damage curves assuming a two-foot flood depth.
- Every improved residential structure was assumed to contain one household.
- Population was estimated based on average household size for Ouray County (2.19), multiplied by the number of improved residential structures.

Details on the losses are shown in Table 4.40 by jurisdiction and Table 4.41 by specific debris fan. An analysis of populations at risk was conducted by applying an average household size of

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2.19 (2010 Census) to the count of residential structures with improvements in the debris fan/flow areas. The results are displayed below in Table 4.40. This analysis yielded an estimated 1,110 people in the debris fan/flow areas. It should be noted that there are a large number of second-home owners in the County, thus the numbers may overestimate the residential population. To compensate for this potential overestimation the population estimates were adjusted using the 2010 U.S. Census estimate of a 34.4% vacancy rate for the County. The adjusted population of 382 is likely to be a more accurate estimate of population at risk within the debris fan/flow areas. As discussed in “Total Exposure to Hazards” in Section 4.3.2, the population of the City of Ouray could swell by more than 1,000 people per day, more than doubling its population, during these months (excluding day-trippers and campers). Information from the City of Ouray Community Plan suggests that peak population in the City could approximate 3,000 people, including all overnight visitors and day visitors. Lodging-related tax revenues that could be lost to the City if a serious flood kept tourists away could be as high as \$27,000 per month.

**Table 4.40 Debris Fan and Flow Vulnerability by Jurisdiction**

Jurisdiction	Occupancy Type	Building Count	Building Improved Actual Value	Estimated Content Value	Total Value	Loss Estimate***	Community Pop. Estimate*	Community Vacancy Rate Adjusted Pop.**
City of Ouray	Commercial	78	\$24,893,460	\$24,893,460	\$49,786,920	\$12,446,730		
	Exempt	1	\$250,710	\$250,710	\$501,420	\$125,355		
	Residential	387	\$64,481,600	\$32,240,800	\$96,722,400	\$24,180,600	848	292
	Unknown	4	\$553,360	\$553,360	\$1,106,720	\$276,680		
	Vacant Land	1	\$315,360	\$0	\$315,360	\$78,840		
	<b>Total</b>	<b>471</b>	<b>\$90,494,490</b>	<b>\$57,938,330</b>	<b>\$148,432,820</b>	<b>\$37,108,205</b>	<b>848</b>	<b>292</b>
Unincorporated	Agriculture	5	\$1,620,930	\$1,620,930	\$3,241,860	\$810,465		
	Commercial	4	\$851,230	\$851,230	\$1,702,460	\$425,615		
	Residential	120	\$22,585,650	\$11,292,825	\$33,878,475	\$8,469,619	263	90
	<b>Total</b>	<b>129</b>	<b>\$25,057,810</b>	<b>\$13,764,985</b>	<b>\$38,822,795</b>	<b>\$9,705,699</b>	<b>263</b>	<b>90</b>
<b>Grand Total</b>	<b>600</b>	<b>\$115,552,300</b>	<b>\$71,703,315</b>	<b>\$187,255,615</b>	<b>\$46,813,904</b>	<b>1,110</b>	<b>382</b>	

\*Average household size is 2.19 based on 2010 U.S. Census  
 \*\*Based on vacancy rate of 34.4% based on 2010 U.S. Census  
 \*\*\*Loss estimate = 25%

**Table 4.41 Improved Structures within Named Debris Fans**

Name	Building Count	Building Improved Actual Value	Estimated Content Value	Total Value	Loss Estimate***	Community Pop. Estimate*	Community Vacancy Rate Adjusted Pop.**
Cascade and Portland Creek Fan	373	\$71,110,940	\$48,076,820	\$119,187,760	\$29,796,940	646	222
Skyrocket Creek Fan	43	\$9,509,700	\$5,892,295	\$15,401,995	\$3,850,499	83	29
Bridalveil Creek Fan	39	\$6,768,860	\$3,990,200	\$10,759,060	\$2,689,765	72	25
Oak Creek Fan	36	\$7,234,060	\$3,812,710	\$11,046,770	\$2,761,693	77	26
Corbett Creek Fan	32	\$4,729,710	\$2,364,855	\$7,094,565	\$1,773,641	70	24
Cutler Creek Fan	28	\$6,929,660	\$3,594,225	\$10,523,885	\$2,630,971	59	20
Fan 5	12	\$1,573,860	\$786,930	\$2,360,790	\$590,198	26	9
Dexter Creek Fan	2	\$197,780	\$98,890	\$296,670	\$74,168	4	2
Fan 2	-	-	-	-	-	-	-
Fan 3	-	-	-	-	-	-	-
Fan 4	-	-	-	-	-	-	-
Fan 6	-	-	-	-	-	-	-
Rotary Park Fan aka Fan 1	-	-	-	-	-	-	-
<b>Total</b>	<b>565</b>	<b>\$108,054,570</b>	<b>\$68,616,925</b>	<b>\$176,671,495</b>	<b>\$44,167,874</b>	<b>1,038</b>	<b>357</b>

\*Average household size is 2.19 based on 2010 U.S. Census  
 \*\*Based on vacancy rate of 34.4% based on 2010 U.S. Census  
 \*\*\*Loss estimate = 25%

Sources: FEMA's Flood Insurance Rate Map, Ouray County Assessor's Office

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**Table 4.42 Critical Facilities within Debris Fan Hazard Areas in Ouray County**

Critical Facility	Type	Jurisdiction	Debris Fan
City of Ouray Community Center	Public Area	City of Ouray	Cascade and Portland Creek Debris Fan
City of Ouray Fire Department	Fire Station	City of Ouray	Cascade and Portland Creek Debris Fan
City of Ouray Police Department	Law Enforcement	City of Ouray	Cascade and Portland Creek Debris Fan
City of Ouray Public Schools	School	City of Ouray	Cascade and Portland Creek Debris Fan
City Of Ouray Town Hall	Government	City of Ouray	Cascade and Portland Creek Debris Fan
Ouray County Courthouse	Government	City of Ouray	Cascade and Portland Creek Debris Fan
Ouray County Public Health	Clinic	City of Ouray	Cascade and Portland Creek Debris Fan
Ouray County Sherriff	Law Enforcement	City of Ouray	Cascade and Portland Creek Debris Fan
Ouray Hot Springs Pool & Fellin Park	Public Area	City of Ouray	Skyrocket Creek Debris Fan

Source: Ouray County

### **Observations**

Table 4.40 indicates that 600 structures are potentially at risk, based on a query of parcels with improved values greater than zero that intersected debris hazard areas. The value of improved structures (including estimated content value) is worth more than \$187 million. A number of critical facilities, notably emergency services facilities, are also located in debris fans in the City of Ouray, as indicated in Table 4.42.

Debris flows in unincorporated Ouray County are most likely to impact transportation corridors. There are also economic impacts from traffic delays or disruptions, which could be potentially major due to the lack of viable alternative transportation corridors in the County. Response times to fire, EMS, and law enforcement emergencies could be significantly affected as well, due to geographically limited access in many areas.

Debris flows originating from Portland and Cascade creeks, based on historic incidents, have posed a serious threat to the City of Ouray residents and residential and commercial property. The City of Ouray has done significant work on mitigating the debris flow hazard. The threat has been reduced somewhat by flumes that have been constructed to divert debris and flows through the City. There is still the potential for a large event to overwhelm these flumes, or for the flumes to be plugged with debris during an event, resulting in debris spilling onto local streets. This analysis represents these more ‘worst case’ scenarios for Portland and Cascade creeks. The debris flow risk can also be significantly exacerbated by wildfires.

More recent development on the debris fans of Skyrocket and Bridalveil creeks incorporate geotechnical investigations and recommendations to reduce potential impacts. Homes on the debris fans are protected to some degree by dredged channels with berms that divert flows. These are not engineered structures and could be susceptible to failure or overtopping during a large event. Skyrocket Creek threatens the hot springs pool, which has been filled with debris in the past. The pool is a major economic engine for the City and can have 300-400 visitors at a time in the busy summer months. A worst case scenario would be if a debris flow struck the crowded

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pool. Residential development on the Corbett Creek and Dexter Creek debris fans could also be potentially at risk. There are currently no warning systems on any of the problem drainages.

### ***Analyzing Development Trends***

Hazard maps and land use codes have been designed to discourage development of hazard-prone areas. The City of Ouray has developed on high hazard debris fan areas of Skyrocket and Bridalveil creeks. Development has also occurred on the Corbett Creek and Cutler Creek debris fans in unincorporated Ouray County.

### **Drought**

Based on Ouray County's recent multi-year droughts and Colorado's drought history, it is evident that all of Ouray County is vulnerable to drought. According to the 2013 update to the State of Colorado Drought Mitigation and Response Plan, Ouray County has high drought vulnerability to aquatic habitat and species due to the presence of state-owned or operated hatcheries and/or instream flows. The County is also vulnerable in this sector due to its relatively junior instream flow rights. The County was also ranked high for vulnerability to drought specific to the socioeconomic sector. Counties vulnerable to this sector have little economic diversity and depend upon one main economic sector, such as tourism or agriculture, for the majority of their stability. The specific impacts of future droughts will vary by region. The agricultural economy of the northern County will experience hardships, including agricultural losses, associated with a reduction in water supply. The southern County will see an increase in dry fuels, beetle kill, and associated wildfires and some loss of tourism revenue during the ski season. Water supply issues for domestic needs will be a concern for the entire County during droughts.

While widespread, the losses associated with drought are often the most difficult to track or quantify. While FEMA requires the potential losses to structures to be analyzed, drought does not normally have a structural impact. The most significant impacts are to water intensive activities such as agriculture, wildfire protection, municipal usage, commerce, tourism, wildlife preservation. Droughts can also cause reduction of electric power generation from hydroelectric facilities, which could suffer lost revenue, and water quality deterioration.

Ridgway Reservoir is a state and local asset vulnerable to drought, in terms of water supply, water quality, and recreation. Recent reservoir renovations have helped to increase storage capacity. The reservoir does not provide water supply to Ouray residents. The water supply to much of the County is from a diversion from the Gunnison Basin, but water from Ouray County is required in exchange for Gunnison Basin water.

In 2002, the drought-imposed fire restrictions impacted camping activity, and cancellation of the 4<sup>th</sup> of July fireworks display had economic repercussions. The 2002 and the 2012 droughts threatened the municipal water supply for the City of Ouray. The City does not have senior water rights. Because of this, users downstream with senior water rights can call on the City to

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curtail its water usage. This happened in both 2002 and 2012. In 2012 the City was attempting to acquire and repair the Red Mountain ditch to supplement its water supply. An augmentation plan was also in development to address this issue<sup>1</sup>. It is reasonable to expect that the City will again be called on to curtail its water usage in the future, but an augmentation plan would help reduce the City's vulnerability to drought. According to the HMPC the 2012 drought also brought increased hay costs, a decrease in agricultural production, reduced cattle herds, and an increase in beetle-killed trees. A comment at a public meeting during the 2013 update noted that washboard on county roads gets worse during drought due to less water for road maintenance. A secondary impact from that includes increased response time for first responders.

The Log Hill Mesa FPD's main concern with prolonged drought is the increase to the wildfire danger. The district works closely with the West Region Wildfire Council to monitor the drought situation and the Sheriff to recommend the implementation of fire restrictions. Water rights for the two water services servicing the district are relatively senior and seem secure. Additionally, the district can fill firefighting apparatus at the Ridgway Reservoir if necessary.

The Ridgway School District's main concern with prolonged drought and or extreme temperatures is the maintenance of its greenscapes and increased vulnerability to the wildfire danger surrounding the schools.

### ***Analyzing Development Trends***

Drought normally does not impact structures and can be difficult to identify specific hazard areas. Population growth can place a greater demand on limited water resources, but growth rates in the County and participating jurisdictions are not expected to significantly increase exposure to the drought hazard in the near future.

### **Earthquake**

Earthquakes represent a low probability, high consequence hazard for Ouray County. Colorado has a relatively short historic record of earthquakes, which makes for a limited data set when making assumptions based on past events. A lot of unknowns remain about the earthquake potential in Ouray County and Colorado in general.

Based on the fact that there have been earthquake epicenters as well as potentially active faults inside the County boundaries, as well as in neighboring counties, earthquakes will likely occur in the future. Based on historic events, these will likely be in the range of magnitude 5.5 or lower. According to the U.S. Geological Survey (USGS), damage usually occurs with earthquakes in the magnitude 4-5 range, but many variables affect damage, such as building age, soil type, distance from the epicenter, etc. With the historic building stock in the City of Ouray and Town

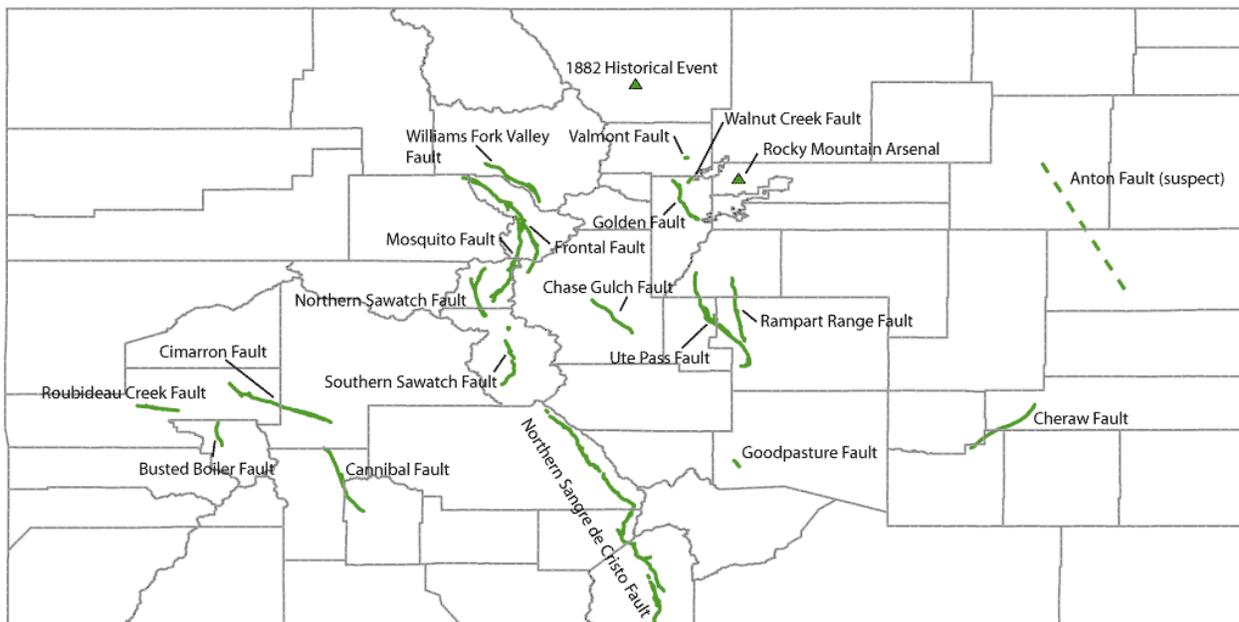
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<sup>1</sup> [http://www.watchnewspapers.com/view/full\\_story/18539617/article-Water-Call-Threatens-Ouray%E2%80%99s-Municipal-Supply?instance=home\\_news\\_bullets](http://www.watchnewspapers.com/view/full_story/18539617/article-Water-Call-Threatens-Ouray%E2%80%99s-Municipal-Supply?instance=home_news_bullets)

of Ridgway, there is potential for a moderate-sized event (e.g., a magnitude 5 event) to do some structural damage, but most damage would be nonstructural (e.g., broken light fixtures, toppled shelves, cracked walls and chimneys). The City of Ouray has inventoried 74 unreinforced masonry buildings, most of which are historic structures that could be vulnerable to earthquake. Falling items within buildings will likely pose the greatest risk to public safety. Also, earthquakes could affect the infrastructure in the northern County.

According to the Colorado Geological Survey (CGS), the maximum credible earthquake for the Busted Boiler fault in Ouray County is magnitude 6.25. The CGS ran a series of deterministic scenarios for selected Colorado faults using HAZUS-MH to assess potential economic and social losses due to earthquake activity in Colorado. Deterministic analyses provide “what if” scenarios (e.g., determines what would happen if an earthquake of a certain magnitude occurred on a particular fault). The earthquake magnitudes used for each fault were the “maximum credible earthquake” as determined by the U.S. Geological Survey. The faults analyzed for Ouray County were Busted Boiler, Cannibal, Cimarron, Roubideau Creek (see Figure 4.48). Table 4.43 summarizes the results for Ouray County.

**Figure 4.48. Faults Analyzed for Potential Losses, Statewide**



Source: Earthquake Evaluation Report, [www.dola.colorado.gov/dem/mitigation/earthquakerpt.pdf](http://www.dola.colorado.gov/dem/mitigation/earthquakerpt.pdf)

**Table 4.43 Potential Earthquake Losses in Ouray County by Fault**

Fault/Magnitude	Fatalities	Total Economic Loss (\$)*	Loss Ratio (%)**
<b>Busted Boiler Fault</b>			
M6.5	5	122.3 million	15.1
M6.0	1	44.1 million	5.5
M5.5	0	14.0 million	1.7

Fault/Magnitude	Fatalities	Total Economic Loss (\$)*	Loss Ratio (%)**
<b>Cannibal</b>			
M7.0	0	7.1 million	0.9
<b>Cimarron Fault</b>			
M6.75	0	13.1 million	1.6
M6.5	0	9.2 million	1.1
M6.0	0	2.9 million	0.36
<b>Roubideau Fault</b>			
M5.5 Normal	0	.26 million	.03
M5.5 Reverse	0	.54 million	.07

Source: Earthquake Evaluation Report, [www.dola.colorado.gov/dem/mitigation/earthquakerpt.pdf](http://www.dola.colorado.gov/dem/mitigation/earthquakerpt.pdf)

\*Direct and indirect losses

\*\*Percentage of the total building stock value damaged; the higher this ratio, the more difficult it is to restore a community to viability (loss ratios 10 percent or greater are considered by FEMA to be critical)

Note: County HAZUS-MH Inventory (HAZUS-MH 2000): \$807.70 million

During the development of this plan in 2008, a HAZUS-MH probabilistic earthquake scenario was run with the latest version of HAZUS-MH (MR3, released October 2007). This scenario was updated in 2013 using HAZUS-MH version 2.1. The methodology includes probabilistic seismic hazard contour maps developed by the USGS for the 2002 update of the National Seismic Hazard Maps that are included with HAZUS-MH. The USGS maps provide estimates of potential ground acceleration and spectral acceleration at periods of 0.3 second and 1.0 second, respectively. The 2,500 year return period analyzes ground shaking estimates with a 2 percent probability of being exceeded in 50 years, from the various seismic sources in the area. The International Building Code uses this level of ground shaking for building design in seismic areas. The CGS feels that the USGS probabilistic shaking maps likely underestimate the hazard due to the limited studies of the earthquake hazard in the state to base the shaking maps on.

The results of the 2,500 year probabilistic HAZUS earthquake scenario can be referenced below in Table 4.44. According to this probabilistic scenario, there is the potential for 13% of the total number of buildings in the County to be affected with roughly 430 buildings experiencing at least moderate damage. Overall, earthquake impacts in Ouray County could be critical, with 25% - 50% of the County affected. Due to the low probability of a damaging earthquake occurring, as discussed below, the planning significance of earthquakes is considered medium by the HMPC.

**Table 4.44 HAZUS-MH Earthquake Loss Estimation 2,500-Year Scenario Results**

Type of Impact	Impacts to County
Total Buildings Damaged	Slight: 629 Moderate: 350 Extensive: 76 Complete: 5
Building and Income Related Losses	\$18.33 million 58% of damage related to residential structures 27% of loss due to business interruption

Type of Impact	Impacts to County
Total Economic Losses (includes building, income and lifeline losses)	\$45.89 million
Casualties (based on 2 a.m. time of occurrence)	Without requiring hospitalization: 3 Requiring hospitalization: 0 Life threatening: 0 Fatalities: 0
Casualties (based on 2 p.m. time of occurrence)	Without requiring hospitalization: 3 Requiring hospitalization: 0 Life threatening: 0 Fatalities: 0
Casualties (based on 5 p.m. time of occurrence)	Without requiring hospitalization: 3 Requiring hospitalization: 0 Life threatening: 0 Fatalities: 0
Damage to Transportation and Utility Systems and Essential Facilities	No expected damage to utility pipeline systems Some damage to transportation systems (highways) Highway Inventory: 263.9 million No expected damage shown to essential facilities
Displaced Households	3
Shelter Requirements	1

Source: HAZUS-MH 2.1: Earthquake Event Report; AMEC

A level 1 HAZUS annualized loss scenario was performed as part of the plan update process. The annualized loss scenario represents the estimated long-term average losses the County could endure from earthquakes any given year based on the aggregate of seismic sources in the area. This scenario is recommended in the FEMA How-To Guide 433, “Using HAZUS-MH for Risk Assessment.” Based on the HAZUS modeling, annualized losses for Ouray County are on the order of \$45.89 million in total economic losses, with \$18.33 million in building related losses. Annualized transportation inventory damage and utility lifeline damage was negligible. The HMPC noted concerns for natural gas pipelines that are in the northern part of the County.

The risk of damage from earthquakes to the Log Hill FPD is rated as negligible. Fire stations are constructed to code and in good repair. Residences and buildings in the district are built to code as enforced by Ouray County.

Ridgway School District is concerned that the elementary school building may not adequately protect our students in the event of a major earthquake due to the age of the structure.

### **Analyzing Development Trends**

Any new construction built to code in the County should generally be able to withstand earthquakes, but the potential for nonstructural damage will increase with new development. Continued growth of population in the County could potentially expose more people to earthquakes and their related hazards.

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## Flooding

Potential losses from flooding were analyzed by using best available flood hazard data, with some enhancements that are described below. This analysis replaces and improves upon an analysis done for the 2008 plan that included a use of less-accurate HAZUS-generated floodplains and less accurate digital floodplains. The following is a discussion of the methodology, including limitations, assumptions, and observed trends of the methodology's results.

A flood vulnerability assessment was performed for Ouray County using GIS. The County's structure locations and associated assessor's building improvement valuation data were provided by the county and were used as the basis for the inventory. Ouray County's digitized FEMA FIRMs were used as the hazard layer (note: the County does not have official DFIRMs). FIRMs are Flood Insurance Rate Maps produced by FEMA to show flood risk that depict the 1% annual chance (100-year) and the 0.2% annual chance (500-year) flood events. Flood zones A and AE are variations of the 1% annual chance event and were combined into a single zone for purposes of this analysis. The "Shaded Zone X" or X500 Zone (or Zone B) represents the 0.2% annual chance hazard zone on the FIRM. Ouray County and the City of Ouray's FIRMs are dated July 3, 1985 and the Town of Ridgway September 27, 1985. There have been two Letters of Map Revision (LOMRs) within the City of Ouray. A significant LOMR in 2005 revised much of the A zone to Zone B, reflecting the drainage improvements associated with the Portland and Cascade Creek flumes. In order to get a more accurate picture of the flood risk AMEC digitized the LOMR for the purposes of this plan update. In some areas of the unincorporated county the FIRMS were supplemented with physiographic floodplain mapping from a Colorado Geological Survey geologic hazard layer to provide a more comprehensive assessment.

GIS was used to join the assessor's building improvement valuation data into the structure location points for analysis. Only structure points with improvement values greater than zero were used in the analysis. The digitized FEMA FIRM flood zones and physiographic floodplains were overlaid in GIS on the structure point locations to identify what would likely be inundated during a 1% annual chance and 0.2% annual chance flood event. Building improvement values for those points were extracted from the parcel/assessor's data and summed for the unincorporated county and for the City of Ouray and the Town of Ridgway. Results of the overlay analysis area shown in Table 4.45 and Table 4.46, and are sorted by flood zone, jurisdiction, and the structures' occupancy type. Table 4.47 shows the combined results of Table 4.45 and Table 4.46. Occupancy type refers to the land use of the parcel and includes residential, commercial, agricultural, vacant land, and exempt. Contents values were estimated as a percentage of building value based on their occupancy type, using FEMA/HAZUS estimated content replacement values. This includes 100% of the structure value for agricultural, commercial, and exempt structures, 50% for residential structures, and 0% for vacant land use classifications. Building and contents values were totaled, and a 25% loss factor was applied to the totals, also based on FEMA depth damage functions, assuming a 2 foot deep flood.

Countywide, including jurisdictions, there are 78 buildings in the FEMA 1% annual chance flood zone. The total building improved actual value in that flood zone is \$17.8 million; the sum of building and contents value in that flood zone is estimated to be \$28.7 million. Assuming a 2 foot deep flood, or 25% loss estimate, losses could be in the order of \$7 million from the 1% annual chance flood event in Ouray County. The Town of Ridgway noted that there is a known issue with the FEMA mapping along Cottonwood Creek that may overstate the property at risk.

**Table 4.45 1% Annual Chance Flood Loss Estimation**

Jurisdiction	Occupancy Type	Building Count	Building Improved Actual Value	Contents Value	Total Value	Loss Estimate
City of Ouray	Commercial	3	\$459,340	\$459,340	\$918,680	\$229,670
	Residential	15	\$1,964,240	\$982,120	\$2,946,360	\$736,590
	<b>Total</b>	<b>18</b>	<b>\$2,423,580</b>	<b>\$1,441,460</b>	<b>\$3,865,040</b>	<b>\$966,260</b>
Town of Ridgway	Commercial	2	\$2,098,160	\$2,098,160	\$4,196,320	\$1,049,080
	Residential	8	\$1,774,270	\$887,135	\$2,661,405	\$665,351
	<b>Total</b>	<b>10</b>	<b>\$3,872,430</b>	<b>\$2,985,295</b>	<b>\$6,857,725</b>	<b>\$1,714,431</b>
Unincorporated	Agriculture	2	\$689,160	\$689,160	\$1,378,320	\$344,580
	Commercial	2	\$759,230	\$759,230	\$1,518,460	\$379,615
	Exempt	1	\$36,930	\$36,930	\$73,860	\$18,465
	Residential	44	\$9,927,650	\$4,963,825	\$14,891,475	\$3,722,869
	Vacant Land	1	\$138,110	\$0	\$138,110	\$34,528
	<b>Total</b>	<b>50</b>	<b>\$11,551,080</b>	<b>\$6,449,145</b>	<b>\$18,000,225</b>	<b>\$4,500,056</b>
<b>Total Count</b>		<b>78</b>	<b>\$17,847,090</b>	<b>\$10,875,900</b>	<b>\$28,722,990</b>	<b>\$7,180,748</b>

The LOMR revising the City of Ouray's downtown area converted the majority of Zone A into Zone B which is a 0.2% annual chance zone. There are 111 buildings in the 0.2% annual chance flood zone with a total building value of \$23.5 million; the sum of building and contents value in that flood zone is estimated to be \$40.7 million shown in Table 4.46. Table 4.47 shows the combined loss estimate from the 1% annual chance and the 0.2% annual chance flood events. There are 247 buildings in the combined zones and the total building value in those three flood zones is \$61.6 million; the sum of building and contents value in the flood zones is \$105 million. Assuming a 2 foot flood depth, there could be an estimated \$26 million in losses from the 0.2% annual chance flood event.

The majority of estimated damage resulting from a 0.2% annual chance flood event both in terms of building exposure and potential dollar losses would occur in City of Ouray. Unincorporated Ouray County has the second most exposure, in terms of the number of buildings and dollar loss (see Table 4.47). There are 180 structures at risk within the City boundaries, representing 77% of the total estimated buildings at risk to flooding (inclusive of the 1% and 0.2% annual chance events) within Ouray County. The analysis showed relatively low risk of flooding for the 1% annual chance zones for the City of Ouray (18 structures) and Town of Ridgway (10 structures). However the City of Ouray has more at risk to the 0.2% annual chance flood event with 111

structures. Also the City of Ouray has known debris fan/flow areas that could compound flood damages with debris impacts and cleanup.

**Table 4.46 0.2% Annual Chance Flood Loss Estimation\***

Jurisdiction	Occupation Type	Building Count	Building Improved Actual Value	Contents Value	Total Value	Loss Estimate
City of Ouray	Commercial	31	\$10,577,650	\$10,577,650	\$21,155,300	\$5,288,825
	Exempt	1	\$250,710	\$250,710	\$501,420	\$125,355
	Residential	79	\$12,668,230	\$6,334,115	\$19,002,345	\$4,750,586
	<b>Total</b>	<b>111</b>	<b>\$23,496,590</b>	<b>\$17,162,475</b>	<b>\$40,659,065</b>	<b>\$10,164,766</b>

\*The Town of Ridgway and Unincorporated County do not have any 0.2% Annual Chance flood zones.

**Table 4.47 Combined 1% and 0.2% Annual Chance Flood Loss Estimation**

Jurisdiction	Occupation Type	Building Count	Building Improved Actual Value	Contents Value	Total Value	Loss Estimate
City of Ouray	Commercial	42	\$14,899,490	\$14,899,490	\$29,798,980	\$7,449,745
	Exempt	1	\$250,710	\$250,710	\$501,420	\$125,355
	Residential	136	\$23,340,120	\$11,670,060	\$35,010,180	\$8,752,545
	Utilities	1	\$6,438,620	\$6,438,620	\$12,877,240	\$3,219,310
	<b>Total</b>	<b>180</b>	<b>\$44,928,940</b>	<b>\$33,258,880</b>	<b>\$78,187,820</b>	<b>\$19,546,955</b>
Town of Ridgway	Commercial	2	\$2,098,160	\$2,098,160	\$4,196,320	\$1,049,080
	Residential	8	\$1,774,270	\$887,135	\$2,661,405	\$665,351
	<b>Total</b>	<b>10</b>	<b>\$3,872,430</b>	<b>\$2,985,295</b>	<b>\$6,857,725</b>	<b>\$1,714,431</b>
Unincorporated	Agriculture	4	\$1,070,050	\$1,070,050	\$2,140,100	\$535,025
	Commercial	2	\$759,230	\$759,230	\$1,518,460	\$379,615
	Exempt	1	\$36,930	\$36,930	\$73,860	\$18,465
	Residential	49	\$10,753,640	\$5,376,820	\$16,130,460	\$4,032,615
	Vacant Land	1	\$138,110	\$0	\$138,110	\$34,528
	<b>Total</b>	<b>57</b>	<b>\$12,757,960</b>	<b>\$7,243,030</b>	<b>\$20,000,990</b>	<b>\$5,000,248</b>
<b>Total Count</b>		<b>247</b>	<b>\$61,559,330</b>	<b>\$43,487,205</b>	<b>\$105,046,535</b>	<b>\$26,261,634</b>

Approximately 74% of the County's total dollar damage estimate for those flood events reflects a loss to structures in the City of Ouray. Structures at risk are illustrated on Figure 4.49 - Figure 4.50 for the County and City of Ouray. The Town of Ridgway has approximately 7% of the County's estimated loss within the Uncompahgre River and Cottonwood Creek, illustrated in Figure 4.51. Unincorporated Ouray County represents 19% of the County's total dollar damage loss estimate for structures located in the 1% and 0.2% annual chance floodplain. Within the floodplains a total of 57 structures are at risk.

In the Unincorporated County, 86% of its estimated building damage is to residential structures and 7% is to structures on agricultural land. The remaining damage in the Unincorporated County is dispersed among commercial, vacant and exempt land. In the City of Ouray, 76% of

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the estimated building damage would be associated with residential structures and 23% to commercial structures.

The loss estimates for this vulnerability assessment are a planning level analysis suitable for flood risk mitigation, emergency preparedness, and response and recovery. The methodology and results should be considered ‘reasonable’. Uncertainties are inherent in any loss estimation methodology, and losses will vary depending on the magnitude of the flood event. Other limitations may include incomplete or inaccurate inventories of the built environment. This loss estimation assumes no mitigation and does not account for buildings that may have been elevated above the 1% annual chance event according to local floodplain management regulations. Another limitation to this analysis is that flooding does occur outside of mapped floodplains due to poor drainage, stormwater overflow, or in areas adjacent to streams that have not been mapped. See the discussion on the flood insurance policies later in this section. The City of Ouray has designated debris fan/flow areas. Other areas of the Town could be at risk to flood and debris should a flood leave the Portland and Cascade Creek flumes to debris blockage or high flows.

The population exposed to the flood hazard was estimated by applying an average household size factor (Census Bureau estimate of 2.19 persons) to the number of residential structures identified in the flood hazard areas. Based on this estimate, a 1% annual chance flood would displace 147 people (including 33 in the City of Ouray and 18 in the Town of Ridgway), and a 0.2% flood would displace an additional 173 people in the City of Ouray.

It should be noted that neither of these methodologies consider tourists or the potential impacts to the local economy due to business downtime and tourism revenue losses. As discussed in “Total Exposure to Hazards” in Section 4.3.2, the population of the City of Ouray could swell by more than 1,000 people per day, more than doubling its population, during these months (excluding day-trippers and campers). Information from the City of Ouray Community Plan suggests that peak population in the City could approximate 3,000 people, including all overnight visitors and day visitors. Lodging-related tax revenues that could be lost to the City if a serious flood kept tourists away could be as high as \$27,000 per month.

A number of facilities critical to both the City of Ouray and Ouray County are located in flood and debris hazard zones in the City of Ouray, as shown in Table 4.48. The Ouray County Social Services building is located in the floodplain but is not at risk per a FEMA Letter of Map Revision based on fill. The County building has flooded in the past, damaging records stored in the basement. The road and bridge infrastructure is vital to Ouray County. There are a limited number of highways and local roads in the County. When these roads are rendered impassable by an event such as a flood or debris flow, ingress or egress can be severely limited. These bridges have been impacted by floods in the past.

**Table 4.48 Critical Facilities at risk to FEMA Floodplains and Geologic Hazard Floodplains**

Critical Facility	Type	Jurisdiction	Flood
City of Ouray Public Works	Infrastructure	City of Ouray	1% Annual Chance
Ouray Hot Springs Pool & Fellin Park	Public Area	City of Ouray	1% Annual Chance
City of Ouray Fire Department (includes County EMS ambulances)	Fire Station	City of Ouray	0.2% Annual Chance
Ouray County Courthouse	Government	City of Ouray	0.2% Annual Chance
City of Ouray Police Department	Law Enforcement	City of Ouray	0.2% Annual Chance
Ouray County Sherriff	Law Enforcement	City of Ouray	0.2% Annual Chance
City of Ouray Community Center	Public Area	City of Ouray	0.2% Annual Chance
Ouray County Road & Bridge Ouray shop	Infrastructure	City of Ouray	Physiographic Floodplain

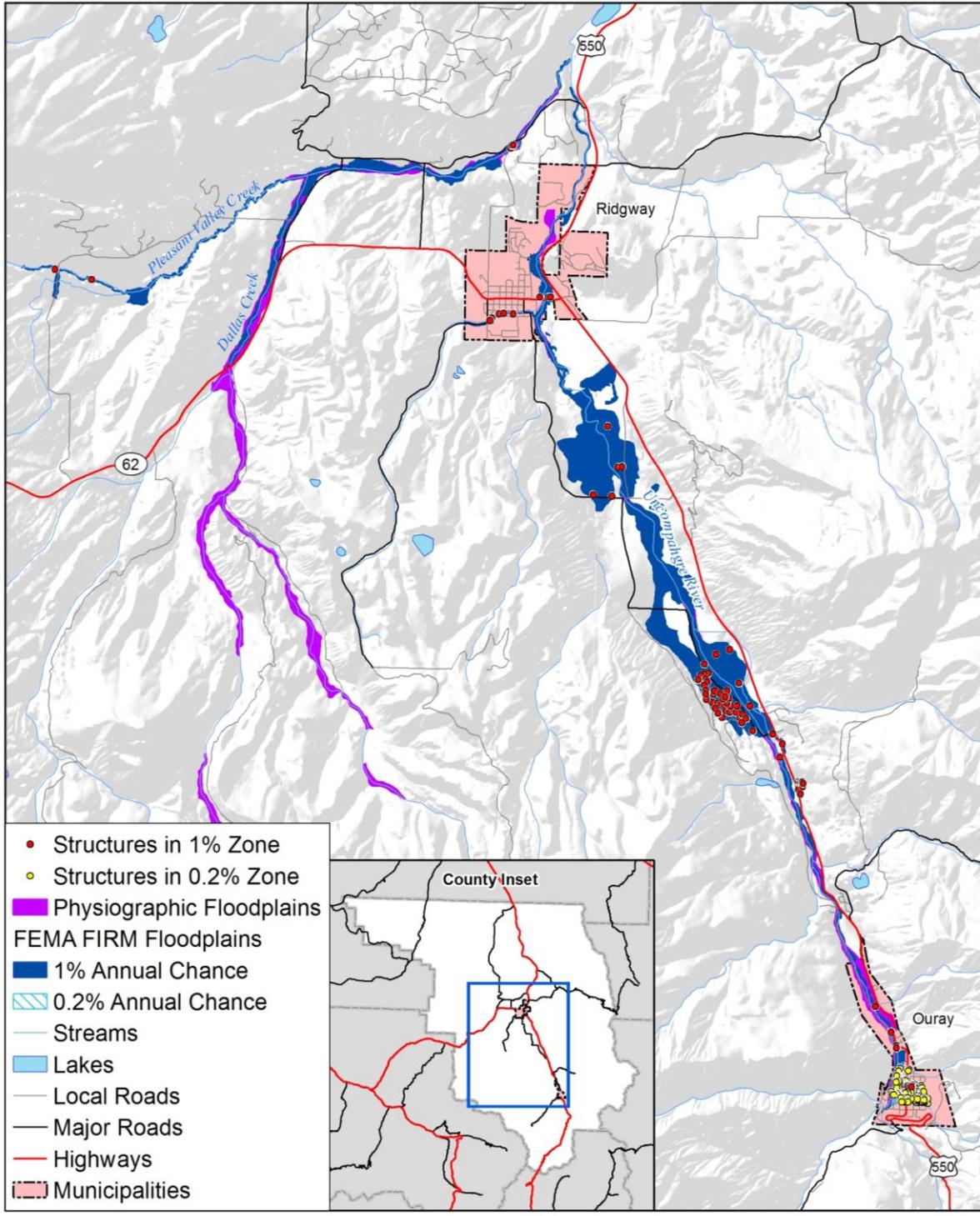
Bridges in the following map are from the National Inventory of Bridges database that comes with HAZUS-MH 2.1. One of the database items includes a “scour index” that is used to quantify the vulnerability of bridges to scour during a flood. Bridges with a scour index between 1 and 3 are considered “scour critical,” or a bridge with a foundation element determined to be unstable for the observed or evaluated scour condition. The locations of these bridges are displayed in Figure 4.52, represented by the red squares, and summarized in Table 4.49. The Highway 62 Bridge in Ridgway is one of these “scour critical” bridges.

According to the State of Colorado Natural Hazards Mitigation Plan, there are 10 state-owned assets in the floodplain in Ouray County. More details on these assets were not available.

**Table 4.49 Ouray County Bridges Rated Scour Critical**

Highway Bridge Code	Location	Community	Year Built
CO007207	County Rd 8A	Ouray County	1930
CO007202	County Rd No 26	Ouray County	1935
CO007192	Oak Street	Ouray	1987
CO005605	SH 62 ML	Ridgway	1948

**Figure 4.49. Ouray County Flood Hazards and Structures at Risk**

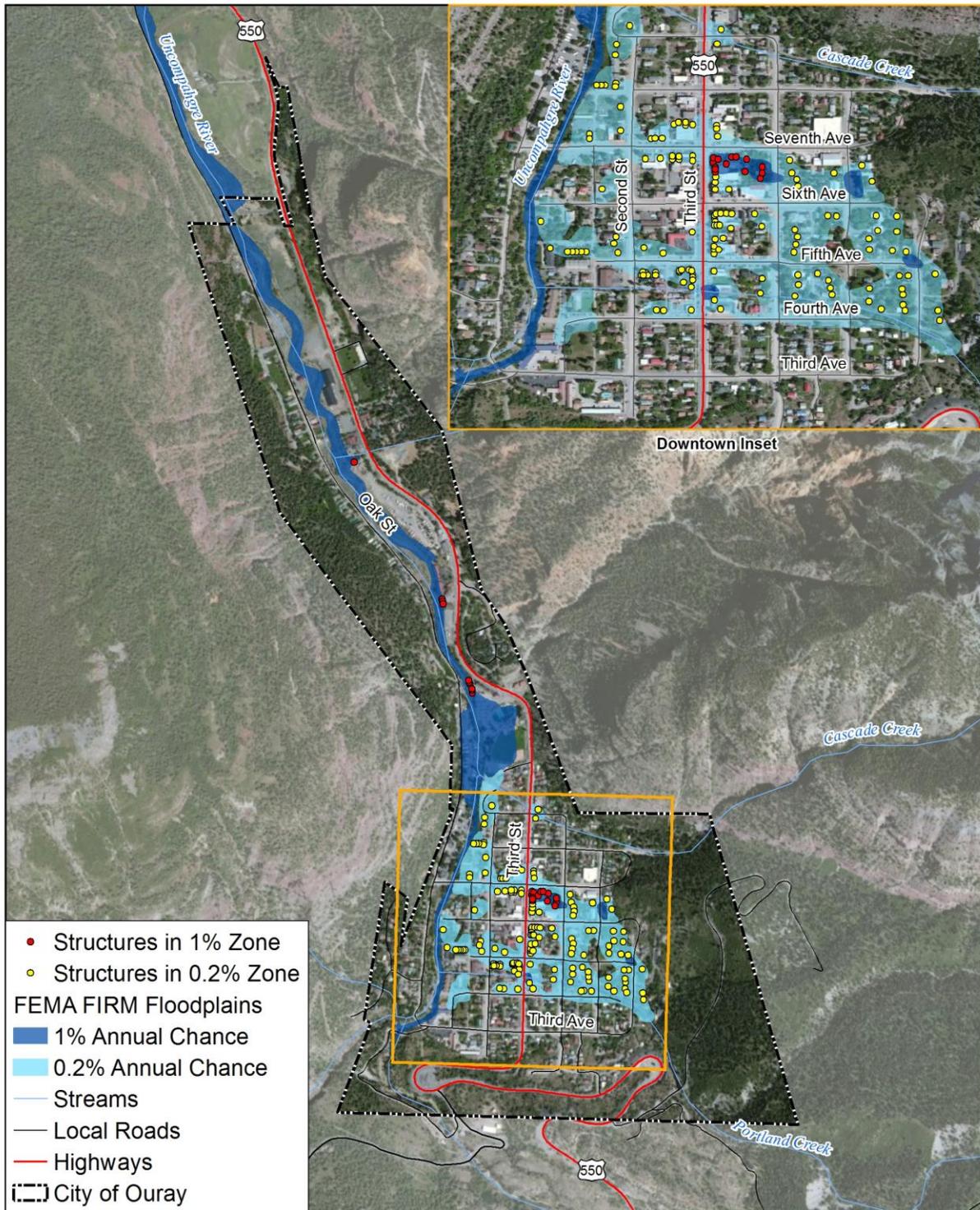


Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, FEMA FIRM: Ridgway 9/27/1985  
 & Ouray City and County 7/3/1985 w/LOMRs, NHD

0 1.5 3 Miles

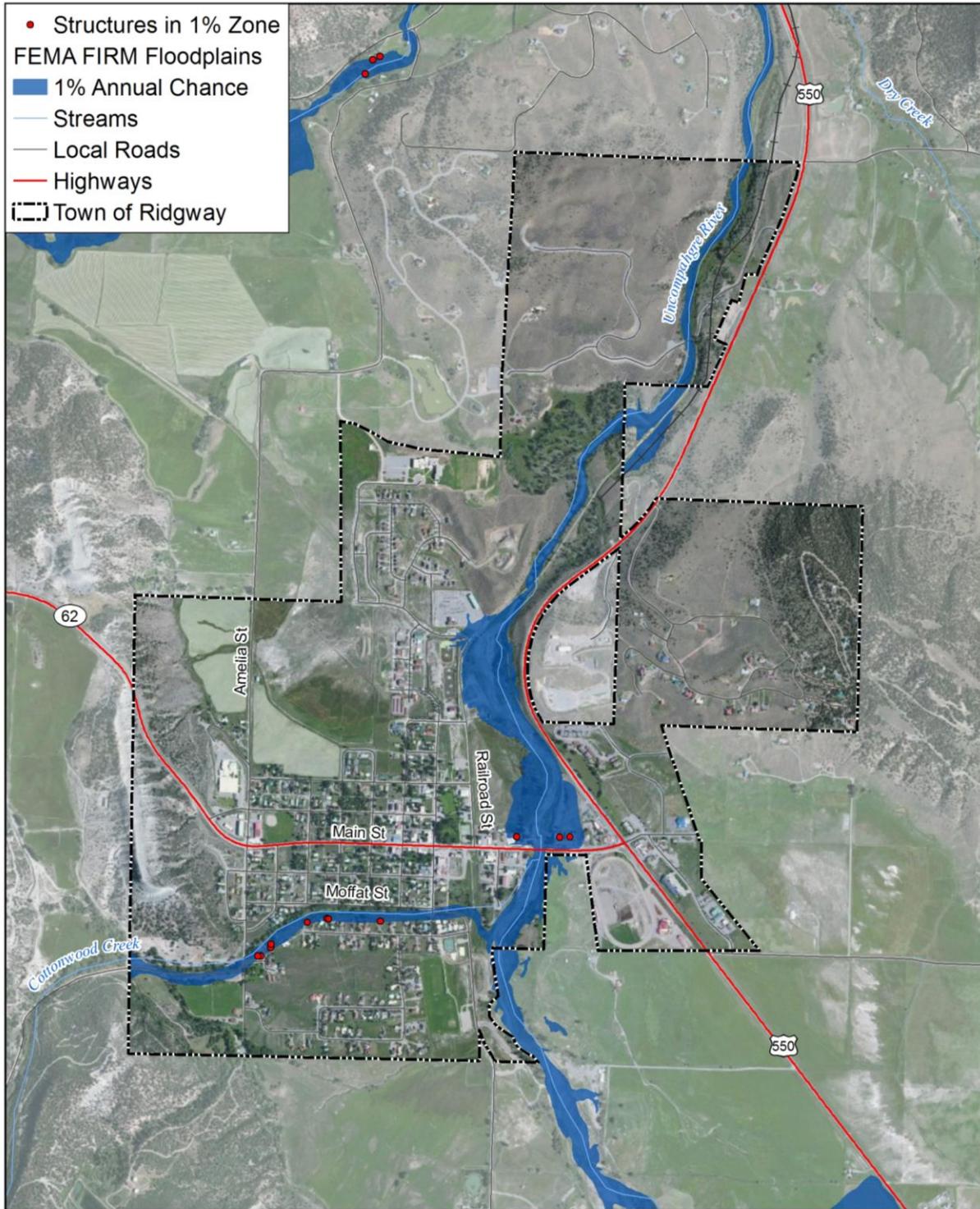


Figure 4.50. City of Ouray Flood Hazards and Structures at Risk



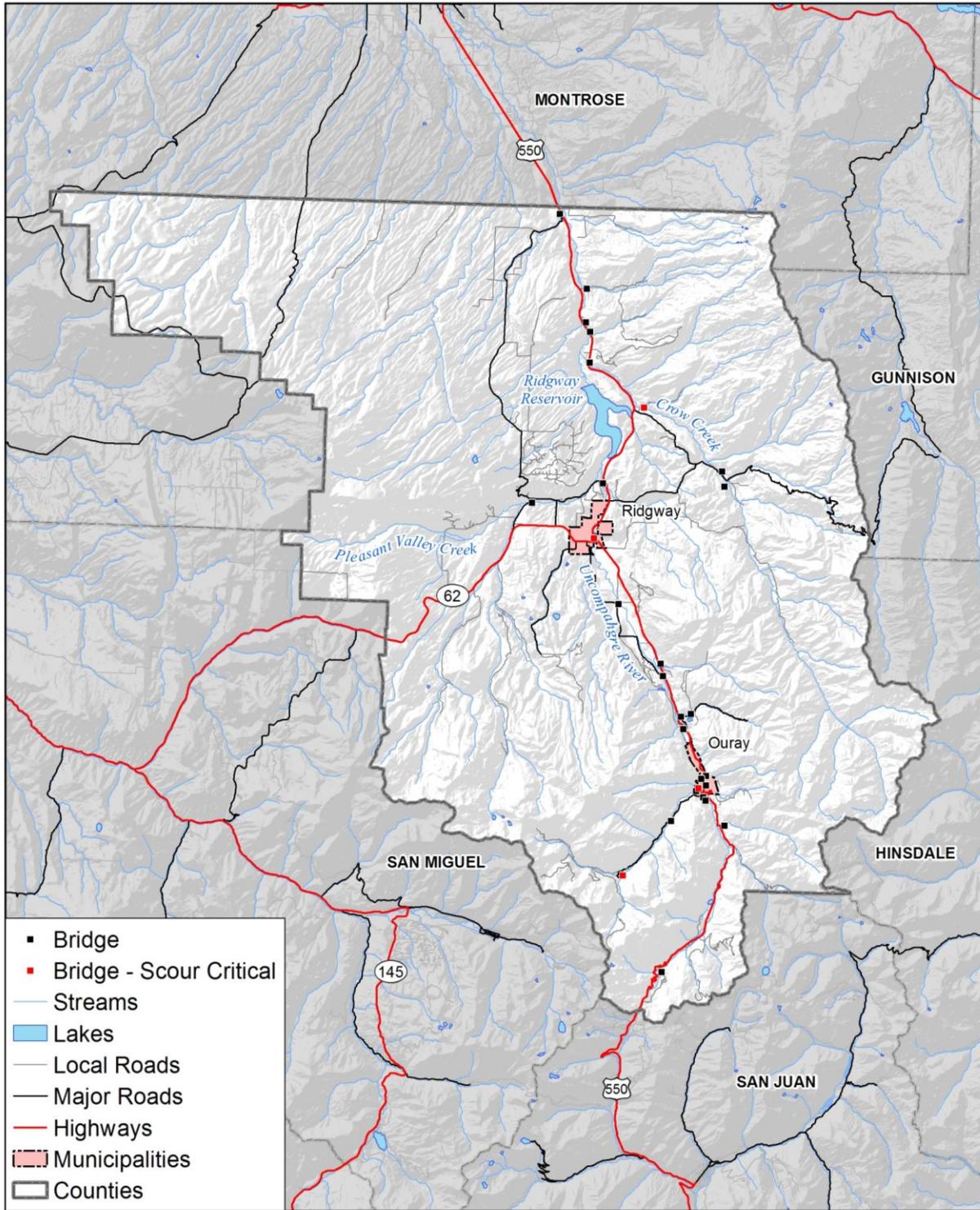
Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, NHD, FEMA FIRM: Ridgway 9/27/1985  
 & Ouray City and County 7/3/1985 w/LOMRs, ESRI World Imagery

**Figure 4.51. Town of Ridgway Flood Hazards and Structures at Risk**



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, FEMA FIRM: Ridgway 9/27/1985  
 & Ouray City and County 7/3/1985, ESRI World Imagery, NHD

**Figure 4.52. Ouray County Bridges**



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, NHD, Hazus-MH 2.1

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### ***Flood Insurance Coverage and Claims Paid***

Table 4.50 provides detailed information on National Flood Insurance Program (NFIP) policies and claims in participating jurisdictions in Ouray County.

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**Table 4.50 Community Participation in the National Flood Insurance Program**

<b>Jurisdiction</b>	<b>Date Joined</b>	<b>Effective FIRM Date</b>	<b>Policies in Force</b>	<b>Insurance in Force (\$)</b>	<b>Number of Claims</b>	<b>Claims Totals (\$)</b>
City of Ouray	7/3/1985	7/3/1985	30	7,699,100	6	33,046
Town of Ridgway	9/27/85	9/27/1985	4	1,400,000	0	0
Unincorporated Areas	7/3/1985	7/3/1985	29	7,258,900	0	0

Source: National Flood Insurance Program, July 1, 2013

As of July 1, 2013, there were 30 policies in force in the City of Ouray. Eleven of the policies were for structures in A zones, and 19 were for structures in B, C, or X zones. Ridgway has four policies in force, none of which are in A zones (an increase of three since 2008). There were 29 policies in force in unincorporated areas of Ouray County (an increase of seven since 2008). Sixteen of the policies were for structures in A zones, and 13 were for structures in B, C, or X zones.

There were no repetitive losses anywhere in Ouray County at the time of the development of this plan.

### ***Analyzing Development Trends***

The risk of flooding to future development should be minimized by the floodplain management programs of the County and its municipalities, if properly enforced. Risk could be further reduced by strengthening floodplain ordinances and floodplain management programs beyond minimum NFIP requirements. An analysis of development between 2008 and 2013 yielded three residences built in the AE zone in the unincorporated county and two in the X500 zone within the City of Ouray. Note that new development in the X500 floodplain is not required to be elevated or mitigated.

### ***Landslide/Rockfall***

During the plan update process Ouray County provided updated CGS geologic hazard data depicting landslide and rockfall hazard data. This data was not available during the 2008 plan and allowed for a refined exposure estimate in 2013. Maps of these areas are shown countywide and by jurisdiction in the landslide/rockfall hazard profile section. A separate landslide and rockfall hazard analysis was performed using this data. The presence of property in these areas does not necessarily indicate risk, as geologic hazards may have been accounted for during development. Also, problems that do occur in these areas do not typically happen collectively, but will be more sporadic or isolated. The tables below indicate that roughly 161 structures are located within mapped landslide hazard areas and 15 in rockfall hazard areas. The City of Ouray has no risk to landslide but is surrounded by rockfall hazard areas; there are no structures at risk

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to rockfall according to the analysis. The Town of Ridgway has no risk to landslide or rockfall within the town limits. There is a potential risk to public safety to travelers due to rockfalls along Highway 550 south of Ridgway, mostly between Ridgway and Ouray but also further south to Red Mountain Pass and the County line. Ouray County's largest rockfall event occurred on Red Mountain Pass on January 12, 2014. This event severed a power line and cost over \$1 million in repairs. In May 2014 the Mayor of the City of Ouray declared an "Economic Emergency" for the City due to the extreme economic hardships caused by Red Mountain Pass rockfall closure. The Camp Bird Road area is another potentially risky area for travelers. The cliffs surrounding the City of Ouray are another source of rockfalls that could impact people and structures. A water line for the City of Ouray is threatened by a landslide near County Road 361. One other landslide problem area includes the 11000 block of County Road 1 as it climbs the escarpment. The road is showing possible damage due to the sliding foundation.

**Table 4.51 Landslide Vulnerability by Jurisdiction**

Jurisdiction	Occupancy Type	Building Count	Building Improved Actual Value	Estimated Content Value	Total Value	Community Pop. Estimate*	Community Vacancy Rate Adjusted Pop.**
Unincorporated	Agriculture	11	\$2,579,330	\$2,579,330	\$5,158,660		
	Commercial	4	\$1,487,290	\$1,487,290	\$2,974,580		
	Residential	133	\$60,927,200	\$30,463,600	\$91,390,800	291	100
	<b>Total</b>	<b>148</b>	<b>\$64,993,820</b>	<b>\$34,530,220</b>	<b>\$99,524,040</b>	<b>291</b>	<b>100</b>

\*Average household size is 2.19 based on 2010 U.S. Census

\*\*Based on a vacancy rate of 34.4% based on 2010 U.S. Census

**Table 4.52 Rockfall Vulnerability by Jurisdiction**

Jurisdiction	Occupancy Type	Building Count	Building Improved Actual Value	Estimated Content Value	Total Value	Community Pop. Estimate*	Community Vacancy Rate Adjusted Pop.**
Unincorporated	Commercial	1	\$2,000	\$2,000	\$4,000		
	Residential	14	\$1,884,900	\$942,450	\$2,827,350	31	11
	<b>Total</b>	<b>15</b>	<b>\$1,886,900</b>	<b>\$944,450</b>	<b>\$2,831,350</b>	<b>31</b>	<b>11</b>

\*Average household size is 2.19 based on 2010 U.S. Census

\*\*Based on a vacancy rate of 34.4% based on 2010 U.S. Census

**Table 4.53 Critical Facilities within Landslide and Rockfall Hazard Areas in Ouray County**

Critical Facility	Type	Jurisdiction	Debris Fan
Lazy Dog Communications	Communications	Ouray County	Landslide Area
Ouray Ice Park	Public Area	Ouray County	Rockfall Area

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Data from SHELDUS, NCDC, and the County indicates that Ouray County's average annual loss from landslide and rockfall events is roughly \$15,803. This does not include indirect economic impacts caused by road closures and forced detours. The County should not necessarily rely on this estimate to plan for annual expenses though, as a single landslide event can be extraordinarily expensive. Based on available data, the event of record occurred on January 12, 2014. Repairs for this event were still ongoing as of April 2014, and the cost at the time was estimated at over \$1 million. This event closed Red Mountain Pass for nearly a month and forced traffic to take a nearly 200-mile long detour. Local businesses in the County claimed economic losses of up to 60% while the pass was closed.

### ***Analyzing Development Trends***

An analysis of development between 2008 and 2013 yielded two residences potentially exposed to rockfall hazards in the unincorporated County and 26 residential and 2 commercial buildings in areas of possible landslide hazard. The severity of landslide problems is directly related to the extent of human activity in hazard areas. Adverse effects can be mitigated by early recognition and avoiding incompatible land uses in these areas or by corrective engineering. The mountainous topography of the County presents considerable constraints to development, most commonly in the form of steep sloped areas. These areas are vulnerable to disturbance and can become unstable. Landslide risk is considered during the permitting and construction per the County's development regulations.

### **Public Health Emergencies - Pandemic Flu**

The total County population of 4,436 could potentially be exposed to a pandemic flu outbreak. According to the Colorado Department of Public Health and Environment's Internal Emergency Response Implementation Plan, susceptibility to the pandemic influenza virus strain will be universal, and the disease affect approximately 30 percent of the state's overall population. Illness rates will be highest among school-age children (about 40 percent) and decline with age. Among working adults, an average of 20 percent will become ill during a community outbreak. In a severe pandemic, it is expected that absenteeism may reach 40 percent due to illness, the need to care for ill family members, and fear of infection. According to Ouray County Public Health the County has a lower than average vaccination rate, making residents potentially more vulnerable to contracting the influenza virus.

The number of hospitalizations and deaths will depend on the virulence of the virus. Risk groups cannot be predicted with certainty. During the annual influenza season, infants, the elderly, the chronically ill, and pregnant women are usually at higher risk. But, in contrast, in the 1918 pandemic, most deaths occurred among young, previously healthy adults.

If a pandemic event affected 30 percent of the Ouray population, approximately 1,330 people in the County could become ill. Local medical staff and resources would be quickly overwhelmed. Public fear and anxiety could cause some panic behaviors. It is difficult to quantify potential losses any further.

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## **Analyzing Development Trends**

Exposure to public health emergencies can increase with population growth.

### **Severe Winter Storms**

The threat to public safety is typically the greatest concern when it comes to impacts of winter storms. But, these storms can also impact the local economy by disrupting transportation and commercial activities. Winter storms are occasionally severe enough to overwhelm snow removal efforts, transportation, livestock management, and business and commercial activities. Travelers on highways in Ouray County, particularly along remote stretches of road, can become stranded, requiring search and rescue assistance and shelter provisions. The County can experience high winds and drifting snow during winter storms that can occasionally isolate individuals and entire communities and lead to serious damage to livestock populations and crops. Winter storm also have the potential to disrupt the delivery of food and fuel into the County. Winter storms contribute directly to three other hazards in this plan: avalanche, extreme temperatures (cold), and mass transportation accident. Limited phone and cell phone service in parts of the County mean that emergency reporting may be impossible during severe winter storm events.

Research presented in Section 4.2.12 Severe Winter Storm did not find detailed significant loss information for this hazard, yet structural losses are possible. Based on past winter storm information from SHEL DUS, the average annualized loss is \$151,689. The average annualized loss based on NCDC data is much lower at \$19,138. Both NCDC and SHEL DUS state that damage estimates are best guesses based on available data at the time of reporting, so these estimates may not be entirely accurate.

Structural damage from winter storms in southwest Colorado can result from severe snow loads on rooftops. Older buildings are more at risk, as are buildings with large flat rooftops (often found in public buildings such as schools). With the historic structures in Ridgway and the City of Ouray, the potential for damage exists, but information to quantify the amount and extent is currently not available. The HMPC noted that a greenhouse on CR 3 had structural damage during a winter storm event in 2008 or 2009. The City has inventoried 74 unreinforced masonry buildings, most of which are historic structures that could be vulnerable to heavy snow loads. The size of the County's elderly population is above average, a potentially vulnerable demographic during severe winter storms. A similar inventory for was not available.

The primary concern of the Log Hill Mesa FPD is access to remote areas of the district. All first due vehicles are equipped with 4 wheel drive or insta-chains to increase their mobility. Fire officers monitor local road conditions and relay information to Road and Bridge if concerns arise about access.

## Analyzing Development Trends

Future residential or commercial buildings built to code should be able to withstand snow loads from severe winter storms. Population growth in the County and growth in visitors has the potential to increase problems with road, business, and school closures and increase the need for snow removal and emergency services related to severe winter weather events.

## Wildfire

The Hazard Identification section laid out several issues that help frame the county's vulnerability to wildland fire. This section attempts to further quantify the impacts that wildland fire could have on people, property, and critical infrastructure in the County. The 2011 CWPP identified 21 communities and eight ASIs within the WUI. Each community was designated a vulnerability rating (very high, high, and moderate) during the CWPP development process. During the update of this mitigation plan an effort was made to further quantify the population at risk as well as the number and value of structures at risk within these CWPP communities. GIS was used to analyze the communities at risk based on the number of improved structures. Contents values were also estimated (see discussion in flood vulnerability discussion). The amount of improved values and estimated structure value exposed was grouped community and is shown in Table 4.54. The results were also grouped by very high, high, and moderate, community wildland fire risk, as shown in Table 4.55. The results indicate that approximately \$930 million in property value and 2,617 structures are potentially exposed to wildland fire hazards in the county. These results are also grouped by fire protection district as shown in Table 4.56. The main planning and mitigation concern for the Log Hill Mesa FPD district is the likelihood of wildfires. The FPD experiences approximately 4 to 5 wildland fires annually. Most fires are attacked early in the incipient stage and extinguished immediately, according to the District. Ridgway School District facilities are relatively safe from wildfire damage due to the lack of combustible vegetation surrounding the perimeters of the buildings. The primary concern regarding wildfires surrounding the Ridgway Schools lies in the access to the school district's facilities which would be required to provide community support if needed.

**Table 4.54 Ouray County Wildland Fire Vulnerability by CWPP Community**

CWPP Community	Community Hazard Rating	Structure Count	Building Improved Actual Value	Building Contents	Total Value	Community Vacancy Rate Adj. Pop.*
City of Ouray	Moderate	689	\$124,990,230	\$80,487,650	\$205,477,880	400
Colona	Moderate	27	\$2,376,190	\$1,525,670	\$3,901,860	14
Cornerstone	Moderate	23	\$14,029,700	\$7,758,495	\$21,788,195	11
Dallas Meadows	High	73	\$22,009,560	\$11,068,730	\$33,078,290	50
Dave Wood South	High	15	\$914,830	\$457,415	\$1,372,245	11
Elk Meadows	High	89	\$11,295,990	\$5,647,995	\$16,943,985	64
Horsefly Tracts	High	68	\$5,371,430	\$2,688,305	\$8,059,735	38

<b>CWPP Community</b>	<b>Community Hazard Rating</b>	<b>Structure Count</b>	<b>Building Improved Actual Value</b>	<b>Building Contents</b>	<b>Total Value</b>	<b>Community Vacancy Rate Adj. Pop.*</b>
Idlewild	High	127	\$24,532,350	\$13,369,305	\$37,901,655	83
Juniper Hills	High	5	\$2,085,230	\$1,042,615	\$3,127,845	4
Lake Lenore / Panoramic Heights	High	60	\$9,625,110	\$4,812,555	\$14,437,665	44
Log Hill Village / Fairway Pines	Very High	400	\$130,418,520	\$69,994,260	\$200,412,780	283
Mineral Farms	Very High	25	\$7,279,780	\$3,639,890	\$10,919,670	19
North Log Hill Mesa	High	256	\$46,621,830	\$24,206,630	\$70,828,460	170
Park Estates	Very High	21	\$4,516,010	\$4,045,565	\$8,561,575	2
Piedmont Hills/Valley Heights	Very High	8	\$2,002,670	\$1,001,335	\$3,004,005	6
Pleasant Valley	Very High	107	\$49,463,580	\$25,983,840	\$75,447,420	73
Ponderosa Village / Indian Springs	Very High	51	\$12,876,620	\$6,676,420	\$19,553,040	36
Silverado Estates	High	24	\$4,551,620	\$2,113,215	\$6,664,835	15
Town of Ridgway	Moderate	476	\$103,508,260	\$63,874,510	\$167,382,770	276
Vista Terrace	High	37	\$8,650,860	\$4,557,845	\$13,208,705	27
Whispering Pines	High	36	\$5,314,820	\$2,657,410	\$7,972,230	27
<b>Totals</b>		<b>2,617</b>	<b>\$592,435,190</b>	<b>\$337,609,655</b>	<b>\$930,044,845</b>	<b>1,652</b>

\*Based on a vacancy rate of 42.9% based on 2010 US Census.

**Table 4.55 Ouray County Wildfire Vulnerability by Hazard Rating Summary**

<b>Community Hazard Rating</b>	<b>Structure Count</b>	<b>Building Improved Actual Value</b>	<b>Building Contents</b>	<b>Total Value</b>	<b>Community Vacancy Rate Adjusted Pop.*</b>
Very High	612	\$206,557,180	\$111,341,310	\$317,898,490	419
High	790	\$140,973,630	\$72,622,020	\$213,595,650	533
Moderate	1,215	\$244,904,380	\$153,646,325	\$398,550,705	701
<b>Total</b>	<b>2,617</b>	<b>\$592,435,190</b>	<b>\$337,609,655</b>	<b>\$930,044,845</b>	<b>1,652</b>

\*Based on a vacancy rate of 34.4% based on 2010 US Census.

Based on observations in wildland-urban interface fires, structures and contents are often completely destroyed, thus the estimated total value also represents potential dollar losses. Note: a wildland fire is not likely to burn all the wildland-urban interface areas in the County at once.

An analysis of populations at risk was conducted by applying an average household size of 2.19 (2010 Census) to the count of residential structures with improvements in the communities at risk. The results are displayed below in Table 4.56. This analysis yielded an estimated 1,652 people in the communities at risk. This includes 951 in the very high and high risk communities of Ouray County. It should be noted that there are a large number of second-home owners in the County, thus the numbers may overestimate the residential population. To compensate for this potential overestimation the population estimates were adjusted using the 2010 U.S. Census

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estimate of a 34.4% vacancy rate for the County. An adjusted population of 1,652 is likely a more accurate estimate of population at risk within the CWPP Communities.

The results quantify what Ouray County residents have known for some time; wildland fires pose a serious threat to people, property, and assets in the County. This also emphasizes the importance of the local level and County level CWPPs, which have identified the priority areas and projects for mitigation. The County CWPP contains a discussion on values at risk. The CWPP notes the impact that wildland fires can have on the local economy. If the County's largest employers and other businesses were out of work for either the short term or the long term due to wildland fires, Ouray County's economy would be impacted. Furthermore, ranching, education, and tourism are important components of Ouray County's economy. Wildland fires can have a direct impact on agricultural lands and Ouray County's scenery, adversely affecting the ability of the County's residents to earn a living from these industries. Ouray County's scenic beauty is a main draw for tourism, so the County could suffer economic losses from tourists not coming to the area due to wildfires.

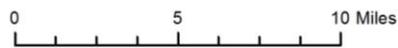
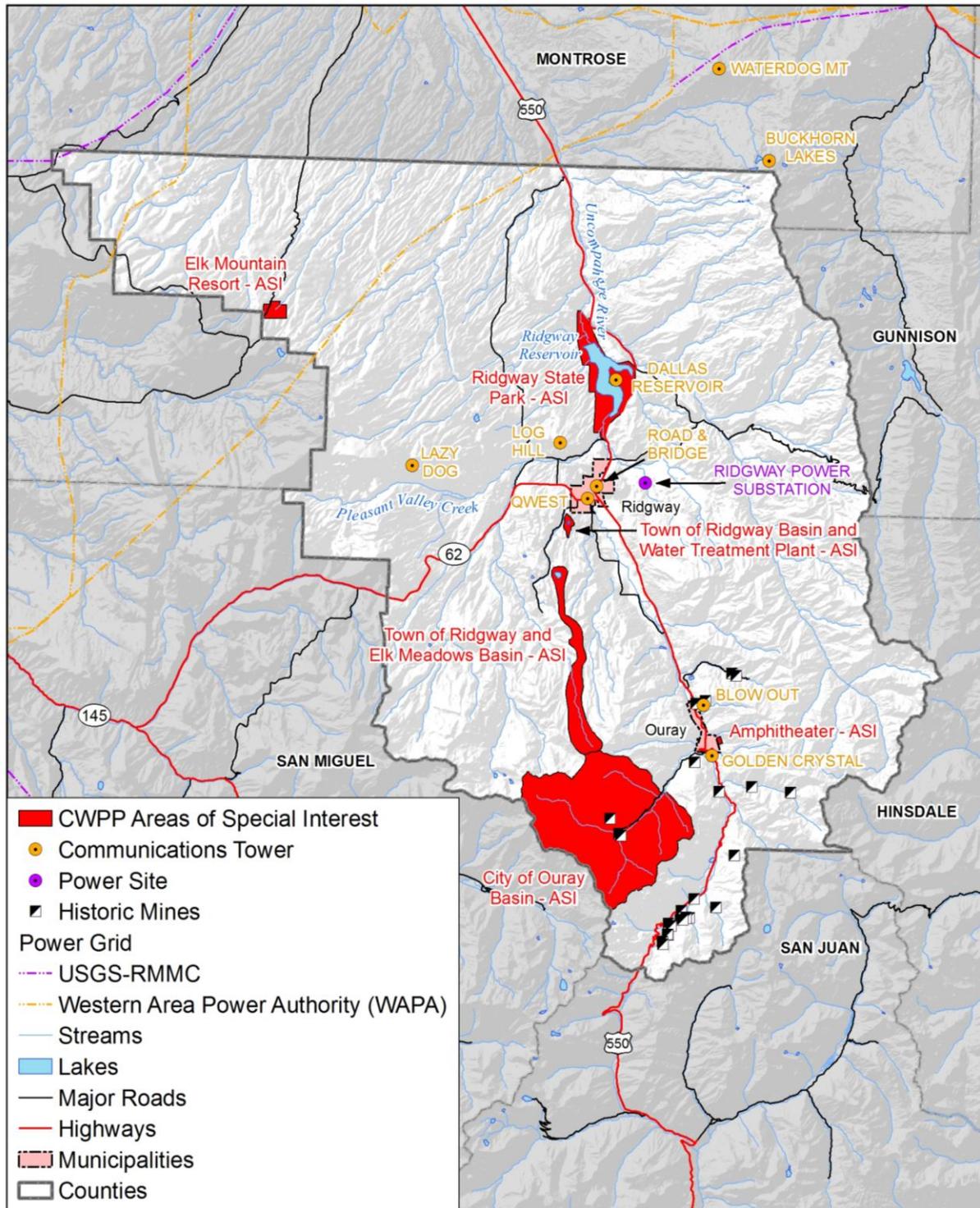
**Table 4.56 Wildland Fire Vulnerability by Fire Protection District and CWPP Community**

Fire Protection District	CWPP Community	Community Hazard Rating	Structure Count	Building Improved Actual Value	Building Contents	Total Value	Community Vacancy Rate Adjusted Pop.
Horsefly FPD	Horsefly Tracts	High	68	\$5,371,430	\$2,688,305	\$8,059,735	38
	Cornerstone	Moderate	23	\$14,029,700	\$7,758,495	\$21,788,195	11
	<b>Total</b>		<b>91</b>	<b>\$19,401,130</b>	<b>\$10,446,800</b>	<b>\$29,847,930</b>	<b>48</b>
Log Hill FPD	Log Hill Village / Fairway Pines	Very High	400	\$130,418,520	\$69,994,260	\$200,412,780	283
	North Log Hill Mesa	High	256	\$46,621,830	\$24,206,630	\$70,828,460	170
	<b>Total</b>		<b>656</b>	<b>\$177,040,350</b>	<b>\$94,200,890</b>	<b>\$271,241,240</b>	<b>453</b>
Montrose FPD	Colona	Moderate	27	\$2,376,190	\$1,525,670	\$3,901,860	14
	<b>Total</b>		<b>27</b>	<b>\$2,376,190</b>	<b>\$1,525,670</b>	<b>\$3,901,860</b>	<b>14</b>
Ouray FPD	Mineral Farms	Very High	25	\$7,279,780	\$3,639,890	\$10,919,670	19
	Lake Lenore / Panoramic Heights	High	60	\$9,625,110	\$4,812,555	\$14,437,665	44
	Whispering Pines	High	36	\$5,314,820	\$2,657,410	\$7,972,230	27
	City of Ouray	Moderate	689	\$124,990,230	\$80,487,650	\$205,477,880	400
	<b>Total</b>		<b>810</b>	<b>\$147,209,940</b>	<b>\$91,597,505</b>	<b>\$238,807,445</b>	<b>490</b>
Ridgway FPD	Park Estates	Very High	21	\$4,516,010	\$4,045,565	\$8,561,575	2
	Piedmont Hills/Valley Heights	Very High	8	\$2,002,670	\$1,001,335	\$3,004,005	6
	Pleasant Valley	Very High	107	\$49,463,580	\$25,983,840	\$75,447,420	73
	Ponderosa Village / Indian Springs	Very High	51	\$12,876,620	\$6,676,420	\$19,553,040	36
	Dallas Meadows	High	73	\$22,009,560	\$11,068,730	\$33,078,290	50
	Elk Meadows	High	89	\$11,295,990	\$5,647,995	\$16,943,985	64
	Idlewild	High	127	\$24,532,350	\$13,369,305	\$37,901,655	83
	Juniper Hills	High	5	\$2,085,230	\$1,042,615	\$3,127,845	4
	Silverado Estates	High	24	\$4,551,620	\$2,113,215	\$6,664,835	15
	Vista Terrace	High	37	\$8,650,860	\$4,557,845	\$13,208,705	27
	Town of Ridgway	Moderate	476	\$103,508,260	\$63,874,510	\$167,382,770	276
	<b>Total</b>		<b>1,018</b>	<b>\$245,492,750</b>	<b>\$139,381,375</b>	<b>\$384,874,125</b>	<b>635</b>
	Ouray County	Dave Wood South	High	15	\$914,830	\$457,415	\$1,372,245
<b>Total</b>			<b>15</b>	<b>\$914,830</b>	<b>\$457,415</b>	<b>\$1,372,245</b>	<b>11</b>
<b>Grand Total</b>			<b>2,617</b>	<b>\$592,435,190</b>	<b>\$337,609,655</b>	<b>\$930,044,845</b>	<b>1,652</b>

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Areas of Special Interest are also vulnerable to wildfires in Ouray County. Areas of special interest (ASIs) are places within the County that could be threatened from wildfire and have a social or economic value which is not based on residential development. Unlike communities, ASIs are not given hazard ratings. Frequent candidates for ASIs include recreation areas, such as parks, reservoirs, ski areas, and defined open space. Guest ranches, church camps, RV parks and other large acreage recreational camps that have a significant, but temporary population are typically included as an ASI. Also included is some critical infrastructure, such as communication sites. ASIs are identified separately from communities because of the size and a focus on recreation and infrastructure over residences. Ouray County's ASIs are shown in Figure 4.53.

Figure 4.53. Ouray County Areas of Special Interest



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Ouray County, CDOT, NHD, MIFMU, County CWPP

Critical infrastructure in Ouray County includes public safety and health, government buildings, physical infrastructure, water supply systems, wastewater treatment, communication towers and schools. Major power transmission lines also traverse wildfire-prone areas within the County. This includes transmission lines owned or operated by Western Area Power Administration (WAPA), Xcel, and San Miguel Power Association. Power lines can also be sources of wildfire ignitions when knocked down by wind or other means. Table 4.57 lists the critical facilities located in the WUI Communities.

**Table 4.57 Critical Facilities Located in the WUI Communities**

Critical Facility	Type	Jurisdiction	WUI Community	WUI Rating
Log Hill comm. site	Communications	Ouray County	Log Hill Village / Fairway Pines	Very High
Lazy Dog comm. site	Communications	Ouray County	Pleasant Valley	Very High
Log Hill Mesa Fire Station #2	Fire Station	Ouray County	Log Hill Village / Fairway Pines	Very High
Dallas Creek water storage	Infrastructure	Ouray County	Log Hill Village / Fairway Pines	Very High
Qwest comm. site	Communications	Town of Ridgway	Town of Ridgway	Moderate
Mountain Medical Center	EMS	Town of Ridgway	Town of Ridgway	Moderate
Ridgway Fire Department	Fire Station	Town of Ridgway	Town of Ridgway	Moderate
Ouray County Social Services	Government	Town of Ridgway	Town of Ridgway	Moderate
Ridgway Town Hall	Government	Town of Ridgway	Town of Ridgway	Moderate
San Miguel Power Assoc. yard	Infrastructure	Town of Ridgway	Town of Ridgway	Moderate
CDOT Ridgway shop	Infrastructure	Town of Ridgway	Town of Ridgway	Moderate
Ridgway Public Works	Infrastructure	Town of Ridgway	Town of Ridgway	Moderate
Ridgway Secondary School	School	Town of Ridgway	Town of Ridgway	Moderate
Ridgway Elementary School	School	Town of Ridgway	Town of Ridgway	Moderate
Ouray County 4-H Event Center	Shelter	Town of Ridgway	Town of Ridgway	Moderate
Ridgway wastewater site	Wastewater Treatment Facility	Town of Ridgway	Town of Ridgway	Moderate
Road & Bridge comm. site	Communications	Ouray County	Town of Ridgway	Moderate
Ouray County Road & Bridge/Land Use	EOC	Ouray County	Town of Ridgway	Moderate
Horsefly Fire Station	Fire Station	Ouray County	Horsefly Tracts	High
Log Hill Mesa Fire Station #1	Fire Station	Ouray County	North Log Hill Mesa	High
Ouray County Public Health	Clinic	City of Ouray	City of Ouray	Moderate
City of Ouray Fire Department	Fire Station	City of Ouray	City of Ouray	Moderate
City Of Ouray Town Hall	Government	City of Ouray	City of Ouray	Moderate
Ouray County Courthouse	Government	City of Ouray	City of Ouray	Moderate
City of Ouray Public Works	Infrastructure	City of Ouray	City of Ouray	Moderate
Ouray County Road & Bridge Ouray shop	Infrastructure	City of Ouray	City of Ouray	Moderate
City of Ouray Police Department	Law Enforcement	City of Ouray	City of Ouray	Moderate
Ouray County Sheriff	Law Enforcement	City of Ouray	City of Ouray	Moderate
Box Canyon Park	Public Area	City of Ouray	City of Ouray	Moderate
Ouray Hot Springs Pool & Fellin Park	Public Area	City of Ouray	City of Ouray	Moderate
City of Ouray Community Center	Public Area	City of Ouray	City of Ouray	Moderate

<b>Critical Facility</b>	<b>Type</b>	<b>Jurisdiction</b>	<b>WUI Community</b>	<b>WUI Rating</b>
City of Ouray Public Schools	School	City of Ouray	City of Ouray	Moderate
Ouray Mountain Rescue Team	EMS	Ouray County	City of Ouray	Moderate
CDOT Ouray shop	Infrastructure	Ouray County	City of Ouray	Moderate
Ouray Ice Park	Public Area	Ouray County	City of Ouray	Moderate

### ***Analyzing Development Trends***

An analysis of development between 2008 and 2013 yielded 187 new properties developed within the identified WUI communities. The majority of these are residential structures, though some commercial development in Ridgway and Ouray is included in that total. The greatest growth is occurring in the Log Hill Village/Fairway Pines (33 new structures - Very High rating), North Log Hill Mesa (19 new structures – High rating), and Cornerstone (12 new structures – Moderate rating) WUI communities. Any new construction built in the unincorporated County needs to conform to the County wildfire mitigation regulations (see discussion in Section 4.4). A public comment on the plan in 2013 noted that the County’s development setback regulations encourage homes to be built in such a way that they are hidden from the roads, which pushes homes deeper into the WUI. The concern was that this can make accidental ignitions more likely to result in a wildfire. The Ouray County Community Wildfire Protection Plan lays out a comprehensive set of strategies to address the wildfire issue while individual mitigation projects are being planned and implemented within the identified focus areas.

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## 4.4 Risk Assessment Summary

The Ouray County Risk Assessment revealed a number of problem areas to be addressed in the mitigation strategy. These key findings are summarized in the following list.

### Avalanche

- The most hazard-related deaths in Ouray County are due to avalanches
- There were 74 avalanches involving deaths or injuries between 1859-2013
- Avalanches and avalanche control periodically closes roads and highways.

### Dam Failure

- Two high hazard (probable loss of life if failure) dams are located in Ouray County
- Full Moon (aka Crystal) Dam has had structural improvements
- Failure of Ridgway Reservoir could cause serious damage, but most impacts would be in Montrose County.

### Debris Flow

- Impacts from debris flows could be critical in the City of Ouray, blocking major streets and hindering transportation and movement.
- Debris flows frequently damage and close roads in the County, particularly County Roads 17, 5 and 7 and State Highways 62 and 145.

### Drought

- Multi-year droughts occur every 10 years on average in Ouray County.
- Drought can affect both water quantity and quality.
- The agriculture and tourism-based economy is particularly vulnerable to drought.
- Drought increases risk to other hazards, such as wildfire.

### Earthquake

- Roughly 430 buildings could experience at least moderate damage in 2,500-Year Probabilistic Scenario, based on HAZUS modeling
- Total economic impacts could exceed \$45.89 million.
- Ridgway Dam is regularly monitored for potential damage from seismic activity.

### Extreme Temperatures

- Extreme cold is a bigger concern for the County than extreme heat, though extreme heat can exacerbate drought and wildfire conditions.
- Extreme cold has caused issues with frozen or burst water pipes and crop losses.

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## **Flood**

- Thirty-five recorded flood events between 1874 and 2013.
- The most serious impacts could occur in the City of Ouray. Ridgway has little flood potential from the Uncompahgre River and its tributaries but has minor stormwater drainage problems.
- Eight critical facilities are at risk to the 1% annual chance, 0.2% annual chance, or physiographic flood hazard.
- \$16,358,000 in flood insurance in force (63 policies) in Ouray County, City of Ouray, and the Town of Ridgway.

## **Landslide/Rockfall**

- There are occasional landslide problems in the County. None of the deposits affect developed areas. There are several rockfall hazard areas around the City of Ouray, the Camp Bird Road Area, and along Highway 550.
- Landslides and rockfall events can damage and close roads. The rockfall event of record occurred on January 12, 2014 on Red Mountain Pass and required over \$1 million in road repairs and rockfall mitigation and resulted in significant economic impacts on local businesses.

## **Lightning**

- Damaging or fatal lightning events are rare in the County.
- The main concern from the Log Hill Mesa FPD's perspective is the added risk of wildfires.
- Outdoor recreationists at high altitude during summer months are very vulnerable to lightning.
- Lightning can damage power grid and information technology and communications networks. A power substation in the County was damaged by a lightning strike in 1999.

## **Public Health Emergencies**

- West Nile Virus and pandemic flu are the main concerns for public health emergencies in the County.
- There have been few pandemic flu or West Nile Virus cases in the County.
- The Town of Ridgway and Ouray County have aggressive mosquito programs in place for mitigation, education, and tracking.

## **Severe Winter Storm**

- There is high vulnerability to severe winter weather along highways and mountain passes.
- Increased population is exposed to hazards and emergencies during high tourist seasons.
- Vehicle accidents, power/utility disruptions, and isolation due to road closures are the main concern related to severe winter storms in the County.

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## **Wildfire**

- The largest wildfire in the County was the May 1999 Baldy fire at 1,326 acres.
- There are 21 communities and 7 areas of special interest within the wildland urban interface in Ouray County.
- Approximately \$930 million in property value and 2,617 structures are potentially exposed to wildland fire hazards in the county.
- Critical roads are also vulnerable to wildfire.
- 35 critical facilities are identified in the WUI communities.

## **Windstorm**

- Past damages from windstorms have typically included blown down trees and power poles, and damage to roofs. Blown-down trees have fallen across Highway 550 just south of the City of Ouray. Strong winds can also blow loose rocks off cliffs and steep slopes in the County, creating a rockfall hazard.
- Windstorms would mainly affect the Log Hill FPD by knocking down power lines and increasing the fire danger. The most populated portion of the District has underground power lines and is less susceptible to this danger.
- Additionally, roadside thinning projects recommended in the Ouray County Community Wildfire Protection Plan will reduce the vulnerability of power lines by removing trees close to them. Both Fire Stations are capable of operating during power outages.

## **Hazardous Materials Release**

- Transported hazardous materials releases are of particular concern to the County due to narrow, winding mountain roads. These roads are especially dangerous during the winter.
- There were seven reported incidents in Ouray County between 1990 and 2012 based on National Response Center records.
- Streams and reservoirs are also vulnerable to contamination.

## **Mass Casualty Events**

- Traffic accidents involving multiple casualties are the primary concern.
- Traffic and bus accidents are most likely to occur along the Highway corridors of 550 and 62. The steeper, curvy sections of Highway 550 above and south of Ouray are particularly prone to accidents.
- A plane crashed into Ridgway Reservoir on March 22, 2014, killing 5 people. Response to the crash took over 1,500 labor hours.
- The reemerging mining industry in the County is another source of potential mass casualty events.
- The County has produced tabletop and full-scale exercises on mass casualty scenarios to improve preparedness and response.

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### **Imminent Threat**

- There have been past incidents in the County that could be considered terrorism or imminent threat, such as a suicide bomber, bombings of buildings in downtown Ridgway, and Ku Klux Klan rallies in the 1920s.
- Potential imminent threat targets in the County include mines, resorts, dams, schools and power infrastructure.

### **Multi-Hazard**

- Ouray County has been included in past emergency declarations for drought, frost/freezing events, and high winds; the County has also been included in state declarations for flooding, mudslides, severe storms, and wildfires.
- Hazard events that cause road closures, such as debris flows/mudslides, floods, landslides, avalanches, and winter storms, affect the economy and safety of Ouray County by restricting access of visitors, workers, and goods and services.

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## 4.5 Mitigation Capabilities Assessment

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Thus far, the planning process has identified the natural and man-made hazards posing a threat to Ouray County and described, in general, the vulnerability of the County to these risks. The next step is to assess what loss prevention mechanisms are already in place. This part of the planning process is the mitigation capability assessment. Combining the risk assessment with the mitigation capability assessment results in “net vulnerability” to disasters and more accurately focuses the goals, objectives, and proposed actions of this plan.

The HMPC used a two-step approach to conduct this assessment. First, an inventory of common mitigation activities was made through the use of a matrix. The purpose of this effort was to identify policies and programs that were either in place or could be undertaken, if appropriate. Second, the HMPC conducted an inventory and review of existing policies, regulations, plans, projects, and programs to determine if they contribute to reducing hazard related losses.

### 4.5.1 Ouray County Mitigation Capabilities

This section presents Ouray County’s mitigation capabilities as well as the capabilities of the City of Ouray, the Town of Ridgway, and, briefly, the Log Hill Mesa Fire Protection District and Ridgway School District. This section also discusses select state capabilities that are applicable to the planning area. This assessment describes existing capabilities: programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. It addresses regulatory mitigation capabilities, administrative and technical mitigation capabilities, financial mitigation capabilities, and mitigation outreach and partnerships for each of the participating jurisdictions. It also summarizes the effectiveness of the existing capabilities in reducing hazard losses by jurisdiction.

#### Ouray County Regulatory Mitigation Capabilities

Table 4.58 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Ouray County. Excerpts from applicable policies, regulations, and plans and program descriptions follow to provide more detail on existing mitigation capabilities.

**Table 4.58 Ouray County Regulatory Mitigation Capabilities Matrix**

Regulatory Tool (ordinances, codes, plans)	Y/N	Comments
General plan	Y	Master Plan 1999
Zoning ordinance	Y	Ouray County Land Use Code (Section 3: Zoning Control/Zoning Provisions)
Subdivision ordinance	Y	Ouray County Land Use Code
Growth management ordinance	Y	See Master Plan
Floodplain ordinance	Y	Ouray County Land Use Code (Section 10: Flood Hazard Regulations)
Other special purpose ordinance (e.g., stormwater, steep slope, wildfire)	Y	Ouray County Land Use Code (Section 12: Geologic Hazard Area Regulations, Section 24: Wildfire Mitigation)
Building code	Y	1997 Uniform Building Code
Fire department ISO rating	5 Districts	Ouray 7, Ridgway 6/9, Log Hill Mesa 5/8B
Erosion or sediment control program	N	
Stormwater management program	N	
Site plan review requirements	Y	
Capital improvements plan	Y	Limited to County buildings
Economic development plan		
Local emergency operations plan	Y	Will be updated as part of mitigation study
Other special plans	Y	Historic preservation, road/trail access preservation Courthouse evacuation and response plan, Warning plan, Rapid Needs assessment plan are all in the final draft waiting to be annexed as of 2013
Flood insurance study or other engineering study for streams	Y	FIS
Elevation certificates		

As indicated in the table above, Ouray County has several plans and programs that guide the County’s mitigation of development of hazard-prone areas. Some of these are described in more detail below.

***Ouray County Master Plan, 1999***

The Ouray County Master Plan is a comprehensive, long-range guide, prepared by the Ouray County Planning Commission, to be used in making decisions that affect the physical, cultural, and socioeconomic development of Ouray County. The plan’s goals provide general statements reflecting the desires of county residents regarding the use of land and lay the groundwork for zoning and the land use decision-making process. The policies provide the County’s positions as they relate to the identified goals and establish guidelines for direction or action. The overall goal of the plan is to allow gradual, long-term population and economic growth in the County in a manner that does not harm the County’s irreplaceable scenic beauty, wildlife, air and water resources, and other environmental qualities and that does not unduly burden the County’s residents or its governments.

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Master plan goals and polices that directly or indirectly mitigate hazards identified in this plan are included below and are organized by the section of the master plan that they are pulled from:

## Agriculture

<b>Goal: To encourage the continued use of lands for agricultural productivity and the right to farm and ranch.</b>
<b>Policy 5:</b> Evaluate and consider for adoption programs and incentives that encourage the placement of land into conservation easements and other protective status.
<b>Policy 7:</b> Obtain, maintain and update a map of ditches and irrigated lands provided by the Colorado Division of Water Resources, supplemented or amended, as required, using other sources. Require developers to designate all irrigation ditches, return flow ditches and drainage ditches located within the boundaries of any development plan and designate access to such ditches and surrounding irrigated fields.
<b>Policy 8:</b> Evaluate and consider for adoption incentives and amendments to the Land Use Code that keep or augment existing water rights within the County.

## County/Municipal Relationships

<b>Goal: To preserve the community character of the City of Ouray and the Town of Ridgway.</b>
<b>Policy 1:</b> The County and municipalities (future and present) in cooperation should come to an agreement regarding the location of urban growth boundaries and urban influence zones. Having created and agreed to these boundaries, the County should recognize them in the following manner: a. The County should not rezone or allow the development of any property, other than agreed upon uses, within the urban growth boundaries. b. The County should support municipal annexations when the subject properties are located within the urban growth boundaries provided all conditions of the intergovernmental agreements are met. c. The County and municipalities should enter into intergovernmental agreements to jointly review any development proposals within established urban growth boundaries and other areas of mutual concern.
<b>Policy 2:</b> Encourage and foster intergovernmental agreements that uphold the intent of this master plan with any areas of concentrated residential development that undertake a process of incorporation.

## Natural Resources

<b>Goal: To manage our natural resources in a manner that is both environmentally sound and protects private property rights.</b>
<b>Policy 5:</b> Evaluate and consider for adoption incentives and technologies that encourage energy and water conservation.
<b>Policy 6:</b> Evaluate and consider for adoption "1041" regulations (C.R.S. §24-65.1-101 et seq., which encourages local governments to designate certain geographic areas (e.g., hazard areas) as matters of state interest for the purposes of controlling the development of such areas).
<b>Policy 7:</b> Continue to maintain wildfire mitigation regulations and encourage fire protection and water supply entities to work proactively to make further improvements in fire safety.

## Rural Character

<b>Goal: To maintain the rural character of Ouray County.</b>
<b>Policy 1:</b> Develop and implement zoning and incentives to maintain low density or large tracts of land. Where appropriate, direct growth toward areas that are already developed or that otherwise clearly support the goals of this plan.
<b>Policy 2:</b> Encourage build out in existing planned unit developments.
<b>Policy 3:</b> Create open space or low-density development areas around the town, city and future unincorporated areas by intergovernmental agreements that further the objectives of this master plan.
<b>Policy 4:</b> Continue to encourage clustering of residential units within all planned unit developments and those areas of Ouray County where it supports the goals of this plan.

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## Transportation

**Goal: To promote a transportation network that allows for the orderly flow of traffic on roads in Ouray County.**

**Policy 2:** If a development creates off-site roadway impacts, the mitigation of such impacts should be required. Such improvements should be considered in addition to any required on-site improvements.

## Visually Significant Areas

**Goal: To protect and preserve visually significant and sensitive areas of Ouray County that provide the scenic backdrops and vistas that all residents and visitors of Ouray County enjoy.**

**Policy 3:** Evaluate and consider for adoption programs and incentives that encourage the placement of land into conservation easements and other protective status.

**Policy 4:** Evaluate and consider for adoption programs for the protection of open space by Ouray County.

**Policy 5:** Evaluate and consider for adoption incentives for planned unit developments to surpass the minimum open space requirement as set forth in the Land Use Code.

## Wildlife and Plant Habitats

**Goal: To recognize the importance of protecting all species and habitat types currently found in Ouray County and maintain healthy and diverse wildlife and plant habitats.**

**Policy 1:** Identify and strive to protect high-quality and significant wildlife and plant habitat areas. These areas shall include habitats of endangered species, species of special concern, migration corridors, breeding and spawning and birthing areas, wetland and riparian areas, important seasonal habitats, and habitats supporting a high diversity of wildlife species.

**Policy 2:** Develop and maintain maps and information resources of significant wildlife and plant habitat areas. Each new development shall be evaluated as to the effect the development will have on wildlife and plant habitat areas. If significant habitat loss could occur, mitigation will be required or the proposed development may be denied.

**Policy 3:** Develop and implement zoning and incentives that protect and preserve significant wildlife and plant habitats.

**Policy 4:** Evaluate and consider for adoption programs and incentives that encourage the placement of land into conservation easements and other protective status.

## *Ouray County Land Use Code, Revised 2010*

The purpose of the Ouray County Land Use Code is to promote the health, safety, and general welfare of the present and future inhabitants of Ouray County by planning for and regulating the use of land so as to provide planned and orderly development and environmental protection in a manner consistent with constitutional rights. The intent of the code is to regulate development and activities in Ouray County, to give special attention to hazardous areas, to protect lands from activities that would cause immediate or foreseeable material danger to significant wildlife habitats, to regulate the use of land on the basis of impact on the communities or surrounding areas, and to secure safety from fire and other damages, among other things. Ouray County Land Use Codes that apply to hazard mitigation are summarized below.

## Overlay Districts

Among the County's zoning provisions is the establishment of overlay districts. Due to continued growth pressures in the County, there is an increased need for coordination between the municipalities and the County to promote the efficient use of services and protection of open lands, agricultural lands, alpine lands, and community identities. In 2001, the County of Ouray,

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the Town of Ridgway, and the City of Ouray entered into intergovernmental agreements that established urban growth boundaries around the respective municipalities, wherein urban growth would be directed, and areas of influence beyond each growth area that would trigger joint planning review by the effected municipality and the County. These intergovernmental agreements have been enforced by the three jurisdictions since that time, and have very effectively instilled a collaborative environment among the local governments with respect to land use policies and other areas of mutual interest.

### **Special Uses**

The County has implemented regulations that require permits for certain special uses. These uses are subject to provisions that ensure the uses will not create undue danger in surrounding areas and will not be located in any area subject to geohazards (and if they are that the hazards have been mitigated). Additional requirements regarding storm drainage facilities, open space, and site development standards that protect natural features and recognize hazards apply for planned unit developments.

### **Improvements Standards**

Developers are required to provide, construct, furnish, or make available all the improvements described in the land use code as they apply to the particular development. Improvement standards are in place for grading and paving, curbs and gutters, sidewalks, retaining walls, water supply and fire protection, sewage disposal, trees and landscaping, fills, drainage and flood control, and underground utilities, among other things. Design standards include site considerations such as slope, stability, drainage, location in relationship to the 100-year floodplain, and the presence of natural features that add value and must be protected/preserved. Drainage design standards are based, at a minimum, on the 100-year frequency storm for maximum periods of intensity. Additional standards that protect health, life, and property address streets and highways (e.g., grades, slope easements, and road beds), and lots, blocks, and sidewalks (e.g., drainage and filled lands).

### **Flood Hazard Regulations**

The purpose of these regulations is to promote the public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific areas. They are designed to:

- Protect human life and health;
- Minimize expenditure of public money for costly flood control projects;
- Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- Minimize prolonged business interruptions;
- Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, and streets and bridges located in areas of special flood hazard;

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- Help maintain a stable tax base by providing for the sound use and development of special flood hazard areas so as to minimize future flood blight areas;
  - Ensure that potential buyers are notified when properties are in special flood hazard areas; and
  - Ensure that those who occupy special flood hazard areas assume responsibility for their actions.

These regulations apply to all areas of special flood hazards within the jurisdiction of Ouray County identified in FEMA's July 3, 1985, flood insurance study and accompanying maps. Ouray County has participated in the National Flood Insurance Program (NFIP) since July 3, 1985, by administering floodplain management regulations that meet the minimum requirements of the NFIP. The County is in the process of updating the regulations to meet the requirements of the State Floodplain Rule, which goes above the NFIP minimum requirements and includes a 1-foot freeboard elevation requirement. Specifically, Ouray County's requirements:

- Restrict or prohibit uses that are dangerous to health, safety, and property due to water or erosion hazards, or that result in damaging increases in erosion or in flood heights or velocities;
- Require that uses (and related facilities) vulnerable to floods be protected against flood damage at the time of initial construction;
- Control the alteration of natural floodplains, stream channels, and natural protective barriers that help accommodate or channel floodwaters;
- Control filling, grading, dredging, and other development that may increase flood damage; and
- Prevent or regulate the construction of flood barriers that will unnaturally divert flood waters or may increase flood hazards in other areas.

The County building official administers and implements these regulations. Duties are related to permit review, obtaining and maintaining relevant information (e.g., elevations, substantially improved structures, floodproofing, etc.), alteration of watercourses, and interpretation of flood insurance rate map boundaries.

Provisions for flood hazard reduction include the following:

- General standards (anchoring, construction materials and methods, utility design and location, encroachments)
- Specific standards for residential and nonresidential construction (elevation, drainage paths, floodproofing, structural components)
- Specific standards for mobile homes (anchoring, elevation)

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## **Geologic Hazard Area Regulations**

The purpose of these regulations is to minimize significant hazards to public health and safety or to property in a designated geologic hazard area, promote safe use in geologic hazard areas, and reduce the impact of geologic hazards on life and property by:

- Prohibiting certain land uses which are dangerous to life or property in geologic hazard areas,
- Restricting the land uses which would be hazardous to the public health and safety or property in geologic hazard areas,
- Restricting the land uses which are particularly vulnerable to geologic hazards so as to alleviate hardship and reduce the demands for public expenditures for relief and protection, and
- Requiring land uses permitted in geologic hazard areas to be protected from geologic hazards by providing for geologic hazard investigation and the avoidance of or mitigation of such hazard impacts at the time of initial construction.

These regulations apply to applications for permits to engage in development in all designated or regulated geologic hazard areas in the County. Geologic hazard areas include all the area delineated on the County's supplemental zoning regulations maps. These areas include and may be divided into avalanche areas, landslide areas, rockfall areas, mudflow areas, unstable slope areas, and/or ground subsidence areas. These maps are on file in the office of the Ouray County Clerk and Recorder.

## **Ouray County Road Standards**

This section sets forth the policies and procedures related to all public and private rights-of-way in Ouray County. Road design standards establish a level of roadway design to assure the health, safety, and welfare of all County residents. The standards recognize that good drainage is one of the most important factors in road design and provide methods for estimating peak flows and guidance for culverts, open channels and ditches, and subsurface drainage. They also regulate construction of bridges over waterways and revegetation and erosion control related to road construction.

## **Wildfire Mitigation Regulations**

These regulations are intended primarily to improve the fire safety of structures and to reduce the threat of personal injury or residential loss of life and/or property resulting from wildfires. These regulations apply to new construction of planned unit developments (PUD), residential structures, accessory buildings, and existing residential structures that are increased 50 percent or more in total square footage of living area. New PUDs must consider the ability of the County to respond to a fire emergency, vegetation coverage and ways to reduce the wildfire hazard on the parcel, construction of roads that provide adequate access for firefighting vehicles, fireflow water supplies, and the County's fire safety rating. New residential structures must consider the County's fire safety rating and reserve water supplies if not on a central system.

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## **Additional Ouray County Land Use Code Regulations**

Other regulations that are relevant to hazard mitigation include the following:

- **Mineral Resource Regulations** stress the importance of public health and safety in extraction and exploration activities and contain provisions to prevent landslides, floods, or erosion due to mineral extraction operations and ensure that such activities cause the least practicable damage to the environment.
- **Sign Regulations** require that subdivision sign supports are constructed to withstand typical weather conditions, including winds.
- **Visual Impact Regulations** prohibit “skyline” development and require vegetative screening or other visual mitigation, and in addition state that all public or private road and driveway cuts and fills shall be revegetated and/or reforested utilizing materials native to the disturbed area.
- **Wildlife Habitat Regulations** protect areas essential for wildlife habitat by establishing procedures and requirements for development or activity within significant wildlife habitats.

### ***Before You Buy or Build in Ouray County, Revised July 20, 2012***

*Before You Buy or Build in Ouray County* is a guide that contains information, building standards, and application forms for building projects in Ouray County. It provides valuable information about zoning, water, wildfire defense, flood hazards, avalanche hazards, permits and procedures, and building standards (e.g., snow and wind load, frost depth, winter design temperature, fire protection cistern locations). It includes a CSFS/CSU Extension brochure on “Creating Wildfire-Defensible Zones,” which is also available on the County’s website.

### ***Ouray County Snow, Wind, and Frost Building Specifications***

These specifications define the roof snow load criteria based on building site elevation. It sets the minimum basic wind speed for determining design wind pressure at any site at a minimum of 90 miles per hour. This standard helps protect structures in Ouray County from severe wind events. The mean frost depth in Ouray County has been established at 40 inches. Frost depth is measured from the top of the footer to finished grade.

### ***Ouray County CWPP***

The Ouray County CWPP was completed in 2011. The CWPP updates the Ouray County Fire Plan that was completed in the winter of 2008. The CWPP analyzes hazards and risks in the County’s wildland-urban interface, assesses local firefighting capabilities, and makes community-specific recommendations for preventing and mitigating the wildfire threat in Ouray County. It complements the Ouray County Wildfire Annual Operating Plan. Wildland fire vulnerability and risk data from the 2008 Ouray County Hazard Mitigation Plan was used in the CWPP. The CWPP also lists several wildland fire mitigation projects from the 2008 Hazard Mitigation Plan.

## Ouray County Administrative and Technical Mitigation Capabilities

Table 4.59 identifies the County personnel responsible for activities related to mitigation and loss prevention in Ouray County.

**Table 4.59 Ouray County Administrative/Technical Mitigation Capabilities Matrix**

Personnel Resources	Y/N	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Y	Land Use Department Head Marc Castrodale	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Y	Building Inspector Tamara Knutson	
Planner/engineer/scientist with an understanding of natural hazards	Y	Building Inspector Tamara Knutson	Refer to Colorado Geological Survey
Personnel skilled in GIS	Y	IT/GIS Jeff Bockes	Ouray County hired GIS coordinator in 2008
Full-time building official	Y	Building Inspector Tamara Knutson	
Floodplain manager	Y	Building Inspector Tamara Knutson	Building official
Emergency manager	Y	Emergency Manager Glenn Boyd	Contract position, 1/3 time
Grant writer	Y	Multiple positions Every Department head	Part of these jobs
Other personnel			
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Yes	IT/GIS Jeff Bockes	
GIS data—Hazard areas	Y	Land use department, METSA MSAG coordinator, SWDS	Wildfire risk and fuels (Bureau of Land Management and Colorado State Forest Service data)
GIS data—Critical facilities	Y	Land use department, METSA MSAG coordinator, SWDS	Wildfire related on “communities at risk” map (Bureau of Land Management data)
GIS data—Building footprints	N		
GIS data—Land use	Y	Zoning, roads	
GIS data—Linked to Assessor’s data	Y		
Warning systems/services (reverse 9-11, cable override, outdoor warning signals)	Y	Communications Coordinator Randy Cassingham	Reverse 911, Emergency Alert System

The following departments are involved in hazard mitigation in Ouray County:

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### **Public Health Department**

The Public Health Department works to communicate, educate, and offer services that provide a healthy and safe environment to live and work in. Programs include Communicable Disease Control, Immunization Programs, and Emergency Preparedness Planning.

### **Sheriff's Office**

The Sheriff's Office is responsible for fire protection on private lands for the unincorporated areas of Ouray County. The Sheriff's Office is also the Hazmat OERA, Search and Rescue Manager, EOC location, and Countywide Emergency Management.

### **Fire Protection Districts**

Ouray County is served by the Montrose Fire Protection District on the north end of the County and four County-based fire protection districts:

- Horsefly Fire Protection Association
- Log Hill Mesa Fire Protection District
- Ouray Fire Protection District and Ouray Fire Department
- Ridgway Fire Protection District

A significant amount of the County is not included in a fire district and some private properties do not have firefighting services available.

### **Ouray County Financial Mitigation Capabilities**

Table 4.60 identifies financial tools or resources that Ouray County could potentially use to help fund mitigation activities.

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**Table 4.60 Ouray County Financial Mitigation Capabilities Matrix**

<b>Financial Resources</b>	<b>Accessible/ Eligible to Use (Y/N)</b>	<b>Comments</b>
Community Development Block Grants	Y	None in effect at this time
Assistance to Fire Fighters Fund	Y	Provides resources related to fire response/protection
Colorado State Fire Fund	Y	Provides a measure of "insurance" for catastrophic wildfire
Capital improvements project funding	Y	By policy with budget surplus
Authority to levy taxes for specific purposes	Y/N	All tax increases require a vote
Fees for water, sewer, gas, or electric services	Y	Driveway permits and addressing
Impact fees for new development	Y	Road impact fees, building permits, subdivision (PUD) fees
Incur debt through general obligation bonds		Subject to vote this year
Incur debt through private activities		Lease/purchase, subject to TABOR (Tax Payer's

<b>Financial Resources</b>	<b>Accessible/ Eligible to Use (Y/N)</b>	<b>Comments</b>
		Bill of Rights) limitation
Withhold spending in hazard prone areas	Y	Mitigation is required in hazard-prone areas
Homeland Security Grants	Y	Provides critically needed equipment not otherwise affordable

## **Ouray County Mitigation Outreach and Partnerships**

### ***Wildfire Safety***

In concert with the BLM/USFS Interagency Fire unit based in Montrose, Ouray County has produced two educational videos. “You Make the Difference” describes the importance of creating fire safe planning and treatments and attempts to overcome arguments that some homeowners use to avoid preparedness for wildfire. “Community Wildfire Protection Planning” shows the steps needed to develop neighborhood based CWPPs. All materials utilize or refer to FIREWISE information and/or contain material provided by the Colorado State Forest Service for wildfire protection. The County continues to work on education and implementation of wildfire mitigation.

### ***Pandemic Flu***

Ouray County went through an extensive Pandemic Flu planning process and has adopted a formal plan and posted it to the Colorado Health Alert Network. Public education forums have been held dealing with disaster preparedness of all sorts but with emphasis on disease possibilities.

### ***Colorado State Programs***

Ouray County participates in the READY Colorado Program and other state-based initiatives aimed at education and preparation to mitigate the impacts of disasters.

### ***County/Municipal Partnerships***

Mitigation of public nuisances is being addressed through County/Municipal partnerships. The County, Town of Ridgway, and Ridgway State Park share resources related to mosquito abatement utilizing a non-toxic larvacide. Noxious weed abatement is also conducted collaboratively between the two entities.

### ***Social Media***

Ouray County Emergency Management maintains a Facebook page to educate citizens and dispel rumors of emergencies. County Emergency Management also sends out educational materials through social media.

## 4.5.2 City of Ouray Mitigation Capabilities

### City of Ouray Regulatory Mitigation Capabilities

Table 4.61 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the City of Ouray. Excerpts from applicable policies, regulations, and plans and program descriptions follow to provide more detail on existing mitigation capabilities.

**Table 4.61 City of Ouray Regulatory Mitigation Capabilities Matrix**

Regulatory Tool (ordinances, codes, plans)	Y/N	Comments
General plan	Y	City of Ouray Community Plan
Zoning ordinance	Y	Ouray City Code (Chapter 7, Land Use and Development)
Subdivision ordinance	Y	Ouray City Code (Chapter 7, Land Use and Development)
Growth management ordinance	Y	Ouray City Code (Chapter 7, Land Use and Development)
Floodplain ordinance	Y	Ouray City Code (Chapter 6, Building Regulations)
Other special purpose ordinance (e.g., stormwater, steep slope, wildfire)	N	
Building code	Y	2009 International Building Code
Fire department ISO rating	Y	Rating: 7
Erosion or sediment control program	N	
Stormwater management program	N	
Site plan review requirements	Y	Site Development Regulations in Ouray City Code (Chapter 7, Land Use and Development)
Capital improvements plan	Y	Plan for water system, will be working on a plan for the wastewater treatment plant in the near future
Economic development plan	Y	Speak with City Resource Director
Local emergency operations plan	Y	Have begun work on, but nothing in place yet, minor plan for flooding
Other special plans	N	
Flood insurance study or other engineering study for streams	Y	U.S. Corps of Engineers work on the Uncompahgre River
Elevation certificates	Y	On Zone A flood insurance rate map only

As indicated in the table above, the City of Ouray has several plans and programs that guide the City's mitigation of development of hazard-prone areas. Some of these are described in more detail below.

#### ***City of Ouray Community Plan, 2004 Update***

The Ouray Community Plan is a comprehensive, long-range guide for the future development of Ouray. The plan provides a basic framework of goals, objectives, and policies to guide public and private investments. The plan is comprehensive; it provides for a coordinated approach to problem solving by looking at environment, economics, population, culture, land use, and community services and facilities simultaneously.

Community plan goals, objectives, and polices that are related to mitigating hazards identified in this plan are included below and organized by the community plan section they came from:

## Environment

<b>Goal: Identify, conserve and protect the environmental qualities that make Ouray a special place.</b>
<b>Objective 1:</b> Minimize adverse environmental impacts, which can result from growth and development.
<b>Objective 2:</b> Actively plan for conservation and protection of unique natural resources.
<b>Objective 3:</b> Encourage land uses that are consistent with conservation of environmental quality and efficient use of natural resources.
<b>Objective 4:</b> Encourage practices that lead to the protection of the health of Ouray's citizens.
<b>Objective 5:</b> Prevent development of private and public property located in the recharge area of the Weehawken Spring aquifer.
<b>Policy 1:</b> Provide leadership to achieve cooperative planning with Ouray County, the U.S. Forest Service and other public and private entities for environmental quality and other mutual planning goals.
<b>Policy 2:</b> Continue to utilize public open space as a means of preserving and protecting the natural setting around Ouray. This may include the acquisition of private property for public open space.
<b>Policy 5:</b> Monitor development and use of geothermal water sources to prevent depletion of aquifer.
<b>Policy 6:</b> Ensure that proposed developments, including excavation and fill projects, respond to the soil, drainage, floodplain, erosion and surface geologic characteristics of the development site by proper engineering and construction.
<b>Policy 7:</b> Regulate development to maintain or enhance the environmental quality of Ouray.
<b>Policy 9:</b> Prevent development of visually sensitive private properties through acquisition for open space.

Mitigation relevant accomplishments since 1993 identified in the plan:

- Established an intergovernmental agreement with Ouray County to guide decision-making on issues of mutual concern.
- Expanded the existing system of parks and public open spaces.
- Continued monitoring flows of existing geothermal water resources.
- Defined engineering requirements for steep or unstable slopes.
- Required permits for excavation and fill.
- Developed requirements for revegetation of road cuts and areas of excavation and fill.

## Land Use

<b>Goal: Plan for growth and redevelopment that maintains the high quality, small town character of Ouray, preserves and enhances the scenic beauty, natural resources, environmental quality and cultural assets that make Ouray a desirable place to live.</b>
<b>Objective 2:</b> Ensure that zoning and development requirements address adverse impacts resulting from conflicting land uses.
<b>Objective 4:</b> Reduce environmental impacts and hazards created by new development.
<b>Growth and Development Policy 1:</b> Cooperate with Ouray County and the Forest Service regarding sound planning for the area surrounding the City to accomplish mutual planning goals.
<b>Growth and Development Policy 3:</b> Create performance standards for new development.

Mitigation relevant accomplishments since 1993 identified in the plan:

- Regulations for development in areas of known hazards are being enforced.

- With landowners’ participation, a comprehensive development plan for North Ouray was created that provides for maintenance of open space, improved safety on Highway 550, and other factors necessary to enhance the community while allowing for growth and development in this area.
- The definition of building height has been revised to take into account the overall height of the structure and its relation to the slope of the building site.
- A cooperative planning agreement with the County has been established.
- Underground utilities to new developments are now required.
- Performance standards to address impacts of new development have been established.
- Lot coverage regulations for paved parking surfaces have been created.

### Community Services and Facilities

<b>Goals: Provide efficient and high quality community services and facilities to the residents and visitors of Ouray and manage growth in a manner that balances land development with the ability of the City to provide necessary public services, facilities, and capital improvements.</b>
<b>Objective 1:</b> Ensure economy and efficiency in operations and capital improvements projects.
<b>Objective 2:</b> Maintain a balance between growth and development and the capacity of services and facilities.
<b>Government Administration Policy 1:</b> Achieve more effective and comprehensive planning.
<b>Government Administration Policy 2:</b> Promote economy and efficiency in all expenditures; seek grants for funding whenever possible.
<b>Water and Sewer Policy 2:</b> Continue to use water and sewer investment fees to raise revenue to pay for capital improvements.
<b>Water and Sewer Policy 3:</b> Monitor the capacity of the water and sewer systems with respect to new demands created by growth and plan for needed system improvements.
<b>Streets Policy 1:</b> Make safety, paving, dust control and maintenance high priorities.
<b>Streets Policy 3:</b> Urge the State to improve avalanche safety and enforce hazardous materials regulations on Highway 550.
<b>Parks Policy 1:</b> Maintain and expand Ouray’s current parks program including developed parks for recreation and undeveloped parks for public open space.

Mitigation relevant accomplishments since 1993:

- The need for future improvements and expansion of water storage has been analyzed.
- Long-range plans for water improvements have been created and record drawings maintained.
- Flumalanche (debris-flow flumes) prevention devices have been installed on the Cascade Creek Flume.
- The pros and cons of paving some of the busier streets to improve dust control and drainage have been considered.

### Ouray City Code

A number of the chapters of the Ouray City Code pertain to hazard mitigation. These are discussed in further detail below.

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## **Floodplain Management Regulations**

Part of the City's Building Regulations, the Floodplain Management Regulations promote the public health, safety, and general welfare and minimize flood hazards and losses through provisions designed to:

- Promote sound planning and land use and permit only such uses within floodplains that will not endanger life, health, and public safety or property in times of flooding;
- Protect the public from avoidable financial expenditures for flood control projects, flood relief measures, and the repair and restoration of damaged public facilities;
- Prevent avoidable interruption of business and commerce;
- Minimize victimization of unwary home and land purchasers; and
- Facilitate the administration of flood hazard areas by establishing requirements that must be met before use or development is permitted.

The City building official or other officer or employee designated by the City Council administers and enforces the provisions of these regulations. Duties are related to permit review, obtaining and maintaining relevant information (e.g., elevations, substantially improved structures, floodproofing, etc.), alteration of watercourses, requiring certain standards evacuation plans for manufactured home parks and subdivisions in flood hazard areas, and interpretation of flood insurance rate map boundaries.

These regulations apply to all areas of special flood hazards within the jurisdiction of the City of Ouray identified in FEMA's July 3, 1985, flood insurance study and accompanying maps. The City of Ouray has participated in the National Flood Insurance Program (NFIP) since July 3, 1985, by administering floodplain management regulations that meet the minimum requirements of the NFIP. Specifically, the City's regulations set standards for all flood-prone areas as well as standards specific to the flood fringe and floodway. The standards address anchoring, elevation, manufactured homes, construction materials, utility design and location, floodproofing, and encroachments. In determining the requirements as they apply to new and substantially improved construction, velocity, depth, and impact forces of potential debris flows must also be considered.

## **Zoning Regulation (Land Use and Development)**

This section divides the City into Zoning Districts of such number, shape and area, of such common unity of purpose or use as are deemed most suitable to effectively accomplish the intent of the City's Master Plan. This section establishes regulations for dimensional requirements, zone district purposes and standards, conditional uses, variances, appeals, rezoning, and supplemental regulations (including floodplain management regulations). Subdivision Development Regulations

Subdivision development regulations are essential for orderly and controlled development within, and adjoining, the City of Ouray. These regulations ensure development is consistent

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with community plans and constructed to established and required standards. These standards also ensure quality, safety, and the overall welfare of property owners, and citizens or customers who use or frequent these developments. These regulations are applicable within all land located within the legal boundaries of the City of Ouray, and all land located within three miles of the corporate limits of the City of Ouray for purposes of access control with reference to the major street plan. These regulations also apply to Planned Unit Developments which may be considered and processed in accordance with Section 7-8.

Development regulations include permitting requirements for new construction, additions, and grading, fill, and excavation. Development standards that mitigate hazards include site planning, identification and mitigation of natural hazards, excavation and grading, drainage, landscaping, and snow storage (e.g., grading for drainage). Special plans, reports, or studies may be required. The standards include minimum acceptable standards for soils engineering reports, engineering geology reports, landscape plans, and grading and drainage plans.

### **Additional City of Ouray Regulations**

Other regulations from the Ouray City Code that are relevant to hazard mitigation include the following:

- **Water use regulations** allow the City Council to limit the use of city water as appropriate. In addition, they declare that it is unlawful to waste water, and that all watering and continuous water flows are terminated during fire alarms.
- **Nuisance regulations** declare it unlawful for any person to create, cause, or maintain any nuisance, or to permit, any nuisance to exist upon or in connection with any premises owned by him or under his control. A nuisance is any thing or activity which unreasonably annoys or interferes with the use or enjoyment of public or private property or that constitutes a health or safety hazard.
- **Open burning** regulations declare it unlawful to burn or allow the burning of any material, with exceptions, on any open premises unless permitted pursuant to regulations.
- **Undergrounding regulations** state that all new electric, cable television, or communication facilities involving the use of poles or above-ground wires are prohibited in the City. New telecommunication lines and cables must be placed underground.

### **City of Ouray Construction Standards**

The purpose of the City of Ouray's Construction Standards is to provide minimum standards to safeguard life, health, property, and public welfare by regulating and controlling the design, construction, quality of materials, use, location, and maintenance of all public improvements and private improvements of common ownership including, but not limited to, water supply systems, storm drainage systems, wire utilities, streets, open space, and parking lots. Applicable standards include excavation, backfill, and compaction; drainage; slope stabilization and revegetation; power and buried wires; curb, gutter, and sidewalks; and streets.

### **Ongoing Projects and Programs**

The Cascade and Portland Flumes were constructed to funnel debris and flood flows through the town. There have been several improvements made to the flumes over the years, notably 1983-85 and in 2004-2005. The City removes debris regularly from two Skyrocket diversion catch basins and one on Cascade Creek near the Uncompahgre River.

Some individual property and business owners have debris and flood protection measures. These include debris/floodwalls around the properties. Some of these protection measures have deteriorated over the years, and some require manual intervention, such as board placement in flood walls in advance of an event.

### **City of Ouray Administrative and Technical Mitigation Capabilities**

Table 4.62 identifies the City personnel responsible for activities related to mitigation and loss prevention in the City of Ouray.

**Table 4.62 City of Ouray Administrative/Technical Mitigation Capabilities Matrix**

<b>Personnel Resources</b>	<b>Y/N</b>	<b>Department/Position</b>	<b>Comments</b>
Planner/engineer with knowledge of land development/land management practices	Y	Community Development Coordinator	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	N		
Planner/engineer/scientist with an understanding of natural hazards	N		
Personnel skilled in GIS	N	Community Development Coordinator	
Full-time building official	N		Part-time, two days per week
Floodplain manager	Y		Building official
Emergency manager	Y		County
Grant writer	N		
Other personnel	N		
GIS data—Hazard areas	N		In process,
GIS data—Critical facilities	N		In process,
GIS data—Building footprints	N		In process,
GIS data—Land use	N	Community Development Coordinator	This could be further developed – in concert with Ouray County efforts
GIS data—Links to Assessor's data	N	Community Development Coordinator	
Warning systems/services (reverse 9-11, cable override, outdoor warning signals)	Y	Area E911 coordinator with County, two warning sirens	Works in Montrose but works with four counties

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The following personnel/departments are involved in hazard mitigation in the City of Ouray:

***City Council***

The City Council is responsible for the administration of the City. The City Council’s mission is “to be accountable and effective guardians of the public trust and resources. We are committed to the provision of effective and efficient public services designed to enhance the quality of life of the citizens of our community. We shall conduct the affairs of our City openly and ethically and manage our growth and development in a manner that respects our environment and preserves the unique character and identity of our community. We shall serve our citizens through the development and implementation of plans and partnerships that provide quality facilities, services and programs for a diverse, vibrant, and healthy community for today and into the future.”

***City Administrator***

The city administrator works for and reports to the City Council. This position oversees personnel and the ordinances which make up the City Code. The administrator serves as the administrative head of the City, oversees day-to-day management, develops and implements the annual budget, and facilitates implementation of the community and council goals.

***Ouray Volunteer Fire Department***

The Ouray Volunteer Fire Department (OVFD) provides fire protection and suppression throughout the community. The OVFD is equipped to provide fire protection and suppression for residential and commercial structure fires, forest fires, and vehicle fires. The department also provides fire prevention education and awareness.

***Public Works Department***

The Public Works Department handles street repair and maintenance as well as maintenance of City buildings, water, and sewer systems.

***Community Development Coordinator***

The Community Development Coordinator oversees planning duties. Information about the City Code, including planning and zoning, can be obtained from this office.

***Building Inspector***

The building inspector oversees building duties. Information about the City Code, building regulations, and inspections can be obtained from the building inspector. Permits for construction are issued by the Building Inspector.

***Planning Commission***

The Planning Commission makes recommendations to the City Council concerning matters related to planning, zoning, and land use regulations.

## City of Ouray Financial Mitigation Capabilities

Table 4.63 identifies financial tools or resources that the City of Ouray could potentially use to help fund mitigation activities.

**Table 4.63 City of Ouray Financial Mitigation Capabilities Matrix**

Financial Resources	Accessible/ Eligible to Use (Y/N)	Comments
Community Development Block Grants	Y	
Capital improvements project funding	Y	
Authority to levy taxes for specific purposes	Y	Limited by TABOR (Tax Payer's Bill of Rights)
Fees for water, sewer, gas, or electric services	Y	Limited by TABOR (Tax Payer's Bill of Rights)
Impact fees for new development	N	Could, but do not currently have any
Incur debt through general obligation bonds	Y	
Incur debt through special tax bonds	Y	
Incur debt through private activities	Y	
Withhold spending in hazard prone areas	Y	

## 4.5.3 Town of Ridgway Mitigation Capabilities

### Town of Ridgway Regulatory Mitigation Capabilities

Table 4.64 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the Town of Ridgway. Excerpts from applicable policies, regulations, and plans and program descriptions follow to provide more detail on existing mitigation capabilities.

**Table 4.64 Town of Ridgway Regulatory Mitigation Capabilities Matrix**

Regulatory Tool (ordinances, codes, plans)	Y/N	Comments
General plan	Y	Town of Ridgway Master Plan
Zoning ordinance	Y	Ridgway Municipal Code (Title 7 Planning & Zoning)
Subdivision ordinance	Y	Ridgway Municipal Code (Title 7 Planning & Zoning)
Growth management ordinance	Y	Comprehensive Plan and intergovernmental agreement
Floodplain ordinance	Y	Ridgway Municipal Code (Title 6 Building Regulations)
Other special purpose ordinance (e.g., stormwater, steep slope, wildfire)	Y	Constraint map (Comprehensive Plan)
Building code	Y	International Building Code 2006
Fire department ISO rating	Y	Rating: 6/9
Erosion or sediment control program	Y	Significant river corridor restoration project encompassing 20 acres; drainage improvements in Cottonwood Creek; watershed protection ordinance – work in progress
Stormwater management program	Y	This needs further development and the town is in need

Regulatory Tool (ordinances, codes, plans)	Y/N	Comments
		of a comprehensive stormwater management plan and regulations; currently we manage each development independently
Site plan review requirements	Y	
Capital improvements plan	Y	
Economic development plan	Y	Embedded in Land Use Plan and annual Strategic Plan
Local emergency operations plan	Y	Ouray County
Other special plans	Y	Annual Strategic Plan
Flood insurance study or other engineering study for streams	Y	
Elevation certificates	Y	Required part of floodplain regulations

As indicated in the table above, the Town of Ridgway has several plans and programs that guide the Town's mitigation of development of hazard-prone areas. Some of these are described in more detail below.

### ***Town of Ridgway Master Plan***

The Ridgway Master Plan comprises several documents, including (but not limited to) the 2007 Northwest Area Master Plan Element, 2007 Transportation Plan Element, 2011 Integrated Weed Management Plan, 2011 Land Use Plan Update; and 2012 Ridgway Source Water Protection Plan. Maps in the Master Plan include the 2011 Land Use Map, 2007 Zoning Map, 2011 Park and Trail Map, and 2005 aerial photograph of the Town and adjacent areas. The complete list of associated documents and maps can be found here:

<http://www.town.ridgway.co.us/compplan.html>.

The Master Plan documents relevant to hazard mitigation are described in further detail in the following paragraphs.

### ***Town of Ridgway Land Use Plan, 2011 Update***

This document updates the Town's 1998 Land Use Plan and 2000 Master Plan. It establishes a land use framework for guiding growth and development within the Town of Ridgway, and is a jumping off point for additional planning efforts into the future.

Goals and polices from the land use element that mitigate hazards identified in this plan are included highlighted here:

<b>Goal 1: Promote growth and development that reinforces Ridgway's existing neighborhoods and businesses, complements the surrounding rural landscape, and celebrates vibrant community spaces.</b>
<b>Policy 12:</b> Require new development to avoid environmental constraints such as steep slopes, the floodway and floodplain, and riparian areas. In general, slopes that exceed a 20% gradient should be restricted from development and road construction. Land-use applicants in or adjacent to these areas should complete detailed geotechnical analysis of their land to determine slope hazards.
<b>Action Item a:</b> Establish site development standards for all land use development, including storm water management and preservation and care of healthy trees and historic structures, to ensure the community and developers understand what is required.

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**Goal 1: Promote growth and development that reinforces Ridgway’s existing neighborhoods and businesses, complements the surrounding rural landscape, and celebrates vibrant community spaces.**

**Action Item m:** Define “steep slopes” and riparian areas, consistent with the Land Use Plan, in the development code, and develop regulations that detail the conditions and performance standards under which such development may be evaluated.

**Goal 4: Preserve, restore, and re-engage the Uncompahgre River to strengthen the riparian corridor as an asset to the community.**

**Policy 1:** Protect the riparian zone, floodplain, waterway, and wildlife habitat areas along the river while providing for context-appropriate public access and recreation areas.

**Policy 2:** Require all development within the riparian corridor to carry out a detailed analysis of the land, including identification of all wetlands in accordance with local, state, and federal requirements.

**Action Item a:** Identify and map the 100-year floodplain and floodway through Ridgway along the Uncompahgre River, in cooperation with FEMA and Ouray County.

**Action Item b:** Locate all future structures, grading, paving, and land disturbance outside of the riparian zone, 100-year floodplain, and identified wildlife corridors and important habitat areas.

**Goal 7: Improve Ridgway’s impact to the environment by reducing its community-wide carbon footprint and promoting more sustainable practices on a variety of scales.**

**Policy 7:** Retain and secure water resources for the Town.

**Action Item i:** Monitor and evaluate water resources for the Town and ensure that policies are in place to protect the sustainability of those resources in light of potential growth.

### ***Town of Ridgway Comprehensive Development Plan, 2000 Update***

The purpose of the Town of Ridgway Comprehensive Development Plan is to present the community’s goals, policies, and priorities relative to future development. It is a decision-making tool to be used as a guide for understanding and predicting future needs, evaluating development alternatives, and making public decisions about land use, government programs, and infrastructure priorities.

Goals and polices from the land use element that mitigate hazards identified in this plan are included highlighted here:

**Goal 3: Preserve rural densities, land uses, and character within the Urban Influence Zone. Define the outer boundary of future residential and commercial development through the designation of an Initial Growth Boundary and an Urban Growth Boundary. This procedure should include mechanisms for transferring, relocating development to areas inside Ridgway.**

**Policy 3:** Work with Ouray County to develop regulations that encourage clustering or other land-conservation designs in areas outside the Urban Growth Boundary but inside the Urban Influence Zone that allow landowners to realize the economic value of property while also preserving open space.

**Policy 5:** Encourage preservation of large tracts of land by clustering of residential development to preserve open space, agricultural land, wildlife habitat, visual quality, and other nonurban amenities.

**Policy 6:** Support open space and agricultural land preservation programs consistent with the goals of the town.

<b>Goal 8: Preserve and improve the natural environment through appropriate land use and development policies.</b>
<b>Policy 1:</b> Develop educational and equipment distribution programs to encourage water conservation.
<b>Policy 2:</b> Development on steep slopes and ridgelines will be restricted to avoid visual impacts or hazards.
<b>Policy 3:</b> Development within identified riparian zones, critical wildlife habitat, or critical wildlife migration corridors will be restricted to preserve natural values.
<b>Policy 6:</b> Allow for subdivision density averaging and density transfers to lands in developments that are not encumbered by topographic, visual, or environmental constraints.
<b>Policy 8:</b> Require that development proposals be reviewed to assure minimum impacts from light pollution and minimum impact on air quality, water quality and quantity, and other environmental values.
<b>Policy 9:</b> Land use decisions will support the preservation of natural values, biodiversity, and native species, including vegetation, wildlife, clean air and water, and functioning ecosystems.
<b>Policy 10:</b> The town should adopt State 1041 regulations aimed at regulating development in environmentally sensitive areas.

***Town of Ridgway Source Water Protection Plan, 2012***

Ridgway’s Source Water Protection Plan is designed to protect their current water source, groundwater wells, and springs. CDPHE completed a Source Water Assessment that included a delineation of the source water protection area, potential sources of contaminants, and the potential of these contaminants to degrade the water source. The planning team developed and prioritized source water protection measures based on the results of the assessment and GIS mapping. The planning team focused on the following issues of concern within the Source Water Protection Area: impacts from transportation on roads, septic systems, agricultural activities, public land management, wildland fires, growth, climate change, forest health, and residential property maintenance. The wildland fires section of the Ridgway Source Water Protection Plan includes a wildland fire risk map developed for the 2008 Ouray County Hazard Mitigation Plan and refers to the mitigation strategies in the 2008 HMP. One of the public land recommendations in the Source Water Protection Plan reads: “Support efforts to mitigate wildfire risks within the urban interface areas as identified in the Ouray County Multi-Hazard Mitigation Plan including the development of Community Wildfire Protection Plan.” A Community Wildfire Protection Plan for Ouray County was developed in 2011, demonstrating the County’s commitment to following through on this recommendation.

Impacts from transportation on roads, wildland fires, and forest health are most closely related to the concerns of the Multi-Hazard Mitigation Plan Update. Transportation on roads can release road particulates into the air, so the County applies a dust suppressant to help prevent this issue. Heavy rain events can carry the dust suppressant into water sources and degrade water quality. This should be taken into account during particularly wet years or years with increased flooding. Wildfires can alter runoff and erosion processes in watersheds, forcing the Town to remove more sediment during the water treatment process which can be costly.

***Northwest Area Master Plan, 2007***

The Trails, Parks, and Open Spaces section of this plan discusses the need to further examine specific geologic parameters including soils, topography, drainages, wetlands, slopes, and other natural features as well as land use development proposals. According to this plan, specific

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environmental constraints and sensitive areas (such as steep slopes and geological features, wildfire, etc.) are not known in the Northwest Area, so the sub-area plan does not directly address these town-wide objectives. However, it is understood that these constraint areas need to be identified and analyzed as part of a development plan and commensurate with the goals of the Town of Ridgway.

### ***Ridgway Municipal Code***

One of the primary purposes of the Ridgway Municipal Code is to promote public health, safety, and welfare. Sections of the Ridgway Municipal Code that pertain to hazard mitigation are discussed in further detail below.

### **Floodplain Management Regulations**

Part of the Town's Building Regulations, the Floodplain Management Regulations guide development in the Town's floodplain. These regulations apply to areas identified in FEMA's September 27, 1985, flood insurance study and the accompanying flood insurance rate map. The Town of Ridgway has participated in the National Flood Insurance Program (NFIP) since March 18, 1977, by administering floodplain management regulations that meet the minimum requirements of the NFIP. Specifically, the Town's regulations:

- Require permits prior to commencing any construction or development in Zones A and A-5;
- Establish the duties of the building official or other officer or employee designated by the Town Council in regard to floodplain management, which are related to permit review, obtaining and maintaining relevant information (e.g., elevations, substantially improved structures, floodproofing, etc.), alteration of watercourses, and interpretation of flood insurance rate map boundaries;
- Set standards to mitigate flooding that address anchoring, manufactured homes, construction materials and equipment, service facility design and location, construction methods, drainage, elevation, floodproofing, and structural components; and
- Restrict development in the floodway.

### **Additional Town of Ridgway Regulations**

Other regulations from the Ridgway Municipal Code that are relevant to hazard mitigation include the following:

- **Zoning and subdivision regulations** are intended to promote public health, safety, and welfare.
- **Water and sewer regulations** allow for emergency regulations restricting the use of Town water.
- **Nuisance regulations** declare it unlawful to create, cause, or maintain any nuisance, or to permit any nuisance to exist upon or in connection with any premises owned by him or under his control. A nuisance is any thing or activity that unreasonably annoys or interferes with the use or enjoyment of public or private property or that constitutes a health or safety hazard.

- **Open burning restrictions** declare it unlawful, with exceptions, to burn or allow the burning of any material on any open premises without a permit and proper containment and control.
- **Undergrounding requirements** state that all new electric or communication facilities involving the use of poles or above-ground wires are prohibited within the Town. New telecommunication lines and cables must be placed underground.

***Town of Ridgway Standard Specification and Typical Drawings for Infrastructure Construction***

The Town of Ridgway Standard Specification and Typical Drawings for Infrastructure Construction contains standards for infrastructure construction that consider hazard mitigation in their application. Applicable standards include trench excavation and backfill; curb, gutter, sidewalks, and streets; street design and construction; power and buried wires; and slope stabilization and revegetation.

***Town of Ridgway Five-Year and Ten-Year Capital Improvement Plans***

The Town’s Capital Improvement Plans incorporate many important government activities, including repair, replacement, and additions to the Town’s stock of buildings, equipment, vehicles, land, and facilities. Capital improvements can include repair or replacement of existing capital assets and development or acquisition of new assets. One of the goals of the Capital Improvement Program is to prioritize and implement capital improvements in recognition of public needs and demands, economic development, health and safety, environmental quality, and other factors. Projects that are considered most important to the Town include those that directly support, improve, or address public health and safety; maintain existing assets, protect previous investments, and minimize future repair, maintenance, and replacements costs; or significantly improve service to the community, public facilities, economic sustainability, and environmental health or contribute to the local quality of life. The Town has been utilizing its capital improvement plan process for several years in identifying, prioritizing, and budgeting needed capital infrastructure and projects throughout the community.

**Town of Ridgway Administrative and Technical Mitigation Capabilities**

Table 4.65 identifies the Town personnel responsible for activities related to mitigation and loss prevention in the Town of Ridgway.

**Table 4.65 Town of Ridgway Administrative/Technical Mitigation Capabilities Matrix**

<b>Personnel Resources</b>	<b>Y/N</b>	<b>Department/Position</b>	<b>Comments</b>
Planner/engineer with knowledge of land development/land management practices	Y	Town Manager/ Planner Public Works Director	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Y	Building Inspector	
Planner/engineer/scientist with an understanding of natural hazards	Y	PW Director	

<b>Personnel Resources</b>	<b>Y/N</b>	<b>Department/Position</b>	<b>Comments</b>
Personnel skilled in GIS	Y	Town Manager/Planner	
Full-time building official	N	Part time Building Inspector	
Floodplain manager	Y	Building Inspector	
Emergency manager	Y	Ouray County	
Grant writer	Y	Town Manager/ Planner PW Director	
Other personnel	Y	Fire Chief in Public Works and Fire Dept Volunteer in PW	
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Y	Town Manager/ Planner	This could be further developed – in concert with Ouray County efforts
GIS data—Hazard areas	N		Work in progress
GIS data—Critical facilities	N		Work in progress
GIS data—Building footprints	Y		Some, work in progress
GIS data—Land use	Y	Town Planner	
GIS data—Assessor's data	Y	Town Planner	
Warning systems/services (reverse 9-11, cable override, outdoor warning signals)	Y	TNS, WENS	

The following personnel/departments are involved in hazard mitigation in the Town of Ridgway:

### ***Town Manager***

The Town Manager oversees and administers the day-to-day operations of the Town; provides interdepartmental coordination; administers Town personnel regulations; and is responsible for intergovernmental relations and legislative affairs. The Manager serves as the Town's public relations and information official, and actively engages in negotiations with parties on agreements, contracts, permits, acquisitions, leases, etc. The Manager participates in land use review and project oversight, and serves as a conduit between the Town Council and the organizational staff. The Town Manager coordinates and communicates with county, regional, state and federal government on intergovernmental relations; oversees planning and budgeting of capital projects; and prepares communications to the public. The Town Manager endeavors to solve problems. Recent accomplishments include creation of Community Development Department; development of the long-range capital improvement plan, assistance in long term planning efforts including parks and transportation elements to master plan; oversight of numerous capital projects including new water plant, river restoration project and regional park; structuring of efficient and skilled organization.

### ***Building Inspection/Code Enforcement Officer (Part-Time)***

The Building Inspection/Code Enforcement Officer inspects buildings and facilities and administers permits and certificates of occupancy; enforces compliance with structural, electrical, plumbing, mechanical and fire codes and other applicable regulations; inspects and oversees utility construction and installation; enforces compliance with the municipal zoning

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code regulations. The Building Inspection/Code Enforcement Officer administers permit applications for residential, commercial and industrial construction projects; works in coordination with other Town staff in the processing of permit submittals; reviews building plans and specifications to ensure compliance with adopted building, fire, plumbing and mechanical codes and other applicable laws and regulations; ensures compliance with applicable Town zoning, building and site plan requirements.

The Building Inspection/Code Enforcement Officer also enforces Municipal Code compliance of zoning and building regulations including but not limited to site development, signage, lighting and land; responds to citizen complaints and conducts investigations into possible code violations, and assists in the preparation of complaints for legal action against violators of building code and related ordinances; works with Town Manager and Town Attorney in the prosecution of such violations when necessary.

The Building Inspector is responsible for administering the Town floodplain management program and assists in land use and building proposal review to ensure that natural hazards are properly mitigated. Recent accomplishments include adoption of International Building Code; oversight of sustainable housing committee; implementation of efficient record management.

### ***Engineer/Public Works Director***

The Director's responsibility is to plan, direct, manage and oversee the activities and operations of the Public Works Department including water, wastewater, street, drainage, engineering, parks and maintenance building; engineering review of land use submittals; coordinate assigned activities with other departments and outside agencies; perform engineering services for in-house projects as directed by the Town Manager; provide highly responsible and complex administrative support to the Town Manager.

The Director oversees and administers the day-to-day operations of the Public Works Department and activities including water, wastewater, street, sidewalks and recreation paths, storm water, drainage, irrigation, parks, project management and engineering functions; administers, manages and implements the goals, objectives, policies and procedures of each assigned service area of the Public Works Department.

The Director administers engineering and construction oversight of infrastructure projects; reviews work to ensure compliance with specifications; inspect construction of infrastructure to be owned by the Town, etc; recommend modifications, and performs professional civil engineering functions, including engineering evaluations, designing, or overseeing the design of water, wastewater, street, walkways, stormwater, parks and drainage projects.

The Director assists in reviewing plans, plats, specifications and related documents to ensure compliance with applicable codes and standards; work closely with the Town Planner and Town Manager in preparation of staff review and recommendations; reviews as-built plans; insure records and files are updated to incorporate changes; revise drawings as appropriate; and assists

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in conducting traffic studies, including the collection and analysis of traffic statistics; develop and implement traffic and parking plans. Duties also include engineering review and analysis of land use submittals including plats, water, sewer, streets, drainage, and other applicable infrastructure; preparation of reports and analyses, and provision of information to the Town Council and Planning and Zoning Commission. The Director oversees capital improvement projects, including, but not limited to, requests for proposals, design and implementation; oversees the operation and maintenance of the wastewater treatment plant to treat, process and dispose of wastewater, sludge and related waste materials; and acts as a liaison between regulatory agencies and the Town.

Recent accomplishments include oversight of water treatment plant, commencement of new lift station facility; assistance in historic streetscape project; assistance in master planning and long term planning efforts, and active involvement in numerous capital projects.

### ***Public Works -- Parks and Environment II***

The Parks Worker II oversees the maintenance and upkeep of Town parklands and open spaces; assists in the installation, maintenance and repair of the town's irrigation systems; inspects and repairs playground equipment and Town facilities; operates park maintenance equipment; hires, trains and supervises temporary seasonal employees as required. The position is responsible for maintaining and repairing building and structures. The Parks Worker II inspects facilities, schedules preventative maintenance and cleaning; coordinates contracted maintenance, repair and remodeling work, including determining needs for service, reviewing bids, recommending contractors and services as liaison to contractors, orders materials, supplies and equipment.

Recent accomplishments include improvements to Cottonwood Park; acquisition of efficient park management equipment; Phase II improvements at Ridgway Athletic Park.

### ***Public Works -- Streets III***

Under general supervision and direction of Public Works Director, performs a variety of skilled duties in the construction, maintenance and repairs of streets, alleys, sidewalks, rights-of-ways, parking lots, bridges, storm drain systems and irrigation ditches including snow removal, street grading, weed control and tree pruning; operates heavy equipment such as loaders, graders, backhoes, bulldozers, trenching machine, gravel screening and various pieces of earth moving and snow removal equipment, sewer rodders and jets; overhauls, adjusts, maintains and performs major repairs on automobiles and construction maintenance and heavy equipment; oversees fleet vehicle maintenance and replacement schedules; provides lead supervision to lower level staff; provides training in areas of equipment usage and maintenance techniques; may lead and assist others in a variety of maintenance, repair and construction related work.

Recent accomplishments include hiring and training of Public Works II position; upgrade of fleet vehicles and equipment; and assistance in numerous capital projects.

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### ***Public Works -- Utility III***

Monitors, inspects, constructs, installs, flushes, cleans and repairs water and wastewater mains, lines and laterals; installs and repairs fire hydrants, valves, water and sewer lines; repairs and services sewer lift stations and pressure reducing valves; tests water volume and pressure; tests water supplies; maintains an inventory of parts, tools, materials and equipment; maintains log and record books; supervises other staff as necessary; assists in large capital projects; maintains nonpotable irrigation water system.

Recent accomplishments include construction and installation of new water treatment plant and implementation of water flushing program.

### ***Public Works – Water and Wastewater Treatment III***

The Treatment Operator oversees the operation and maintenance of the wastewater treatment plant to treat, process and dispose of wastewater, sludge and related waste materials, including all phases of wastewater treatment and industrial pretreatment; operation and maintenance of the water treatment and distribution system and facility. The Treatment Operator complies with all applicable state and federal regulations and requirements for the proper operation of the water distribution and wastewater collection facilities; monitors plant operations, performs installation and preventative and corrective maintenance of water and wastewater plant equipment, structures and buildings; maintains pumps and filters and calibrates equipment.

The Operator conducts periodic inspections; conducts physical and chemical tests by sampling and analyzing; responsible to maintain EPA certifications; monitors water quality in distribution system according to federal regulations; monitors discharge of wastewater to protect receiving waters; maintains records and paperwork; and ensures that records and reports regarding analysis and operations are compiled, maintained, prepared and delivered to regulatory agencies. The Treatment Operator recommends improvements and modifications to maintain compliance with federal, state and local regulations; performs daily plant operations and monitors various meters, gauges and treatment processes to ensure efficient functioning of the plant and equipment; and responds to requests and inquiries from customers of the water and wastewater systems.

Recent accomplishments include construction and installation of new water treatment plant, and removal of biosolids from wastewater treatment facility.

### **Town of Ridgway Financial Mitigation Capabilities**

Table 4.66 identifies financial tools or resources that the Town of Ridgway could potentially use to help fund mitigation activities.

**Table 4.66 Town of Ridgway Financial Mitigation Capabilities Matrix**

Financial Resources	Accessible/ Eligible to Use (Y/N)	Comments
Community Development Block Grants	Y	
Capital improvements project funding	Y	
Authority to levy taxes for specific purposes	Y	Subject to state laws
Fees for water, sewer, gas, or electric services	Y	Not for gas or electric
Impact fees for new development	Y	
Incur debt through general obligation bonds	Y	Subject to state laws
Incur debt through special tax bonds	Y	Subject to state laws
Incur debt through private activities	n/a	
Withhold spending in hazard prone areas		

### Town of Ridgway Mitigation Outreach and Partnerships

Town participates in water conservation and drought status outreach and environmental education programs. Specifically, the Town institutes in regular water conservation efforts and is currently drafting a watershed protection ordinance and water conservation plan. The Town has active participation with the Southwest Conservation Corps and is starting up a community corps program that will employ resident teenagers into conservation programs and projects. The Town has constructed an outdoor environmental classroom for use by the Ridgway School District, located within a recently completed river park. The Town has supportive of conservation easements on four parcels within the Town boundaries, and actively protects its parklands and open spaces without use of toxic herbicides or pesticides.

The Town is actively represented on the Gunnison Valley Transportation Planning Region, Statewide Transportation Advisory Committee, the Gunnison Basin Roundtable, and numerous other partnership arrangements with local and state agencies.

#### 4.5.4 Log Hill Mesa Fire Protection District

The capabilities of the Log Hill Mesa Fire Protection District to address hazards identified in this Plan are summarized by hazard below.

**Wildfire:** The main planning and mitigation concern for the District is the likelihood of wildfires. The Log Hill Mesa Fire Protection District is run by a part-time contract chief. All firefighters are volunteers, as is the administrative officer who has grant writing responsibilities. The District offers occasional fire safety classes and has participated in a fire mitigation/defensible space program around fire stations in the past. The District has an ISO rating of 5/8B, effective January 2012. The last ISO survey was completed in May 2011.

The District constructed a new Public Safety Center in Log Hill Village. The new station allows the redistribution of firefighting assets to better protect the Log Hill Village/Fairway Pines area

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and allow Ouray County EMS to station an ambulance in Log Hill Village, reducing travel time by an average of 20 minutes. The District completed several important planning mechanisms including an evacuation and reoccupation master plan in 2010, and a CWPP in 2012. The CWPP contains a wildfire risk assessment for every residential structure on the Mesa. Each home was rated from low to extreme risk. Parcel-specific recommendations for reducing wildfire risk are listed by street address. The CWPP received a Firewise Community Protection Award and was used to develop the District's operations plan and mapbook. The District maintains a status report of the 41 wildfire mitigation and preparedness actions identified in the CWPP.

The District participates in the Ready, Set, Go! Program and briefs residents on fire safety and awareness at several events throughout the year. A Ready, Set, Go! Action Guide is provided to residents. Log Hill Mesa is a Firewise designated community, and Firewise mitigation information is provided to residents. The District provided every resident with a structure evaluation as to how to improve their home's survivability in a wildfire. The District also maintains a website ([www.loghillfire.org](http://www.loghillfire.org)) which provides information to residents about disaster preparedness. The evacuation plan and CWPP are both available on the website.

The District currently has a project planned for the fall of 2012 to mitigate 15 acres of land adjacent to Fire Station 2 and Dallas Creek Water Company to help protect them from wildfire. The District is awaiting funding through the West Region Wildfire Council for this project.

The District recently was awarded a grant from the Wildfire Risk Reduction Grant Program. This grant program was created under Senate Bill 13-269 and passed in 2013 by the Colorado General Assembly, focuses on projects that reduce the risk for damage to property, infrastructure and water supplies, and those that limit the likelihood of wildfires spreading into populated areas. Funds are directed to non-federal lands within Colorado. The Log Hill application includes 183 acres to be treated, including defensible space and landscape-scale projects. The District received \$57,382 for projects within the District's boundaries. The areas treated include a shaded fuel break protecting Log Hill Fire Station #2 and the Dallas Creek Water Treatment Plant, roadside thinning along escape routes on Ponderosa Drive and County Road 1, and defensible space around residences.

Additionally, the District has an automatic aid agreement with Montrose Fire and mutual aid agreements with all surrounding fire departments. Log Hill Fire participates in the Ouray County Annual Operating Plan and is an active member of the West Region Wildfire Council. Log Hill Fire has published a comprehensive Evacuation Plan for the District and received recognition from the National Fire Protection Association for its evacuation exercise conducted in 2012.

**Drought:** The District's main concern with prolonged drought is the increase to the wildfire danger. The District works closely with the West Region Wildfire Council to monitor the drought situation and the Sheriff to recommend the implementation of fire restrictions. Water

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rights for the two water services servicing the District are relatively senior and seem secure. Additionally, the District can fill firefighting apparatus at the Ridgway Reservoir if necessary.

**Earthquake:** The risk of damage from earthquakes to the District is rated as negligible. Fire stations are constructed to code and in good repair. Residences and buildings in the District are built to code as enforced by Ouray County.

**Extreme Temperatures:** The main risk to the District is high temperatures increasing the risk of wildfires. The District monitors red flag warnings on a daily basis along with fire weather warnings to assess the added risk of wildfires. Low temperatures have never caused problems with the water delivery systems or vehicles and fire department operations. Yearly classes are held in the department about winter driving safety and operation on the fireground during extreme cold weather.

**Lightning:** The primary concern with lightning is the added risk of wildfires. Fire Station 2 has an emergency generator if lightning causes a power outage and can act as a command center for the District. Station 1 is equipped to allow for access to the vehicles and their deployment despite any power outage.

**Severe Winter Storms:** The primary concern is access to remote areas of the District. All first due vehicles are equipped with 4 wheel drive or insta-chains to increase their mobility. Fire officers monitor local road conditions and relay information to Road and Bridge if concerns arise about access.

**Windstorms:** Windstorms would mainly affect the District by knocking down power lines and increasing the fire danger. The most populated portion of the District has underground power lines and is less susceptible to this danger. Fire officers occasionally monitor the condition of trees near power lines and recommend the power company conduct thinning or cutting of trees that threaten the power lines. Additionally, roadside thinning projects recommended in the Ouray County Community Wildfire Protection Plan will reduce the vulnerability of power lines by removing trees close to them. Both fire stations are capable of operating during power outages. Fire Station 2 has an emergency generator and can serve as a command post if needed.

**Other:** The District does not have jurisdiction over certain hazards and thus capabilities to address them have not been evaluated. These hazards are: debris flow, landslide/rockfall, mass casualty event, public health emergencies, and imminent threat. Other hazards not identified have little or no historic or potential impact on the District including avalanche, flooding, hazardous materials, and dam failure.

#### **4.5.5 Ridgway School District**

The Ridgway School was first built in 1936-1937. A secondary school was built in 2005-2006. The District Office is located at the Ridgway Elementary School. The School District is active in hazard mitigation and holds trainings for fire safety, lockdown emergencies, and driver safety.

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The capabilities of the Ridgway School District to address hazards identified in this Plan are summarized by hazard below.

**Drought and Extreme Temperatures:** The school district's main concern with prolonged drought and or extreme temperatures is the maintenance of its greenscapes and increased vulnerability to the wildfire danger surrounding the schools. The school district works closely with the Ridgway Volunteer Fire Department and West Region Wildfire Council to monitor the drought situation and looks toward the Ouray County Sheriff to recommend the implementation of fire restrictions.

**Earthquake:** While major seismic events are relatively rare in the southwestern Colorado, due to the age of our elementary building, there is a concern that the structure may not adequately protect our students in the event of a major earthquake. The district lacks earthquake response protocols, but will make immediate effort to rectify this deficiency.

**Severe Winter Storms:** The primary concern with severe winter storms is access to remote areas of the district. All RSD busses and vehicles are equipped with either 4 wheel drive or insta-chains to increase their mobility. Fire officers monitor local road conditions and relay information to Ouray County Road and Bridge if concerns arise about access.

Due to the high elevation in which Ridgway is located, severe winter weather is always a concern. As such, the district has protocols in place which dictate our response. Steps within the protocols include, but are not limited to:

- Communication with Ouray County Sheriff, Colorado Department of Transportation, Ouray County Road Maintenance, regional school district transportation directors, and local radio stations to ascertain the safety of roads.
- A chain of command to make decisions on announcing a closure of schools, late start, or shelter- in-place.
- A communication plan which utilizes instantaneous modes of communication (web-based, text based, Robo call system)
- A student-parent reunification plan.

The District is also weatherizing the school buildings.

**Wildfires:** Due to the sparse amount of combustible vegetation surrounding the perimeters of both school buildings, the school facilities are considered to be relatively safe from wildfire damage. The primary concern regarding wildfires surrounding the Ridgway Schools lies in the access to school district facilities which would be required to provide community support if needed. As such, we are dependent upon emergency responders, local and regional fire response teams, the Colorado Department of Transportation, and Ouray County road maintenance to establish and maintain safe entrance and egress to our facilities.

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**Imminent Threat/ Intruder/ Shooter:** Due to the history of critical incidents in schools across the nation, the RSD has developed and adopted a Critical Emergency Response Manual. Based upon the National Incident Management System (NIMS) protocols and response guidelines, the district is well prepared for effective response to a number of critical incidents. The Crisis Team is assembled to quarterly to review roles and responsibilities in the event of an incident. Additionally, building principals review incident protocols with staff during their bi-monthly staff meetings. An ongoing project in the School District is remodeling and hardening security of school buildings against intruders and shooters.

**Mass Casualty Event:** The RSD facilities are designated as community critical incident shelters. As such, we have worked with the Red-Cross to evaluate the capacity and functionality of our facilities. Additionally, in the event of such an incident, we will coordinate efforts with Ouray County, Ridgway Town government, and local and regional emergency responders and law enforcement.

**Other:** Other hazards not discussed above have little or no historic or potential impact on the District including avalanche, dam failure flooding, debris flow, landslide/rockfall, hazardous materials, public health emergencies and windstorms.

#### ***Ridgway School District Emergency Response Plan and Guidelines***

The Ridgway School District has an Emergency Response Plan that addresses winter storms, wildfires, long-term or short-term power outages, active shooter, and other hazards. The plan establishes the criteria and procedures for school closures, delayed starts, lock-down and sheltering in place. The plan also lists step-by-step procedures that school officials and employees need to take during an event. The plan acknowledges the need for procedures related to earthquakes, which are currently absent from the document.

### **4.5.6 Other Hazard Management Programs and Stakeholders in Ouray County**

#### **Horsefly Volunteer Fire Department**

Horsefly Volunteer Fire Department is an all volunteer, 501(c)3 organization. The association is equipped with brush trucks and pumpers in order to be first responders to wildfire events in the vicinity. The association has no structure firefighting capabilities and has no fire station, but fundraising efforts are underway to build the first one.

The Cornerstone development will eventually create more WUI area within the Horsefly protection area. With the exception of Cornerstone, essentially all homes are on 35+ acres. There has been an ongoing campaign to educate residents about wildfire mitigation and have had residents collaborate to reduce the cost of mitigation on larger areas with dense brush. The Community Wildfire Protection Plan is nearly complete for the area. For the time being,

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Horsefly Volunteer Fire Department provides Cornerstone Metropolitan District with an emergency response fire engine and covers their needs as far as wildfire response services.

Other assets to be protected in the vicinity of the Horsefly area include the Source Gas buried pipeline, the Tri-County water line, the WAPA 235kV power line and the DMEA and SMPA lines.

### **Ouray Volunteer Fire Department**

The Ouray Volunteer Fire Department (OVFD) provides fire protection and suppression throughout the City of Ouray, as well as mutual aid for surrounding districts. The OVFD is equipped to provide fire protection and suppression in numerous different situations including residential and commercial structures, forest fires, and vehicle fires. On an average emergency call, the OVFD responds with 8-15 firefighters and 2-3 fire suppression vehicles. The department also provides fire prevention education and awareness for all (<http://www.cityofouray.com/staticpages/index.php?page=CityAdministration>).

### **Ridgway Fire Protection District**

The Ridgway Fire Protection District serves the citizens of Ridgway by ensuring protection of life and property. This is accomplished by preventing fires and life safety hazards through education, engineering, and inspection; suppressing fires with a volunteer-based force that is supported by a personnel force; responding to medical emergencies and providing aid; training all department personnel and civilians; and being prepared to take a proactive role in the mitigation of hazardous materials, confined space, and natural disasters that occur in the Town of Ridgway (<http://www.ridgwayfiredepartment.org/missionstatement.htm>).

### **Montrose Fire Protection District**

Montrose Fire Protection District is composed of over 50 members and governed by a five-member Board of Directors elected by residents of the District. The District provides fire protection to a portion of Ouray County, including the communities of Colona and Dave Wood South. The 2011 Ouray County CWPP ranked Colona as a moderate wildfire hazard community and Dave Wood South as a high wildfire hazard community. Montrose Fire Protection District also provides medical and structural fire response to Cornerstone Metropolitan District.

Station #3 recently began operation on January 1, 2012. The District altered its staffing model to operate the station, allowing for reduced response times district-wide. The 2012 Annual Report found that average response times were between roughly six and nine minutes from the receipt of the call until the first District resource arrived for each station's primary response area. A new ambulance was added to the District's fleet in 2012. EMS calls comprise the majority of the District's requests for service, making the new ambulance a particularly valuable asset.

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Montrose Fire Protection District conducts annual business inspections to ensure compliance with the Fire Code. These inspections also provide firefighters with a chance to learn the layout and construction of certain buildings. The Districts also promotes public education programs on wildfire and fire safety, with the majority of public outreach and education occurring during National Fire Prevention Week each October. In 2012, these programs reached an estimated 613 adults and 1,621 children.

### **U.S. Highway 550 Avalanche Reduction Project**

In September 1992, the Colorado Department of Transportation contracted with the Colorado Department of Natural Resources Avalanche Information Center (CAIC) to provide avalanche condition evaluations, forecasts, and recommendations for avalanche control and road closure and other related services for U.S. Highway 550 in the San Juan Mountains of southwestern Colorado. Two CAIC forecasters are based midway along the 37-mile long avalanche-prone route, in the town of Silverton, from November 1 through May 1.

### **Dallas Creek Water Company**

Dallas Creek Water Company is a privately owned water utility regulated by the Public Utilities Commission. Part of the Company's mission is to meet fire protection demands, in addition to providing safe drinking water to customers. Dallas Creek Water provides domestic water to residents and commercial customers in Log Hill Village and Fairway Pines subdivisions in Ridgway. The Company's water treatment plant is located in Log Hill Mesa. The Company has prepared an Emergency Notification Plan in compliance with the Public Utilities Commission. The plan is designed to provide immediate information needed by managers and other appointed officials to notify customers of the proper actions they should follow during various emergencies including earthquakes, vandalism, or hazardous materials spills that may affect water supply or facilities.

### **Colorado Water Conservation Board**

The Colorado Water Conservation Board (CWCB) is an agency of the State of Colorado. The CWCB Flood Protection Program is directed to review and approve statewide floodplain studies and designations prior to adoption by local governments. The CWCB is also responsible for the coordination of the National Flood Insurance Program (NFIP) in Colorado and for providing assistance to local communities in meeting NFIP requirements. This includes CWCB prepared or partnered local floodplain studies.

### **Division of Homeland Security and Emergency Management**

The Colorado Division of Homeland Security and Emergency Management (DHSEM) is responsible for the state's comprehensive emergency management program, which supports local and state agencies. Activities and services cover all aspects of emergency management. Assistance to local governments includes financial and technical assistance as well as training

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and exercise support. Services are made available through local emergency managers supported by DHSEM staff assigned to specific areas of the state.

### **Colorado Geological Survey**

The Colorado Geological Survey is a state government agency within the Colorado School of Mines whose mission is to help reduce the impact of geologic hazards on the citizens of Colorado, to promote responsible economic development of mineral and energy resources, provide geologic insight into water resources, provide avalanche safety training and forecasting, and to provide geologic advice and information to a variety of constituencies.

### **Colorado State Forest Service**

The mission of the Colorado State Forest Service is to achieve stewardship of Colorado's diverse forest environments for the benefit of present and future generations. Through an extensive planning process, the Colorado State Forest Service identified several strategic priorities: healthy, diverse and sustainable forest conditions; communication, outreach, education and policy; critical agency relationships; foundations for effective program delivery; and organizational environment. CSFS provides technical forestry assistance and forestry and wildfire prevention and mitigation education to individuals, landowners, partners and other groups. Specific program areas used to help those who request assistance include developing FireWise prevention education materials and programs to delivery these messages and materials to homeowners, landowners, and communities. CSFS also supports development and implementation of Community Wildfire Protection Plans. The Colorado Wildfire Risk Assessment Portal (CO-WRAP) was released in March 2013 to help community leaders, professional planners, and citizens determine wildfire risk and where forest management actions can achieve the greatest impact to reduce that risk.

### **West Region Wildfire Council**

The West Region Wildfire Council (WRWC) combines federal, state, county, and local representatives from Delta, Gunnison, Hinsdale, Montrose, Ouray, and San Miguel Counties. The WRWC strives to prepare counties, FPDs, communities, and interagency fire management partners to plan for and mitigate the potential threats from wildland fire. By promoting wildfire preparation, prevention and mitigation education, the WRWC strives to better mitigate the threat of catastrophic wildland fire to communities and natural resources. The West Region Wildfire Council CWPP Coordinator helps to facilitate the implementation of hazard reduction recommendations outlined in the CWPPs through partnerships and grants.



# 5 MITIGATION STRATEGY

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**Requirement §201.6(c)(3): [The plan shall include] 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.**

This section presents the mitigation strategy developed by the Ouray County Hazard Mitigation Planning Committee (HMPC) based on the County's risk assessment in Chapter 4. The mitigation strategy was developed through a collaborative group process and consists of goals, objectives, and mitigation actions. The following definitions are based upon those found in FEMA publication 386-3, *Developing a Mitigation Plan* (2002):

- **Goals** are general guidelines that explain what you want to achieve. Goals are defined before considering how to accomplish them so that they are not dependent on the means of achievement. They are usually long-term, broad, policy-type statements.
- **Objectives** define strategies or implementation steps to attain the identified goals and are specific and measurable.
- **Mitigation Actions** are specific actions that help achieve goals and objectives.

This section describes how the County accomplished Phase 3 of FEMA's 4-phase guidance-Develop the Mitigation Plan-and includes the following from the 10-step planning process:

- Planning Step 6: Set Goals
- Planning Step 7: Review Possible Activities
- Planning Step 8: Draft an Action Plan

## 5.1 Mitigation Strategy Overview

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The results of the planning process, the risk assessment, the goal setting, the identification of mitigation actions, and the hard work of the HMPC are captured in this mitigation strategy and mitigation action plan. As part of the 2013 plan update process, a comprehensive review and update of the mitigation strategy portion of the plan was conducted by the HMPC. Some of the initial goals and objectives from the 2008 plan were revisited, reaffirmed, and refined. The end result was an updated mitigation strategy that reflects the updated risk assessment, the completion of 2008 actions, and the new priorities of this plan update. Section 5.2 below identifies the current goals and objectives of this plan update, and Section 5.4 details the updated mitigation action plan.

## 5.2 Goals and Objectives

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**Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.**

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The HMPC developed goals and objectives to provide direction for reducing hazard-related losses in Ouray County. These were based upon the results of the risk assessment and a review of goals and objectives from other state and local plans, specifically, the Colorado State Multi-Hazard Mitigation Plan, 2010, Ouray County Master Plan, and Ouray County Community Wildfire Protection Plan (2011). This review was to ensure that this plan's mitigation strategy was integrated with existing plans and policies.

The HMPC revisited and re-validated the goals during the 2013 update during a planning meeting. The HMPC determined that the 2008 goals and objectives were still valid and should not be changed. Goals and objectives are listed below, but are not prioritized:

**Goal 1: Minimize Loss of Life and Injury from Anticipated Hazard Events**

- Educate citizens about natural hazard events and ways to protect themselves
- Complete local-level community wildfire protection plans, to include evacuation routes and procedures
- Improve flash flood and debris flow warning and evacuation capabilities
- Implement debris flow mitigation
- Make travel safer on Highway 550 between Ouray and Red Mountain Pass
- Provide training and equipment to responders and government officials
- Update and expand all-hazard emergency response plans

**Goal 2: Reduce the Potential Impact of Natural and Manmade Disasters on Public and Private Property, the Economy, Natural Environment, and Historic Resources**

- Reduce flood impacts to the citizens of the City of Ouray, Town of Ridgway, and the County
- Reduce debris flow impacts to public, private, and historic structures in City of Ouray
- Reduce wildfire impacts to structures and response resources
- Continue to reduce impacts of wildfire to future development through land use planning, subdivision reviews, permitting, and building codes
- Update mapping of hazard areas, including flood, debris flow, and avalanche
- Use updated risk maps to improve the risk assessment in future updates to this plan and to provide public information
- Reduce drought impacts

**Goal 3: Reduce the Potential Impact of Natural and Manmade Disasters on Critical Facilities, Infrastructure, and Critical Support Services**

- Protect critical facilities and assets at risk to flood, debris flows, or landslide
- Protect critical facilities and assets at risk to wildfire
- Protect necessary communication infrastructure from multiple hazards (wildfire, lightning, windstorm, flood, extreme temperatures)
- Provide continuity of operations and continuity of government
- Provide necessary support infrastructure
- Review government capabilities for responding effectively to anticipated hazard events and upgrade where possible

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## 5.3 Identification and Analysis of Mitigation Actions

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**Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include 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.**

Representatives from the participating jurisdictions was present at the combined second and third meeting of the HMPC to identify and analyze potential mitigation actions. To identify and analyze potential mitigation actions to achieve the mitigation goals, AMEC provided the HMPC with a packet of materials at its second/third meeting with information on types of mitigation actions, key issues from Chapter 4 Risk Assessment, and a worksheet of the plan's goals and objectives. The group discussed different types of mitigation actions. During both the 2008 and 2013 planning processes, the HMPC was provided with the following list of categories of mitigation actions, which originated from the National Flood Insurance Program's Community Rating System (CRS), as well as definitions and examples for each category:

- **Prevention:** Administrative or regulatory actions or processes that influence the way land and buildings are developed and built.
- **Property protection:** Actions that involve the modification of existing buildings or structures to protect them from a hazard or remove them from the hazard area.
- **Structural:** Actions that involve the construction of structures to reduce the impact of a hazard.
- **Natural resource protection:** Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems.
- **Emergency services:** Actions that protect people and property during and immediately after a disaster or hazard event.
- **Public information/education and awareness:** Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them.

The HMPC members were also provided with several lists of alternative multi-hazard mitigation actions for each of the above categories. A facilitated discussion then took place to examine and analyze the alternatives. With an understanding of the alternatives, a brainstorming session was conducted to generate a list of preferred mitigation actions. HMPC members wrote project ideas on large sticky notes. These were posted on flip charts. The result was a number of new project ideas with the intent of mitigating hazards. Based upon the key issues identified in the risk assessment, including the existing capabilities of jurisdictions, and the overall political, technical, and financial feasibility of the potential actions, the HMPC came to consensus on mitigation actions for each hazard. Certain hazards were best addressed through multi-hazard actions.

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### 5.3.1 Prioritization Process

Once the mitigation actions were identified, the HMPC members were provided with several sets of decision-making tools, including FEMA's recommended criteria, STAPLEE, and others, to assist in deciding why one recommended action might be more important, more effective, or more likely to be implemented than another. STAPLEE stands for the following:

- **Social:** Will the action be acceptable to the community? Could it have an unfair effect on a particular segment of the population?
- **Technical:** Is the action technically feasible? Are there secondary impacts? Does it offer a long-term solution?
- **Administrative:** Are there adequate staffing, funding, and maintenance capabilities to implement the project?
- **Political:** Will there be adequate political and public support for the project?
- **Legal:** Does the jurisdiction have the legal authority to implement the action?
- **Economic:** Is the action cost-beneficial? Is there funding available? Will the action contribute to the local economy?
- **Environmental:** Will there be negative environmental consequences from the action? Does it comply with environmental regulations? Is it consistent with community environmental goals?

In accordance with the DMA requirements, an emphasis was placed on the importance of a benefit-cost analysis in determining project priority (the 'economic' factor of STAPLEE). Other criteria used to recommend what actions might be more important, more effective, or more likely to be implemented than others included:

- Does the action protect lives?
- Does the action address hazards or areas with the highest risk?
- Does the action protect critical facilities, infrastructure or community assets?
- Does the action meet multiple objectives (Multiple Objective Management)?

This process of identification and analysis of mitigation alternatives allowed the HMPC to come to consensus and to prioritize recommended mitigation actions. Emphasis was placed on the importance of a benefit-cost analysis in determining project priority; however, this was not a quantitative analysis. The Disaster Mitigation Act regulations state that benefit-cost review is the primary method by which mitigation projects should be prioritized. Recognizing the federal regulatory requirement to prioritize by benefit-cost, and the need for any publicly funded project to be cost-effective, the HMPC decided to pursue implementation according to when and where damage occurs, available funding, political will, jurisdictional priority, and priorities identified in the Colorado Natural Hazards Mitigation Plan. Cost-effectiveness will be considered in additional detail when seeking FEMA mitigation grant funding for eligible projects identified in this plan.

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Following the third HMPC meeting in both 2008 and 2013 the representative from each participating jurisdiction coordinated a meeting with his or her jurisdictional planning team to discuss mitigation actions. Using the STAPLEE criteria, the jurisdictional planning teams chose from the mitigation actions those that they wanted to implement in their jurisdiction. They also updated actions from the 2008 plan and identified new actions specific to the risks in their jurisdiction. Appropriate team members were assigned to complete implementation worksheets for each identified action.

## 5.4 Mitigation Action Plan

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**44 CFR Requirement §201.6(c)(3)(iii): [The mitigation strategy shall include] an action plan describing how the actions identified in paragraph (c)(3)(ii) 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 benefits review of the proposed projects and their associated costs.**

This section outlines the development of the updated mitigation action plan. The action plan consists of the specific projects, or actions, designed to meet the plan's goals. Over time the implementation of these projects will be tracked as a measure of demonstrated progress on meeting the plan's goals.

### 5.4.1 Progress on Previous Mitigation Actions

During the 2013 update process the HMPC reviewed and evaluated the 2008 mitigation strategy to determine the status of the actions. The purpose of this was to measure progress by determining which actions were completed, and to revisit the remaining items to determine if they should be carried forward or removed from the plan. The 2008 mitigation strategy contained 42 separate mitigation actions. Of these actions, three have been deleted. The actions that have been deleted are shown in Table 5.1. In general, the review shows that much progress has been made since the original plan was adopted in 2008. Implementation of the actions has resulted in greater community awareness of Ouray County's vulnerability to natural hazards and reduced vulnerability for hazards such as wildfire and debris flow. Several of these actions have increased the mitigation and response capabilities of the County, and thus will help save lives in future incidents. Table 5.2 lists over 39 actions from the 2008 plan that have been implemented or are ongoing and being carried forward, and 20 new mitigation actions. This table was developed during the 2013 update so that actions could be easily referenced by jurisdiction, including their implementation details. This can be used moving forward as reference during annual reviews. More detailed descriptions of those actions can be referenced in Appendix C.

Ouray County and the fire protection districts, in partnership the West Region Wildfire Council, have progress in fuels reduction projects in an effort to mitigate wildfire hazards. In 2011 these entities worked together to develop the Ouray County Community Wildfire Protection Plan with specific recommendations for each community in the County based on individual wildfire hazard assessments. In 2012 Log Hill Mesa utilized West Region Wildfire Council grant funding to complete defensible space improvements for over 25 houses.

Other mitigation actions have seen much progress and are close to completion. The status of the actions being carried forward from the 2008 plan is included in the more detailed action descriptions that follow Table 5.2 or in the jurisdictional annexes.

During the update and revision to the mitigation strategy the priority of the 2008 actions were revisited. Revised priorities are reflected in Table 5.2.

**Table 5.1. Deleted Mitigation Actions from 2008 Plan**

Jurisdiction	Action Description	Hazard(s)	Status	Comments/Progress
Multi-Jurisdictional	Recommend that local governments require real estate disclosure on high flood or wildfire risk to individual properties using City/County approved forms	Flood, wildfire	Deleted	Not feasible due to liability implications; also not needed as hazards are noted as a standard practice during the development review process.
Ouray County	Develop Local Incident Command Type 3 Team Capability	All-hazards	Deleted	Not feasible
City of Ouray	Acquire property for sale on Bridal Veil Creek debris fan for open space designation	Debris flow	Deleted	City evaluated and determined not feasible due to cost of property.

### 5.4.2 Continued Compliance with NFIP

Given the flood hazard and risk in the planning area, and recognizing the importance of the NFIP in mitigating flood losses, an emphasis will be placed on continued compliance with the NFIP by Ouray County, the City of Ouray, and the Town of Ridgway. As NFIP participants, these communities have and will continue to make every effort to remain in good standing with NFIP. This includes continuing to comply with the NFIP’s standards for updating and adopting floodplain maps and maintaining and updating the floodplain zoning ordinance. There are several action items identified in Table 5.2 that address specifics related to NFIP continued compliance. Other details related to NFIP participation are discussed in the flood vulnerability discussion in Section 4.3.

### 5.4.3 Updated Mitigation Action Plan

The new and continuing mitigation actions developed by the HMPC are summarized in Table 5.2. The HMPC came to consensus on which departments and persons are responsible for completing an implementation worksheet for the County for each identified mitigation action. The worksheets document background information, ideas for implementation, lead agency, partners, potential funding, cost estimates, benefits, and timeline for each identified action. Action details are presented in Appendix C.

Ouray County, the City of Ouray, and the Town of Ridgway all have significant regulatory, personnel, technical, and financial resources and capabilities. The communities have been very

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proactive about mitigating risk to natural hazards when the need is identified and guiding new development away from hazard areas. Several of the fire districts have also been very proactive about mitigating risk to natural hazards, particularly wildfire. Many actions are also aimed at additional proactive planning efforts and integrating existing plans to further enhance local capabilities. Several of these mitigation actions are intended to reduce impacts to existing development. Those that protect future development from hazards, as required per the DMA 2000 regulations, are indicated by an asterisk ‘\*’ in the action title. These actions include those that promote wise development and hazard avoidance, such as code, mapping and zoning improvements.

The County’s highest priority hazards in the mitigation strategy are wildfire, debris flow, and flood. The County and jurisdictions continue to contribute their own resources to education, planning, land use and building regulations, critical facility protection, defensible space, and fuel reduction. However, the vulnerability is high and continued resources are required to implement needed loss reduction measures.

Table 5.2 summarizes all of the prioritized mitigation actions and indicates which jurisdictions plan to implement them; it also provides information on the hazards and plan goals addressed. The mitigation action implementation worksheets for the actions follow the matrix.

**Table 5.2. Mitigation Action Matrix**

Action ID#	Action	Lead (Bold) and partner agencies	Priority	Goals Addressed	Hazard	Status: Ongoing, completed, deferred, or deleted. Indicate reasons why project was completed, deferred, or deleted. Note successes or losses avoided if applicable
<b>Multi-Jurisdictional Actions</b>						
1	Develop CWPP for other remaining designated WUI areas for extreme and very high communities	<b>Sheriff's Office</b> ; Fire protection districts; CSFS, West Region Wildfire Council, community representatives; local, state, federal, and interested community stakeholder representatives	H	1	Wildfire	Ongoing.  Countywide CWPP Completed in 2011. Log Hill Fire's CWPP complete. Ouray Fire District looking to develop a district specific CWPP.
2	Improve and expand early warning systems to detect hazardous precipitation events and potential flooding	<b>Ouray City Manager</b> and <b>Ouray County Sheriff</b> in conjunction with the Bureau of Land Management and Tri-County Water	H	1	Flooding, All-hazards	Partially complete. Warning options have expanded but automated systems to detect hazardous flooding still needs to be explored. There are only 5 gauges. USGS gauge stations also exist. NWS gets notification in heavy rainfall.  Wireless Emergency Notification System (WENS) adopted and in use for 2 years – text message and email based.  Twenty-First Century Communications (TFCC)-Reverse 911 system.  Making use of Facebook/social media
3	Improve the coverage of the NOAA all-hazards radio in Ouray County for all potential warning situations (present coverage is limited to Ridgway area)	<b>County Sheriff</b> , City of Ouray administration/police, National Weather Service Grand Junction	H	1	All-hazards	Not completed due to lack of funding. Need to develop and include templates for non-weather events and dam failure events.
4	Develop a flood evacuation plan for the critical portions of the City of Ouray	<b>City of Ouray Police</b> , Fire, and Public Works departments, and City Administration, County Sheriff	H	1	Flood	This was developed by the City in 2008. Needs to be updated.
5	Maintain State of Colorado avalanche forecasting and control efforts	<b>CDOT, CODNR-CAIC</b>	M	1	Avalanche	Ongoing.

<b>Action ID#</b>	<b>Action</b>	<b>Lead (Bold) and partner agencies</b>	<b>Priority</b>	<b>Goals Addressed</b>	<b>Hazard</b>	<b>Status: Ongoing, completed, deferred, or deleted. Indicate reasons why project was completed, deferred, or deleted. Note successes or losses avoided if applicable</b>
6	Encourage the State of Colorado to continue to monitor and enforce hazardous materials transport regulations	<b>Colorado Department of Public Safety – State Patrol</b> , Sheriff, Ouray Police, Ridgway Marshal	M	1	Hazardous Materials	Ongoing. State Patrol sets check stations roughly every couple of months.
7	Have the State of Colorado re-evaluate the extension of the East Riverside avalanche shed for greater protection	<b>CDOT</b>	L	1	Avalanche	No action. CDOT is doing a regional transportation plan update in 2013. The possibility of including this project in CDOT's plan update should be explored.
8	Evaluate driver safety options to minimize risks to motorists and tour buses on Highway 550 between Ouray and Red Mountain Pass	<b>CDOT, Colorado State Patrol</b>	L	1	All-hazards	Ongoing. Rockfall mitigation and signage done. Road improvements on Bear Creek Bridge Greyhound changed their route and no longer goes through the City but Inexperienced truck drivers on HWY 550 still an issue.
9	Invite the Colorado Water Conservation Board and FEMA to host flood insurance workshops prior to flood season every two years	<b>Ouray City administration</b> in coordination with County Emergency Management and Ridgway administration/planning	H	2	Flood	Ongoing. CWCB and FEMA came down once. Could coordinate open house.
10	Continue to implement sound floodplain management practices as communities participating in the National Flood Insurance Program	<b>Ouray County</b> Building Department; Ridgway Administration, Planning and Building Departments; <b>City of Ouray</b> Building Department	M	2	Flood	Ongoing. FEMA and CWCB staff visited the City of Ouray and Ridgway in 2013 to assist with development of management practices and update of ordinances to conform with new State floodplain rules.

<b>Action ID#</b>	<b>Action</b>	<b>Lead (Bold) and partner agencies</b>	<b>Priority</b>	<b>Goals Addressed</b>	<b>Hazard</b>	<b>Status: Ongoing, completed, deferred, or deleted. Indicate reasons why project was completed, deferred, or deleted. Note successes or losses avoided if applicable</b>
11	Encourage residents to construct defensible space around homes through promotion of Firewise techniques	<b>Fire Chiefs</b> , FPDs, CSFS, WRWC	M	2	Wildfire	Ongoing. Log Hill Mesa received Firewise community designation in 2012. Over 104 Log Hill Mesa houses had defensible space improvements made in the fall of 2012 through the WRWC grant program.  Others countywide too.  Incorporate informational link into "Before You Build" document  Ouray F.D. has met with WRWC to do property-specific risk assessments.
12	Improve FPD wildland capabilities per CWPP recommendations	<b>Fire Chiefs</b> , FPDs	M	1	Wildfire	New in 2013
13	Implement fuels treatment projects in areas identified in the Ouray County CWPP	<b>Fire Districts</b> with Respective Federal Agencies, Colorado State Forest Service, Neighborhood CWPP projects, West Region Wildfire Council, local fire departments and individual land owners	H	2	Wildfire	Ongoing. Changed from medium to high priority in 2013. With WRWC assistance over 419 acres of hazardous fuels reduction treatments identified in the CWPP have been funded since 2011. "Community Chipping Days" help homeowners clear hazardous fuels from around their homes. CSFS and CRCS have been involved with several other hazardous fuels reduction treatments in the County.
14	Review County wildfire regulations with insurance industry. Partner with insurance industry*	Ouray Emergency Management with <b>County Staff and Fire Dept.</b> representatives	M	2	Wildfire	Ongoing but needs additional action. WRWC hosts workshops for insurance agents.
15	Redo or update the flood hazard risk maps for 100- and 500-year floods*	Building departments in <b>County and municipalities</b> , Colorado Water Conservation Board	M	2	Flood	Not completed but still an important need. Need to communicate importance to State/FEMA.

<b>Action ID#</b>	<b>Action</b>	<b>Lead (Bold) and partner agencies</b>	<b>Priority</b>	<b>Goals Addressed</b>	<b>Hazard</b>	<b>Status: Ongoing, completed, deferred, or deleted. Indicate reasons why project was completed, deferred, or deleted. Note successes or losses avoided if applicable</b>
16	Provide hazardous fuels reduction treatments around the five radio/cell sites in Ouray County	<b>Ouray County</b> Emergency Planning with respective land management agencies	H	3	Wildfire	Done on 3 main sites. Log Hill Fire looking at ways to implement.
17	Provide hazardous fuels reduction treatments around the Ridgway power substation	<b>San Miguel Power, BLM</b>	H	3	Wildfire	Not completed but still needs action
18	Provide hazardous fuels reduction treatments around the 230 KV power line	<b>USFS, WAPA</b>	H	3	Wildfire	Ongoing
19	Evaluate multi-hazard risk to five radio/cell sites and repeater sites and develop appropriate mitigation recommendations	<b>County</b> Emergency Management, Site users	M	3	All-hazards	Partially completed. Sites have been engineered for wind loading. Removed clutter of inactive antennas. Some have increased security too.  Ongoing maintenance needed – to reduce fuels and repair lightning arrestors
20	Develop capability for off-site backup of critical data	<b>County, City of Ouray, Town of Ridgway</b>	L	3	All-hazards	Backup of critical data is in place but still within City limits. Ongoing for County and Ridgway.
21	Develop continuity of operations and continuity of government plans	<b>County, City of Ouray, Town of Ridgway</b> County Emergency Planning with cooperation of local governments	L	3	All-hazards	Ouray County Emergency Preparedness Plan completed November 2012. Ridgway School has completed. City of Ouray and Town of Ridgway still need to complete.
22	Identify potential multi-hazard shelter sites and ensure adequate supplies and backup power capabilities	<b>County</b> Emergency Management with possible shelter site managers and the Red Cross	H	3	All-hazards	In progress. MOU for Right of First Refusal for portable generator in place with company in Grand Junction.  Schools identified as backup shelters (not Red Cross certified). Have reassessed for ADA compliance. New Ridgway school.  4-H Center wired for generator hookup.  Getting generator for EOC and Road & Bridge building

Action ID#	Action	Lead (Bold) and partner agencies	Priority	Goals Addressed	Hazard	Status: Ongoing, completed, deferred, or deleted. Indicate reasons why project was completed, deferred, or deleted. Note successes or losses avoided if applicable
23	Upgrade County Wireless Communications to include access to State 800 Mhz system	<b>Ouray County Sheriff</b> in conjunction with the State of Colorado and the Office of Homeland Security	H	3	All-hazards	Complete. Done for Sheriff's Office and all law enforcement except City of Ouray.
24	Improve countywide GIS capabilities to support land use planning and emergency management*	<b>Ouray County</b> , Town of Ridgway, Ouray GIS/Information Technologies Department	M	3	All-hazards	Ongoing. City of Ouray and Town of Ridgway have budgeted funds to assist with the initial development of GIS capabilities. Supports emergency notification too.
25	Produce multi-hazard education.	<b>Ouray County</b> Emergency Management, Ouray County Public Health; municipalities and fire protection districts	L	1	All-hazards	<p>Ongoing. County is working on education and implementation of fire mitigation across the County. Created a Facebook page for County Emergency Management to educate citizens and dispel rumors of emergencies. OEM sends out educational materials. Town of Ridgway has voluntary water restrictions and annual workshops on water conservation and drought status with the Town Council. Ridgway also has a noxious weed management plan. Log Hill Mesa participates in Ready, Set, Go! program and distributes info to public several times each year. Log Hill Mesa also provides Firewise mitigation info and structure evaluations for wildfire mitigation. Log Hill Mesa's website also has disaster preparedness info.</p> <p>Include re-entry flyers for burned areas. CDPHE has developed guidance on this that can be modified for local conditions Evacuation routes/sites.</p> <p>NWS provides storm spotter training every other year in Montrose and Delta – gets good participation from Ouray.</p>

Action ID#	Action	Lead (Bold) and partner agencies	Priority	Goals Addressed	Hazard	Status: Ongoing, completed, deferred, or deleted. Indicate reasons why project was completed, deferred, or deleted. Note successes or losses avoided if applicable
26	Hazmat awareness training for first responders	<b>EMS, law enforcement, fire</b>	H	1	Hazardous Materials	New in 2013.
27	Provide the Grand Junction NWS office with appropriate non-weather emergency message (NWEM) templates	<b>Ouray County Emergency Management, NWS</b>	H	1	All-hazards (non-weather)	New in 2013.
28	Work with State Patrol hazmat officers to monitor hazmat through county roads and CDOT roads	<b>Ouray County Emergency Management, CDOT, State Patrol</b>	H	1	Hazardous Materials	New in 2013.
29	Education of citizens about flood insurance: clear water vs. sediment/mudflow	<b>City of Ouray and Town of Ridgway</b>	M	2	Flood/Debris flow	New in 2013.
<b>Ouray County</b>						
30	Update the County's emergency operations plan to the latest standards and include Ridgway and Ouray	<b>Ouray County Emergency Management</b>	L	1	All-hazards	Completed. The EOP has been updated and adopted.
31	Review the County wildfire mitigation standards code against the National Fire Protection Association model and modify the Ouray County code if appropriate*	<b>Ouray County Land Use and Planning</b>	M	2	Wildfire	Needs to be done.
32	Explore adding the development of a community wildfire protection plan and defensible space as requirements for subdivision planned unit development approvals*	<b>Ouray County Planning Office, Planning Commission and BOCC</b>	L	2	Wildfire	Needs to be done in conjunction with previous action.
33	Update and modernize the avalanche hazard atlas with development of a GIS avalanche database	<b>Ouray County Emergency Management</b>	M	2	Avalanche	No action.

Action ID#	Action	Lead (Bold) and partner agencies	Priority	Goals Addressed	Hazard	Status: Ongoing, completed, deferred, or deleted. Indicate reasons why project was completed, deferred, or deleted. Note successes or losses avoided if applicable
34	Set up a countywide emergency operations center at the Ridgway Land Use Office, which is not in potential flood and fire risk areas and is close to the County fuel supply and the central radio system repeater	County Emergency Management, Planning Office Staff	M	3	All-hazards	Purchasing by September 30, 2013. EOC software purchased and laptop ordered. Setup in late November 2013 and test with exercise in February 2014.
35	Upgrade County emergency manager position from part-time to full-time	Ouray County administration	H	3	All-hazards	No action due to funding. Hours increased from 13 hrs to 16 hrs but full time position still needed.
36	Improve fire response capabilities, including installing "quick dumps" on all County and City water trucks and equip to carry "porta-ponds"	County Emergency Management, Road and Bridge Dept.	L	3	Wildfire	Not yet feasible to retrofit due to cost. Bids received but not affordable; capability still needed.
37	Educate citizens on beetle kill and work with USFS to mitigate beetle kill affected trees within the County	<b>USFS</b> , Ouray County Emergency Management, City of Ouray, Town of Ridgway, Fire Departments	H	2	Wildfire	New in 2013
38	Build a culvert or drainage system to prevent County Road 17 near Corbett Creek from flooding and washing out during heavy rainstorms	<b>Ouray County</b> , Ouray County Road and Bridge	H	2	Flood	New in 2013
39	Reduce avalanche risks to miners and first responders	<b>Ouray County</b> , Ouray County Road and Bridge	H	1	Avalanche	New in 2013
40	Create emergency management resource lists	<b>Ouray County Emergency Management</b> , Ouray County Sheriff, EMS, OVFD, Log Hill Mesa Fire, Ridgway Fire, Ouray County Road and Bridge	H	3	All-hazards	New in 2013
41	Ensure all are trained in NIMS according to FEMA regulations	<b>Ouray County Emergency Management</b> , all responding agencies	H	3	All-hazards	New in 2013

<b>Action ID#</b>	<b>Action</b>	<b>Lead (Bold) and partner agencies</b>	<b>Priority</b>	<b>Goals Addressed</b>	<b>Hazard</b>	<b>Status: Ongoing, completed, deferred, or deleted. Indicate reasons why project was completed, deferred, or deleted. Note successes or losses avoided if applicable</b>
42	Create preloaded warning messages for specific events (e.g. flood, fire, evacuation) for our target notification system and NWO	<b>Ouray County Emergency Management</b> , 911 Board, NWO	H	2	All-hazards	New in 2013
43	Research and implement a strategy to reduce ISO ratings countywide	<b>Ouray County Emergency Management</b> , West Region Wildfire Council	H	3	Wildfire	New in 2013
44	Work with Parks & Wildlife and Tri-County to keep debris low in Ridgway Reservoir to prevent flooding and dam overflow	<b>Colorado Parks and Wildlife</b> , Tri-County, Ouray County	M	1	Flood, Dam Failure	New in 2013
45	Create EOPs related to imminent threats for public buildings such as the County Courthouse City Hall, Town Hall, and schools	<b>Ouray County Emergency Management</b> , City of Ouray, Town of Ridgway, schools	H	3	Imminent Threat	New in 2013
<b>City of Ouray</b>						
46	Replace Skyrocket Creek Diversion Dam to divert debris flows away from the Ouray Hot Springs Pool	<b>City of Ouray Administration</b>	H	1	Debris flow	Completed. Secured long-term permitting with Corp to remove debris on regular basis.
47	Conduct outreach on debris flow and flood protection methods for property and business owners in the City of Ouray	<b>City of Ouray Administration</b>	M	2	Debris flow/Flood	No action.
48	Protect City of Ouray water main from landslide impacts	<b>City of Ouray Administration</b>	M	3	Landslide	Water line and redundant line installed in 2012.
49	Bi-annual removal of rock and debris in the Cascade catchment basin to prevent flooding	<b>City of Ouray Administrator</b>	M	1	Flood	New in 2013
50	Annual removal of rock and debris in the Skyrocket catchment basin to prevent flooding	<b>City of Ouray Administrator</b>	M	1	Flood	New in 2013

						<b>Status: Ongoing, completed, deferred, or deleted. Indicate reasons why project was completed, deferred, or deleted. Note successes or losses avoided if applicable</b>
<b>Action ID#</b>	<b>Action</b>	<b>Lead (Bold) and partner agencies</b>	<b>Priority</b>	<b>Goals Addressed</b>	<b>Hazard</b>	
51	Replace or repair Weehawken Spring transmission line should an event take the line out of service. Develop plan for public notification, conservation methods, and fire protection alternatives if service is interrupted.	<b>City of Ouray Administrator, Forest Service</b>	H	3	All-hazards	New in 2013
52	Complete CWPP for City of Ouray Volunteer Fire Department	<b>Ouray Volunteer Fire Department</b>	H	1	Wildfire	New in 2013
<b>Town of Ridgway</b>						
53	Develop a stormwater management plan for the Town of Ridgway	<b>Town of Ridgway Administration</b>	H	2	Flood	On 5 year Capital Improvement Plan list. Do in phases and in concert with transportation improvements.
54	Develop additional raw water storage for Ridgway	<b>Town of Ridgway Administration</b>	H	2	Drought	Funded. Completion anticipated by fall 2014.
<b>Fire Protection Districts</b>						
55	Develop CWPP for Log Hill Mesa	<b>Log Hill Mesa FPD</b>	H	1	Wildfire	Completed. Received a Firewise Community Protection Award. Used to encourage mitigation among residents. Used to develop operations plan and mapbook.
56	Complete the Horsefly Fire Protection Association CWPP to include evacuation routing and signage	<b>Horsefly Fire Association</b>	M	1	Wildfire	Ongoing. Over 25 houses had defensible space improvements made in the fall of 2012 through the WRWC grant program.
57	Complete ISO reevaluation of Log Hill Mesa Fire Protection District	<b>Log Hill Mesa Fire Protection District</b>	M	2	Wildfire	Completed in May 2011. In January 2012, Public Protection Classification rating improved to 5/8B from 6/9.
<b>Ridgway School District</b>						

<b>Action ID#</b>	<b>Action</b>	<b>Lead (Bold) and partner agencies</b>	<b>Priority</b>	<b>Goals Addressed</b>	<b>Hazard</b>	<b>Status: Ongoing, completed, deferred, or deleted. Indicate reasons why project was completed, deferred, or deleted. Note successes or losses avoided if applicable</b>
58	Secure exterior school entrances by installing electronic locks with card readers	<b>Ridgway School District</b>	H	1	Imminent Threat	New in 2013
59	Upgrade emergency notification system	<b>Tim Lyons – IT Manager</b>	H	1	All-hazards	New in 2013
60	Improve earthquake preparedness in School District Buildings	<b>Ridgway School District</b>	M	1	Earthquake	New in 2013
61	Install safety film on windows at secondary schools to prevent intrusion and injuries from shattered glass	<b>Ridgway School District</b>	M	1	All-hazards	New in 2013

\*Action addresses reducing losses to future development



## 6 PLAN ADOPTION

**Requirement §201.6(c)(3): [The local hazard mitigation plan shall include] documentation that the plan has been formally approved by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, county commissioner, Tribal Council).**

The purpose of formally adopting this plan is to secure buy-in from Ouray County and participating jurisdictions, raise awareness of the plan, and formalize the plan's implementation. The adoption of this plan completes Planning Step 9 of the 10-step planning process: Adopt the Plan. The governing board for each participating jurisdiction has adopted this local hazard mitigation plan by passing a resolution. A copy of the generic resolution and the executed copies are included in Appendix A Plan Adoption. The dates each jurisdiction adopted the initial plan are listed below. Re-adoption documentation from the 2013 update process can be referenced in Appendix A.

### 2008 Adoption

Ouray County Board of County Commissioners	Adopted October 13, 2008
Ouray City Council	Adopted October 20, 2008
Ridgway Town Council	Adopted November 12, 2008
Log Hill Mesa Fire Protection District	Adopted November 5, 2008
Horsefly Fire Association	Adopted January 22, 2009



# 7 PLAN IMPLEMENTATION AND MAINTENANCE

**Requirement §201.6(c)(4): [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.**

Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. This is Planning Step 10 of the 10-step planning process and Phase 4 of FEMA’s Four-phase process. This chapter provides an overview of the overall strategy for plan implementation and maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

Section 3.0 Planning Process includes information on the implementation and maintenance process since the 2008 plan was adopted. This section includes information on the ongoing implementation and maintenance process and reflects adjustments made in the 2013 update.

## 7.1 Implementation

Once adopted, the plan faces the truest test of its worth: implementation. While this plan contains many worthwhile projects, the HMPC will need to decide which action(s) to undertake first. Two factors will help with making that decision: the priority assigned the actions in the planning process and funding availability. Low or no-cost projects most easily demonstrate progress toward successful plan implementation.

Implementation will be accomplished by adhering to the schedules identified for each action (see Table 5.2 in Chapter 5 and Appendix C Actions) and through constant, pervasive, and energetic efforts to network and highlight the multi-objective, win-win benefits of each project to the Ouray community and its stakeholders. These efforts include the routine actions of monitoring agendas, attending meetings, and promoting a safe, sustainable community. The three main components of implementation are:

- IMPLEMENT the action plan recommendations of this plan;
- UTILIZE existing rules, regulations, policies and procedures already in existence; and
- COMMUNICATE the hazard information collected and analyzed through this planning process so that the community better understands what can happen where, and what they can do themselves to be better prepared. Also, publicize the “success stories” that are achieved through the HMPC’s ongoing efforts.

Simultaneous to these efforts, the HMPC will constantly monitor funding opportunities that could be leveraged to implement some of the more costly actions. This will include creating and

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maintaining a bank of ideas on how to meet required local match or participation requirements. When funding does become available, the HMPC will be in a position to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, special district budgeted funds, state and federal earmarked funds, and other grant programs, including those that can serve or support multi-objective applications.

### **7.1.1 Role of Hazard Mitigation Planning Committee in Implementation and Maintenance**

With adoption of this plan, the HMPC will be tasked with plan implementation and maintenance. The HMPC will be led by the County emergency manager. The HMPC will act as an advisory body. Its primary duties will be to see the plan successfully carried out and to report to the community governing boards and the public on the status of plan implementation and mitigation opportunities. The HMPC agrees to:

- Act as a forum for hazard mitigation issues;
- Meet annually or after a disaster event to monitor and evaluate the implementation of the plan;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high-priority, low/no-cost recommended actions;
- Keep the concept of mitigation in the forefront of community decision making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters;
- Maintain a vigilant monitoring of multi-objective cost-share opportunities to help the community implement the plan's recommended actions for which no current funding exists;
- Monitor and assist in implementation and update of this plan;
- Report on plan progress and recommended changes to the Ouray Board of County Commissioners and Town/City Councils; and
- Inform and solicit input from the public.

The HMPC is an advisory body and will not have any powers over county, city, town, or special district staff. Its primary duty is to see the plan successfully carried out and to report to the community governing boards and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information on the County website and local newspapers.

## **7.2 Maintenance**

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Plan maintenance implies an ongoing effort to monitor and evaluate plan implementation and to update the plan as required or as progress, roadblocks, or changing circumstances are recognized.

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## 7.2.1 Maintenance Schedule

In order to track progress and update the mitigation strategies identified in the action plan, the HMPC will revisit this plan annually or after a significant hazard event or disaster declaration. The County emergency manager is responsible for initiating this review and convening members of the HMPC on a once yearly basis, or more frequently as needed. Ouray County Emergency Management regularly reports to the Board of County Commissioners (BOCC) before flood and fire season in April. Emergency Management provides a report to the BOCC at the end of each hazard season and officially meets with the Board in September or October. This report typically includes information on hazard preparedness and mitigation. Ouray Emergency Management will convene the HMPC prior to the Board meeting to discuss status on mitigation actions and review available grants that could be used to implement actions.

This plan will be updated, approved and adopted within a five-year cycle as per Requirement §201.6(c)(4)(i) of the Disaster Mitigation Act of 2000. Efforts to begin the update should begin no later than January 2018. The County will inquire with DHSEM and FEMA for funds to assist with the update in 2016 as most applicable grants have multiple years to expend the funds. Funding sources may include the Emergency Management Performance Grants, Pre- Disaster Mitigation, Hazard Mitigation Grant Program (if a presidential disaster has been declared), and Flood Mitigation Assistance grant funds. Updates to this plan will follow the most current FEMA and DHSEM planning guidance. The next plan update is anticipated to be completed and reapproved by DHSEM and FEMA Region VIII by November 2018.

## 7.2.2 Maintenance Evaluation Process

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Such changes in vulnerability may include:

- Decreased vulnerability as a result of implementing recommended actions,
- Increased vulnerability as a result of failed or ineffective mitigation actions, and/or
- Increased vulnerability as a result of new development (and/or annexation).

Updates to this plan will:

- Consider changes in vulnerability due to project implementation,
- Document success stories where mitigation efforts have proven effective,
- Document areas where mitigation actions were not effective,
- Document any new hazards that may arise or were previously overlooked,
- Document hazard events and impacts that occurred within the five-year period,
- Incorporate new data or studies on hazards and risks,
- Incorporate new capabilities or changes in capabilities,
- Document continued public involvement

- 
- Document changes to the planning process, which may include new or additional stakeholder involvement
  - Incorporate growth and development-related changes to building inventories,
  - Incorporate new project recommendations or changes in project prioritization,
  - Include a public involvement process to receive public comment on the updated plan prior to submitting the updated plan to DHSEM/FEMA, and
  - Include readoption by all participating entities following DHSEM/FEMA approval.

The HMPC will use the following process to evaluate progress, note changes in vulnerability, and consider changes in priorities as a result of plan implementation:

- A representative from the responsible entity identified in each mitigation measure will be responsible for tracking and reporting on an annual basis to the HMPC on project status. The representative will provide input on whether the project as implemented meets the defined goals objectives and is likely to be successful in reducing vulnerabilities.
- If the project does not meet identified goals and objectives, the HMPC will select alternative projects for implementation.
- New projects identified will require an individual assigned to be responsible for defining the project scope, implementing the project, monitoring success of the project.
- Projects that were not ranked high priority but were identified as potential mitigation strategies will be reviewed as well during the monitoring and update of this plan to determine feasibility of future implementation.
- Changes will be made to the plan to accommodate for projects that have failed or are not considered feasible after a review for their consistency with established criteria, the time frame, priorities, and/or funding resources.

As a measure of progress the HMPC will evaluate the overall percentage of actions implemented within each 5 year update cycle. Changes will be made to the plan to accommodate for actions that have failed or are not considered feasible after a review of their consistency with established criteria, timeframe, community priorities, and/or funding resources. Actions that were not ranked high but were identified as potential mitigation activities will be reviewed as well during the monitoring and update of this plan to determine feasibility of future implementation. Updating of the plan will be by written changes and submissions, as Ouray County Emergency Management deems appropriate and necessary, and as approved by the Ouray County Board of Commissioners and the governing boards of the other participating jurisdictions.

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## 7.2.3 Incorporation into Existing Planning Mechanisms

**44 CFR Requirement §201.6(c)(4)(ii): [The plan shall include 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.**

Another important implementation mechanism that is highly effective and low-cost is incorporation of the hazard mitigation plan recommendations and their underlying principles into other jurisdictional plans and mechanisms. Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development. As stated in Section 7.1 of this plan, implementation through existing plans and/or programs is recommended, where possible. This point is re-emphasized here. Based on this plan's capability assessment, the participating jurisdictions have and continue to implement policies and programs to reduce losses to life and property from natural hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing projects, where possible, through these other program mechanisms. These existing mechanisms include:

- Ouray County Master Plan
- Ouray County Land Use Code
- City of Ouray Community Plan
- Ouray City Code
- Town of Ridgway Master Plan
- Ridgway Municipal Code
- Ridgway Capital Improvement Plans
- Ridgway Source Water Protection Plan
- Ouray County CWPP
- Ouray County Emergency Operations Plan

HMPC members involved in the updates to these mechanisms will be responsible for integrating the findings and recommendations of this plan with these other plans, as appropriate. An example would be using the risk assessment information to update the hazard analysis in the Ouray County Emergency Operations Plan.

## 7.2.4 Continued Public Involvement

**44 CFR Requirement §201.6(c)(4)(iii): [The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.**

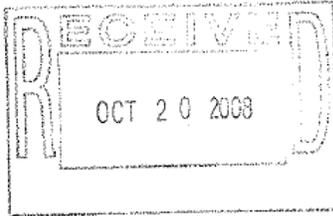
Continued public involvement is also imperative to the overall success of the plan's implementation. The update process provides an opportunity to publicize success stories from the plan implementation and seek additional public comment. A public hearing(s) to receive

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public comment on plan maintenance and updating will be held during the update period. When the HMPC reconvenes for the update, they will coordinate with all stakeholders participating in the planning process—including those that joined the committee since the planning process began—to update and revise the plan. The plan maintenance and update process will include continued public and stakeholder involvement and input through participation in designated committee meetings, web postings, social media, and press releases to local media. Activities related to public involvement during the 2013 update are documented in Section 3 and Appendix E. Public comment received at the August 20, 2013 meeting indicated that more regular communication on the status of the implementation of the plan would be welcomed. As a result Ouray Emergency Management will take the lead in ensuring that the progress report shared with the BOCC (see Section 7.2.1) is also made available to the public. This report will be advertised through email blasts and social media and the local newspapers approximately one month after meeting with the BOCC.



# APPENDIX A: PLAN ADOPTION



Resolution 2008-060

**RESOLUTION  
OF  
THE BOARD OF COUNTY COMMISSIONERS  
OURAY, COLORADO**

**RE: Multi-Hazard Mitigation Plan 2008**

**Whereas,** Ouray County recognizes the threat that natural hazards pose to people and property within our community; and

**Whereas,** undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

**Whereas,** an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

**Whereas,** the Colorado Division of Emergency Management and Federal Emergency Management Agency, Region VIII officials have reviewed the Ouray County, Colorado Multi-Hazard Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

**Whereas,** Ouray County resides within the county Planning Area, and fully participated in the mitigation planning process to prepare this Multi-Hazard Mitigation Plan; and

**Now, Therefore, Be It Resolved,** that the Ouray County Board of County Commissioners hereby adopts the Ouray County, Colorado, Multi-Hazard Mitigation Plan (*Exhibit A*) as an official plan; and

**Be It Further Resolved,** Ouray County will submit this Adoption Resolution to the Colorado Division of Emergency Management and Federal Emergency Management Agency, Region VIII officials to enable the Plan's final approval.

Adopted this 13<sup>th</sup> day of October, 2008.

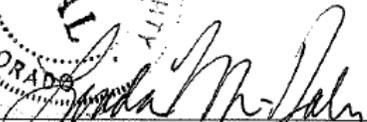
BOARD OF COUNTY COMMISSIONERS  
OF OURAY COUNTY, COLORADO

  
K. Keith Meinert, Chair

  
Don Batchelder, Vice Chair

  
Heidi M. Albritton, Commissioner Member



  
(Michelle Nauer, Clerk and Recorder)  
By: Linda Munson-Haley, Deputy Clerk of the Board

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A RESOLUTION OF THE CITY COUNCIL  
OF THE CITY OF OURAY, COLORADO  
(RESOLUTION NO. 5, 2008)

WHEREAS, the City of Ouray recognizes the threat that natural hazards may pose to people and property within our community; and

WHEREAS, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

WHEREAS, an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

WHEREAS, the Colorado Division of Emergency Management and Federal Emergency Management Agency, Region VIII officials have reviewed the Ouray County, Colorado Multi-Hazard Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS, an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

WHEREAS, the City of Ouray resides within the Ouray County Planning Area, and fully participated in the mitigation planning process to prepare this Multi-Hazard Mitigation Plan; and

NOW THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF OURAY, COLORADO, that the City of Ouray, hereby adopts the Ouray County, Colorado, Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the City of Ouray will submit this Adoption Resolution to the Colorado Division of Emergency Management and Federal Emergency Management Agency, Region VIII officials to enable the Plan's final approval.

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ADOPTED this 20<sup>th</sup> day of October, 2008, by the Ouray City Council.

CITY OF OURAY, COLORADO

By:   
Robert E. Risch, Mayor

ATTEST:

  
Kathy Elmout, City Clerk

Councilmen voting as follows:

Kersen absent  
Risch yes  
Stoufer yes  
Stuller yes  
Wolfe yes

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RESOLUTION NO. 08-10

RESOLUTION OF THE TOWN COUNCIL, TOWN OF RIDGWAY, COLORADO  
ADOPTING THE OURAY COUNTY, COLORADO  
MULTI-HAZARD MITIGATION PLAN 2008

Whereas, the Town Council of the Town of Ridgway recognizes the threat that natural hazards pose to people and property within the community; and

WHEREAS, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

WHEREAS, an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

WHEREAS, the Colorado Division of Emergency Management and Federal Emergency Management Agency, Region VIII officials have reviewed the Ouray County, Colorado Multi-Hazard Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

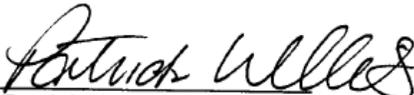
WHEREAS, an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

WHEREAS, the Town of Ridgway is situate within the county Planning Area, and the Town organization has fully participated in the mitigation planning process to prepare this Multi-Hazard Mitigation Plan.

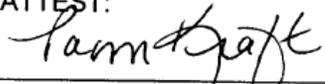
NOW THEREFORE BE IT RESOLVED, the Town Council of the Town of Ridgway, Ouray County, Colorado hereby adopts the Ouray County, Colorado, Multi-Hazard Mitigation Plan as an official plan; and that this Resolution shall be submitted to the Colorado Division of Emergency Management and Federal Emergency Management Agency, Region VIII officials to enable the Plan's final approval.

APPROVED AND ADOPTED THIS 12<sup>th</sup> day of November, 2008.

TOWN OF RIDGWAY

  
Patrick Willits, Mayor

ATTEST:

  
Pam Kraft, MMC, Town Clerk

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Multi-Hazard Mitigation Plan Adoption Resolution

**Adopting the Ouray County, Colorado  
Multi-Hazard Mitigation Plan 2008**

**Whereas**, Log Hill Mesa Fire Protection District recognizes the threat that natural hazards pose to people and property within our community; and

**Whereas**, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

**Whereas**, an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

**Whereas**, the Colorado Division of Emergency Management and Federal Emergency Management Agency, Region VIII officials have reviewed the Ouray County, Colorado Multi-Hazard Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

**Whereas**, an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

**Whereas**, Log Hill Mesa Fire Protection District resides within the county Planning Area, and fully participated in the mitigation planning process to prepare this Multi-Hazard Mitigation Plan; and

**Now, therefore, be it resolved**, that the Log Hill Mesa Fire Protection District hereby adopts the Ouray County, Colorado, Multi-Hazard Mitigation Plan as an official plan; and

**Be it further resolved**, Log Hill Mesa Fire Protection District will submit this Adoption Resolution to the Colorado Division of Emergency Management and Federal Emergency Management Agency, Region VIII officials to enable the Plan's final approval.

Passed: 11/5/08 (Date)

  
\_\_\_\_\_  
Chairman, Log Hill Mesa Fire Protection District

Multi-Hazard Mitigation Plan Adoption Resolution

Resolution # \_\_\_\_\_

**Adopting the Ouray County, Colorado  
Multi-Hazard Mitigation Plan 2008**

**Whereas, Horsefly Volunteer Fire Protection recognizes the threat that natural hazards pose to people and property within our community; and**

**Whereas, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and**

**Whereas, an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and**

**Whereas, the Colorado Division of Emergency Management and Federal Emergency Management Agency, Region VIII officials have reviewed the Ouray County, Colorado Multi-Hazard Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and**

**Whereas, an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and**

**Whereas, Horsefly Volunteer Fire Protection resides within the county Planning Area, and fully participated in the mitigation planning process to prepare this Multi-Hazard Mitigation Plan; and**

**Now, therefore, be it resolved, that the Horsefly Volunteer Fire Protection Board, hereby adopts the Ouray County, Colorado, Multi-Hazard Mitigation Plan as an official plan; and**

**Be it further resolved, Horsefly Volunteer Fire Protection will submit this Adoption Resolution to the Colorado Division of Emergency Management and Federal Emergency Management Agency, Region VIII officials to enable the Plan's final approval.**

Passed: \_\_\_\_\_ (date) 1/27/09

Peter Taylor  
Co Chairman  
Horsefly Fire



# APPENDIX B: HAZARD MITIGATION PLANNING COMMITTEE

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## County and Municipalities

Sally Bailar  
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Emergency Manager  
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Town Manager  
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Town of Ridgway  
Ridgway Town Engineer

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County Weed Manager  
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Junior Mattivi  
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County Sheriff  
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Assessor  
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Chris Miller  
Ouray County Road and Bridge

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Road Superintendent  
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Vacant  
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Chief of Police  
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David Scott  
Town of Ridgway Marshal Department  
Town Marshal  
marshal@ridgwayPD.com  
(970) 626-5196

## Districts

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Log Hill Volunteer Fire Department

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Tri-County Water District  
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Cheryl Gomez  
Ridgway School District  
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Sandra Kern  
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Trevor Latta  
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Ion Spor  
Tri-County Water District  
Ridgway Dam and Reservoir  
Superintendent  
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Niles Yoho  
Horsefly Fire Association  
Fire Chief  
vballin2011@gmail.com

Joanne Fairchild  
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## State Stakeholders

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Colorado Geological Survey  
Geologist

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Vance Kelso

Colorado Department of Transportation

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(970) 626-4377

Deanna Butterbaugh

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## APPENDIX C: MITIGATION ACTIONS

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The following appendix provides project specifics and implementation details. They are grouped by jurisdiction (see Section 5.4.3 and Table 5.2 Mitigation Action Matrix for summary).

### ***1: Develop Community Wildfire Protection Plan for other remaining Designated Wildland-Urban Interface Areas for extreme and very high WUI communities***

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**Hazards Addressed:** Wildfire

**Issue/Background:** Wildfire poses risks to life, property, critical infrastructure, and natural resources. In Ouray County, there is a need for more community wildfire protection plans. One plan has been completed in the County, the “4 Neighborhood Community Wildfire Protection Plan” for Dexter/Cutler Creek, Panoramic Heights, Whispering Pines, and Lake Lenore communities. Log Hill Mesa (including Log Hill/Fairway Pines, North ¼ Log Hill Mesa, and Lazy Dog) has been identified as a high risk area in need of a plan (see separate action). This action addresses the completion of other community wildfire protection plans, with prioritized attention to the high risk communities identified in the Ouray County Fire Plan and this plan. The plans will include details on routes and/or safe areas. New plans will be linked to the Ouray County Wildfire Protection Plan.

**Other Alternatives:** Pursue wildfire hazard mitigation efforts without formalized written plans. Develop ordinances for high risk communities that more stringently address new construction ignitability, defensible space for structures, access/egress, and availability of water for suppression efforts.

**Responsible Office:** Ouray County Sheriff’s Office will oversee the effort. Community representatives or consultants will author plans. The fire protection districts; CSFS; West Region Wildfire Council; and all other local, state, federal, and interested community stakeholder representatives should be involved in the plan’s development in the form of technical, financial, or community collaboration assistance.

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$10,000-\$75,000, depending on level of specificity requested, size of community, etc.

**Potential Funding:** 50/50 to 90/10 cost-share grants through Colorado State Forest Service and the Bureau of Land Management. Other grant possibilities are being investigated.

**Benefits (Avoided Losses):** Reduces potential for firefighter fatalities; loss of life, property, critical infrastructure; and reduction in quality of watershed and other natural resources.

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**Schedule:** Horsefly Fire Protection Association should complete their plan before the 2008 fire season. The County is participating in a Regional Council with other counties and the BLM to find resources to complete a County and/or Regional effort to finish neighborhood plans.

**Status in 2013:** Ongoing. Log Hill Mesa FPD's CWPP is complete. Ouray Fire Department is still looking to develop their CWPP.

***2: Improve and expand Early Warning Systems to detect hazardous precipitation events and potential flooding***

---

**Hazards Addressed:** Flood

**Issue/Background:** Historically, flooding in Ouray County has been a major concern, especially in the Portland and Cascade drainages east of Ouray and the Cottonwood and Dallas drainages west of Ridgway. Flooding from these areas has destroyed private property and bridges on state highways and county roads. This project would involve coordinating with the Bureau of Reclamation and Tri-County Water to use an existing precipitation measurement system currently being used to monitor hazardous precipitation in the basin above Ridgway Reservoir. This basin includes the watersheds above the City of Ouray and could warn of impending flood and debris flows in the City and County along the Uncompahgre River and its tributaries.

**Other Alternatives:** No action

**Responsible Office:** Ouray City Manager and Ouray County Sheriff in conjunction with the Bureau of Reclamation and Tri-County Water, National Weather Service

**Priority (High, Medium, Low):** High

**Cost Estimate:** Anticipated to be low cost and accomplished mainly with coordination.

**Potential Funding:** Ouray County, Bureau of Reclamation, Tri-County Water, possible state grants

**Benefits (Avoided Losses):** Improved public safety; reduction in property loss

**Schedule:** 2008-2010

**Status in 2013:** Partially complete. Warning options have expanded but automated systems to detect hazardous flooding still need to be explored. There are only five automated rain gauges within the hydrological catch basin for Ridgway Reservoir. The five automated rain gauges have a very complex set of criteria for initiating any alert for heavy rainfall and would potentially require synchronization of rainfall thresholds. Since there is a single category score for the rainfall value, heavy rainfall at one gauge site may not initiate any alert if no rainfall is being measured at the other four gauge sites. USGS gauge stations also exist. As for other rain gauges (i.e. RAWS) within Ouray County, the threshold values for alerting NWS forecasters varies from

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gauge to gauge, depending on a number of factors. NWS and USBR gets notification during heavy rainfall events. The text message and email-based WENS system was adopted and has been in use for two years. The County also has the Twenty-First Century Communications Reverse 911 system and has been making use of Facebook and social media to communicate with the public.

***3: Improve the coverage of the NOAA all-hazards radio in Ouray County for all potential warning situations***

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**Hazards Addressed:** All

**Issue/Background:** The present NOAA All Hazards radio coverage in Ouray County is limited to the Ridgway area. NOAA All Hazards radio provides tone alert messages on all hazards, and could be useful to provide advance warning of hazardous weather conditions that could produce flash flooding/debris flows in the City of Ouray. This project would secure funding for a transmitter that would extend coverage into the City of Ouray and Uncompahgre Gorge areas.

**Other Alternatives:** No action

**Responsible Office:** County Sherriff, City of Ouray administration/police, Ouray County Emergency Manager, National Weather Service Grand Junction

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$35,000 for the transmitter, other hardware, and installation costs.

**Potential Funding:** Department of Homeland Security

**Benefits (avoided losses):** Reduced loss of life and injuries due to advanced warning

**Schedule:** 2008

**Status in 2013:** Not completed due to lack of funding by NOAA's NWS to pay for the recurring annual costs for utilities, communications, and maintenance.

***4: Develop a Flood Evacuation Plan for the City of Ouray***

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**Hazards Addressed:** Flash flood, debris flow

**Issue/Background:** Each year the potential exists for flash floods along Sky Rocket Creek and Bridal Veil Creek, as well as Cascade and Portland Creeks. Such floods are most likely to happen in July and August. Ouray's population peaks during these months due to visitors to Hot Springs Pool and Fellin Park, which is in the direct path of Skyrocket Creek and has the greatest potential for loss of life/injury. Currently, there are no means of warning and directing people to evacuate in the event of a flash flood.

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This project would identify evacuation routes and procedures in an evacuation plan. The plan will be tested with alert drills “with sound and fury” in high risk neighborhoods, coordinated with distribution of prevention/response literature at the time of the drills

**Other Alternatives:** No action

**Responsible Office:** City of Ouray Police, Fire, and Public Works departments, and City Administration, County Sheriff

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$10,000

**Potential Funding:** Colorado Division of Emergency Management

**Benefits (Avoided Losses):** Loss of life and injuries will be prevented/reduced

**Schedule:** 2008

**Status in 2013:** This was developed by the City in 2008 but needs to be updated.

***5: Maintain State of Colorado avalanche forecasting and control efforts***

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**Hazards Addressed:** Avalanche

**Issue/Background:** The U.S. Highway 550 Avalanche Reduction Project has been ongoing since September 1992, when the Colorado Department of Transportation contracted with the Colorado Department of Natural Resources Avalanche Information Center (CAIC) to provide avalanche condition evaluations, forecasts, and recommendations for avalanche control and road closure and other related services for U.S. Highway 550 in the San Juan Mountains of southwestern Colorado. Two CAIC forecasters are based midway along the 37-mile long avalanche-prone route, in the town of Silverton, from November 1 through May 1. These forecasts provide daily avalanche hazard monitoring and dissemination through website, KNVF broadcasts, and telephone information line. CDOT contracts with a helicopter company for avalanche control. It is important to Ouray residents and visitors that these efforts be maintained.

**Other Alternatives:** No action

**Responsible Office:** CDOT, CODNR-CAIC

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** Existing state agency budgets

**Potential Funding:** CDOT, CODNR

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**Benefits (avoided losses):** Reduced potential for death or injury to road crews, motorists, backcountry users

**Schedule:** Ongoing

**Status in 2013:** Ongoing

***6: Encourage the State of Colorado continue to monitor and enforce hazardous materials transport regulations***

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**Hazards Addressed:** Hazardous Materials

**Issue/Background:** Highways 550 and 62 are not designated hazardous materials routes, but occasionally there is illicit transportation of hazardous materials. The State Patrol currently monitors and enforces hazardous materials transport regulations. This project encourages the State to continue these efforts, supplemented by increased vigilance by local law enforcement officials.

**Other Alternatives:** No action

**Responsible Office:** Colorado Department of Public Safety – State Patrol, Sheriff, Ouray Police, Ridgway Marshal

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** Low, accomplished within existing agency budget

**Potential Funding:** Colorado Department of Public Safety

**Benefits (avoided losses):** Reduced potential for death or injury to road crews, motorists

**Schedule:** Ongoing

**Status in 2013:** Ongoing. State Patrol sets check stations roughly every couple of months

***7: Have the State of Colorado reevaluate the extension of the East Riverside avalanche shed for greater protection***

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**Hazards Addressed:** Avalanche

**Issue/Background:** The East Riverside avalanche shed does not currently extend across the entire run-out zone of this high risk avalanche path crossing Highway 550. There have been numerous fatalities at this site, including one that would have been prevented had the shed been long enough. The cost of extending the shed has been a prohibitive factor in the past. The Colorado Department of Transportation should re-evaluate the cost and feasibility of extending the shed or other alternatives.

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**Other Alternatives:** Snow monitoring and warning system that would alert snow plow operators and other motorists of dangerous snow loads high in the avalanche starting zone. Currently CDOT is focusing efforts in better forecasting and road closures.

**Responsible Office:** CDOT

**Priority (High, Medium, Low):** Low

**Cost Estimate:** Several million dollars

**Potential Funding:** CDOT, Federal Highway Funding, FEMA Pre Disaster Mitigation grant

**Benefits (avoided losses):** Reduced potential for death or injury to road crews, motorists

**Schedule:** 2010

**Status in 2013:** No action. CDOT is doing transportation plan update in 2013. The possibility of including this project in CDOT's plan update should be explored.

***8: Evaluate driver safety options to minimize risks to motorists and tour buses on Highway 550 between Ouray and Red Mountain Pass***

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**Hazards Addressed:** Mass casualty incident

**Issue/Background:** Steep drop offs and narrow and curved right of ways on Highway 550 between Ouray and Red Mountain Pass increase the potential for serious transportation accidents. The Colorado Department of Transportation should re-evaluate the feasibility of guardrails or signage that may minimize impacts of an accident. Conventional guardrails are not feasible in most areas. Installation of guardrail sufficient to resist the lateral force of an errant vehicle would be extremely expensive. Additional guardrail sections impede snow removal and may create other hazards. Driver safety education for tour bus drivers and truck drivers should also be considered.

**Other Alternatives:** Emergency exercises by Ouray emergency responders to prepare for the aftermath of a tour bus crash (exercise conducted May 14<sup>th</sup>, 2008).

**Responsible Office:** CDOT, Colorado State Patrol

**Priority (High, Medium, Low):** Low

**Cost Estimate:** Evaluation of options could be accomplished within existing agency budgets.

**Potential Funding:** CDOT, Colorado Department of Public Safety

**Benefits (avoided losses):** Reduced potential for traffic accidents and mass casualties (such as a tour bus), fuel truck crashes

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**Schedule:** 2010

**Status in 2013:** Ongoing. Rockfall mitigation and signage done. Road improvements on Bear Creek Bridge. Greyhound changed their route and no longer goes through the City, but inexperienced truck drivers on Highway 550 can still present an issue.

**9: Invite the Colorado Water Conservation Board to host bi-annual flood insurance workshops prior to flood season**

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**Issue/Background:** Ouray County should invite the Colorado Water Conservation Board (CWCB) to provide a flood insurance workshop for property owners, local lenders and insurance agents, and government representatives. The objective would be to publicize the National Flood Insurance Program (NFIP), and promote the purchase of insurance for structures in the floodplain. Citizens need to be informed, or reminded, that their structure is in a floodplain and that it's advisable to purchase flood insurance. Recommended that this occur in spring 2008 due to high snowpack and flooding concerns.

**Other Alternatives:** No action

**Responsible Office:** Ouray City administration in coordination with County Emergency Management and Ridgway administration/planning

**Priority (High, Medium, Low):** High

**Cost Estimate:** Low. Can be accomplished within existing budgets or with minimal expense

**Benefits (avoided Losses):** Reduced uninsured property losses from floods

**Potential funding:** Colorado Division of Emergency Management, Colorado Water Conservation Board.

**Schedule:** Spring/summer 2008

**Status in 2013:** Ongoing. CWCB and FEMA came down once. Could coordinate open house.

**10: Continue to implement sound floodplain management practices as communities participating in the National Flood Insurance Program**

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**Hazards Addressed:** Flood, debris flow

**Issue/Background:** The County, City of Ouray, and Town of Ridgway all participate in the National Flood Insurance Program. This project restates these entities commitment to the implementation of sound floodplain management practices, as stated in each entity's flood damage prevention ordinance. This includes ongoing activities such as enforcing local floodplain development regulations, including issuing permits for appropriate development in Special Flood Hazard Areas and ensuring that this development is elevated to or above the base flood elevation. This project also includes periodic reviews of the floodplain ordinance to ensure

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that it is clear and up to date. Floodplain managers will remain current on NFIP policies, and are encouraged to attend appropriate training and consider achieving Certified Floodplain Manager (CFM) status.

**Other Alternatives:** No action

**Responsible Office:** Ouray County Building Department; Ridgway Administration, Planning and Building Departments; City of Ouray Building Department

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** Low

**Potential Funding:** Covered in existing local budgets

**Benefits (avoided losses):** Reduced property loss from flood and debris flows, continued availability of flood insurance for residents.

**Schedule:** Ongoing

**Status in 2013:** Ongoing. FEMA and CWCB staff visited the City and Ridgway in 2013 to assist with development of management practices and update of ordinances to conform with new State floodplain rules.

***11: Encourage residents to construct defensible space around homes through promotion of Firewise techniques***

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**Hazards Addressed:** Wildfire

**Issue/Background:** Ouray County has provided educational materials to encourage such actions but more needs to be done to get specific neighborhoods to actively participate. The Counties in the West Homeland Security Region are working on contracting for more neighborhood specific CWPP actions which would enhance the promotion of further FIREWISE efforts.

**Other Alternatives:** No action. Leave this kind of education up to the Fire Districts where they cover some of the critical neighborhoods.

**Responsible Office:** Fire Chiefs, Log Hill Mesa FPD and other fire protection districts, CSFS, WRWC

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** \$50,000 to contract out the CWPP work for the Ouray County Portion of a larger effort.

**Potential Funding:** BLM Fire Assistance, CSFS Fire Education, FEMA, local in-kind work.

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**Benefits (avoided losses):** Improved public safety and reduced property losses.

**Schedule:** 2008 thru 2010

**Status in 2013:** Ongoing. Log Hill Mesa received Firewise community designation in 2012. Over 104 Log Hill Mesa houses had defensible space improvements made in the fall of 2012 through the WRWC grant program. Others countywide too. Incorporate information link into “Before You Build.” Ouray F.D. has met with WRWC to do property-specific risk assessments.

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***12: Improve FPD wildland capabilities per CWPP recommendations***

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**Hazards Addressed:** Wildfire

**Issue/Background:** The 2011 Ouray County CWPP identified areas needing improvement in the fire protection district wildfire capabilities. Refer to the CWPP for specific recommendations.

**Other Alternatives:** No action

**Responsible Office:** Fire chiefs in Log Hill Mesa and Ridgway fire protection districts; Ouray Fire

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** Will vary by district

**Potential Funding:** CO Division of Homeland Security and Emergency Management; FEMA Assistance to Firefighters Grant Program.

**Benefits (avoided losses):** Protect life safety and property from wildfire with improved response capabilities

**Schedule:** As funding allows

**Status in 2013:** Ongoing in Log Hill Mesa FPD. Log Hill Mesa FPD uses a spreadsheet to track their responsibilities as laid out in their CWPP. Log Hill Mesa FPD has made significant progress in completing their actions and responsibilities.

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***13: Implement fuels treatment projects in areas identified in the Ouray County CWPP***

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**Hazards Addressed:** Wildfire

**Issue/Background:** Local CWPPs have identified certain areas of the County needing fuels reduction treatment, some of which are on Federal Lands. NEPA studies need to be completed where required and fuel treatments executed.

**Other Alternatives:** No action. Wait for landowners to take what steps they can to reduce their own risk.

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**Responsible Office:** Respective Federal Agencies, Colorado State Forest Service, Neighborhood CWPP projects, local fire departments and individual land owners.

**Priority (High, Medium, Low):** High

**Cost Estimate:** Once all treatment areas are identified in more specific CWPPs the total of treatments would probably exceed one million dollars over time not including follow up treatments. (Benefit of reduced loss potential would surely exceed one hundred million.)

**Potential Funding:** Federal Agencies, State Forest Service Fire Districts and local and individual contributions in cash and in kind.

**Benefits (avoided losses):** Life Safety, substantially reduced risk of loss of property.

**Schedule:** Next 10 years

**Status in 2013:** Ongoing. Changed from medium to high priority in 2013. Since 2011, the West Region Wildfire Council has been involved with or helped to fund over 419 acres of hazardous fuels reduction treatments in Ouray County. All of these treatments have been high priority recommendations outlined in the County CWPP with the majority of acres being completed as defensible space or extended defensible space projects. Many homeowners have participated in “Community Chipping Days” or events to clear dead/flammable vegetation from around their homes. Several strategically placed fuel breaks have also been completed. CSFS and NRCS have been involved with several other hazardous fuels reduction treatments in Ouray County.

#### ***14: Review the County wildfire regulations with the insurance industry***

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**Hazards Addressed:** Wildfire

**Issue/Background:** Ouray County has fairly aggressive building restrictions in areas where wildfire is a risk. Visiting with some insurance carriers might help improve access to proper insurance and reduce costs as an incentive to further improve fire safety.

**Other Alternatives:** No action. Allow insurance companies to operate at their own pace.

**Responsible Office:** Ouray County Emergency Management with County Staff and Fire Dept. representatives, insurance industry, WRWC

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** Low

**Potential Funding:** Local budgets

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**Benefits (avoided losses):** Additional incentives to execute FIREWISE treatments and reduce property losses.

**Schedule:** 2009

**Status in 2013:** Ongoing. WRWC hosts workshops for insurance agents.

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***15: Redo or update the flood hazard risk maps for 100- and 500-year floods (M)***

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**Hazards Addressed:** Flood

**Issue/Background:** Existing Flood Insurance Rate Maps were created in 1985 and need to be revised using current engineering methods. The old maps have been digitized by the County but do not align well with existing roads in the area, and are not easy to associate with parcels, building sites, etc. With an updated digital flood map it would be much more feasible to make accurate predictions of affected properties and base land use and other decisions based on reliable, 'official' GIS information. The Town of Ridgway has noted specific accuracy issues with the FIRM shown for Cottonwood Creek. An updated digital Flood Insurance Rate Map would be easier to update and maintain, and could be used in more accurate flood risk assessments in future updates to this plan. While Ouray County is not high on the State of Colorado priority list for Map Modernization or RiskMAP, the County and municipalities are willing to participate in this program, and continue to urge the State to consider the County for future map update efforts and funding.

**Other Alternatives:** No action. Use existing maps.

**Responsible Office:** Building departments in County, Town of Ridgway, City of Ouray, Colorado Water Conservation Board

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** \$300,000

**Potential Funding:** FEMA RiskMAP, CWCB

**Benefits (avoided losses):** Improved information on which to base floodplain management decisions.

**Schedule:** Identified in 2008 and still needs implementation ASAP.

**Status in 2013:** Not completed but still an important need. Need to communicate importance to State/FEMA.

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**16: Provide hazardous fuels reduction treatments around the five radio/cell sites in Ouray County**

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**Hazards Addressed:** Wildfire

**Issue/Background:** Five radio/cellular tower facilities lay within wildfire risk areas and a fire could compromise critical communications to deal with a fire or other emergency. These sites are a high priority for treatments.

**Other Alternatives:** No action.

**Responsible Office:** Ouray County Emergency Management with respective land management agencies

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$200,000+

**Potential Funding:** FEMA PDM, HMGP, CO Wildfire Risk Reduction Grant Program

**Benefits (avoided losses):** Several million dollars in electronic and electrical equipment would be protected and the ability to communicate during various emergencies would not be compromised.

**Schedule:** 2008-2009

**Status in 2013:** Done on three main sites. Log Hill Mesa Fire is looking at ways to implement this project at Log Hill site.

**17: Provide hazardous fuels reduction reduction treatments around the Ridgway power substation**

---

**Hazards Addressed:** Wildfire

**Issue/Background:** The Ridgway Power Substation is an important link in electrical service delivery to the entire population of Ouray County and it lies in a fairly heavily forested area with low rainfall. Firewise treatment is needed to ensure that this critical site is not likely to be damaged during a fire.

**Other Alternatives:** No action

**Responsible Office:** San Miguel Power, BLM

**Priority (High, Medium, Low):** High

**Cost Estimate:** less than \$20,000

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**Potential Funding:** San Miguel Power, Tri-State Generation, BLM

**Benefits (avoided losses):** Protect equipment valued over \$1M and avoid potential extended loss of electrical service.

**Schedule:** 2009

**Status in 2013:** Needs action

***18: Provide hazardous fuels reduction treatments around the 230 KV power line***

---

**Hazards Addressed:** Wildfire

**Issue/Background:** Some of this work has been completed. Required NEPA and Antiquities studies have been done but some of the work in the higher elevations has not been completed. This power line feeds power into the National Grid and needs the enhanced protection that completed treatments would offer.

**Other Alternatives:** No action

**Responsible Office:** USFS, WAPA

**Priority (High, Medium, Low):** High

**Cost Estimate:** Unknown

**Potential Funding:** Federal fire mitigation funding, Tri-State Generation

**Benefits (avoided losses):** Interruption of local and national power grid can be avoided.

**Schedule:** As soon as possible

**Status in 2013:** Ongoing.

***19: Evaluate multi-hazard risk to five radio/cell sites and repeater sites and develop appropriate mitigation recommendations***

---

**Hazards Addressed:** Wildfire, lightning, windstorm, flood, extreme temperature

**Issue/Background:** There are five radio/cell sites that are critical to the communication infrastructure in Ouray County. These sites need to be further evaluated for risk to lightning, windstorm, flood, and extreme temperatures. All radio sites would be vulnerable to lightning, for which mitigation is relatively inexpensive (see related project specific to wildfire mitigation).

**Other Alternatives:** No action

**Responsible Office:** Ouray County Emergency Management, site users

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**Priority (High, Medium, Low):** Medium

**Cost Estimate:** \$500,000 to protect from all hazards

**Potential Funding:** Fire Mitigation funds, FEMA, site owner contributions cash/in-kind

**Benefits (avoided losses):** Avoid loss of critical services, avoid damage to millions of dollars worth of equipment

**Schedule:** 2010

**Status in 2013:** Partially completed. Sites have been engineered for wind loading and some have increased security as well. Ongoing maintenance is needed to reduce wildfire fuels and repair lightning arrestors.

***20: Develop capability for off-site backup of critical data***

---

**Hazards Addressed:** All

**Issue/Background:** In order for governments to continue operations, they must have access to records, maps, financial information and other critical data. Without this information on-going operations will be severely curtailed. Very recently updated information needs to be stored in a location where even major disruption cannot destroy the data.

**Other Alternatives:** No action. Duplicate hard copy records were considered and deemed impractical.

**Responsible Office:** Local governments including County, City of Ouray and Ridgway

**Priority (High, Medium, Low):** Low

**Cost Estimate:** Varies, some governments already have this

**Potential Funding:** Local budgets

**Benefits (avoided losses):** Avoid potential loss of valuable records and data

**Schedule:** As soon as practical

**Status in 2013:** Backup of critical data is in place but still within City limits. Ongoing for County and Ridgway.

***21: Develop continuity of operations and continuity of government plans***

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**Hazards Addressed:** All

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**Issue/Background:** Regardless of disruption, governments need to continue operation. This is important to accomplish the things that governments do that other options can't handle as well, and because failure of a government would have a very negative psychological impact on the population.

**Other Alternatives:** No action. Rely on operational choices without pre-planning

**Responsible Office:** Ouray County Emergency Management with cooperation of local governments

**Priority (High, Medium, Low):** Low

**Cost Estimate:** Less than \$10,000

**Potential Funding:** County Emergency Planning budget

**Benefits (avoided losses):** At a minimum, a preplan will save time in re-establishing government operations.

**Schedule:** 2008/2009 inclusion in County/Municipality Multi-Hazard Response Plans

**Status in 2013:** Ouray County Emergency Preparedness Plan completed in November 2012. Ridgway School has completed a plan. The City of Ouray and Town of Ridgway still need to complete.

***22: Identify potential multi-hazard shelter sites and ensure adequate supplies and backup power capabilities***

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**Hazards Addressed:** All

**Issue/Background:** Ouray County's most likely disasters are flooding or wildfire. Either could necessitate temporary sheltering of displaced persons and animals. Very few locations in the County are well equipped to handle this situation – especially during a power failure. There are at least four locations where such sheltering could take place and none of them have emergency power. Obtaining and installing emergency power at possible shelter sites could be an important step toward an effective evacuation plan and the perception that regardless of what happens, the local governments can keep working and providing services and shelter to the population.

**Other Alternatives:** No action. Count on other facilities to handle evacuations, possibly some distance from Ouray County

**Responsible Office:** Emergency Management with possible shelter site managers and the Red Cross.

**Priority (High, Medium, Low):** High

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**Cost Estimate:** Establishing and updating shelter agreements are almost no cost except time. Large generators and transfer switches are expensive. Each site equipped would cost around \$50,000. And even the County Fairgrounds would need animal housing facilities that do not now exist. Probably four locations should be prepared for sheltering to include generators and animal care facilities in addition to meeting human needs. Total cost approximately \$250,000.

**Potential Funding:** Homeland Security, FEMA and local contributions

**Benefits (avoided losses):** Reduced risk to lives, more effective evacuation orders

**Schedule:** 2010

**Status in 2013:** In progress. Memorandum of Understanding in place for Right of First Refusal for portable generator with company in Grand Junction. Schools are identified as backup shelters (not Red Cross certified) and have been reassessed for ADA compliance. New Ridgway school. 4-H center has been wired for generator hookup. Working to obtain generators for EOC and Road & Bridge.

***23: Upgrade Ouray County's communication to include access to the State's 800 Mhz system***

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**Hazards Addressed:** All

**Issue/Background:** Ouray County is in the process of upgrading its communication system. This will include radio and tower replacements. The hope is to have the County running on the state 800 system in the near future.

**Other Alternatives:** No action

**Responsible Office:** Ouray County Sheriff in conjunction with the State of Colorado and the Office of Homeland Security

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$150,000

**Benefits (Avoided Losses):** Life safety; reduction in property loss

**Potential Funding:** Ouray County, State of Colorado, Homeland Security, DOLA

**Schedule:** Summer 2008, but dependent on construction of a communications tower on Log Hill Mesa which can accommodate already purchased State System Equipment.

**Status in 2013:** Completed. Done for Sheriff's Office and all law enforcement except the City of Ouray.

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## **24: Improve Countywide GIS Capabilities to Support Land Use Planning and Emergency Management**

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**Hazards Addressed:** Multi

**Issue/Background:** Currently, there is no countywide capability to map and provide easy access to customizable data regarding hazards and hazards mitigation. The County needs to develop a shared system with robust capabilities to map, track, and update GIS with all pertinent information regarding hazard mitigation. This action would entail developing a GIS needs assessment and implementation plan to determine current status and availability of GIS data, software, hardware, and personnel resources and future needs.

**Other Alternatives:** Track hazard/mitigation data via hardcopy maps; keep central storehouse of all maps/data

**Responsible Office:** Ouray County, Town of Ridgway, Ouray GIS/Information Technologies Department

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** \$10,000-\$20,000 for software/updates and hiring of contractor to enter hardcopy data into GIS.

**Potential Funding:** Shared City of Ouray, Town of Ridgway, and Ouray County budgets, DOLA grants

**Benefits (Avoided Losses):** Ability to more accurately/efficiently develop mitigation strategies and public education efforts.

**Schedule:** Develop project plan by fall 2008; begin implementation by end of 2008

**Status in 2013:** Ongoing. City of Ouray and Town of Ridgway have budgeted funds to assist with the initial development of GIS capabilities.

## **25: Produce Multi-Hazard Education**

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**Hazards Addressed:** All

**Issue/Background:** Once risk and mitigation studies are complete, information will be available that would benefit the public. A strategy and method of sharing this information needs to be developed and executed that could include development of a PowerPoint presentation for public meetings and use of existing print media (including weather safety, avalanche safety, water safety brochures, etc.). Public education materials should include re-entry flyers for burned areas. CDPHE has developed public education guidance.

**Other Alternatives:** No action. Depend on news media to release important information.

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**Responsible Office:** Ouray County Emergency Management, Ouray County Public Health

**Priority (High, Medium, Low):** Low

**Cost Estimate:** \$10,000

**Potential Funding:** Local, FEMA's Emergency Management Performance Grants, Ready Colorado

**Benefits (Avoided Losses):** The citizenry of Ouray County will know how to prepare for and respond appropriately to emergencies, which will reduce loss of life, injuries, property damage, and the impact on emergency services.

**Schedule:** Strategy and plan by end of 2008, first round of dissemination through 2009

**Status in 2013:** Ongoing. County is working on education and implementation of fire mitigation across the County. Created a Facebook page for County Emergency Management to educate citizens and dispel rumors of emergencies. OEM sends out educational materials. Town of Ridgway has voluntary water restrictions and annual workshops on water conservation and drought status with the Town Council. Ridgway also has a noxious weed management plan. Log Hill Mesa participates in Ready, Set, Go! program and distributes info to public several times each year. Log Hill Mesa also provides Firewise mitigation info and structure evaluations for wildfire mitigation. Log Hill Mesa's website also has disaster preparedness info. Public education materials should include information on evacuation and re-entry. Another source of public education is NWS's storm spotter training. This training is held every year in Montrose and Delta, and gets participation from Ouray County residents.

### ***26: Hazmat awareness training for first responders***

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**Hazards Addressed:** Hazardous Materials

**Issue/Background:** Conduct hazmat training to bring all responders to awareness level (at minimum). Additional training is needed to ensure the safety of first responders.

**Other Alternatives:** No action

**Responsible Office:** Ouray County EMS, law enforcement personnel, fire protection districts

**Priority (High, Medium, Low):** High

**Cost Estimate:** Staff time, approximately \$175.00 per student

**Potential Funding:** Funds from FPDs, County, or state

**Benefits (Avoided Losses):** Protect life safety, property, and critical facilities from hazardous materials spills; improve hazmat emergency response and recovery capabilities

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**Schedule:** Ongoing

**Status in 2013:** New in 2013. Log Hill Mesa FPD has nine firefighters who meet state certification standards for HAZMAT OPS.

***27: Provide the Grand Junction NWS office with appropriate non-weather emergency message (NWEM) templates***

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**Hazards Addressed:** All-hazards

**Issue/Background:** To provide the National Weather Service's Grand Junction forecast office appropriate Non-Weather Emergency Message (NWEM) templates. NWEM templates are put into the NWS warning operations computer system and ready to use at a moment's notice. Use of the NWEM templates will significantly improve the efficiency of the NWEM warning notification process when an NWEM issuance is requested by the emergency manager or other authorized official within Ouray County. An example of a template follows:

**Fire Warning** (Valid for [eastern] Ouray County)

THE FOLLOWING MESSAGE IS BEING TRANSMITTED AT THE REQUEST OF THE OURAY COUNTY SHERIFF'S OFFICE.

...FIRE WARNING FOR [EASTERN] OURAY COUNTY...INCLUDING THE COMMUNITIES OF \_\_\_\_\_ ...

AT \_\_\_\_\_ ...A WILDFIRE WAS REPORTED TO BE BURNING IN THE VICINITY OF \_\_\_\_\_. THIS FIRE IS AT RISK OF SPREADING TOWARD POPULATED AREAS...POSING A RISK TO LIFE AND PROPERTY. RESIDENTS WITHIN THE WARNING AREA SHOULD BRING COMPANION ANIMALS INDOORS AND GATHER NECESSARY ITEMS IN PREPARATION FOR EVACUATION. FOR ADDITIONAL INFORMATION ON PREPARING FOR EVACUATION...CALL 211 FROM A LAND LINE OR XXX-XXXX FROM A CELL PHONE. YOU MAY ALSO VISIT [WWW.OURAYCOUNTYCO.GOV/SHERIFF](http://WWW.OURAYCOUNTYCO.GOV/SHERIFF).

**Other Alternatives:** Currently, the most common method for NWEM issuances requires the emergency manager or other authorized official to call the National Weather Service (NWS) forecast office and dictating the emergency message to a forecaster, who in turn has to type the entire text within the NWS warning operations computer system. The current method is much more time consuming than the method used with an existing NWEM template at the NWS office.

Another method occasionally used by emergency managers or other authorized officials is to send a fax to the NWS forecast office. But again, the forecaster must type the entire text into the NWS warning operations computer system. This takes up valuable time.

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Sending the NWEM message to the NWS in an e-mail message is not an option due to security concerns; e-mail messages are not considered by the government to be a secure resource for communications, and NWS warning operations computer systems are not allowed to have any direct communications with outside computer systems.

**Responsible Office:** Ouray County Emergency Management, Grand Junction NWS

**Priority (High, Medium, Low):** High

**Cost Estimate:** No direct monetary costs would be involved with this activity. However, composing the templates and coordinating the content of those templates with other Ouray County entities would likely take several hours.

**Potential Funding:** Allowing the Ouray County Emergency Manager extra time (i.e. one day) to develop the NWEM templates.

**Benefits (Avoided Losses):** Having NWEM templates already in place within the NWS warning operations computer system will save an average of about 10 minutes from the other approved methods for processing and issuing NWEMs. In emergency situations when minutes count, the faster the public receives the warning messages the more likely that fewer people will be injured or killed.

**Schedule:** The NWS forecast office in Grand Junction will install NWEM templates within a day of receiving them from the Ouray County emergency manager.

**Status in 2013:** Pending as of September 17, 2013

***28: Work with State Patrol hazmat officers to monitor hazardous materials transportation through county road and CDOT roads***

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**Hazards Addressed:** Hazardous Materials

**Issue/Background:** Knowledge of transported hazardous materials types and quantities is needed so that responders can manage an incident appropriately and communicate appropriate warning to the public.

**Other Alternatives:**

**Responsible Office:** Ouray County Emergency Management, CDOT, State Patrol

**Priority (High, Medium, Low):** High

**Cost Estimate:** Staff time

**Potential Funding:**

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**Benefits (avoided losses):** Protect life safety from hazardous materials spills on roadways, improve first responder awareness of hazmat issues in the County

**Schedule:** Ongoing

**Status in 2013:** New in 2013

***29: Education of citizens about flood insurance and issues related to clear water vs. sediment/mudflow***

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**Hazards Addressed:** All

**Issue/Background:** Citizens need to be reminded that flood insurance is not covered within standard homeowners or renters insurance policies. There are also distinctions between clear water flooding and sediment/mudflow flooding that citizens should be aware of. Changes to the NFIP and flood insurance premiums associated with the Biggert Waters act of 2012 should also be mentioned in the public awareness efforts.

**Other Alternatives:** No action

**Responsible Office:** City of Ouray and Town of Ridgway

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** \$5,000 for brochure specific to issues, but leverage other existing pamphlets/resources where possible.

**Potential Funding:** CWCB/FEMA resources

**Benefits (Avoided Losses):** While flood insurance will not reduce losses, it will help with recovery and replacement of damaged property.

**Schedule:** Next three years

**Status in 2013:** New in 2013

***30: Update the County's Emergency Operations Plan to the Latest Standards to Include Ridgway and Ouray***

---

**Hazards Addressed:** All

**Issue/Background:** The County Emergency Operations Plan needs updating and expansion. Plans for the City of Ouray and the Town of Ridgway can be incorporated where different. Emergency operations centers are planned to be shared where emergency power is available. This project would outline procedures for tracking disaster expenses, which is important for reimbursement purposes if a disaster declaration was received from the State or Federal Government.

---

**Other Alternatives:** No action

**Responsible Office:** Ouray County Emergency Management

**Priority (High, Medium, Low):** Low

**Cost Estimate:** \$10,000

**Potential Funding:** Local, FEMA's Emergency Management Performance Grants

**Benefits (Avoided Losses):** Reduced confusion beginning with initial response; more effective response

**Schedule:** Completed by end of 2008

**Status in 2013:** Completed. The EOP has been updated and adopted.

***31: Review the County wildfire mitigation standards code against the National Fire Protection Association model and modify the Ouray County code if appropriate***

---

**Hazards Addressed:** Wildfire

**Issue/Background:** Review and assess all County building and land use regulations, processes, and procedures regarding wildfire risks and mitigation. Are they effective? Do they go far enough? Do they take into consideration all current data regarding wildfire risks? The intent of this action is to proactively reduce the risk of wildfire at the point of planning a development or applying for a building permit.

**Other Alternatives:** No action

**Responsible Office:** Ouray County Land Use and Planning

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** \$800-\$1,500 (hire contractor to evaluate current data and draft recommendations)

**Potential Funding:** Grant, Ouray County, City of Ouray, Town of Ridgway

**Benefits (Avoided Losses):** Reduced impacts to lives and property from wildfire

**Schedule:** Three months beginning in fall 2008

**Status in 2013:** Still needs to be done.

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**32: Explore adding the development of a community wildfire protection plan and defensible space as requirements for subdivision planned unit development approvals**

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**Hazards Addressed:** Wildfire

**Issue/Background:** Any new Planned Unit Development might significantly alter the situation in and around the area proposed for development such that a specific CWPP would be appropriate.

**Other Alternatives:** No action. Allow the PUD to develop then come back in and do a specific CWPP.

**Responsible Office:** Ouray County Planning Office, Planning Commission and BOCC

**Priority (High, Medium, Low):** Low

**Cost Estimate:** Low

**Potential Funding:** Budgetary expenditure could be covered with PUD fee adjustment if necessary.

**Benefits (avoided losses):** Reduced property losses by ensuring fire mitigation at the beginning of the planning process.

**Schedule:** Ongoing if adopted

**Status in 2013:** Needs to be done in conjunction with action to review the County wildfire mitigation standards code against the National Fire Protection Association model.

**33: Update and modernize the avalanche hazard atlas with development of a GIS avalanche database**

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**Hazards Addressed:** Avalanche

**Issue/Background:** The existing avalanche hazard atlas for the county was developed in the early to mid 1970's. There is a need to have this data in a GIS format to assist with better informed land use decisions. This project would entail hiring a consultant to digitize existing avalanche hazard areas, model other avalanche prone areas not currently mapped, and review current aerial photos to determine avalanche path run-outs.

**Other Alternatives:** No action

**Responsible Office:** Ouray County Emergency Management

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** \$10,000 in consulting fees

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**Potential Funding:** FEMA PDM planning grants, local, CO DEM SHMP, CDOT

**Benefits (avoided losses):** Property losses avoided. Better information for planning decisions.

**Schedule:** 2009

**Status in 2013:** No action.

**34: Set up a countywide emergency operations center at the Ridgway Land Use Office, which is not in potential flood and fire risk areas and is close to the County fuel supply and the central radio system repeater**

---

**Hazards Addressed:** All

**Issue/Background:** The County has obtained emergency power generators for two locations which would be Emergency Operations Centers (EOCs) including the Ridgway Land Use Office. The Sheriff's Office in Ouray has most of the essential equipment including one of the generators and is set up to operate as an EOC but it is in a potential flood area. The Ridgway site has the generator but lacks all the other equipment that can make it operational such as radio consoles, extra phones, and individual work stations. Both locations need to be available to effectively respond to disasters based on location, and especially because the only other location could be incapacitated by flooding.

**Other Alternatives:** No action. Stick with present facility at the Sheriff's Office as the only EOC site

**Responsible Office:** Emergency Management, Planning Office Staff

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** \$10,000

**Potential Funding:** FEMA, Homeland Security, local budget

**Benefits (avoided losses):** Improved and more coordinated command and control. Ensure location availability for EOC in disaster situation

**Schedule:** 2010

**Status in 2013:** Transition of EOC to Ridgway underway. Purchasing by September 30, 2013. EOC software purchased and laptop ordered. Setup in late November 2013 and exercise in February 2014.

**35: Upgrade County emergency manager position from part-time to full-time**

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**Hazards Addressed:** All

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**Issue/Background:** The County emergency planner position is currently funded 1/3 time, but the workload is full time at times. Emergency managers across the country have had increased demands on their time since 9/11/2001. Given the number of hazards in the County, and the potential for serious consequences, a full-time position is probably needed.

**Other Alternatives:** No action

**Responsible Office:** Ouray County administration

**Priority (High, Medium, Low):** High

**Cost Estimate:** Additional \$30,000 per year on top of existing salary

**Potential Funding:** County, FEMA's Emergency Management Performance Grants, cost share with Ridgway and Ouray.

**Benefits (avoided losses):** Reduced loss of life and injury and property loss through additional coordination, response, recovery, mitigation and preparedness activities.

**Schedule:** 2009 and beyond

**Status in 2013:** No action due to funding. Hours increased from 13 hours to 16 hours but full-time position still needed.

***36: Improve fire response capabilities, including installing "quick dumps" on all County and City water trucks and carry "port-a-ponds"***

---

**Hazards Addressed:** Wildfire

**Issue/Background:** Ouray County has 3 medium to large capacity water trucks that could be effective sources of water to support firefighting with addition of "quick dumps" and the capability of carrying "port-a-ponds" that could contain their load of water while they go for another load. This has proven a highly effective firefighting support in other locations since fire equipment has limited water capacity and often needs to stay on scene once they arrive.

**Other Alternatives:** No action. Rely on fire trucks to carry adequate water.

**Responsible Office:** Ouray County Emergency Management, Road and Bridge Dept.

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$800/truck for quick dumps, \$2,500/truck for port-a-pond and carrying bracket, total of \$9,900 to equip all 3 trucks.

**Potential Funding:** FEMA, BLM, CSFS, County in-kind

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**Benefits (avoided losses):** Could be life saving by allowing firefighter entry teams to make entry with adequate water supply ensured, certainly would improve wildfire support capability and save property which would otherwise be destroyed.

**Schedule:** 2009

**Status in 2013:** Currently not feasible to retrofit due to cost. Bids were received but not affordable at the time; capability still needed.

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**37: Educate citizens on beetle kill issues**

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**Hazards Addressed:** Wildfire

**Issue/Background:** Educate citizens on beetle kill issues and work with USFS to mitigate beetle kill affected trees within the County.

**Other Alternatives:** No action

**Responsible Office:** USFS, Ouray County Emergency Management, City of Ouray, Town of Ridgway, fire departments

**Priority (High, Medium, Low):** High

**Cost Estimate:** Unknown

**Potential Funding:** Unknown

**Benefits (Avoided Losses):** Help prevent fires

**Schedule:** Unknown

**Status in 2013:** New in 2013

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**38: Build a culvert or drainage system on County Road 17**

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**Hazards Addressed:** Flood

**Issue/Background:** County Road 17 has washed out five times in three months during 2013. Build a culvert or drainage system to prevent County Road 17 near Corbett Creek from flooding and washing out during heavy rainstorms.

**Other Alternatives:** Continued ongoing repair and maintenance

**Responsible Office:** Ouray County, Ouray County Road and Bridge

---

**Priority (High, Medium, Low):** High

**Cost Estimate:** Unknown

**Potential Funding:** Unknown

**Benefits (avoided losses):** Protect life safety and property by preventing or mitigating this issue. Maintain emergency response access along County Road 17.

**Schedule:** Unknown

**Status in 2013:** New in 2013

***39: Reduce avalanche risks to miners and first responders***

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**Hazards Addressed:** Avalanche

**Issue/Background:** Reduce avalanche risks to miners and rescuers on County Road 361. The increased traffic on this route due to the reopening of the mines creates the need for increased Road and Bridge avalanche maintenance. Mining companies have contracted some avalanche control work but potentially more effort is needed to ensure safety when avalanche risk is high.

**Other Alternatives:**

**Responsible Office:** Ouray County, Ouray County Road and Bridge, mining companies

**Priority (High, Medium, Low):** High

**Cost Estimate:** Unknown

**Potential Funding:** Unknown

**Benefits (Avoided Losses):** Protect life safety

**Schedule:** Unknown

**Status in 2013:** New in 2013

***40: Create emergency management resource lists***

---

**Hazards Addressed:** All-hazards

**Issue/Background:** Create lists of private and public emergency management/disaster response resources and upload to ROS and WebEOC. Disaster events may overwhelm local first responders. Ouray County and other stakeholders need to know what public and private resources are available to them to improve disaster response.

---

**Other Alternatives:** No action

**Responsible Office:** Ouray County Emergency Management, Ouray County Sheriff's Office, Ouray County EMS, fire departments, Ouray County Road and Bridge

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$2,500 in County Emergency Management staff time

**Potential Funding:** Ouray County

**Benefits (avoided losses):** Improve emergency response, identify resource gaps

**Schedule:** December 2014

**Status in 2013:** New in 2013

#### ***41: NIMS Training***

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**Hazards Addressed:** All-hazards

**Issue/Background:** Coordination, communication, and interoperability among first responders are vital to the success of emergency management operations. All first responders need to complete NIMS training consistent with FEMA regulations.

**Other Alternatives:**

**Responsible Office:** Ouray County Emergency Management, all responding/emergency management agencies and departments

**Priority (High, Medium, Low):** High

**Cost Estimate:** Unknown

**Potential Funding:** Unknown

**Benefits (Avoided Losses):** Create a collective understanding of incident command, improve emergency response

**Schedule:** December 2013

**Status in 2013:** New in 2013. Log Hill Mesa FPD is NIMS compliant with all responders current on IS-100 and IS-700. Officers are current in IS-200 and IS-800. The Chief is also IS-300 qualified. Log Hill Mesa FPD is working to update training requirements for their District Board.

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#### **42: Create preloaded warning messages**

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**Hazards Addressed:** All

**Issue/Background:** Create pre-loaded warning messages for specific events (e.g. flood, wildfire, evacuation) for the target notification system and National Weather Service.

**Other Alternatives:**

**Responsible Office:** Ouray County Emergency Management, 911 Board, NWS

**Priority (High, Medium, Low):** High

**Cost Estimate:** Unknown

**Potential Funding:** None

**Benefits (Avoided Losses):** Creates quick warning allowing people to take action to protect themselves more quickly

**Schedule:** December 2013

**Status in 2013:** New in 2013. Log Hill Mesa FPD has preloaded notifications for evacuation, responder recall, and evacuation in TFCC Center personnel. Log Hill Mesa FPD also has preloaded evacuation maps in TFCC.

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#### **43: Improve ISO ratings**

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**Hazards Addressed:** Wildfire

**Issue/Background:** Research and implement a strategy to reduce ISO ratings countywide. Lower ISO ratings are achieved by improving fire protection capabilities, with the benefit of reducing insurance costs to residents in the County.

**Other Alternatives:**

**Responsible Office:** Ouray County Emergency Management, West Region Wildfire Council, fire departments

**Priority (High, Medium, Low):** High

**Cost Estimate:** Unknown

**Potential Funding:** Unknown

**Benefits (avoided losses):** Reduced insurance costs, improved fire response capabilities

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**Schedule:** Unknown

**Status in 2013:** New in 2013. Log Hill Mesa FPD's ISO rating improved to 5/8B in 2012. No ISO re-evaluation is scheduled for at least 10 years.

***44: Reduce flood/dam overflow risk in Ridgway Reservoir***

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**Hazards Addressed:** Flood, dam failure

**Issue/Background:** Work with Colorado Parks and Wildlife and Tri-County to keep debris low in Ridgway Reservoir to prevent flooding and dam overflow.

**Other Alternatives:**

**Responsible Office:** Colorado Parks and Wildlife, Tri-County, Ouray County

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** Unknown

**Potential Funding:** Unknown

**Benefits (avoided losses):** Protect life safety and property by reducing flood and dam failure risk in Ridgway Reservoir

**Schedule:** Annually

**Status in 2013:** New in 2013

***45: Develop Imminent Threat Emergency Operations Plans for local government and schools***

---

**Hazards Addressed:** Imminent Threat

**Issue/Background:** Create EOPs related to imminent threat specifically for public buildings such as the County Courthouse, City Hall, Town Hall, and schools in the County.

**Other Alternatives:** No action

**Responsible Office:** Ouray County Emergency Management, City of Ouray, Town of Ridgway

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$2,600 in County Emergency Management staff time

**Potential Funding:** None

**Benefits (avoided losses):** Protect life safety

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**Schedule:** December 2014

**Status in 2013:** New in 2013

***46: Replace Skyrocket Dam to Divert Debris Flows away from the Ouray Hot Springs Pool***

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**Hazards Addressed:** Debris flow, flood

**Issue/Background:** The Skyrocket Creek debris fan is surrounded by development and adjacent to one of the most populated (and popular) areas in the City, the Hot Springs Pool and Fellin Park. The original dam was constructed in 1929 to divert drainage north into a catch basin and to the Uncompahgre river, but was washed out in August 2005. A new structure is needed to divert flows to the north side of the Skyrocket Creek debris fan, which would minimize the impacts to the pool and park located on the south side of the fan.

**Other Alternatives:** Expand south catch basin and develop flume channel to the river

**Responsible Office:** City of Ouray

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$500,000+

**Potential Funding:** FEMA, Department of Local Affairs, Conservation Trust Fund

**Benefits (Avoided Losses):** Improved public safety. Allows for evacuation of a subdivision if necessary.

**Schedule:** Pending funding

**Status in 2013:** Completed. Secured long-term permitting with USACE to remove debris on a regular basis.

***47: Conduct outreach on debris flow and flood protection methods for property and business owners in the City of Ouray***

---

**Hazards Addressed:** Flood, debris flow

**Issue/Background:** Educate citizens to potential hazards and mitigation opportunities, especially around flumes, drainages, and rivers.

**Other Alternatives:** No action

**Responsible Office:** City of Ouray Police

**Priority (High, Medium, Low):** Low

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**Cost Estimate:** \$5,000 for materials and to bring in experts that can assist

**Potential Funding:** City general funds. Possibly some grant money. Technical assistance from Colorado Water Conservation Board, Colorado Geological Survey

**Benefits (avoided losses):** Reduce property losses and potential risks to citizens.

**Schedule:** 2009

**Status in 2013:** No action.

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***48: Protect City of Ouray water main from landslide impacts***

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**Hazards Addressed:** Landslide

**Issue/Background:** The City's main water supply runs through an 18" main. Approximately 300' of the main is not buried and runs on top of the ground on a hillside that is unstable and potentially could slide away. This would rupture the water main and would take days to repair. The City's water tank can only hold approximately 24 hours of what is needed for the community. This project will evaluate installing a second, redundant line that would be buried under the County road in the area.

**Other Alternatives:** No action. Repair breaks in the existing line after they occur

**Responsible Office:** City of Ouray

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** \$500,000 +

**Potential Funding:** Department of Local Affairs or FEMA PDM grants with matching funds

**Benefits (avoided losses):** Avoid temporary loss of water supply to the entire community.

**Schedule:** Engineering in 2008 with construction to be completed in 2009

**Status in 2013:** Water line and redundant line installed in 2012.

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***49: Reduce flood and debris flow risk in Cascade catchment basin***

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**Hazards Addressed:** Flood and debris flow

**Issue/Background:** Rocks and debris need to be removed from the Cascade catchment basin biannually to prevent flooding.

**Other Alternatives:**

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**Responsible Office:** City of Ouray Administrator

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** \$10,000 every two years

**Potential Funding:** None

**Benefits (avoided losses):** Protect life safety and property by reducing flood risk from Cascade catchment basin

**Schedule:** Biannually

**Status in 2013:** New in 2013

***50: Reduce flood and debris flow risk in Skyrocket catchment basin***

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**Hazards Addressed:** Flood and debris flow

**Issue/Background:** Rocks and debris need to be removed from the Skyrocket catchment basin annually to prevent flooding.

**Other Alternatives:**

**Responsible Office:** City of Ouray Administrator

**Priority (High, Medium, Low):** Medium

**Cost Estimate:**

**Potential Funding:**

**Benefits (avoided losses):** Protect life safety and property by reducing flood risk from Skyrocket catchment basin

**Schedule:** Annually

**Status in 2013:** New in 2013

***51: Protect Weehawkin Spring Transmission Line and Plan for Service Interruption***

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**Hazards Addressed:** Flood and landslide

**Issue/Background:** The Weehawkin Spring Water line feeds the Ouray public water system. Should the line break or be lost the citizens of Ouray could be out of water until the line is repaired.

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The project would be replacement or repair of the Weehawken Spring transmission line delivering water to our storage tanks and the city Water Treatment Facility should an event happen that takes the line out of service. Numerous events such as a flash flood of Canyon Creek or Weehawken Creek could take out the transmission line. County Road 361 slipping and has the potential for taking the transmission line out or Forest Service property sliding taking out the line. The City needs to plan for repairs to the transmission line should this happen. We have a limited supply of water in storage and it could take several days to repair the transmission line.

The plan should include public notification of limited drinking water and recommended conservation methods. The project should include alternatives for fire protection and awareness that fire protection could be hampered due to no supply of water.

**Other Alternatives:** Identify ways to mitigate flood and landslide risk to the line.

**Responsible Office:** City of Ouray Administrator, Partner with Ouray County and US Forest Service

**Priority (High, Medium, Low):** High

**Cost Estimate:**

**Potential Funding:**

**Benefits (avoided losses):** Would avoid citizens potentially being without water

**Schedule:**

**Status in 2013:** New in 2013

***52: Complete CWPP for Ouray Volunteer Fire Department***

---

**Hazards Addressed:** Wildfire

**Issue/Background:** Wildfire poses risks to life, property, critical infrastructure, and natural resources. In Ouray County, there is a need for more community wildfire protection plans. This project would entail the development of a CWPP specific for the Ouray Volunteer Fire Department to identify parcel-level fuels treatment and defensible space needs.

**Other Alternatives:**

**Responsible Office:** Ouray Volunteer Fire Department

**Priority (High, Medium, Low):** High

**Cost Estimate:**

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**Benefits (Avoided Losses):** Prevent potential loss of life and residential losses

**Potential Funding:** Grants, donations

**Schedule:**

**Status in 2013:** New in 2013

***53: Develop a Stormwater Management Plan for the Town of Ridgway***

---

**Hazards Addressed:** Flooding, notably localized flooding related to storm events

**Issue/Background:** In the urban environments, where dense residential use occurs and where large expanses of impervious surfaces exist (i.e., rooftops, roads), the ability to handle and safely route stormwater discharges is critical. The focus of Ridgway's stormwater management plan will be needed infrastructure, prioritization, and cost estimation.

**Other Alternatives:** No action

**Responsible Office:** Town of Ridgway Administration

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$80,000-\$100,000 (outside engineering consultation)

**Potential Funding:** Municipal funding, grant assistance possible

**Benefits (avoided losses):** Property damage and loss of life or injury will be reduced or prevented

**Schedule:** 2008-2009

**Status in 2013:** On 5 year CIP list. Do in phases and in concert with transportation improvements.

***54: Develop Additional Raw Storage for the Town of Ridgway***

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**Hazards Addressed:** Drought

**Issue/Background:** Severe drought has potential to impact the municipal water supply for Ridgway. This project would explore alternatives to supplement the water supply for the Town, from additional storage tanks to strategic snow removal and stockpiling snow during winter.

**Other Alternatives:** No action

**Responsible Office:** Town of Ridgway Administration

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**Priority (High, Medium, Low):** Medium

**Cost Estimate:** Initial study of alternatives will be about \$30,000 for consultant assistance.

**Potential Funding:** Colorado Department of Local Affairs, town budget

**Benefits (avoided losses):** Reduced need for emergency water supplies, water restrictions

**Schedule:** 2009

**Status in 2013:** Funded. Complete by next fall.

***55: Develop a Community Wildfire Protection Plan for Log Hill Mesa***

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**Hazards Addressed:** Wildfire

**Issue Background:** Log Hill Mesa Fire Protection District contains the two largest subdivisions in the most at-risk wildfire-urban interface area in Ouray County. There are over 800 people at risk, and their residences are valued at over \$280 million.

**Other Alternatives:** No action

**Responsible Office:** Log Hill Mesa Fire Protection District

**Priority (High, Medium, Low):** High

**Cost Estimate:** Unknown

**Potential Funding:** Community Wildfire Protection Plan grant

**Benefits (Avoided Losses):** Improved wildfire mitigation, incident response, and evacuation strategies

**Schedule:** 2009

**Status in 2013:** Completed. Received a Firewise Community Protection Award. Used to encourage mitigation among residents. Used to develop operations plan and mapbook.

***56: Complete Horsefly Fire Protection Association wildfire protection plan to include evacuation routing and signage***

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**Hazards Addressed:** Wildfire

**Issue/Background:** The Horsefly Community Wildfire Protection Plan is near completion. There are some dead-end roads in the northwest part of Ouray County where Horsefly Fire Association operates. The residents of these areas would have no egress in the event of a large

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wildfire. Many of these areas are blocked by private land from egress to public land or to existing evacuation routes.

**Other Alternatives:** Coordinate with a countywide program to provide emergency evacuation plan and develop routes.

**Responsible Office:** Horsefly Fire Association

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** Would require identification of exact routes and obstacles to overcome. i.e. acquiring easements – clearing right-of-way, gravel, etc.

**Benefits (Avoided Losses):** Potential loss of life and residential losses

**Potential Funding:** Grants, donations

**Schedule:** 2009

**Status in 2013:** Ongoing. Over 25 houses had defensible space improvements made in the fall of 2012 through the WRWC grant program.

***57: Complete ISO Reevaluation of Log Hill Mesa Fire Protection District***

---

**Hazards Addressed:** Wildfire

**Issue Background:** Affordable fire insurance is based on ISO ratings of fire departments. Log Hill Mesa Fire Protection District has undergone extensive modernization, including the development of a new Public Safety Center, which should significantly raise its ISO rating and lower insurance costs.

**Other Alternatives:** No action

**Responsible Office:** Log Hill Mesa Fire Protection District

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** None, covered by operating budget

**Benefits (Avoided Losses):** Lower cost insurance makes it more readily available to all, resulting in fewer uninsured losses.

**Potential Funding:** Operating budget

**Schedule:** IAW ISO schedule, fall 2008

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**Status in 2013:** Completed in May 2011. In January 2012, Public Protection Classification rating improved to 5/8B from 6/9.

***58: Secure exterior school entrances by installing electronic locks with card readers***

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**Hazards Addressed:** Imminent Threat

**Issue/Background:** Exterior entrances for the schools need to be secured against intruders. This can be accomplished by installing electronic locks with card readers on all access doors.

**Other Alternatives:** No action

**Responsible Office:** Ridgway School District

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$30,000

**Benefits (Avoided Losses):** Prevent potential loss of life, keep building secure, avoid/prevent intruder entrance

**Potential Funding:** Unknown

**Schedule:** 1-2 years

**Status in 2013:** New in 2013

***59: Upgrade emergency notification system***

---

**Hazards Addressed:** All-hazards

**Issue/Background:** The alarm for the emergency notification system is not heard in all rooms or buildings in the schools. The intercom and communication systems need to be upgraded so all staff and students can hear the warnings. This will improve communication capabilities during emergencies.

**Other Alternatives:** No action

**Responsible Office:** Tim Lyons, IT Manager

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$50,000

**Benefits (Avoided Losses):** Full alert for emergencies. Communication among all staff, students, and emergency personnel

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**Potential Funding:** Unknown

**Schedule:** 1-2 years

**Status in 2013:** New in 2013

***60: Improve earthquake preparedness in School District buildings***

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**Hazards Addressed:** Earthquake

**Issue/Background:** Earthquakes can potentially cause casualties and property damage. Ridgway School District can mitigate the impacts of earthquakes by auditing classrooms, public spaces, and offices, and secure furnishing and equipment that could potentially fall during an earthquake.

**Other Alternatives:** No action

**Responsible Office:** Ridgway School District

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** \$2,000

**Benefits (Avoided Losses):** Protect staff and students, furnishings, and equipment

**Potential Funding:** Unknown

**Schedule:** 1-2 years

**Status in 2013:** New in 2013

***61: Install safety film on windows at Ridgway Secondary School***

---

**Hazards Addressed:** All-hazards

**Issue/Background:** Windows damaged by earthquakes, terrorist events, or intruders can cause physical injury from broken glass. Installing safety film on the windows at the secondary school will help prevent injuries from broken windows.

**Other Alternatives:** No action

**Responsible Office:** Ridgway School District

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** \$25,000

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**Benefits (Avoided Losses):** Eliminate glass shatter, prevent injuries from broken windows, resist intruders

**Potential Funding:** Unknown

**Schedule:** 1-2 years

**Status in 2013:** New in 2013



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# APPENDIX E: PLANNING PROCESS DOCUMENTATION

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## OURAY COUNTY MULTI HAZARD MITIGATION PLAN 2013 UPDATE

### ***KICKOFF MEETING and HAZARD IDENTIFICATION UPDATE***

Friday, May 24th, 2013

9:00am - Noon

County Land Use Building, 111 Mall Rd, Ridgway, CO 81432

- ❖ Introductions
- ❖ Mitigation, Mitigation Planning, and the Disaster Mitigation Act Requirements
- ❖ The Role of the Hazard Mitigation Planning Committee
- ❖ Overview of the existing Hazard Mitigation Plan
- ❖ Implementation Success Stories
- ❖ Objectives and Schedule for the Plan Update
- ❖ Review of Identified Hazards
- ❖ Coordinating with Other Agencies, Related Planning Efforts, and Recent Studies
- ❖ Planning for Public Involvement
- ❖ Information Needs
- ❖ Questions and Answers/Adjourn



**SIGN-IN SHEET**  
**OURAY COUNTY**  
**LOCAL HAZARD MITIGATION PLAN UPDATE PROJECT**  
**HMPC Meeting #1 – KICKOFF MEETING**

Friday, May 24, 2013 @ 9:00-Noon  
 Ouray County Land Use Building, 111 Mall Road, Ridgway Colorado 81432

Name	Jurisdiction/Organization/Citizen	Title	Phone	E-mail
Glenn Boyd	Ouray County Em/ Public Health/EHS		970-328-1271	gboyd@ouraycounty.co.gov
TEENA LATTI	Ouray Fire CHIEF		970-497-0797	OVFD@ci.ouray.co.us
Cornie Hunt	Ouray County	County Administrator	970-325-7203	chunt@ouraycounty.co.gov
VICKI LANE	OURAY COUNTY	ADMIN SPECIALIST	(970) 325-7227	vlane@ouraycounty.co.gov
Susie Mayfield	Ouray County	Assessor	970-325-4371	smayfield@ouraycounty.co.gov
Tamara Knutson	Land Use	Building Inspector	262 331 0062	TKnutson@ouraycounty.co.gov
WILL CLAYSON	OURAY COUNTY	FACILITIES MGR	970 318 0127	wclayson@ouraycounty.co.us
PATRICIA GRAVINA	Colorado	Local Mitigation Planning	970-749-8280	patricia.gravina@stade.co.us
Deanna Buttebaugh	Colorado OEM	Mitigation Specialist	720-852-6687	deanna.buttebaugh@cbt.co.us
JEN R. SPOR	Mesa Water/Ridgway P/R	Superintendent	970-826-5475	jen@mesawater.net
JEFF BOOKES	Ouray/LO	17/615	970-325-7350	jbookes@ouraycounty.co.gov
Chris Muller	OCRB + Ridgway Fire	Superintendent	970-626-5381	cmuller@ouraycounty.co.gov
Kimberly Mitchell	Ouray City EMS	Chief Paramedic	970-325-7275	kmitchell@ouraycounty.co.gov
JENNIFER MARTINI	Ouray County Sheriff	Sheriff	970-328-7272	dominic.martini@ouraycounty.co.gov



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Subject: Multi-Hazard Mitigation Plan – Risk Assessment Meeting Jan 24th

The next meeting of the Ouray County Hazard Mitigation Planning Committee (HMPC) will be Thursday, January 24<sup>th</sup>, 9:00-11:30 at the Ridgway Town Hall. The purpose of the meeting will be to present and discuss the results of the draft risk assessment developed for the plan. Since the kickoff meeting in September AMEC Earth and Environmental has profiled the identified hazards using input from the planning team and other sources. A quantitative risk assessment was performed on the more significant hazards, such as flood and wildfire. The results of this analysis, and a summary of the current capabilities of the County and towns to mitigate the hazards, will be presented. This will provide the basis for formulating mitigation goals and specific action items that will be developed at future HMPC meetings.

An electronic draft of the risk assessment will be made available in advance of the meeting for review. Details about that will come in a future email. Please plan on attending or sending an alternate person if you cannot. See you there.

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# OURAY COUNTY

## MULTI HAZARD MITIGATION PLAN 2013 UPDATE

### *Risk Assessment and Mitigation Strategy Update Meeting*

**Date:** August 21, 2013

**Time:** 9:00am-2:00pm

**Location:** County Land Use Building, 111 Mall Rd, Ridgway, CO 81432

### Agenda

1. Opening remarks and introductions
2. Review of the planning process
- 4.
3. Public meeting re-cap
- 5.
4. Risk assessment update overview
- 6.
5. Capability assessment update highlights
- 7.
6. Reviewing and updating goals and objectives
7. Review of possible mitigation activities and alternatives
8. Discuss criteria for mitigation action selection and prioritization
- 8.
9. Review of progress on existing actions in the plan
10. Brainstorming Session: Development of new mitigation actions (group process)
11. Prioritize mitigation actions (group process)
12. Discuss plan implementation and maintenance
13. Discuss next steps to plan finalization

**SIGN-IN SHEET**  
**OURAY COUNTY**  
**HAZARD MITIGATION PLAN UPDATE PROJECT**  
**HMPC Meetings #2&3 - Risk Assessment and Mitigation Strategy Review/Update**

Wednesday, August 21<sup>st</sup>, 2013 @ 9:00am-2:00pm  
 County Land Use Building, 111 Mall Rd., Ridgway, CO 81432

Name	Jurisdiction/Organization/Citizen	Title	Phone	E-mail
Glenn Boyd	Ouray County EMS / Public Health	Emergency Manager	970-318-1271	gboyd@ouraycountyco.gov
Maggie Craft	Ouray County Fire / Fire	Investigator	970-318-6589	mcraft@ridgway.k12.co.us
Tor Austin	Ridgway School District	Transportation	970-626-3208	Tor.a.67@ADL.com
Lilia Falk	Ly Hill Fire	A. Chief	249-8407x85	lilia@gnmail.com
Zoe Ford	West Region Wildfire Coord	Coordinator	626-5975	twidam@montrose.net
Kim Mitchell	Ridgway Fire / Ridgway Fire	Special Agent	970-318-8546	Kimitchell@ouraycountyco.gov
Peanna Butterbaugh	Ouray City EMS	Chief Paramedic	303-519-0999	peanna@thehighrestate.co.us
Jeff Bobus	State Office of Emergency Management / Ouray County	Mitigation Specialist	970-325-8604	jbobus@ouraycountyco.us
Patric Restinelli	City of Ouray JVFCD	City Administrator	325-7060	restin@ourayco.us
Ann Morghenaley	City of Ouray	Community Development Wafd.	325-7067	morgenthalera@ourayco.us
Joanne Fairchild	Dallas Creek Wilder	Admin.	970-240-8123	admin@ourayco.us
Chris Miller	OCES Ridgway Fire	Road Superintendent	970-626-5591	cmiller@ourayco.us
Road Harris	Ouray Fire Co. Extrication	BOSS MAN	970-626-9775	rharris@ouraycountyco.us
Will Clapsdol	OC FACILITIES / OURAY FIRE	FACILITIES MNG	970-318-1127	wclapsdol@ouraycountyco.us



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**A meeting to discuss the Ouray County Multi-Hazard Mitigation Plan Update will be held at the Ouray Community Center on Tuesday, August 20th at 7:00-9:00 pm.** Citizens, elected officials, and emergency responder personnel are encouraged to attend. The purpose of the meeting will be to present and discuss the draft multi-hazard mitigation plan update. The plan identifies hazards such as floods, landslides, wildfires, and avalanches and assesses their potential impacts to people and property. The plan is undergoing its five-year update under the guidance of the Ouray County Hazard Mitigation Planning Committee (HMPC) with consultant assistance. Participating jurisdictions include Ouray County, the City of Ouray, the Town of Ridgway, Log Hill Mesa Fire Protection District, Horsefly Fire Association, Montrose Fire Protection District, and Ridgway Fire Protection District. The plan update process has been underway since May 2013. Hazard profiles have been updated using input from the planning team and other sources. A quantitative risk assessment was performed on the more significant hazards, such as flood, landslide, and wildfire, to detail the risk to the participating jurisdictions. The Ouray County HMPC is in the process of updating the plan goals and identifying new potential projects to mitigate the impacts of the hazards. These goals and projects will be integrated into the final plan. Public awareness of the effort and comment and input on the draft risk assessment and mitigation strategy is being sought at this meeting. For more information contact Glenn Boyd at Ouray County Emergency Management, 970-325-4670, [gboyd@ouraycountyco.gov](mailto:gboyd@ouraycountyco.gov).

Glenn Boyd, Emergency Manager

**SIGN-IN SHEET  
OURAY COUNTY  
HAZARD MITIGATION PLAN UPDATE PROJECT  
PUBLIC MEETING**

Tuesday, August 20<sup>th</sup>, 2013 @ 7:00pm-9:00pm  
Ouray Community Center, 320 6<sup>th</sup> Ave., Ouray, CO 81427

Name	Jurisdiction/Organization/Citizen	Title	Phone	E-mail
Glenn Boyd	Ouray Public Health Ouray Emergency Mng/EMS	Emergency Manager	970-318-1271	gboyd@ouraycounty.co.gov
Todd Jones	Citizen		970-729-0703	toddjones@gmail.com
Kathy Beckhardt	CITIZEN		970-249-5917	ktraveler@me.com
DAVE BECKHARDT	'		970-249-5917	DBECKHARDT@ME.COM
J.D. HAZEN			970-708-0651	FRBSHAK@YAHOO.COM
WILL CLAPSAL	OURAY COUNTY OURAY FIRE	FACILITIES MNG	318 1127	
Susie Mayfield	Ouray County Assessor	Assessor	970-325-4371	smayfield@ouraycounty.co.gov
B.A. Blake	Ouray County Deputy Treasurer/Deputy Public Works		970-325-4325	bb@ouraycounty.co.gov
John Clark	Town of Ridgway	Mayor	970-877-8434	johnclark@townofridgway.co.us
TIM FASEK	OURAY MOUNTAIN RESCUE	TEAM CAPTAIN	970-318-6894	timfasek@yahoo.com
DEB Tolson	Volunteer (local business owner) Ouray EMS/EMT-B	Volunteer	410-590-8443	thetobincollector@gmail.com
Bill Telfe	Ouray County Public Works	Reporter	970-626-6862	bill@ouraynews.com
Kirk Hartshorn	CITIZEN		720-244-5754	Kirkhartshorn@gmail.com



Please complete this questionnaire and return by September 2, 2013 to:  
Fax 970-325-7314 Attn: Glenn Boyd  
Mail: Ouray County Emergency Management  
Box 670  
Ouray, CO 81427  
gboyd@ouraycountycoco.gov 970-325-4670

## Ouray County Multi-Hazard Mitigation Plan Public input form

1. The hazards addressed in the Draft 2013 update of the Multi-Hazard Mitigation Plan are listed below. Please indicate the level of significance in Ouray County that you perceive for each hazard. Please rate these hazards 1 through 3 as follows: 1=low, 2=moderate, 3=high.

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> Avalanche            | <input checked="" type="checkbox"/> Public Health Emergencies         |
| <input type="checkbox"/> Dam Failure                     | <input checked="" type="checkbox"/> Severe Winter Weather             |
| <input checked="" type="checkbox"/> Debris Flow          | <input checked="" type="checkbox"/> Wildfire                          |
| <input checked="" type="checkbox"/> Drought              | <input type="checkbox"/> Windstorm                                    |
| <input checked="" type="checkbox"/> Earthquake           | <input checked="" type="checkbox"/> Hazardous Materials spill/release |
| <input checked="" type="checkbox"/> Extreme Temperatures | <input type="checkbox"/> Mass Casualty Events                         |
| <input checked="" type="checkbox"/> Flooding             | <input checked="" type="checkbox"/> Imminent Threat                   |
| <input checked="" type="checkbox"/> Landslide/Rockfall   | <input type="checkbox"/> Other  |
| <input type="checkbox"/> Lightning                       |   |

2. Do you have information on specific hazard issues/problem areas that you would like the planning committee to consider? Note the jurisdiction to which it applies (town, county, special district etc.).

*- too new to know!*

3. The following types of mitigation actions may be considered in Ouray County. Please place a check  next to the types of mitigation actions that you think should have the highest priority in the Ouray County Multi-Hazard Mitigation Plan.

- |  |   |
|--|---|
| <input type="checkbox"/> Indoor/Outdoor Warning  | <input type="checkbox"/> Flood mitigation                           |
| <input checked="" type="checkbox"/> Wildfire Fuels Treatment projects                    | <input type="checkbox"/> Floodprone Property Buyout                 |
| <input type="checkbox"/> Continued Participation in the National Flood Insurance Program | <input type="checkbox"/> Education and discounts on flood insurance |
| <input checked="" type="checkbox"/> Critical Facilities Protection                       | <input type="checkbox"/> Avalanche mitigation                       |
| <input type="checkbox"/> Planning/Zoning   | <input type="checkbox"/> Landslide/rockfall mitigation              |
| <input type="checkbox"/> Public Education/Awareness                                      | <input checked="" type="checkbox"/> Debris flow/mudslide mitigation |
|  | <input type="checkbox"/> Evacuation route development               |

4. Please comment on any other pre-disaster strategies that the planning committee should consider for reducing future losses caused by natural disasters (use the back of this form if needed).

5. Provide your name and email address if you would like to be added to a distribution list for upcoming activities related to the planning process:

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Ouray County Draft 2013 Update to the Multi Hazard Mitigation Plan



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**Not seeing any Drop-down menus? You should see a row of items above this line...**

[Home](#) [Government](#) [Services](#) [Departments](#) [Officials](#) [Public Notices](#) [Local Info](#)  
You may experience compatibility issues with some web browsers. Try turning on *Compatibility View* in Internet Explorer (found in the Tools menu). We apologize for any inconvenience, and we are working on a solution.

Ouray County lies in southwest Colorado and encompasses a diverse landscape, including the headwaters of the Uncompahgre River in the high country of the San Juan Mountains, the broad mesas of the Uncompahgre Plateau region, and the valley of the Uncompahgre River. ([Google Maps link](#))

The county covers 542 square miles and has a population of around [4,530](#). Two municipalities lie within the county, the [City of Ouray](#) and the [Town of Ridgway](#).

While active mining operations and agriculture remain a vital and active part of life in Ouray County, tourism now forms the basis of our economy. Visitors from around the world are drawn to Ouray County for its history, natural beauty and variety of outdoor activities. The quality of this unique experience available in Ouray County is unmatched anywhere else in the world!

**Ouray County Coordinated Election - November 5 / Sample Ballots**

[Ballot Style #1](#)  
Montrose School District Voters

[Ballot Style #2](#)  
Ridgway School District Voters

[Ballot Style #3](#)  
Rural Ouray and Ouray School District Voters

[Ballot Style #4](#)  
City of Ouray and Ouray School District Voters

**Ouray County Quick Links**

- [CR1 TIGERV Grant Application](#)
- [Agendas, Minutes, Resolutions and Work Sessions](#)
- [4-H Event Center & Fairgrounds](#)
- [4-Wheel Drive Road Schedule - 2013](#)
- [Alpine Loop OHV Brochure](#)
- [Assessor Online Parcel Information](#)
- [Building Inspection](#)
- Budget: [Ouray County 2013 Budget](#)
- [Camp Bird Road Slow and Quiet Zone Brochure](#)
- [Clerk & Recorder Public Records Search](#)
- [Community Wildfire Protection Plan 2011](#)
- [County Ordinances](#)
- [County Proclamations](#)
- [Energy Efficiency and Weatherization Rebates](#)
- [Land Use Code](#)
- [Marriage License](#)
- [Motor Vehicle Registration](#)
- [Multi-Hazard Mitigation Plan](#)
- [Multi-Hazard Mitigation Plan \(2013 Draft\)](#)

**VIR PUBLIC HEARING HAS BEEN CONTINUED TO NOVEMBER 6 AT 6:00 P.M. at the OURAY COUNTY 4-H EVENT CENTER**

The public record will be posted on this website once it has been completed and will be available at the Ouray County Courthouse and at the Land Use / Road and Bridge offices well in advance of the continued public hearing.

Public comment has been closed.

The Ouray County Board of County Commissioners has continued the public hearing on proposed changes to the Visual Impact Regulations in the Land Use Code. The record of the proceedings on August 7, 8 and 13 is being compiled and will be made available at a later date.

**BOCC Hearing Packet**



**Click here for the Visual Impact Hearing Procedures**

Click on this button to go to a page with links to all of the proposed Visual Impact Regulations (Section 9 of the Ouray County Land Use Code) and related documents.

**SIGN UP NOW FOR EMERGENCY NOTIFICATIONS**

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As part of the initial hazard identification process, members of the HMPC used a hazards worksheet to identify and rate the significance of a variety of possible hazards. Significance was measured in general terms, focusing on key criteria such as the geographic extent of the hazard, the probability of an event occurring, and the likely magnitude and severity levels. A data collection guide was used to collect hazard, risk and capabilities information from Ouray County and the participating jurisdictions which was then integrated into this plan. A template of the data collection guide is provided here:

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**Local Hazard Mitigation Plan Update  
Data Collection Guide  
for  
Ouray County, Colorado  
Hazard Mitigation Planning Committee (HMPC)  
Prepared by  
AMEC Environment and Infrastructure, Inc.  
May 2013**

*New participating Jurisdictions:  
Please complete by June 28<sup>th</sup>, 2013*



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## Overview

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The contents of this workbook have been designed to assist Ouray County in collecting necessary background information to support the hazard mitigation planning process pursuant to the Federal Disaster Mitigation Act (DMA) of 2000. This includes a hazard identification and vulnerability assessment, an assessment of Ouray County's current hazard mitigation capabilities, and an identification of potential mitigation projects that, if undertaken, could prevent or reduce future losses.

The essential information needed to support the planning process includes background information about Ouray County; plans, technical studies, and data related to hazards and risks; current governing codes, ordinances, regulations, and procedures whose intent is to minimize future losses; and an assessment of the planning area's technical and organizational capabilities to perform hazard mitigation/loss prevention functions. It is important that the plan shows what Ouray County is doing now to limit future disaster losses.

The planning process is heavily dependent on existing data to be supplied by each of the participants represented on the Hazard Mitigation Planning Committee (HMPC). The DMA plan development process does not require the development of new data, but requires *existing data only*.

The goal of this process is to produce a hazard mitigation plan that meets Ouray County's needs, as well as the requirements of DMA 2000 and that contains a list of updated projects that may be eligible for streamlined federal mitigation funding pre or post disaster.

## What is Mitigation?

---

Hazard mitigation is defined by FEMA as "any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event." The results of a three-year, congressionally mandated independent study to assess future savings from mitigation activities provides evidence that mitigation activities are highly cost-effective. On average, each dollar spent on mitigation saves society an average of \$4 in avoided future losses in addition to saving lives and preventing injuries (National Institute of Building Science Multi-Hazard Mitigation Council 2005).

Mitigation generally means reducing long-term risk from hazards to acceptable levels through predetermined measures accompanying physical development, for example: strengthening structures to withstand high winds or snow loads; elevating, removing or limiting development in flood-prone areas; clearing defensible space around residences in Wildfire Urban Interface (WUI) areas; or designing development away from areas of geological instability.

Mitigation is different from emergency preparedness or response. Preparedness concentrates on activities which make a person, place, or organization ready to respond to a disaster with emergency equipment, food, emergency shelter, and medicine. Response activities may reduce damages, such as sandbagging during a flood, but this is a short term solution and requires advance warning and

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capabilities in place during the event. Mitigation of flood hazards through wise floodplain management is a long term solution.

## Participation

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

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

For HMPC members, ‘participation’ means the planning committee representatives will:

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

## Data Collection Guide

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This guide contains an explanation of the types of hazard mitigation/loss prevention data that is needed for the hazard mitigation planning process. This guide identifies specific requirements for the Risk Assessment Process, which includes the Hazard Identification, Vulnerability, and Capability Assessments as well as defines requirements for development of the Mitigation Strategy. Also review the existing Ouray County Multi-Hazard Mitigation Plan (2008) as you go through the worksheets.

The worksheets have been developed to assist with the data collection needed for the update. These need to be completed for each *NEW* participating jurisdiction that desires credit for participation in the 2013 update, or *existing* jurisdictions that have substantial changes from the 2008 plan. The guide will serve two purposes:

- helps facilitate the collection of the necessary information.
- functions as evidence of “participation” in the planning process.

Each jurisdiction should utilize members of their planning subcommittee to complete the forms.

**Data collection guides are due on June 28<sup>TH</sup> to Jeff Brislawn (contact information below).**

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## Project Reference

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### **Ouray County Point of Contact:**

Glenn Boyd

Ouray County Emergency Manager

Ouray County Public Health Emergency Preparedness Coordinator

Box 670 Ouray CO 81427

Phone: (970)325-4670

Cell: (970)318-1271

Fax: (970)325-7314

[gboyd@ouraycountyco.gov](mailto:gboyd@ouraycountyco.gov)

### **AMEC Project Manager**

Jeff Brislawn

Hazard Mitigation Lead/ Project Manager

AMEC Environment and Infrastructure, Inc.

1002 Walnut St., Suite 200

Boulder, CO 80302

Tel 303-820-4654

Fax 303-442-0616

[jeff.brislawn@amec.com](mailto:jeff.brislawn@amec.com)

Link to the existing **Ouray County Multi-Hazard Mitigation Plan (2008)**:

<http://ouraycountyco.gov/Home/Ouray%20County%20Multi-Hazard%20Mitigation%20Plan.pdf>

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## The Risk Assessment Process

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The risk assessment process includes three components: hazard identification, vulnerability assessment, and capability assessment. Data needs and worksheets for each of the risk assessment components are included in this guide.

# Ouray County Local Hazard Mitigation Plan Worksheet #1: Hazard Identification Update

Name of Department/Jurisdiction: \_\_\_\_\_

Use this worksheet to identify possible hazards that may impact your jurisdiction. Hazards currently identified in the plan are listed. List others that may not be represented, where appropriate. Please rank according to the guidelines that follow the table. Use copies of Worksheet #2: Historic Hazard Event to provide evidence to justify your conclusions.

Hazard	Frequency of Occurrence	Spatial Extent	Potential Magnitude	Significance	Hazard Map? (Paper/GIS/Source)
Avalanche					
Dam Failure					
Debris Flow					
Drought					
Earthquake					
Extreme Temperatures					
Flood					
Hazardous Materials					
Landslide and Rockfall					
Lightning					
Mass Casualty Event					
Pandemic Flu					
Severe Winter Storm					
Terrorism					
West Nile Virus					
Windstorm					
Wildfires					

**Probability of Future Occurrence:**

Highly Likely: Near 100% probability in next year or happens every year.  
 Likely: Between 10 and 100% probability in next year or has a recurrence interval of 10 years or less.  
 Occasional: Between 1 and 10% probability in next year or has a recurrence interval of 11 to 100 years.  
 Unlikely: Less than 1% probability in next 100 years or has a recurrence interval of greater than every 100 years.

**Geographic Location/Spatial Extent:**

Large: More than 50% of planning area affected  
 Medium: 25-50% of planning area affected  
 Small: 10-25% of planning area affected  
 Isolated: Less than 10% of planning area affected

**Potential Magnitude:**

Catastrophic: Multiple deaths; property destroyed and severely damaged; and/or interruption of essential facilities and service for more than 72 hours  
 Critical: Isolated deaths and/or multiple injuries and illnesses; major or long-term property damage that threatens structural stability; and/or interruption of essential facilities and services for 24-72 hours  
 Limited: Minor injuries and illnesses; minimal property damage that does not threaten structural stability; and/or interruption of essential facilities and services for less than 24 hours  
 Negligible: No or few injuries or illnesses; minor quality of life loss; little or no property damage; and/or brief interruption of essential facilities and services

**Significance (your subjective opinion):** Low, Medium, High

Prepared by: \_\_\_\_\_

Phone: \_\_\_\_\_

Email: \_\_\_\_\_

Please return worksheets by mail, email, or fax to:  
**Jeff Brislaw, AMEC Environment & Infrastructure**  
 1002 Walnut St., Suite 200  
 Boulder, CO 80302  
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## Ouray County Local Hazard Mitigation Plan Worksheet #2: Historic Hazard Event

Name of Department/Jurisdiction: \_\_\_\_\_

Please fill out one sheet for each significant hazard event with as much detail as possible. Attach supporting documentation, photocopies of newspaper articles, or other original sources.

Type of event	
Nature and magnitude of event	
Location	
Date of event	
Injuries	
Deaths	
Property damage	
Infrastructure damage	
Crop damage	
Business/economic impacts	
Road/school/other closures	
Other damage	
Insured losses	
Federal/state disaster relief funding	
Opinion on likelihood of occurring again	
Source of information	
Comments	

Prepared by: \_\_\_\_\_

Phone: \_\_\_\_\_

Email: \_\_\_\_\_

Please return worksheets by mail, email, or fax to:  
**Jeff Brislawn, AMEC Environment & Infrastructure**  
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## Ouray County Local Hazard Mitigation Plan Worksheet #3: Vulnerability Assessment

**Name of Department/Jurisdiction:** \_\_\_\_\_

The purpose of this worksheet is to assess the vulnerable buildings, populations, critical facilities, infrastructure, and other important assets in your community by using the best available data to complete the table and questions that follow. Use the table on the next page to compile a detailed inventory of specific assets at risk including critical facilities and infrastructure; natural, cultural, and historical assets; and economic assets as defined below. These may include hospitals, fire stations, or historic buildings. In the hazard specific column of the asset inventory table, indicate if there is a specific hazard to which the asset is at risk.

### Critical Facilities

FEMA generally defines four kinds of critical facilities:

- Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic, and/or water-reactive materials
- Hospitals, nursing homes, and housing likely to have occupants who may not be sufficiently mobile to avoid injury or death during a hazard event
- Police stations, fire stations, vehicle and equipment storage facilities, and emergency operations centers that are needed for emergency response activities before, during, and after a hazard event
- Public and private utility facilities that are vital to maintaining or restoring normal services to hazard areas before, during, and after a hazard event

FEMA’s HAZUS-MH loss estimation software uses the following three categories of critical assets. ‘Essential facilities’ are those that, if damaged, would have devastating impacts on disaster response and/or recovery. ‘High potential loss facilities’ are those that would have a high loss or impact on the community. Transportation and lifeline facilities are third category of critical assets; examples are provided below.

Essential Facilities	High Potential Loss Facilities	Transportation and Lifeline
<ul style="list-style-type: none"> <li>▪ Hospitals and other medical facilities</li> <li>▪ Police stations</li> <li>▪ Fire station</li> <li>▪ Emergency Operations Centers</li> </ul>	<ul style="list-style-type: none"> <li>▪ Power plants</li> <li>▪ Dams/levees</li> <li>▪ Military installations</li> <li>▪ Hazardous material sites</li> <li>▪ Schools</li> <li>▪ Shelters</li> <li>▪ Day care centers</li> <li>▪ Nursing homes</li> <li>▪ Main government buildings</li> </ul>	<ul style="list-style-type: none"> <li>▪ Highways, bridges, and tunnels</li> <li>▪ Railroads and facilities</li> <li>▪ Bus facilities</li> <li>▪ Airports</li> <li>▪ Water treatment facilities</li> <li>▪ Natural gas facilities and pipelines</li> <li>▪ Oil facilities and pipelines</li> <li>▪ Communications facilities</li> </ul>



**Additional Vulnerability Questions**

<p><b>Average depth of 100-year floodplain</b></p>	
<p><b>Describe any hazard-related concerns or issues regarding the vulnerability of special needs populations, such as the elderly, disabled, or low-income.</b></p>	
<p><b>Describe growth and development trends and future growth areas and how they relate to hazard areas and vulnerability concerns/issues.</b></p>	
<p><b>Review Chapter 5 in the 2008 Ouray County Multi-Hazard Mitigation Plan. Indicate what projects have been completed or are ongoing and describe how vulnerability has changed (or not) as a result of implementing successful mitigation actions.</b></p>	

Prepared by: \_\_\_\_\_

Phone: \_\_\_\_\_

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## Ouray County Local Hazard Mitigation Plan Worksheet #4: Capability Assessment

**Name of Department/Jurisdiction:** \_\_\_\_\_

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. Please complete this worksheet and provide supporting documentation if possible.

### Regulatory

The following planning and land management tools are typically used by local jurisdictions to implement hazard mitigation activities. Please indicate which ones your jurisdiction has in place. If your jurisdiction does not have this capability or authority, please indicate if a higher level of government has the authority. Also use the comments column to indicate how we can obtain a copy of the plan or document (i.e. available on the web (include address), will put on ftp, will e-mail or mail, will fax).

<b>Regulatory Tool (ordinances, codes, plans)</b>	<b>Yes/No</b>	<b>Comments</b>
General or Comprehensive plan		
Zoning ordinance		
Subdivision ordinance		
Growth management ordinance		
Floodplain ordinance		
Other special purpose ordinance (stormwater, steep slope, wildfire)		
Building code		
Fire department ISO rating		
Erosion or sediment control program		
Stormwater management program		
Site plan review requirements		
Capital improvements plan		
Economic development plan		
Local emergency operations plan		
Other special plans		
Flood insurance study or other engineering study for streams		
Elevation certificates (for floodplain development)		
Other		

## Administrative/Technical

Identify the technical and personnel resources responsible for activities related to hazard mitigation/loss prevention within your jurisdiction. For smaller jurisdictions without local staff resources, if there are public resources at the next higher level government that can provide technical assistance, please indicate so in the comments column.

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices			
Engineer/professional trained in construction practices related to buildings and/or infrastructure			
Planner/engineer/scientist with an understanding of natural hazards			
Personnel skilled in GIS			
Full time building official			
Floodplain manager			
Emergency manager			
Grant writer			
Other personnel			
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)			
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)			
Other			

## Additional Capabilities Questions

<p>Does your community have any hazard-related certifications, such as Storm Ready certification or Firewise Communities certification?</p>	
<p>Describe any past or ongoing public education or information programs, such as for responsible water use, earthquake or fire safety, household preparedness, or environmental education.</p>	
<p>Describe any other past or ongoing projects or programs designed to reduce disaster losses. These may include projects to protect critical facilities.</p>	
<p>Describe any funding sources that could be leveraged for mitigation. These could include stormwater utility fees, general fund revenue, or grant sources.</p>	

Prepared by: \_\_\_\_\_

Phone: \_\_\_\_\_

Email: \_\_\_\_\_

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