Gunnison County Natural Hazard Mitigation Plan



August 2020

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1 INTRODUCTION

1.1 Purpose

Gunnison County, Colorado, including the participating jurisdictions and special districts of the City of Gunnison, Town of Crested Butte, Town of Mt. Crested Butte, Arrowhead Fire Protection District (FPD), Crested Butte FPD, and the Crested Butte South Metropolitan District, has prepared this natural hazard mitigation plan (HMP) update to guide hazard mitigation planning to better protect the people and property of the County from the effects of hazard events. This plan update demonstrates the community's commitment to reducing risks from hazards and serves as a tool to help decision makers direct mitigation activities and resources. This plan was also developed to make Gunnison 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. Flood Mitigation Assistance (FMA) and other funding opportunities may be available.

The plan update covers the Gunnison County response area, which includes the entirety of Gunnison County and the northwestern portion of neighboring Saguache County. Additionally, approximately 78% of the land in Gunnison County is owned and managed by the U.S. Forest Services (USFS) and Bureau of Land Management (BLM). While the federal government ultimately has jurisdiction in these parts of the County, the Gunnison County Natural Hazard Mitigation Plan update could be used to support federal hazard mitigation efforts. In particular, the hazard profiles and risk assessments in the plan update could be useful for supporting the federal government's efforts related to wildland fire and watershed protection.

1.2 Background and Scope

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 $6

in avoided future losses in addition to saving lives and preventing injuries (National Institute of Building Science Multi-Hazard Mitigation Council Jan 11, 2018).

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 Gunnison County's Natural Hazard Mitigation Plan update process, identifies relevant hazards and risks, and identifies the strategy the County and participating jurisdictions will use to decrease vulnerability and increase resiliency and sustainability.

This plan update 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 or DMA.) While the act 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 Gunnison County response area is subject to many kinds of hazards, access to these programs is vital.

Gunnison County's Local Emergency Planning Committee began efforts to create the County's first hazard mitigation plan in September 2002. The first plan was adopted and approved by FEMA in 2003. During that time period, the Colorado Division of Emergency Management established a goal for all communities in the state to develop local hazard mitigation plans. Gunnison County was the first county in the state to prepare a hazard mitigation plan approved by FEMA. The 2003 plan was updated in 2013 (final approval by FEMA Mar 5, 2014). Gunnison County began the update of the 2013 plan on Jan 23, 2018. Information in the plan update 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 Gunnison County response area has been affected by hazards in the past and is thus committed to reducing future disaster impacts and maintaining eligibility for federal funding.

1.3 Multi-Jurisdictional Planning

This plan was prepared as a multi-jurisdictional plan. The planning area encompasses all of Gunnison County, the City of Gunnison, Town of Crested Butte, Town of Mt. Crested Butte, Arrowhead FPD, Crested Butte FPD, Crested Butte South Metropolitan District, and the northwestern portion of Saguache County within the Gunnison County response area. All local units of government in the County were invited to participate in the planning process. The decision whether or not to participate in this process was a local decision, based on local community needs. Local governments have the options not to prepare a plan, to prepare a stand-alone plan for their jurisdiction, or to participate in a multi-jurisdiction or county-wide plan. The following entities meet the definition of a local government per the DMA regulations and have opted to participate in this effort and are seeking FEMA approval of the 2020 version of this plan. Entities that participated in the plan are noted below. Additional detail about participation can be referenced in Chapter 3, and Appendices B and C.

Participating entities

- **Gunnison County**
- **City of Gunnison**
- **Town of Crested Butte**
- **Town of Mt. Crested Butte**
- **Gunnison Fire Protection District**
- **Crested Butte FPD**

Non-DMA Participating Organizations

- **Western Colorado University**
- **Gunnison Valley Hospital**
- **Upper Gunnison River Watershed Conservation District**
- **West Region Wildfire Council**
- **Colorado Division of Homeland Security and Emergency Management**
- **Colorado Department of Parks and Wildlife**
- **Colorado Division of Water Resources**
- **National Weather Service (Grand Junction CO office)**
- **Skyland Metropolitan District**

1.4 Plan Organization

The Gunnison County Natural Hazard Mitigation Plan is organized as follows:

- 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 includes further details on the hazard mitigation action items identified in Chapter 5 and is a key aspect of this plan. Appendix B catalogs the documents used during the 2018 planning process, such as meeting sign in sheets, meeting minutes, public notices, etc. Appendix C lists the members who served on the 2018 Hazard Mitigation Planning Committee (HMPC). A list of references is provided in Appendix D, and a draft plan adoption ordinance is available for the HMPC's reference in Appendix E. Appendix F contains several maps in 11"x17" format.

2 COMMUNITY PROFILE

2.1 Geography and Climate

Gunnison County is located in the Rocky Mountains of central-western Colorado. Gunnison County is known for its striking scenery of mountainous terrain, deep valleys, rivers, and Blue Mesa Reservoir, the largest reservoir in Colorado. It is bordered by Chaffee County to the east, Saguache and Hinsdale counties to the south, Montrose and Delta counties to the west, Ouray County to the southwest, and Mesa and Pitkin counties to the north. The County's eastern border is coterminous with the Continental Divide. Gunnison County encompasses 3,239 square miles. Roughly 78% of the land in the County is owned and managed by the US Forest Service (USFS) and Bureau of Land Management (BLM). The USFS owns 1,220,035 acres, and the BLM owns 355,350 acres. The Curecanti National Recreation Area encompasses 40,000 acres within Gunnison County.

Gunnison County has four distinct seasons and averages 300 days of sunshine per year. The climate varies widely among different locations in the County. Elevation in the County ranges from roughly 5,880 feet to over 14,285 feet at Castle Peak, the highest point in the County. Due to the topographic and geographic diversity of the County climate statistics were collected from three Western Regional Climate Center (WRCC) stations in Gunnison County to characterize the County's climate. Climate records for the Gunnison, Crested Butte, and Cochetopa Creek stations are summarized below.

In the City of Gunnison area, the warmest month is July with an average high of 80.7°F and an average low of 42.7°F. The coolest month is January with an average high of 25.8°F and an average low of -7.4°F. The warmest recorded temperature near Gunnison was 105°F, and the coolest temperature was -47°F. Average annual precipitation is 10.31 inches per year, and average annual snowfall is 49.7 inches per year. Vegetation in the area consists of grasses, shrubs, and timber.

The Crested Butte area receives significantly more snowfall than the Gunnison area. Average annual snowfall at the Crested Butte WRCC station is 197.5 inches, and average annual precipitation is 23.47 inches. The highest temperature ever recorded at this station was 91°F, and the lowest recorded temperature was -47°F. January is also the coolest month in the Crested Butte area; the average high is 27.8°F, and the average low is -4.4°F. July is the warmest month with an average high of 76.0°F and an average low of 38.5°F.

Climate records at the Cochetopa Creek station display similar numbers to the Gunnison station. Average annual snowfall is 50.3 inches with 10.97 inches in average annual precipitation. July is the warmest month with an average high of 81.1°F and an

average low of 42.5°F. January is the coolest month with an average high of 28.0°F and an average low of -5.2°F. The warmest temperature ever recorded at this station was 94°F, and the coolest was -40°F.

2.2 History

Gunnison County is named for Captain John W. Gunnison, a U.S. Army engineer who was chosen to survey a route in the area for the transcontinental railroad in the 1850s. The area now encompassed by the County was originally home to the Ute Indian tribes, who were pushed out by ranchers, traders, and miners. Gunnison's wealth as a mining area was short lived, lasting only a few years. Much of the population that had settled in Gunnison departed at that point. On May 22, 1877, the City of Gunnison became the official county seat. The cattle industry established a foothold in the area in the 1880s, but it was the arrival of two railroads in Gunnison in the early 1880s that truly enabled the area to flourish. Initially the Denver & Rio Grande Railroad and the Denver, South Park & Pacific Railroad both ran through Gunnison, but Denver, South Park & Pacific soon discontinued operations in the area. The Denver & Rio Grande Railroad served as the primary means of transport until the 1950s when cars and trucks achieved widespread use.

Around the 1960s, Gunnison County and other parts of the Rocky Mountains started to become popular vacation destinations for skiing. Communities in Gunnison County pushed to become popular summer tourism destinations as well in the 1980s. Today, the economic base of Gunnison County is rooted primarily in education, health care, tourism, ranching, and recreation.

2.3 Population

According to the Colorado State Demography Officer the estimated 2017 county population was 16,871 people. Population estimates for 2017 for the City of Gunnison, the Town of Crested Butte, the Town of Mt. Crested Butte, the Town of Pitkin, the Town of Marble, and the unincorporated county are provided in Table 2.1.

Table 2.1. 2017 Population Estimates

Jurisdiction	2017
City of Gunnison	6,443
Town of Crested Butte	1,656
Town of Marble	141
Town of Mt. Crested Butte	850
Town of Pitkin	71

Total Gunnison County	**16,871**

Source: https://demography.dola.colorado.gov/population/population-totals-municipalities/#population-totals-for-colorado-municipalities

Annual Estimates of the resident population by sex, race, and Hispanic origin for April 1, 2010 to July 1, 2017 are shown in Table 2.2. These statistics can be compared to the national averages to indicate social vulnerability. A population with a high percentage of people under 5 years of age or over 65 years of age may have increased social vulnerability; members of these age groups may require additional assistance or resources to find shelter or evacuate during an emergency. According to the 2017 U.S. Census, 15.6% of the nation's population is 65 years of age or older, and 6.1% of the population is under 5 years old.

Table 2.2. Gunnison County 2017 Demographic and Social Characteristics

Characteristic	Gunnison County	City of Gunnison	Town of Crested Butte	Town of Marble	Town of Mt. Crested Butte	Town of Pitkin
Gender/Age						
Male %	54.08%	55.52%	56.79%	48.80%	57.84%	56.32%
Female %	45.92%	44.48%	43.21%	51.20%	42.16%	43.68%
Under 5 years %	4.38%	4.10%	5.60%	4.00%	0.30%	0.00%
65 years and over %	12.66%	6.60%	13.30%	20.80%	13.00%	10.30%
Race/Ethnicity (one race)						
White	87.20%	79.69%	98.05%	90.40%	94.25%	100.00%
American Indian/Alaska Native	0.73%	0.18%	0.31%	0.00%	0.00%	0.00%
Asian	0.76%	0.30%	0.00%	0.00%	0.00%	0.00%
Black or African American	0.59%	0.72%	0.00%	0.00%	0.00%	0.00%
Hispanic or Latino (of any race)	9.17%	18.67%	0.86%	9.60%	1.24%	0.00%
Education						
High school graduate or higher (among people age 25+) %	95.35%	89.01%	97.98%	94.23%	99.57%	100.00%

Source: State of Colorado Demography Office

According to population projections by the Colorado State Demography office, Gunnison County's population is expected to reach 22,728 by 2050. The State Demography Office did not perform population forecasts at the municipal level.

According to the State demography Office, Gunnison County's population is expected to grow at roughly .99% per year between 2010 and 2050. This estimate is based on the average annual percent change estimates in Table 2.3. This is lower than the State Demography Office's 5-year forecast for all of Colorado (1.30%) and lower than the World Bank's population growth forecast for the U.S. (2.81%) from 2010-2050.

Table 2.3. Population Projections for Gunnison County: 2010-2050

	2010	2015	2020	2025	2030	2035	2040	2045	2050
Population	15,314*	16,097	17,202	18,255	19,282	20,277	21,238	22,024	22,728
Average Annual Percent Change (over 5-year increments)		1.0%	1.3%	1.2%	1.1%	1.0%	0.9%	0.7%	0.6%

Source: Colorado State Demography Office

*Note that the Colorado State Demography Office's population estimate for 2010 is 15,314 people, compared to the U.S. Census Bureau's estimate of 15,324.

2.4 Government

The Board of County Commissioners is the governing body for Gunnison 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 Board of County Commissioners select a County Manager to provide support, policy, budget transparency and strategic leadership to the Commissioners, public and the county organization.

The City of Gunnison is a home rule municipality. The governing body of the City consists of a City Council and a City Manager. The Council is composed of a mayor, a mayor pro tempore, and three councilors, all of whom are elected by the citizens of the City of Gunnison. The City Manager is appointed by the Council. The City Council determines policy and budget for Gunnison, with assistance from the City Manager.

The Town of Crested Butte adopted a Council-Manager form of government in 1974. A seven-member Town Council and Mayor govern the Home Rule community. The Mayor serves a two-year term. The Town of Mt. Crested Butte is also governed by a Mayor and Town Council. Seven citizens sit on the Mt. Crested Butte Town Council, serving four-year terms.

2.5 Economy

Early economic endeavors in Gunnison County included fur trapping and mining, though both were very short-lived. Cattle ranching emerged in the 1880s. In the last few decades, education, health care, recreation, tourism, construction, and retail have taken the lead. According to the 2010 Census, the industries that employed the most people in Gunnison County were educational services, health care, and social assistance (19.9%); arts, entertainment, recreation, accommodation, and food services (18.9%); construction (15.2%); and retail trade (10%). Select economic characteristics for Gunnison County from the 2010 Census are shown in Table 2.4.

Table 2.4. Gunnison County Economic Characteristics

Characteristic	Gunnison County	City of Gunnison	Town of Crested Butte	Town of Marble	Town of Mt. Crested Butte	Town of Pitkin
Population below poverty level %	15.37%	29.04%	7.88%	7.20%	6.88%	8.05%
Median home value, 2012-16	$311,700	$217,200	$608,300	$323,100	$400,900	$270,000
Median household income 2012-16	$50,746	$36,094	$58,889	$70,500	$52,308	$63,750
Per capita income 2012-16	$25,920	$17,408	$34,282	$57,686	$32,438	$25,362
Population in labor force (Labor Force Participation Rate)	73.2%	73.6%	76.3%	70.4%	78.9%	72.6%
Population employed	68.0%	64.8%	73.9%	65.2%	77.9%	72.6%
Unemployment Rate	7.1%	11.9%	3.1%	7.4%	1.3%	0.0%

Source: State of Colorado Demography Office

2.6 Mitigation Capabilities Assessment

As part of the 2018 plan update process, the County and participating jurisdictions developed a mitigation capability assessment. Capabilities include plans, policies, and procedures that are currently in place that contribute to reducing hazard losses. 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 questionnaire 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.

2.6.1 Gunnison County Mitigation Capabilities

This section presents Gunnison County's mitigation capabilities as well as the capabilities of the City of Gunnison, Town of Crested Butte, Town of Mt. Crested Butte, Arrowhead Fire Protection District, Crested Butte Fire Protection District, and Crested Butte South Metropolitan District that are applicable to the planning area. This assessment describes existing capabilities, programs, and policies currently in use to reduce hazard impacts or capabilities that could be used to implement hazard mitigation activities. It addresses regulatory mitigation capabilities and administrative/technical mitigation capabilities for the participating jurisdictions.

Gunnison County Regulatory Mitigation Capabilities

Table 2.5 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Gunnison County. Excerpts from applicable policies, regulations, plans and programs descriptions follow to provide more detail on existing mitigation capabilities.

Table 2.5. Gunnison County Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	In Place?	Comments
County Comprehensive Plan	Y	Crested Butte to Gunnison Corridor Comprehensive Plan and Upper Crystal River Valley Comprehensive Plan
Zoning ordinance	N	Abandoned in 1978 in favor of "performance-based" or "form-based" land use regulations
Subdivision ordinance	Y	
Growth management ordinance	N	No ordinance, but preferred growth scenarios in 2005 Crested Butte to Gunnison Corridor Comprehensive Plan, status quo future build-out study in 2005 Upper Crystal River Valley Comprehensive Plan
Floodplain ordinance	Y	Land Use Resolution Section 11-103
Other special purpose ordinance (stormwater, steep slope, wildfire)	Y	Land Use Resolution, Section 11-103: Flood Hazards, Section 11-104: Geologic Hazards, Section 11-105: Wildfire Hazards, Section 12-107: Fire Protection
Building codes	Y	International Building Code, International Fuel Gas Code, International Mechanical code, International Residential Code, International Energy Conservation Code
Fire department ISO rating		Varies by department
Erosion or sediment control program	Y	Land Use Resolution, Section 13-116
Stormwater management program	Y	Stormwater management follows Colorado State guidelines
Site plan review requirements	Y	Land Use Resolution, Section 13-103
Capital improvements plan	Y	

Regulatory Tool (ordinances, codes, plans)	In Place?	Comments
Economic development plan	Y	2016 One Valley Prosperity Plan
Local emergency operations plan	Y	Currently being updated
Other special plans	Y	Gunnison County CWPP, Upper Crystal River Valley CWPP, Saguache County Hazard Mitigation Plan, Western Saguache County CWPP, USGS and CGS studies on various geologic hazards
Flood insurance study or other engineering study for streams	Y	"FIS for Gunnison County, Colorado, Unincorporated Areas" dated May 16, 2013
Elevation certificates (for floodplain development)	Y	

Source: www.gunnisoncounty.org, HMPC

As indicated in the table above, Gunnison County has several plans and programs that guide the County's mitigation of development in hazard-prone areas. Some of these plans and programs are described in more detail below.

Crested Butte to Gunnison Corridor Comprehensive Plan

The Crested Butte to Gunnison Corridor Comprehensive Plan provides a general statement of intended land use and environmental practices in the Crested Butte to Gunnison corridor. On request from the Gunnison County Planning Commission, the Crested Butte to Gunnison Corridor Comprehensive Plan developers examined future growth scenarios based on the assumption that trends in land use would remain the same over time. Population projections for the year 2020 were obtained from the Colorado State Demographer's Office to estimate population density in the land use planning areas. Estimated population growth rates were based on average growth rates from 1990-2000 and 1999-2000. The growth rates for the 1990-2000 period varied widely from 1.55 in the City of Gunnison to 8.87 in Pitkin. The county-wide growth rate was 3.11. Growth rates from 1999-2000 were much more moderate, and even negative in Pitkin. The county-wide growth rate was 2.14 from 1999-2000. These development scenarios took into account natural hazard areas such as floodplains, avalanches chutes, geologic constraint areas, etc., and assumed that development would not occur in those locations.

Upper Crystal River Valley Comprehensive Plan

The Upper Crystal River Valley Comprehensive Plan was designed to provide direction for land use in the Upper Crystal River watershed within Gunnison County. The Plan provided profiles of several natural hazards, including geologic constraints, flooding, and wildfire in the watershed, including the Town of Marble. The slope profile was also relevant as it relates to potential risk of avalanches, severe wildfires, debris flows, landslides, and mudslides. Taking hazard locations into account, the Upper Crystal River Valley Comprehensive Plan steering committee developed land use

recommendations based on the findings of the plan and a community-based survey distributed to Upper Crystal River watershed residents. The survey respondents expressed significant support for protecting the local environment and confining future development near existing development. The steering committee's recommendations reflected these priorities. Some of the recommendations, while not related explicitly to hazard mitigation, have mitigating impacts. For example, the recommendations to require developers to build at least 100 feet away from streams can have the dual benefit of protecting viewsheds and keeping development out of potential flood zones.

Gunnison County Community Wildfire Protection Plan

The Gunnison County CWPP was completed in 2011. The fire plan outlines the County's fire response capabilities and mitigation strategies. The Gunnison County CWPP was built on several existing community-specific CWPPs and wildfire operating plans. 32 CWPP communities and seven areas of special interest were identified within Gunnison County's wildland urban interface (WUI). An exhaustive GIS analysis was used to determine each community's risk to wildland fire. No community was ranked lower than moderate risk, and some were ranked as extreme risk. Mitigation recommendations, such as fuel-breaks and defensible space projects, were provided for all 32 communities. The CWPP also took inventory of the wildland fire mitigation capabilities among the several fire departments in the County. Recommendations were made for increasing firefighter safety, improving training, and enhancing local water supplies for wildfire response. Representatives from local, regional, state, and federal agencies collaborated throughout the planning process and assisted with plan development. It should be noted that while the 2011 CWPP is a valuable tool, our intent going forward is to develop community-specific CWPP's, which will allow for greater focus on each communities unique characteristics, risk, and gaps.

Western Saguache County Community Wildfire Protection Plan

The Western Saguache County CWPP was completed in 2008. The fire plan outlines the fire response capabilities and mitigation strategies in this area of the County. Much of the fire protection responsibility for western Saguache County falls to Gunnison area fire protection districts; emergency personnel from the Gunnison County area are able to provide a more timely response than personnel in eastern Saguache County. The plan made a number of recommendations that impact communities in the Saguache portion of the Gunnison County response area, namely Sargents, Gold Basin, and Vulcan. Wildland fire mitigation recommendations from the CWPP include:

- Provide FireWise information to all property owners with structures on their land and new property owners and applicants for building permits.
- Work with County Commissioners on wildland fire standards for subdivision developments.

- Conduct one FireWise workshop for WUI residents.
- Provide interested parties with FireWise onsite consultations.
- Mow safety zones in the vicinity of Gold Basin and Vulcan on a bi-annual basis or when grass growth makes it necessary.
- Wildland firefighter training for Gunnison Fire Protection District personnel. Get 6 more firefighters qualified as FF2 plus increase qualifications of existing personnel.
- Wildland firefighter training for Sargents personnel. Get nine more firefighters qualified as FF2.
- Add five more sets of web-gear and tools to Sargents wildland fire cache.
- Develop two additional dry hydrant water sources in the Sargents area.
- Thin and mow along WUI evacuation routes.
- Improve natural vegetation resistance to wildfire using prescribed burning.
- Complete Vulcan hazardous fuel treatments.
- Develop Fuels Mitigation Plan for Vulcan.
- Acquire five new handheld radios.
- Develop Gold Basin fuelbreak complex.
- Acquire five new handheld radios.
- Develop Gold Basin fuelbreak complex.

GIS maps illustrated recommended locations for wildland fire mitigation projects in Deer Haven, Sargents, Gold Basin, and Vulcan.

Saguache County Multi-Hazard Mitigation Plan

The Saguache County Multi-Hazard Mitigation Plan was approved 2/20/2018. The Plan covers communities in western Saguache County, which falls within the Gunnison County Emergency Response Area. The Plan states that the Gunnison Fire Protection District provides fire response and protection for the Sargents subdivision through an intergovernmental agreement. The Saguache County HMP lists mitigation recommendations from the Western Saguache CWPP but does not list other actions specific to the portion of Saguache in the Gunnison County response area. Those mitigation actions are discussed previously in the *Western Saguache County Community Wildfire Protection Plan, 2008* section.

Gunnison County Land Use Resolution

The purpose of the Gunnison County Land Use Resolution is to promote health, safety, general welfare, and the environment; simplify the land use planning and regulatory review process; protect the heritage of the County's rural character; provide for orderly use of land; preserve neighborhood character; encourage housing diversity; evaluate cumulative impacts; encourage innovations; regulate land use based on impacts; and not to deprive all reasonable economic use of real property. The intent of the code is to regulate development and activities in Gunnison 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. The code includes specific standards for developing in areas subjects to flooding, geologic hazards, and wildland fire in Article 11.

Gunnison County Administrative and Technical Mitigation Capabilities

Table 2.6 identifies the County personnel responsible for activities related to mitigation and loss prevention in Gunnison County.

Table 2.6. Gunnison County Administrative/Technical Mitigation Capabilities

Personnel Resources	In Place?	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Y	Community and Economic Development Department	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Y	Community Development Department/Building Office	
Planner/engineer/scientist with an understanding of natural hazards	Y	Community and Economic Development Department Director	
Personnel skilled in GIS	Y	GIS/Maps	
Full time building official	Y	Community Development Dept./Building Inspector	
Floodplain manager	Y	Community Development Dept. /Assistant Director	
Emergency manager	Y	Emergency Management	
Grant writer	Y	Emergency Management (for mitigation-relevant grants)	
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Y	GIS/Maps	Flood, geologic hazards, and wildfire, address points, critical facilities, structure footprints, parcels
Warning Systems/Services	Y	Emergency Management	Code Red Notification System, Notify Me, Facebook, Twitter.

Gunnison County Financial Mitigation Capabilities

Table 2.7 Identifies County funds used for mitigation and loss prevention activities.

Table 2.7. Gunnison County Financial Mitigation Capabilities

Funded Mitigation Activities	In Place?	Comments
Levy for Specific Purposes with Voter Approval	N	
Utilities Fees	N	
System Development Fee	N	
General Obligation Bonds to Incur Debt	N	
Special Tax Bonds to Incur Debt	N	
Withheld Spending in Hazard-Prone Areas	N	
Stormwater Service Fees	N	
Capital Improvement Project Funding	N	
Community Development Block Grants	N	

Gunnison County Education and Outreach Mitigation Capabilities

Table 2.8 Identifies County Education and Outreach capabilities for communicating mitigation and loss prevention activities to business sectors and the public.

Table 2.8. Gunnison County Education and Outreach Capabilities

Education and Outreach Capabilities	In Place?	Comments
Local Citizen Groups That Communicate Hazard Risks	Y	Local Emergency Planning Committee (LEPC) and the Multi-Agency Coordination Group
Firewise	Y	
StormReady	Y	
Gunnison Basin Wildfire Council	Y	

The following departments are involved in hazard mitigation in Gunnison County:

Community and Economic Development Department

The Community Development Department is composed of three offices: Planning, Building, and Environmental Health. The Community Development Department is responsible for administering and maintaining land use regulations, issuing various permits related to

land use, administering the County's floodplain management regulations, and conducting site reviews.

Emergency Management Department

The Emergency Management Department serves all of Gunnison County and assists northwestern Saguache County with emergency management and coordination. The Department is responsible for maintaining and exercising the County's Emergency Operations Plan, as well as providing training and exercises in emergency management. The Emergency Management Department is also charged with maintaining the County's hazard mitigation plan and served as the lead during the 2018 HMP update process. The Department manages resources received from local, state, and private sources, and facilitates mutual aid agreements or intergovernmental agreements between agencies and jurisdictions.

Geographic Information Systems (GIS) Department

The GIS Department maintains the County's GIS system and databases. Their mapping services are used in the County's long-range planning and project site planning. Their datasets include geologic hazards, flood hazards, and wildfire hazards. These datasets and layers were used to determine the areas within the County that have the highest risk to certain natural hazards, which is discussed in Chapter 4 of this plan.

Planning Commission

The Planning Commission consists of seven members, including five regular members serving three-year terms and two alternates serving one-year terms. The Planning Commission makes recommendations to the County's governing body concerning matters related to planning, zoning, land use regulations and wildlife conservation. The Planning Commission administers and maintains the County's Land Use Resolution and floodplain studies. They conduct site inspections and hazard site reviews. The Planning Commission also works with the Board of Commissioners and the Community Development Department to develop planning documents such as master/comprehensive plans and corridor plans. The Planning Commission takes the County's natural hazards into account when developing these plans. Per House Bill 74-1041 passed by the state legislature in 1974 and the Local Government Land Use Control Enabling Act of 1974, the local government has the right to regulate land use in natural hazard areas.

Public Works Department

The Public Works Department is responsible for the repair, plowing, and maintenance of County, Forest Service, and BLM roads and bridges within the planning area.

2.6.2 City of Gunnison Mitigation Capabilities

City of Gunnison Regulatory Mitigation Capabilities

Table 2.9 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 Gunnison. Excerpts from applicable policies, regulations, plans, and program descriptions follow to provide more detail on existing mitigation capabilities.

Table 2.9. City of Gunnison Regulatory Mitigation Capabilities Matrix

Regulatory Tool (ordinances, codes, plans)	In Place?	Comments
Master Plan (2007)	Y	Available at http://www.gunnisonco.gov/Planning/City%20of%20Gunnison%20Master%20Plan.pdf
Comprehensive Plan Update	Y	2020 City of Gunnison Comprehensive Plan
Zoning ordinance	Y	City of Gunnison Land Development Code
Subdivision ordinance	Y	City of Gunnison Land Development Code
Growth management ordinance	N	
Floodplain ordinance	Y	Gunnison Municipal Code Title 14 Technical Codes
Building code	Y	Gunnison Municipal Code Title 14 Technical Codes
Fire department ISO rating	Y	
Erosion or sediment control program	Y	Construction erosion & Stormwater in Land Development Code. Per State erosion control mandates
Stormwater management program	Y	2012 Draft Stormwater and Erosion Control Standards are developed but have not been adopted:
Site plan review requirements	Y	City of Gunnison Land Development Code
Capital improvements plan	Y	
Local emergency operations plan	Y	Update Adoption February 2012
Flood insurance study or other engineering study for streams	Y	FIS and DFIRM effective date of May 16, 2013.
Elevation certificates (for floodplain development)	Y	Building Permit Files

Source: www.cityofgunnison-co.gov, HMPC

As indicated in the table above, the City of Gunnison has several plans and programs that guide the City's development, including avoidance of development in floodplains of

the Gunnison River and Tomichi Creek. Some of the plans identified in Table 2.9 are described in more detail in the following paragraphs.

City of Gunnison Master Plan, 2007

The Land Development Code regulates setbacks from river corridors and wetlands. Wetlands can help mitigate flood hazards by essentially functioning as a natural sponge for flood waters and rainfall runoff. It is important to protect these natural resources to avoid exacerbating flood hazards in the City.

City of Gunnison Land Development Code, 2014

The City of Gunnison Land Development Code was written to establish standards for proposed development within the City, protect and enhance the quality of life for the City's residents, establish a clear land development review process, provide guidelines for orderly development within the City, ensure adequate public facilities, and conserve property values. The City's Land Development Code deals specifically with natural hazards such as flooding, steep slopes, and avalanches. The City developed storm water management criteria based on the Denver Urban Drainage and Flood Control District's *Urban Storm Drainage Criteria Manuals (USDCM), Volumes 1-3*. The Land Development Code provides guidelines for when building on slopes is acceptable or prohibited. The City will conduct a review of any proposed development site where the slope is greater than or equal to 10% grade. New construction is also prohibited on any portion of a parcel that shows evidence of slope instability, avalanches, landslides, flooding, alluvial fans, and other hazards.

City of Gunnison Administrative and Technical Mitigation Capabilities

Table 2.10 identifies the City personnel responsible for activities related to mitigation and loss prevention in the City of Gunnison.

Table 2.10. City of Gunnison Administrative/Technical Mitigation Capabilities

Personnel Resources	In Place?	Department/Position
Planner/engineer with knowledge of land development/land management practices	Y	Community Development Director
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Y	City Engineer Public Works Dept.
Planner/engineer/scientist with an understanding of natural hazards	Y	Community Development Director
Personnel skilled in GIS	Y	Planning Department Staff

Personnel Resources	In Place?	Department/Position
Full time building official	Y	Community Development Dept Building Official
Floodplain manager	Y	Community Development Dept CD Director and Building Official
Emergency manager	Y	Community Development Dept. Fire Marshal
Grant writer	Y	Community Development Dept Staff Parks and Rec Staff
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Y	Community Development Dept Planning Staff
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Y	Police Department Chief and Captain

City of Gunnison Financial Mitigation Capabilities

Table 2.11 Identifies City of Gunnison funds used for mitigation and loss prevention activities.

Table 2.11. City of Gunnison Financial Mitigation Capabilities

Funded Mitigation Activities	In Place?	Comments
Levy for Specific Purposes with Voter Approval	N	
Utilities Fees	N	
System Development Fee	N	
General Obligation Bonds to Incur Debt	N	
Special Tax Bonds to Incur Debt	N	
Withheld Spending in Hazard-Prone Areas	N	
Stormwater Service Fees	N	
Capital Improvement Project Funding	N	
Community Development Block Grants	N	

City of Gunnison Education and Outreach Mitigation Capabilities

Table 2.12 Identifies City Education and Outreach capabilities for communicating mitigation and loss prevention activities to business sectors and the public.

Table 2.12. City of Gunnison Education and Outreach Capabilities

Education and Outreach Capabilities	In Place?	Comments
Local Citizen Groups That Communicate Hazard Risks	Y	Local Emergency Planning Committee (LEPC) and the Multi-Agency Coordination Group
Firewise	Y	
StormReady	Y	
Gunnison Basin Wildfire Council	Y	

The following departments are involved in hazard mitigation in the City of Gunnison:

Community Development Department

The City of Gunnison Community Development Department is responsible for administering the Land Development Code. The Building Department within Community Development provides floodplain management services for the City of Gunnison; the City's Building Official and Director are also Certified Floodplain Managers.

Planning and Zoning Commission

The Planning and Zoning Commission has a role in hazard mitigation as it relates to land use and development decisions. The Commission ensures compliance with the City's Land Development Code by reviewing development applications. The Commission also writes the City's Master Plan. The Commission works closely with the Community Development Department to guide land use in the City of Gunnison. Seven citizens are appointed by the City Council to serve on the Planning and Zoning Commission for five-year terms. One of the seven members functions as a liaison between the Commission and the City Council.

Public Works – Streets and Alleys

The Public Works Streets and Alleys Department is responsible for the repair, plowing, and maintenance of 35 miles of centerline streets and 24 miles of alleys within the City of Gunnison.

2.6.3 Town of Crested Butte Mitigation Capabilities

Town of Crested Butte Regulatory Mitigation Capabilities

The Town of Crested Butte has several regulatory plans and projects related to hazard mitigation. Table 2.13 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 Crested Butte. Excerpts from applicable policies, regulations, plans, and program descriptions follow to provide more detail on existing mitigation capabilities.

Table 2.13. Town of Crested Butte Regulatory Mitigation Capabilities Matrix

Regulatory Tool (ordinances, codes, plans)	In Place?	Comments
General or Comprehensive plan	Y	The Crested Butte Land Use Plan and the Crested Butte Area Plan
Zoning ordinance	Y	Crested Butte Town Code Chapter 16
Subdivision ordinance	Y	Crested Butte Town Code Chapter 17
Floodplain ordinance	Y	Crested Butte prohibits development in the 100 year floodplain. Established in Crested Butte Area Plan and Subdivision Regulations
Building code	Y	Crested Butte Town Code Chapter 18
Fire department ISO rating	Y	ISO Rating 5
Erosion or sediment control program	Y	Developers are encouraged to use low impact development strategies to minimize storm water drainage and minimize erosion.
Site plan review requirements	Y	Setbacks and snow shed issues are considered during design review by the Crested Butte Board of Zoning and Architectural Review
Capital improvements plan	Y	Available at Town of Crested Butte Finance Department
Local emergency operations plan	Y	Town of Crested Butte Disaster Emergency Management Plan, 2008 Crested Butte Flood Response Plan
Other special plans	Y	2014 Transportation Plan and 2009 Weed Management Plan
Flood insurance study or other engineering study for streams	Y	Flood Insurance Study (FIS) and Flood Insurance Rate Map (FIRM) Effective Date: May 16, 2013 Floodplain Information Report for Coal Creek Crested Butte, Colorado, September 18, 1992
Elevation certificates (for floodplain development)	Y	Any development must provide floodplain elevations and first floor elevations if it is located in Zone A on FEMA floodplain maps.

As indicated in the table above, the Town of Crested Butte has several plans and programs that guide the Town's mitigation of development in hazard-prone areas. Some of the plans identified in Table 2.13 are described in more detail in the following paragraphs.

Crested Butte Land Use Plan

The Crested Butte Land Use Plan provides guidance for decision-making regarding land use and development within the Town. The Land Use Plan's policies and recommendations take into account community goals and desires for growth and development. The Plan builds on and ties together several plans, planning projects and studies that were completed prior to the 1996 Land Use Plan.

Crested Butte Area Plan

The Crested Butte Area Plan establishes the three-mile planning area regulations and recommendations. Colorado Revised Statues (CRS) Sections 31-13-101 mandate that municipalities establish plans for the three-mile area from any point of the municipal boundary prior to annexation. Crested Butte's three-mile plan area is known as the Middle Slate River Valley. The Area Plan also addresses proposed development in unincorporated Gunnison County near the Town of Crested Butte. The Area Plan emphasizes the importance of mitigation activities in land development, such as wetland preservation, building away from steep grades and cliffs for wildland fire mitigation, open space planning, and maintaining wildlife corridors.

Crested Butte Charter and Municipal Code

The Crested Butte Charter and Municipal Code is the Town's governing document. It includes provisions for zoning, subdivision development, watershed protection, building codes, and floodplain regulations.

Town of Crested Butte Flood Plan

The Town of Crested Butte Flood Plan serves as an action plan for three different flooding scenarios: bank overtopping, obstructions on banks and bridges from debris (e.g. trees washed downstream and lodged under bridges), and bank failure. The plan focuses on Coal Creek as the main source of flooding in the Town. The plan proposes specific actions for dealing with each individual scenario. For bank overtopping, the Town would use sand bags, loose sand, reinforced visqueens, jersey barriers, and ADS culvert pipes. Initial efforts would work to contain flooding within existing stream banks. If containment is not feasible, the Town will then attempt to divert flood waters into containment structures or to another location of Coal Creek where water capacity increases.

Debris-caused flooding can result from trees or logs becoming trapped under bridges and blocking the flow of water. This is most likely to happen when water levels are already high, leaving less room for debris to pass under bridges or other structures. In the case of debris causing Coal Creek to backup and flood, the Town will attempt to remove the blockage with a backhoe, track hoe, pikes, grappling hooks, or chainsaws where safe and feasible. The Town has pinpointed the First Street bridge and the bridges on Elk Avenue and Second Street as the areas of most concern for debris-caused flooding.

The third scenario, bank failure, is mostly likely north of Maroon Avenue where no creek wall improvement projects have occurred. Creek walls on the outside curve of the stream are subjected to the most erosion and are the most likely to fail. It is especially important to monitor stream banks during periods of high water. Sand bags or "rip-rap" (e.g. rocks or concrete) can be used to stabilize stream banks. Jetty-like structures can also be used to divert waters away from weaker bank areas. The Town will monitor stream banks and evaluate specific sites for stabilization or diversion activities.

Town of Crested Butte Noxious Weed Control Program

The Town of Crested Butte manages weeds through integrated management methods outlined in the Town's Noxious Weed Management Plan ("Plan"). The intent of the Plan is to provide guidelines for managing state and locally designated noxious weeds which represent a threat to the environmental and economic value of lands in Crested Butte. The Plan can be found online at www.townofcrestedbutte.com under the Community Information tab.

Smith Hill Preservation Project

The Town helped to preserved 280 acres on Smith Hill at a cost of $4,600,000. The Gunnison Valley Land Preservation Board contributed $100,000 to the project. Mitigation aspects of the project included eradicating noxious weeks on the site.

Town of Crested Butte Administrative and Technical Mitigation Capabilities

2.14 identifies the Town personnel responsible for activities related to mitigation and loss prevention in the Town of Crested Butte.

Table 2.14. Town of Crested Butte Administrative/Technical Mitigation Capabilities

Personnel Resources	In Place?	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Y	Community Development	

Personnel Resources	In Place?	Department/Position	Comments
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Y	Community Development Director/Public Works Director	
Planner/engineer/scientist with an understanding of natural hazards	Y	Community Development Director	
Personnel skilled in GIS	Y	GIS Specialist	
Full time building official	Y	Building Department/Building Official and Building Inspector	
Floodplain manager	Y	Building Inspector	
Emergency manager	Y	Gunnison County Emergency Manager	Also Crested Butte Marshals and Crested Butte Fire Protection District
Grant writer	Y	Community Development Director	All department heads act as grant writers
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Y	GIS Specialist	
Warning Systems/Services	Y	Crested Butte FPD	

Town of Crested Butte Financial Mitigation Capabilities

Table 2.15 Identifies Town of Crested Butte funds used for mitigation and loss prevention activities.

Table 2.15. Town of Crested Butte Financial Mitigation Capabilities

Funded Mitigation Activities	In Place?	Comments
Levy for Specific Purposes with Voter Approval	N	
Utilities Fees	N	
System Development Fee	N	
General Obligation Bonds to Incur Debt	N	
Special Tax Bonds to Incur Debt	N	
Withheld Spending in Hazard-Prone Areas	N	
Stormwater Service Fees	N	
Capital Improvement Project Funding	N	

Funded Mitigation Activities	In Place?	Comments
Community Development Block Grants	N	

Town of Crested Butte Education and Outreach Mitigation Capabilities

Table 2.16 Identifies Town Education and Outreach capabilities for communicating mitigation and loss prevention activities to business sectors and the public.

Table 2.16. Town of Crested Butte Education and Outreach Capabilities

Education and Outreach Capabilities	In Place?	Comments
Local Citizen Groups That Communicate Hazard Risks	Y	Local Emergency Planning Committee (LEPC) and the Multi-Agency Coordination Group
Firewise	Y	
StormReady	Y	
Gunnison Basin Wildfire Council	Y	

The following departments are involved in hazard mitigation in the Town of Crested Butte:

Community Development Department - Building Division

The Building Division ensures compliance with the Town's zoning ordinances, issues and administers building permits, administers the floodplain ordinance, and conducts the building design review process. The Building Department is responsible for ensuring that structures in the Town adhere to building codes, which may include provisions related to natural hazard mitigation.

Community Development Department – Planning Division

The Planning Division manages current planning, long range planning, and special planning in the Town of Crested Butte. Generally, the Planning Division works to provide recommendations to the Town Council for land use and development within the Town.

Public Works – Street Division

The Streets Division of the Crested Butte Public Works Department maintains the Town's streets and alleys. Maintenance includes snow removal, construction, upkeep, and signage.

2.6.4 Town of Mt. Crested Butte Mitigation Capabilities

Town of Mt. Crested Butte Regulatory Mitigation Capabilities

Table 2.17 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 Mt. Crested Butte. Excerpts from applicable policies, regulations, plans, and program descriptions follow to provide more detail on existing mitigation capabilities.

Table 2.17. Town of Mt. Crested Butte Regulatory Mitigation Capabilities Matrix

Regulatory Tool (ordinances, codes, plans)	In Place?	Comments
General or Comprehensive plan	Y	Mt. Crested Butte Code
Zoning ordinance	Y	Mt. Crested Butte Code – Chapter 21
Subdivision ordinance	Y	Mt. Crested Butte Code – Chapter 18
Floodplain ordinance	Y	Mt Crested Butte Code – Chapter 23
Building code	Y	Mt. Crested Butte Code – Chapters 6 & 8 Currently working under 2012 I-Codes as amended
Fire department ISO rating		See Crested Butte FPD
Erosion or sediment control program	Y	Required for all major construction projects
Stormwater management program	Y	Required for all major construction projects
Site plan review requirements	Y	Mt. Crested Butte Code – Chapter 21
Capital improvements plan	Y	
Economic development plan	Y	Five Year Plan
Local emergency operations plan	Y	Housed with Mt. Crested Butte Police Department
Other	Y	Noxious/invasive weed management courses

As indicated in the table above, the Town of Mt. Crested Butte has several plans and programs that guide the Town's mitigation of development in hazard-prone areas. Some of the plans identified in Table 2.17 are described in more detail in the following paragraphs.

Mt. Crested Butte Code

The Mt. Crested Butte Code serves as a governing document for the Town and contains several codes related to the governance of Mt. Crested Butte, building regulations, fire prevention and protection, and zoning. Chapter 6 establishes building regulations and

details the various building and development codes used in Mt. Crested Butte. Chapter 8 summarizes open burning restrictions as related to fire prevention and protection and adopts the 2012 International Fire Code (as amended). Chapter 18 establishes subdivision regulations and wetland development standards, which can impact the Town's flood hazards. Chapter 21, Zoning, explains avalanche zone districts in the community and related development restrictions. Chapter 21 also establishes the procedures for structure design review.

Avalanche Mitigation Projects

Mt. Crested Butte installed avalanche fences in 2007 to mitigate the avalanche hazard. Avalanche signage was also put up to make residents aware of the danger. There have been no avalanches or people caught in avalanches, in this area, since signage and fencing has been in place.

Town of Mt. Crested Butte Administrative and Technical Mitigation Capabilities

Table 2.18 identifies the Town personnel responsible for activities related to mitigation and loss prevention in the Town of Mt. Crested Butte.

Table 2.18. Town of Mt. Crested Butte Administrative/Technical Mitigation Capabilities

Personnel Resources	In Place?	Department/Position
Planner/engineer with knowledge of land development/land management practices	Y	Community Development
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Y	Community Development
Personnel skilled in GIS	Y	Community Development
Full time building official	Y	Community Development
Emergency manager	Y	Town Manager/Police Chief
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Y	Community Development
Warning Systems/Services	Y	Reverse 911

Town of Mt. Crested Butte Financial Mitigation Capabilities

Table 2.19 Identifies Town of mt. Crested Butte funds used for mitigation and loss prevention activities.

Table 2.19. Town of Mt. Crested Butte Financial Mitigation Capabilities

Funded Mitigation Activities	In Place?	Comments
Levy for Specific Purposes with Voter Approval	N	
Utilities Fees	N	
System Development Fee	N	
General Obligation Bonds to Incur Debt	N	
Special Tax Bonds to Incur Debt	N	
Withheld Spending in Hazard-Prone Areas	N	
Stormwater Service Fees	N	
Capital Improvement Project Funding	N	
Community Development Block Grants	N	

Town of Mt. Crested Butte Education and Outreach Mitigation Capabilities

Table 2.20 Identifies Town Education and Outreach capabilities for communicating mitigation and loss prevention activities to business sectors and the public.

Table 2.20. Town of Mt Crested Butte Education and Outreach Capabilities

Education and Outreach Capabilities	In Place?	Comments
Local Citizen Groups That Communicate Hazard Risks	Y	Local Emergency Planning Committee (LEPC) and the Multi-Agency Coordination Group
Firewise	Y	
StormReady	Y	
Gunnison Basin Wildfire Council	Y	

The following departments are involved in hazard mitigation in the Town of Mt. Crested Butte:

Community Development Department

The Mt. Crested Butte Community Development Department is responsible for administering the Planning and Building functions for the Town. The Planning function includes preparing long-range plans, ensuring compliance with the town code as it relates to planning, conducting future growth studies, and processing certain land use applications. The Building function entails implementing and enforcing development laws, ordinances, and codes. The Building function also serves to ensure compliance with Downtown Development Authority design standards, and prepares building design reviews for the Planning Commission.

Town Maintenance – Streets and Roads

The Town Maintenance Streets and Roads division maintain and improves all roads and streets within Mt. Crested Butte. Streets and Roads also maintains culverts, wetlands, drainages, and retaining walls; the department plays an important role in flood mitigation in the Town.

2.6.5 Special Districts

Arrowhead Fire Protection District

The Arrowhead Fire Protection District (FPD) provides fire protection for the Arrowhead community in southwestern Gunnison County. The Arrowhead FPD is composed of approximately 10 firefighters, nine Emergency Medical Services (EMS) responders, and 10 logistics/support personnel. The Arrowhead community has its own CWPP, which identified high wildland fire risk areas and recommended mitigation projects. The Arrowhead FPD was also included in the 2011 Gunnison County CWPP. The Arrowhead FPD has gone to great lengths to educate residents and execute projects related to wildland fire mitigation. In 2011, the FPD conducted a wildland fire preplanning project, which included site visits from firefighters to educate residents about their unique wildland fire risk level. Each residence was categorized into one of three categories defined within the National Wildfire Coordinating Group (NWCG) Incident Response Pocket Guide. Firefighters then made recommendations to homeowners on how to improve their individual rating. This project collected data on the preparatory needs of the Arrowhead residences. The data for each residence was linked to GIS software for use during a wildland fire response.

The Arrowhead Improvement Association (AIA) has also played a significant role in wildland fire mitigation in the community. The AIA developed covenants and regulations for defensible space and wildland fire mitigation. The AIA routinely works with the FPD

to hold public outreach meetings and create and distribute wildland fire mitigation fliers to Arrowhead residents. The AIA Forest Manager works closely with the Colorado State Forest Service to obtain funding for mitigation projects. Through these partnerships, the majority of extreme wildland fire risk communities in the Arrowhead CWPP have been mitigated.

Table 2.21 and Table 2.22 summarize the plans, personnel, and ordinances with a role in hazard mitigation in the Arrowhead community.

Table 2.21. Arrowhead FPD Regulatory Mitigation Capabilities Matrix

Regulatory Tool (ordinances, codes, plans)	In Place?	Comments
General or Comprehensive plan	N	Gunnison County
Subdivision ordinance	Y	Arrowhead Improvements Association – Covenants and Regulations http://www.arrowhead1.org/pdf/docs/covenants.pdf http://www.arrowhead1.org/pdf/docs/regs_11-01-19.pdf
Floodplain ordinance	Y	Gunnison County Land Use Resolution Section 11-103
Other special purpose ordinance (stormwater, steep slope, wildfire)	Y	Gunnison County Land Use Resolution, Section 11-103: Flood Hazards, Section 11-104: Geologic Hazards, Section 11-105: Wildfire Hazards, Section 12-107: Fire Protection, Section 13, structural snowload requirements. Stormwater management follows Colorado State guidelines
Fire department ISO rating	ISO 9	
Erosion or sediment control program	Y	Gunnison County Land Use Resolution, Section 13-116
Site plan review requirements	N	Arrowhead Improvements Association – Design Review Committee
Capital improvements plan	N	Contact AIA Office @ (970)240-9599
Economic development plan	Y	Gunnison County 2011 Community Economic Development Plan
Local emergency operations plan	N	Arrowhead CWPP, Gunnison County CWPP, Arrowhead Evacuation Plan
Other special plans	Y	Gunnison County CWPP
Flood insurance study or other engineering study for streams	Y	"FIS for Gunnison County, Colorado, Unincorporated Areas" dated May 16, 2013
Elevation certificates (for floodplain development)	Y	Gunnison County

Table 2.22. Arrowhead FPD Administrative/Technical Mitigation Capabilities

Personnel Resources	In Place?	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	N	County Community Development Dept./Planner	Gunnison County
Engineer/professional trained in construction practices related to buildings and/or infrastructure	N		Gunnison County
Planner/engineer/scientist with an understanding of natural hazards	N		Gunnison County
Personnel skilled in GIS	N	County GIS/Maps Dept.	Gunnison County
Full time building official	N	County Community Development Dept./Building Inspector	Gunnison County
Floodplain manager	N	County Community Development Dept./Assistant Director	Gunnison County
Emergency manager	Y	Arrowhead Fire Protection District – Fire Chief, Gunnison County Emergency Manager	
Grant writer	Y	Arrowhead Improvements Association – Forest Manager (Fire mitigation grants), Arrowhead Improvements Association Board or their designee for other grants	
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	N	County GIS/Maps Dept.	Gunnison County has data for flood, geologic hazards, and wildfire, address points, critical facilities, structure footprints, parcels
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Y	Gunnison County Emergency Management	Gunnison County has opt-in Intrado Target Notification system

Arrowhead FPD Financial Mitigation Capabilities

Table 2.23 Identifies District funds used for mitigation and loss prevention activities.

Table 2.23. Arrowhead Fire Protection District Financial Mitigation Capabilities

Funded Mitigation Activities	In Place?	Comments
Levy for Specific Purposes with Voter Approval	N	
Utilities Fees	N	
System Development Fee	N	

Funded Mitigation Activities	In Place?	Comments
General Obligation Bonds to Incur Debt	N	
Special Tax Bonds to Incur Debt	N	
Withheld Spending in Hazard-Prone Areas	N	
Stormwater Service Fees	N	
Capital Improvement Project Funding	N	
Community Development Block Grants	N	

Arrowhead Fire Protection District Education and Outreach Mitigation Capabilities

Table 2.24 Identifies District Education and Outreach capabilities for communicating mitigation and loss prevention activities to business sectors and the public.

Table 2.24. Arrowhead Fire Protection District Education and Outreach Capabilities

Education and Outreach Capabilities	In Place?	Comments
Local Citizen Groups That Communicate Hazard Risks	Y	Local Emergency Planning Committee (LEPC) and the Multi-Agency Coordination Group
Firewise	Y	
StormReady	Y	
Gunnison Basin Wildfire Council	Y	

Crested Butte Fire Protection District

The Crested Butte Fire Protection District (CBFPD) provides fire protection, prevention, and rescue services for Crested Butte, Mt. Crested Butte, and the surrounding area. Their response area covers 220 square miles in the Crested Butte Valley. The CBFPD serves a population of roughly 2,500 people, although this number can swell to as many as 10,000 people during major tourist seasons. The CBFPD is governed by a Board of Directors consisting of five members. 35 volunteer firefighters and six paid staff members make up the CBFPD work force. The CBFPD was included in the 2011 Gunnison County CWPP. Nine CWPP communities were identified within the CBFPD response area. Seven of the CWPP communities were ranked as having a high or greater wildland fire hazard rating. Wildland fire mitigation projects were identified for each of the nine CWPP communities. The projects are executed on an ongoing basis with funding from the WRWC and Colorado State Forest Service. The CBFPD meets with subdivision HOAs annually.

Table 2.25 and Table 2.26 summarize the CBFPD's mitigation capabilities.

Table 2.25. Crested Butte Fire Protection District Regulatory Mitigation Capabilities Matrix

Regulatory Tool (ordinances, codes, plans)	In Place?	Comments
General or Comprehensive plan	Y	General or comprehensive plans for Mt. Crested Butte, Crested Butte, and Gunnison County
Zoning ordinance	Y	Zoning ordinances for Mt. Crested Butte and Crested Butte
Subdivision ordinance	Y	Subdivision ordinances for Mt. Crested Butte, Crested Butte, and Gunnison County
Other special purpose ordinance (stormwater, steep slope, wildfire)	Y	Gunnison County defensible space ordinances
Building code	Y	Building codes for Mt. Crested Butte, Crested Butte, and Gunnison County
Fire department ISO rating	Y	
Site plan review requirements	Y	Site plan review requirements for Mt. Crested Butte, Crested Butte, and Gunnison County
Local emergency operations plan	Y	

Table 2.26. Crested Butte Fire Protection District Administrative/Technical Capabilities

Personnel Resources	In Place?	Department/Position
Personnel skilled in GIS	Y	Gunnison County GIS/Maps Department
Full time building official	Y	Building officials for Mt. Crested Butte, Crested Butte, and Gunnison County
Emergency manager	Y	Gunnison County Emergency Manager
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Y	Gunnison County GIS/Maps Department
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Y	

Crested Butte Fire Protection District Financial Mitigation Capabilities

Table 2.27 Identifies District funds used for mitigation and loss prevention activities.

Table 2.27. Crested Butte Fire Protection District Financial Mitigation Capabilities

Funded Mitigation Activities	In Place?	Comments
Levy for Specific Purposes with Voter Approval	N	
Utilities Fees	N	
System Development Fee	N	
General Obligation Bonds to Incur Debt	N	
Special Tax Bonds to Incur Debt	N	
Withheld Spending in Hazard-Prone Areas	N	
Stormwater Service Fees	N	
Capital Improvement Project Funding	N	
Community Development Block Grants	N	

Crested Butte Fire Protection District Education and Outreach Mitigation Capabilities

Table 2.28 Identifies District Education and Outreach capabilities for communicating mitigation and loss prevention activities to business sectors and the public.

Table 2.28. Crested Butte Fire Protection District Education and Outreach Capabilities

Education and Outreach Capabilities	In Place?	Comments
Local Citizen Groups That Communicate Hazard Risks	Y	Local Emergency Planning Committee (LEPC) and the Multi-Agency Coordination Group
Firewise	Y	
StormReady	Y	
Gunnison Basin Wildfire Council	Y	

Crested Butte South Metropolitan District

Crested Butte South Metropolitan District is a special service district that supplies municipal-type services, such as water and sanitation, to residents. As a special

district, Crested Butte South Metropolitan District meets FEMA's definition of a "local government." The District developed a responsible water use resolution which was passed by the District's Board of Directors. It educates residents on the use of water, as well as restricting water use to certain times of the day. This can help mitigate drought and the related wildland fire impacts to the community. The District is primarily concerned with man-made hazards as they relate to future growth in the community. Crested Butte South Metro is currently at roughly 45% build out, so the potential exists for a population boom to occur. The District's regulatory and administrative/technical mitigation capabilities are summarized in Table 2.29 and Table 2.30.

Table 2.29. Crested Butte South Metropolitan District Regulatory Mitigation Capabilities Matrix

Regulatory Tool (ordinances, codes, plans)	In Place?	Comments
Zoning ordinance	Y	CB South POA (Property Owners Association) www.cbsouth.net
Subdivision ordinance	Y	Same as above
Floodplain ordinance	Y	FEMA through Gunnison County Planning
Building code	Y	Gunnison County UBC
Fire department ISO rating	Y	5
Stormwater management program	N	No storm water infrastructure
Site plan review requirements	Y	CB South POA
Capital improvements plan	Y	CB South Metro District cbsouthmetro@crestedbutte.net
Local emergency operations plan	Y	Emergency Response Plan
Other special plans	Y	Source Water Protection Plan
Elevation certificates (for floodplain development)	Y	CB South Metro District

Table 2.30. Crested Butte South Metropolitan District Administrative/Technical Mitigation Capabilities

Personnel Resources	In Place?	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Y	Norm Whitehead P.E. Independent Contractor	CB South Resident

Personnel Resources	In Place?	Department/Position	Comments
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Y	Norm Whitehead P.E.	
Planner/engineer/scientist with an understanding of natural hazards	Y	Norm Whitehead P.E.	
Personnel skilled in GIS	Y	Norm Whitehead P.E.	
Full time building official	Y	Dan Vaughn CB South POA	Planning Specialist
Emergency manager	N	Scott Morrill Gunnison County	Personnel at county level
Other personnel	Y	CB South Metro District Crew	We have a lot of equipment
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	N	Mike Pelletier Gunnison County	Personnel at county level
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	N	Gunnison County Emergency Management	Reverse 911

Crested Butte South Metropolitan District Financial Mitigation Capabilities

Table 2.31 Identifies District funds used for mitigation activities

Table 2.31. Crested Butte South Metropolitan District Financial Mitigation Capabilities

Funded Mitigation Activities	In Place?	Comments
Levy for Specific Purposes with Voter Approval	N	
Utilities Fees	N	
System Development Fee	N	
General Obligation Bonds to Incur Debt	N	
Special Tax Bonds to Incur Debt	N	
Withheld Spending in Hazard-Prone Areas	N	
Stormwater Service Fees	N	
Capital Improvement Project Funding	N	
Community Development Block Grants	N	

Crested Butte South Metropolitan District Education and Outreach Mitigation Capabilities

Table 2.32 Identifies District Education and Outreach capabilities for communicating mitigation and loss prevention activities to business sectors and the public.

Table 2.32. Crested Butte South Metropolitan District Education and Outreach Capabilities

Education and Outreach Capabilities	In Place?	Comments
Local Citizen Groups That Communicate Hazard Risks	Y	Local Emergency Planning Committee (LEPC) and the Multi-Agency Coordination Group
Firewise	Y	
StormReady	Y	
Gunnison Basin Wildfire Council	Y	

Mt. Crested Butte Water and Sanitation District

The Mt. Crested Butte Water and Sanitation (MCBWS) District was created in 1963. The organization is governed by an elected Board of Directors composed of five Directors who serve four-year terms. The District is currently staffed by 13 full-time employees. The MCBWS District serves roughly 6,500 residential and commercial customers, although this number can increase to over 10,000 during ski season. The District's boundaries cover 3.055 square miles and encompass the Town of Mt. Crested Butte and the Meridian Lake Park subdivision. The Water and Sanitation District's mitigation capabilities include newsletters and policies that encourage efficient water use among their customers. The District has also placed sand bags at the East River to mitigate flood impacts.

Table 2.33 summaries the administrative and technical mitigation capabilities for the Mt. Crested Butte Water and Sanitation District.

Table 2.33. Mt. Crested Butte Water and Sanitation District Administrative/Technical Mitigation Capabilities

Personnel Resources	In Place?	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Y	Community Development Depts./Planners	Resources in both Gunnison County and Town of Mt. Crested Butte

Personnel Resources	In Place?	Department/Position	Comments
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Y	Community Development Dept.	Resources in Town of Mt. Crested Butte
Planner/engineer/scientist with an understanding of natural hazards	Y		
Personnel skilled in GIS	Y	County GIS/Maps Dept. and Mt. Crested Butte Community Development Dept.	Resources in both Gunnison County and Town of Mt. Crested Butte
Full time building official	Y	County Community Development Dept./Building Inspector and Mt. Crested Butte Community Development Dept.	Resources in both Gunnison County and Town of Mt. Crested Butte
Floodplain manager	Y	County Community Development Dept./Assistant Director	Resources in Gunnison County
Emergency manager	Y	County Emergency Management and Mt. Crested Butte Town Manager/Police Chief	Resources in both Gunnison County and Town of Mt. Crested Butte
Grant writer	Y	Gunnison County Emergency Management (for mitigation-relevant grants)	Resources in Gunnison County
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Y	County GIS/Maps and Mt. Crested Butte Community Development Dept.	County has data for flood, geologic hazards, and wildfire, address points, critical facilities, structure footprints, parcels
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Y	County Emergency Management	County has opt-in Intrado Target Notification system/Mt. Crested Butte has Reverse 911

Mt. Crested Butte Water and Sanitation District Financial Mitigation Capabilities

Table 2.34 Identifies District funds used for mitigation and loss prevention activities

Table 2.34. Mt. Crested Butte Water and Sanitation Financial Mitigation Capabilities

Funded Mitigation Activities	In Place?	Comments
Levy for Specific Purposes with Voter Approval	N	
Utilities Fees	N	
System Development Fee	N	

Funded Mitigation Activities	In Place?	Comments
General Obligation Bonds to Incur Debt	N	
Special Tax Bonds to Incur Debt	N	
Withheld Spending in Hazard-Prone Areas	N	
Stormwater Service Fees	N	
Capital Improvement Project Funding	N	
Community Development Block Grants	N	

Mt. Crested Butte Water and Sanitation District Education and Outreach Mitigation Capabilities

Table 2.35 Identifies District Education and Outreach capabilities for communicating mitigation and loss prevention activities to business sectors and the public.

Table 2.35. Gunnison County Education and Outreach Capabilities

Education and Outreach Capabilities	In Place?	Comments
Local Citizen Groups That Communicate Hazard Risks	Y	Local Emergency Planning Committee (LEPC) and the Multi-Agency Coordination Group
Firewise	Y	
StormReady	Y	
Gunnison Basin Wildfire Council	Y	

2.6.6 Participation in National Flood Insurance Program

Gunnison County, the Town of Crested Butte, City of Gunnison, and Town of Mt. Crested Butte all currently participate in the National Flood Insurance Program (NFIP). The NFIP allows private property owners to purchase affordable flood insurance and enables the community to retain its eligibility to receive certain federally backed monies and disaster relief funds. Gunnison County joined the NFIP on September 29, 1989, the City of Gunnison joined on April 18, 1983, and Crested Butte joined on September 4, 1985. Mt Crested Butte joined on April 28, 2008 as part of the emergency program.

Gunnison County and the City of Gunnison also participate in the Community Rating System (CRS). The CRS is a voluntary program for NFIP-participating communities. It provides flood insurance discounts to policyholders in communities that provide extra measures of flood protection above the minimum NFIP requirements. Gunnison County currently holds a CRS rating of Class 8, and the City of Gunnison is rated at Class 9. The Class 8 rating provides a 10% flood insurance discount for policyholders within a

special flood hazard area (SFHA) and a 5% discount for those outside of the SFHA. The Class 9 rating provides a 5% discount for policyholders both within and outside of the SFHA.

The flooding discussion in *Section 4.3.4 Vulnerability by Hazard* includes greater detail on flood insurance coverage and claims for NFIP participant communities in Gunnison County.

2.6.7 Other State, Regional, and Local Agencies Related to Hazard Mitigation

Colorado Office of Emergency Management

The Colorado Office of Emergency Management (COEM) 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 and exercise support. Services are made available through local emergency managers supported by COEM staff assigned to specific areas of the state.

Colorado Geological Survey

The Colorado Geological Survey is a state government agency within the Colorado Department of Natural Resources 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. The Colorado Avalanche Information Center is housed in the Colorado Geological Survey.

Colorado State Forest Service

The mission of the Colorado State Forest Service is to provide for the stewardship of forest resources and to reduce related risks to life, property, and the environment for the benefit of present and future generations. Its fire preparedness and response strategic priority is to provide leadership in wildland fire protection for state and private lands in Colorado and reduce wildfire-related loss of life, property, and critical resources.

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. The CWCB has promulgated new floodplain rules and regulations that became effective on January 14, 2011. Increased protection for public health, safety, and welfare in the state is the primary reason for updating Colorado's floodplain rules. The CWCB's rules aim to reduce flood losses through sound flood protection actions, which are implemented at the local level and supported by State and Federal programs. Key provisions of the new floodplain rules include: higher freeboard for structures, a 0.5 foot floodway, and additional protection for "critical facilities" in the 100-year floodplain.

Colorado Department of Transportation

The Colorado Department of Transportation (CDOT) conducts planning and projects that relate to hazard mitigation. These include design of bridges to withstand scouring and convey flood flows in addition to rockfall hazard identification and mitigation along the State's highway system. CDOT employs message signs, road closure devices, and radio advisories to warn motorists of dangerous driving conditions and road closures due to severe weather or rockfall incidents. CDOT has a number of specialized programs involved in hazard mitigation, including the Avalanche Management Program and the Rockfall Program. CDOT's Avalanche Management Program involves a three-phased approach. The first phase trains CDOT staff in avalanche awareness, survival, and rescue. The second phase focuses on avalanche forecasting by monitoring conditions and recommending road closures or avalanche control operations. Avalanche control operations are implemented in the third phase of the program. Operations may include triggering avalanches in a safe, controlled environment; closing highways; or setting up structures to divert avalanches. The CDOT Rockfall Program, administered by the Geotechnical Program, entails design and implementation of rockfall hazard mitigation projects. The Rockfall Program puts control devices in place to prevent rocks from falling onto highways, and posts safety signs to alert motorists of rockfall dangers along state highways. The Rockfall Program uses the Colorado Rockfall Hazard Rating System (CRHRS), discussed in **Chapter 4 Risk Assessment**, to prioritize rockfall hazard areas for mitigation.

Gunnison Basin Wildfire Council

Gunnison County is fortunate to have an active and engaged fire safe council called the Gunnison Basin Wildfire Council (GBWC). The GBWC is comprised of representatives from local fire districts and departments, Colorado State Forest Service, United States Forest Service, Bureau of Land Management, Gunnison County Sheriff, and Gunnison County OEM. The GBWC has been involved in the development of local CWPPs since the 1990s. The GBWC formed the core stakeholder group for the development of this

countywide CWPP and steered its development through participation at meetings, providing comments on drafts, and assisting with field visits.

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, fire protection districts, 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 this plan and other community specific CWPPs.

Colorado Division of Water Resources (DWR)

Also known as the *Office of the State Engineer,* administers water rights, issues water well permits, represents Colorado in interstate water compact proceedings, monitors streamflow and water use, approves construction and repair of dams and performs dam safety inspections, issues licenses for well drillers and assures the safe and proper construction of water wells, and maintains numerous databases of Colorado water information.

Colorado Division of Natural Resources (CDNR)

The Colorado Department of Natural Resources was created with a mission to develop, preserve and enhance the state's natural resources for the benefit and enjoyment of current and future citizens and visitors.

United States Forest Service (USFS)

The United States Forest Service is an agency of the U.S. Department of Agriculture that administers the nation's 154 national forests and 20 national grasslands.

BLM

The Bureau of Land Management is an agency within the United States Department of the Interior responsible for administering public lands. With oversight over 247.3 million acres, it governs one eighth of the country's landmass.

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 Gunnison County

The planning process and development of the Gunnison County Natural Hazard Mitigation Plan has its roots in meetings and activities that began in September 2002 and continued through 2020. The first version of this plan was approved by FEMA in 2003 and was the first local hazard mitigation plan in Colorado and one of the first in the nation, completed in accordance with the DMA 2000 regulations. Since the original development of the plan, FEMA guidance for local hazard mitigation plans has been refined and updated. This plan underwent an update in 2018-2020 under the coordination of the Gunnison County Emergency Manager as part of the required five year update cycle. This update was necessary to conform to the latest FEMA guidance and improve the plan in general. The development of the plan followed a structured planning process that involved various local government departments and other public and private stakeholders. The planning process is described further in this section.

3.1.1 Plan Section Review and Analysis – 2020 Update

During the 2020 update process, the HMPC updated each section of the previously approved plan to include new information and improve the organization and formatting of the plan's contents. The HMPC analyzed each section using FEMA's local plan update guidance to ensure that the plan met the latest requirements.

The 2020 plan update examined multiple hazards, as well as providing more detailed assessments of the hazards discussed in the 2013 plan. The step-by-step process used in the 2020 plan is very similar to that of the 2013 plan.

3.2 Local Government Participation

The DMA planning regulations and guidance stress that each local government seeking FEMA approval of their mitigation plan must participate in the planning effort in the following ways:

- Participate in the process as part of the HMPC,
- 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 the Gunnison County Natural Hazard Mitigation Plan's HMPC, "participation" meant:

- Attending and participating in the HMPC meetings;
- Establishing/reconvening a local steering committee;
- Providing available data requested of the HMPC;
- Providing/updating the hazard profile and vulnerability details specific to jurisdictions;
- Developing/updating the local mitigation strategy (action items and progress/status);
- Reviewing and providing comments on the plan drafts;
- Advertising, coordinating, and participating in the public input process; and
- Coordinating the formal adoption of the plan by the governing boards.

Gunnison County's Natural Hazard Mitigation Plan is a multi-jurisdictional plan that geographically covers everything within Gunnison County's jurisdictional boundaries and emergency response area. Jurisdictions that participated in the 2020 Gunnison County All-Hazard Mitigation Plan included the County, City of Gunnison, Town of Crested Butte, and Town of Mt. Crested Butte. Jurisdictions that fully participated in the update of this plan in 2018 by meeting the previous participation definition included unincorporated Gunnison County, City of Gunnison, Town of Crested Butte, Town of Mt. Crested Butte, Arrowhead FPD, and the Crested Butte FPD, and Crested Butte South Metro District.

3.3 The 10-Step Planning Process

Gunnison County Emergency Management established the planning process for Gunnison County's plan using the DMA planning requirements and FEMA's associated guidance. This guidance is 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, Gunnison County Emergency Management integrated a more detailed 10-step planning process used for FEMA's CRS and Flood Mitigation Assistance programs. Thus, the modified 10-step process used for this plan meets the requirements of five major programs: FEMA's Hazard Mitigation Grant Program, Pre-Disaster Mitigation program, CRS, Flood Mitigation Assistance Program, and new flood control projects authorized by the U.S. Army Corps of Engineers (USACE).

Table 3.1 shows how the modified 10-step process fits into FEMA's four-phase process.

Table 3.1. FEMA's Four-Phase Process and the 10-Step CRS Process Used to Develop Gunnison 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
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

3.3.1 Phase 1: Organize Resources

Planning Step 1: Organize the Planning Effort

Gunnison County Emergency Management established the framework and organization for the development of the plan. The Gunnison County Emergency Manager took the lead on coordinating and reconvening the HMPC with the guidance from the Mitigation Planning Specialist from the Colorado Division of Homeland Security and Emergency Management. The Emergency Manager identified the key county, municipal, and other local government and initial stakeholder representatives. Invitations were emailed 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 and special districts participated on the HMPC and the development of the plan:

Table 3.2. HMPC Participants

Jurisdiction	Participating Departments and Agencies
Gunnison County	Emergency Management
	Administration
	Public Works
	Community Development
	Health and Human Services
	GIS
	Sheriff's Department
	Regional Airport
	Gunnison County/Colorado State University Extension
City of Gunnison	Administration
	Police Department
Town of Crested Butte	Marshal's Office
	Planning and Community Development
Town of Mt. Crested Butte	Police Department
	Community Development
Special Districts	Arrowhead Fire Protection District
	Crested Butte Fire Protection District
	Crested Butte South Metropolitan District

A list of specific HMPC representatives is included in Appendix C. Other local, state, federal, and private stakeholders invited to participate in the HMPC are discussed under Planning Step 3.

During the planning process the HMPC communicated with a combination of face-to-face meetings, phone interviews, and email correspondence. Three planning meetings with the HMPC were held during the plan's update between January 2018 and May 2018. The meeting schedule and topics are listed in the following table. The meetings were held in Gunnison, at the Gunnison County Emergency Operations Center (EOC) and were approximately 3 hours long. The sign-in sheets and agendas for each of the meetings are located in Appendix B.

Table 3.3. Schedule of HMPC Meetings

HMPC	Meeting Topic	Meeting Date	Comments
1	Introduction, overview, Section 2 and Section 4	January 19, 2018	
2	Finalize Section 2 and 4; Begin Section 5	March 21, 2018	
3	Finalize Section 5; Begin Human Caused Hazards	May 02, 2018	
4	Finalize Human Caused Hazards, Discuss Final HMP	January 23, 2019	Meeting was originally scheduled for June 20, 2018, but had to be cancelled & rescheduled.
5	Public Meeting	January 31, 2019 in Crested Butte And February 4, 2019 in Gunnison	Meeting was originally scheduled for July 18, 2018, but had to be cancelled & rescheduled.

During the kickoff meeting, Gunnison County Emergency Management presented information on the scope and purpose of the plan, participation requirements of HMPC members, and the proposed project work plan and schedule. Participants were provided worksheets to facilitate the collection of information needed to support the plan, such as data on historic hazard events, values at risk, and current capabilities.

Planning Step 2: Involve the Public

The first public meeting was scheduled for June 20, 2018 but had to be rescheduled to January 31st and February 4th, 2019. Advertisements were placed in the local newspapers, including the *Crested Butte News, Gunnison Country Times,* and the *Gunnison Country Shopper*. The ads encouraged residents to attend and learn about the hazards that could impact the County and how the plan could help reduce those impacts. The public was given an opportunity to review and comment on the draft plan. Record of public advertisements, public surveys, and meeting sign-in sheets are on file with Gunnison County Emergency Management and provided in Appendix B.

Planning Step 3: Coordinate with Other Departments and Agencies

Early in the planning process, the HMPC determined that data collection, mitigation strategy development, and plan approval would be greatly enhanced by inviting state and federal agencies and organizations to participate in the process. Based on their involvement in hazard mitigation activities, their role in land stewardship in the County, or their role in public safety, representatives from the following agencies were invited to participate on the HMPC:

- Mt. Crested Butte Water and Sanitation District
- Colorado Office of Emergency Management
- Colorado Department of Parks and Wildlife
- Colorado Department of Transportation
- Colorado Department of Local Affairs
- Colorado Division of Water Resources
- Colorado State Forest Service
- Colorado State Patrol
- Colorado Water Conservation Board
- U.S. Forest Service
- U.S. Bureau of Land Management
- Montrose Interagency Fire Management Unit
- Curecanti National Recreation Area/Black Canyon National Park
- U.S. Bureau of Reclamation
- National Weather Service
- Natural Resources Conservation Service
- Carbondale Fire Protection District
- Upper Gunnison River Water Conservancy District
- Chaffee County Emergency Management
- Garfield County Emergency Management
- Saguache County Emergency Management
- Hinsdale County Emergency Management
- Montrose County Emergency Management
- Delta County Emergency Management
- Shavano Conservation District
- Gunnison County Metropolitan Recreation District
- Skyland Metropolitan District
- West Region Wildfire Council

Many of these stakeholders participated in the process by attending HMPC meetings. They were also given an opportunity to review and comment on the draft plan.

Other Community Planning Efforts and Hazard Mitigation Activities

Hazard mitigation planning involves identifying existing policies, tools, and actions that will reduce a community's risk and vulnerability from natural hazards. As such, this plan was coordinated with, and builds off of, other related planning efforts that help reduce hazard losses. Gunnison County uses a variety of comprehensive planning mechanisms, such as comprehensive 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.

- 2017 Gunnison County Emergency Operations Plan
- 2011 Gunnison County CWPP
- Gunnison County Land Use Resolution, reprinted in 2006
- 2005 Crested Butte to Gunnison Corridor Comprehensive Plan
- 2013 Gunnison County All-Hazard Mitigation Plan
- 1988 Colorado Landslide Hazard Mitigation Plan
- 1972 Colorado Geological Survey Miscellaneous Publication 8 “Engineering Geologic Factors of the Marble Area, Gunnison County, Colorado”

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.

3.3.2 Phase 2: Assess Risks

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

Gunnison County Emergency Management led the HMPC in a comprehensive research effort to identify and document all the hazards that have, or could, impact the Gunnison County response area. Data collection worksheets were used in this effort to aid in determining hazards and vulnerabilities and where risk varies across the response area. Where data permitted, GIS was used to display, analyze, and quantify hazards and vulnerabilities. The HMPC conducted a capability assessment to review and document the response 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 and Hazard Profile.**

3.3.3 Phase 3: Develop the Mitigation Plan

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

Gunnison County Emergency Management 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. This process and its results are described in greater detail in **Chapter 5 Mitigation Strategy**.

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, Gunnison County Emergency Management produced a complete first draft of the plan. This complete draft was posted for HMPC review and comment. 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. Gunnison County Emergency Management integrated comments and issues from the public, as appropriate, along with additional internal review comments and produced a final draft for the Colorado Office of Emergency Management and FEMA Region VIII to review and approve, contingent upon final adoption by the governing boards of each participating jurisdiction.

3.3.4 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

HMPC members prioritize mitigation actions at the June 7, 2012 meeting.

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 Gunnison County response 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 Gunnison County.

4 RISK ASSESSMENT AND HAZARD PROFILE

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 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 *Local Mitigation Planning Handbook* (2013), which breaks the assessment down to a four-step process:

1) Describe Hazards
2) Identify Community Assets
3) Analyze Risks
4) Summarize Vulnerability

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 Gunnison County response area and describes why some hazards have been omitted from further consideration.
- **Section 4.2 Hazard Profiles** discusses the threat to the response area and describes previous occurrences of hazard events and the likelihood of future occurrences. Maps of the hazard areas are provided, where applicable.
- **Section 4.3 Assessing Vulnerability** assesses the response area's total exposure to natural hazards, considering assets at risk, critical facilities, and future development trends.

The 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 2.6 Mitigation Capabilities Assessment.**

4.1 Hazard Identification

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.

The HMPC conducted a hazard identification study to determine the hazards that threaten the Gunnison County response area.

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 the Gunnison County response area. Hazards data was obtained from FEMA, the Colorado Office of Emergency Management (including the State of Colorado State Hazard Mitigation Plan), the National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC), the 2013 Gunnison County Hazard Mitigation Plan, and many others. The HMPC also contributed hazard information through the data collection guides. Together, these sources were examined to assess the significance of the hazards to the Gunnison County response area. The hazards evaluated in this plan include those that have occurred historically or have the potential to cause significant human, and/or monetary, and/or environmental losses in the future.

The following natural hazards, listed alphabetically, were identified and investigated for the Gunnison County Natural Hazard Mitigation Plan:

- Avalanche
- Dam Failure
- Drought
- Earthquake
- Extreme Cold
- Flooding
- Hailstorm
- High Wind
- Ice Jam / Ice Floe
- Landslide/Rockfall/Debris Flow
- Lightning
- Severe Winter Storm
- Wildland Fire

Human caused hazards also exist in the Gunnison County response area. Human caused hazards include:

- Hazardous Materials Incident
- Prolonged Power Outage
- Technological Hazard
- Transportation Accidents
- Terrorism (foreign and local instigators, to include active aggressor incidents)

The focus of the HMP update is on natural hazards. Prolonged power outages that could be a consequence of certain natural hazards are addressed in the hazard profiles where appropriate.

Members of the HMPC used a hazards identification 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. 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 and listed alphabetically are Flooding, Severe Winter Storm, and Wildland Fire. Some modifications were made to the original HMPC input based on the results of this risk assessment.

Table 4.1 Gunnison County Hazards Identification Worksheet

Hazard	Likelihood of Event/Frequency*	Hazard Extent* (Spatial Extent)	Potential Magnitude*	Significance*
Avalanche	Highly Likely	Limited	Limited	Low
Dam Failure	Occasional	Significant	Critical	Medium
Drought	Likely	Extensive	Limited	Medium
Earthquake	Occasional	Extensive	Limited	Low
Extreme Cold	Highly Likely	Extensive	Negligible	Low
Flooding	Highly Likely	Significant	Critical	High
Ice Jam / Ice Jam Flood	Highly Likely	Limited	Critical	Medium
Hailstorm	Occasional	Limited	Negligible	Low
High Wind	Likely	Extensive	Negligible	Medium
Landslide, Rockfall, and Debris Flow	Likely	Limited	Limited	Medium
Lightning	Likely	Limited	Negligible	Low
Severe Winter Storm	Likely	Extensive	Limited	High
Wildland Fire	Highly Likely	Extensive	Critical	High

***See category definitions next page, which are from Section 4.2.1 Profile Methodology**

Likelihood of Event/Frequency

Highly Likely—Near 100% chance of occurrence in next year, or happens every year.

Likely—Between 10 and 99% chance of occurrence in next year, or has a recurrence interval of 10 years or less.

Occasional—Between 1 and 9% 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 response area
Significant: 10-49% of response area
Extensive: 50-100% of response area

Significance

Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

Potential Magnitude

- **Catastrophic**—More than 50% of property severely damaged, and/or facilities are inoperable or closed for more than 30 days. More than 50% agricultural losses. Multiple fatalities and injuries. Critical indirect impacts.
- **Critical**—25 to 50% of property severely damaged, and/or facilities are inoperable or closed for at least 14 days. 10-50% agricultural losses. Injuries and/or illnesses result in permanent disability and some fatalities. Moderate indirect impacts.
- **Limited**—10 to 24% of property affected. Some injuries, complete shutdown of critical facilities for 7-13 days, more than 10% of property is severely damaged.
- **Negligible**—Less than 10% of property affected. Minor injuries, minimal quality-of-life impact, shutdown of critical facilities and services for 24 hours or less, less than 10% of property is severely damaged.

Thunderstorm is not identified as an individual hazard, but is recognized for its role in the flooding, lightning, and high winds hazards. The Gunnison County response area in Figure 2.1 does not experience coastal erosion, coastal storms, hurricanes, or tsunamis. Volcano was not profiled due to the lack of active volcanoes in or near Colorado. Extreme heat was not profiled since temperatures rarely exceed 90 degrees due to the County's high elevation. Tornadoes were not profiled as they are generally rare events in Colorado's high country.

The hazards discussed in this plan apply to Gunnison County's entire emergency response area. The response area includes the northwestern portion of Saguache County since Gunnison County's emergency personnel can provide a more timely response to this area than Saguache County's emergency response personnel.

Although the identified hazards apply to the entire Gunnison County response area, some hazards have a greater impact on certain jurisdictions or special districts. Table 4.2 summarizes which hazards affect the individual entities that participated in this plan update, and it indicates that many hazards affect all or most participating jurisdictions; however, the magnitude or frequency of impacts may vary from place to place. Hazard impacts by jurisdiction are differentiated in detail in the hazard profiles and the vulnerability assessments. Each hazard profile in **Section 4.2 Hazard Profiles** contains three main subsections entitled *Geographical Area Affected*, *Potential Magnitude*, and *Likelihood/Frequency of Occurrence*. If a given hazard affects certain jurisdictions more often or severely than others, it is noted in these subsections. **Section 4.3 Assessing Vulnerability** specifies hazard impacts to individual jurisdictions in analysis tables and accompanying text. Maps were developed whenever possible to illustrate the spatial extent of identified hazards.

Table 4.2 Hazards for Each Participating Jurisdiction or Special District

Hazard	Gunnison County (Including Federal and State Lands)	Gunnison	Crested Butte	Mt. Crested Butte	Arrowhead FPD	Crested Butte FPD	Gunnison FPD	Crested Butte South Metro Dist.	Mt. Crested Butte Water and Sanitation Dist.
Avalanche	✓			✓		✓	✓		✓
Dam Failure	✓	✓	✓	✓	✓	✓	✓	✓	✓
Drought	✓	✓	✓	✓	✓	✓	✓	✓	✓
Earthquake	✓	✓	✓	✓	✓	✓	✓	✓	✓
Extreme Cold	✓	✓	✓	✓	✓	✓	✓	✓	✓
Flooding	✓	✓	✓		✓	✓	✓	✓	
Hail	✓	✓	✓	✓	✓	✓	✓	✓	✓
High Wind	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ice Jam / Ice Jam Flood	✓	✓	✓		✓		✓	✓	

Hazard	Gunnison County (Including Federal and State Lands)	Gunnison	Crested Butte	Mt. Crested Butte	Arrowhead FPD	Crested Butte FPD	Gunnison FPD	Crested Butte South Metro Dist.	Mt. Crested Butte Water and Sanitation Dist.
Landslide/ Rockfall/ Debris Flow	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lightning	✓	✓	✓	✓	✓	✓	✓	✓	✓
Severe Winter Weather	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wildland Fire	✓	✓	✓	✓	✓	✓	✓	✓	✓

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 response 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. During federal and/or state disaster declarations, disaster assistance is supplemental and sequential. When the local government's capacity has been surpassed, a state disaster declaration may be issued, possibly 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 possible 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 as 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 declared emergencies and disasters that included Gunnison or Saguache County between 1953 and 2018. Note that in all of these declarations, neither Gunnison County nor Saguache County was declared alone, but was part of a statewide or regional declaration.

Table 4.3 Federal Disaster and Emergency Declarations Involving Gunnison County and/or Saguache County: 1980-2018

Event/ Hazard	Year	Declaration Type	Remarks/Description
Heavy Rain and Flooding	1970	Presidential—Major Disaster Declaration	$3.3 million (2009* dollars) statewide)
Flooding and Landslide	1973	Presidential—Major Disaster Declaration	$4.7 million (2009* dollars) statewide
Drought	1977	Presidential—Emergency Declaration	$4.8 million (2009* dollars) statewide
Flooding, Severe Storm, Mudslides, Landslides	1984	Presidential—Major Disaster Declaration	Gunnison and Saguache County included
Landslide/Rockfall	1998	Governor's Declaration	Archuleta, Garfield, Mesa, Gunnison, Rio Blanco
Drought	2002	Presidential—Emergency Declaration	Statewide
Wildland fire	2002	Presidential—Emergency Declaration	Statewide
Drought/Insects	2003	USDA	Saguache County included
Snow Emergency	2003	Governor's Declaration	Statewide
Hurricane Katrina Evacuation	2005	Presidential—Emergency Declaration	Statewide
Drought, fire, high winds, heat	2005/6	USDA	Saguache County included
Heat, high winds, insect pests, late freeze, drought	2006	USDA	Gunnison County included
Severe Spring Snowstorm	2009	Governor's Declaration	Statewide
Severe Blizzard	2009	Governor's Declaration	Statewide
Drought	2014	USDA	Gunnison County included
Drought	2015	USDA	Gunnison County included
Frost, Freeze	2017	USDA	Gunnison County included
Drought	2018	USDA and SBA	Gunnison County included

Sources: FEMA Disaster Declarations by State/Tribal Government https://www.fema.gov/disasters/state-tribal-government/0/CO USDA Disaster Declarations https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/disaster-designation-information/index Small Business Administration Disaster Declarations https://disasterloan.sba.gov/ela/Declarations/Index , 2013 State of Colorado Natural Hazards Mitigation Plan; 2016 State of Colorado Hazard and Incident Response and Recovery Plan

*The Public Entity Risk Institute's extent of record is 2009, which is why the damage estimate is in 2009 dollars.

4.2 Hazard Profiles

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 the Gunnison County response area.

Past Occurrences

This subsection contains information on historic incidents, including impacts where known. The extent or location of the hazard within or near the Gunnison County response 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 Gunnison County or which jurisdictions are most likely to be affected by a hazard event. Affected areas outside of Gunnison County but within the Gunnison County response area are also noted in this subsection.

Potential Magnitude

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

- **Catastrophic**—More than 50% of property severely damaged, and/or facilities are inoperable or closed for more than 30 days. More than 50% agricultural losses. Multiple fatalities and injuries. Critical indirect impacts.
- **Critical**—25 to 50% of property severely damaged, and/or facilities are inoperable or closed for at least 14 days. 10-50% agricultural losses. Injuries and/or illnesses result in permanent disability and some fatalities. Moderate indirect impacts.
- **Limited**—10 to 24% of property affected. Some injuries, complete shutdown of critical facilities for 7-13 days, more than 10% of property is severely damaged.

- **Negligible**—Less than 10% of property affected. Minor injuries, minimal quality-of-life impact, shutdown of critical facilities and services for 24 hours or less, less than 10% of property is severely damaged.

Likelihood/Frequency 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% chance of occurrence in next year, or happens every year.
- **Likely**—Between 10 and 99% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
- **Occasional**—Between 1 and 9% 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.

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. Stated mathematically, the methodology for calculating the probability of future occurrences is:

$$\frac{\text{\# of known events}}{\text{years of historic record}} \times 100$$

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% 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% of all avalanches start on slopes of 30-45 degrees; about 98% of all avalanches occur on slopes of 25-50 degrees. Avalanches occur most often on slopes above the 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 the 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: CAIC). The avalanche danger increases with major snowstorms and periods of thaw. About 2,300 avalanches are reported in the State of Colorado to the Colorado Avalanche Information Center in an average winter. More than 80% of these occur during or just after large snowstorms.

An increase in backcountry recreation (skiers and snowmobilers) in recent years has led to more people being in avalanche-prone areas. A trend among some backcountry skiers and snowboarders is traveling into steeper and more "extreme" terrain, which tends to be more avalanche-prone. Gunnison County is known for its outdoor recreation opportunities, such as skiing at Crested Butte and abundant backcountry skiing, snowboarding, and snowmobiling options. Thus avalanches pose a risk to people in the Gunnison County response area, particularly backcountry enthusiasts.

This hazard generally affects a small number of people, such as the participants in backcountry recreation discussed above. Motorists traveling along steep mountain highways are also at risk of injury and death due to avalanches. US Highway 50 (Monarch Pass and Little Blue Canyon), CO Highway 133 McClure Pass, and County Road 730 Taylor Canyon are regularly impacted by avalanches. Road and highway closures, damaged structures, and destruction of forests are 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

Between 1999 and 2019, there have been 6 avalanche fatalities in Gunnison County. These following accidents occurred 2019 – Brush Creek (2 fatalities, Feb) and CB South (1 fatality, roof slide, March), 2016 – Ruby Mountain (1 fatality, Jan), 2014 – Kebler Pass (1 fatality, Feb), and 2013 - Raspberry Creek/Marble area (1 fatality, Jan) . These events are shown below in Table 4.4 Gunnison County Avalanche History. It is important to note that SHELDUS casualty and damage estimates are calculated by averaging the damages among the impacted counties. This is why an event may be recorded as causing 0.03 injuries, for example.

Table 4.4 Gunnison County Avalanche History: 1999 – 2019*

Date	Injuries	Fatalities	Property Damage ($)**
2/6/1999	1	3	0
2/18/2001	0.33	0	0
2/25/2001	0	0.33	0
2/6/2002	0	1	0

Date	Injuries	Fatalities	Property Damage ($)**
10/23/2004	0.33	0	0
11/21/2004	0.25	0	0
1/6/2005	0	0	22,222
12/14/2008	0	0.13	0
12/17/2008	0	0.33	0
2/11/2010	0.25	0.25	0
3/30/2010	0	0.25	125
5/30/2010	0.33	0	0
01/13/2013	0	1	0
2/10/2014	0	1	0
01/21/2016	0	1	0
2/16/2019	0	2	0
3/09/2019	0	1	0
TOTAL	**2.49**	**10.29**	**22,347**

Sources: SHELDUS
*Extent of Record
**Dollar value based on year of event

Since 2013 the CAIC has recorded, on average, 381 avalanches in the Gunnison Zone, which covers most of Gunnison County. From 2010 through present there were 7 documented incidents of injury separate from the fatalities. These accidents occurred 2018/19 – MT Crested Butte (1,roof slide, March) and Irwin (1,Dec), 2017/18 – Schyulkyl Ridge (2, Feb), 2016/17 – Copper Creek/Gothic (1, Feb) and Mt Emmons/Coon (1,Mar). Table 4.5 summarizes the CAIC avalanche records for Gunnison County that resulted in injuries.

Table 4.5 Colorado Avalanche Information Center Accident Reports for Gunnison County

Date	Location	Primary Activity	Summary
12/2/2010	Redwell Basin, Ruby Range	Backcountry Tourer	1 skier caught, carried, injured
10/24/2010	Mt. Baldy, North Bowl, Crested Butte	Backcountry Tourer	1 snowboarder, on foot, caught and not buried
12/20/2010	Marble Peak	Backcountry Tourer	Solo skier caught, partially buried
01/13/2013	Raspberry Creek, near Marble	Backcountry Tourer	1 skier caught, buried, and killed
02/10/2014	Near Kebler Pass, west of Crested Butte	Snowmobiler	2 snowmobilers caught, 1 partially buried, 1 buried and killed
01/21/2016	Ruby Peak, Ruby Range west of Crested Butte	Snowmobiler	2 snowmobilers caught, 1 partially buried uninjured, 1 fully buried and killed
2/03/2017	Above Copper Creek, near Gothic	Backcountry Tourer	1 skier caught, carried, and injured

2/19/2018	Schuykill Ridge	Backcountry Tourer	2 skiers caught, 1 partially buried, 2 injured
12/06/2018	Irwin Snowcat Ski Operation	Mechanised Guide	3 skiers caught, 1 partially buried with minor injuries.
2/16/2019	Pearl Pass Road, Brush Creek Drainage	Backcountry Tourer	2 backcountry tourers caught, buried, and killed
3/08/2019	Mount Crested Butte	Resident	1 worker caught, buried
3/9/2019	Crested Butte South	Resident	2 residents caught and buried, 1 killed

Sources: Colorado Avalanche Information Center (CAIC)

Geographical Area Affected

The avalanche hazard extent in the Gunnison County response area is **limited**. Areas that are particularly at risk include the CBMR (Crested Butte Mountain Resort), backcountry recreation areas, and highways or roads along steep mountainsides. There is no countywide mapping available of the avalanche hazard. Several avalanche hazard areas have been identified in or near the Town of Mt. Crested Butte. Other hazard areas that have been identified and mapped within Gunnison County include the area around Marble and Highway 133 near McClure Pass, including the Chair Mountain Subdivision.

The Town of Mt Crested Butte had avalanche hazard zones mapped in a 1989 study (Snow-Avalanche Hazard and Mapping Analysis, Town of Mt. Crested Butte, Gunnison County). Figure 4.1 depicts the avalanche zones in Mt. Crested Butte as of February 12, 2007, based on an update of the 1989 study. Avalanche hazards are classified into three zones:

R1-Orange Zones (High Hazard zones) – Avalanches with average return periods of either 10 years or less and/or will produce impact pressures of 600 pounds per square foot on flat, rigid surfaces normal to the avalanche flow.

B- Blue Zones (Moderate Hazard zones) – Zones that are downslope of the R1 zone representing the maximum runout distances of avalanches during design-mitigation or "100-year" avalanche conditions. The B zones experience avalanches at intervals of 10 to 100 years and will produce impact pressures of less than 600 pounds per square foot on flat, rigid surfaces normal to the avalanche flow.

R2 – Pink Zones (High Hazard Snowslide zone) – These zones are in areas where small avalanches or "snowslides" can occur. Although small and not considered damaging, they could bury and injure or kill any persons caught.

The Town of Mt. Crested Butte has limited areas of Orange and Blue zones, primarily on the southwest edge of the town, but some Orange on the eastern edge, and pockets of Pink zone scattered throughout.

Figure 4.1. Mt. Crested Butte Avalanche Map

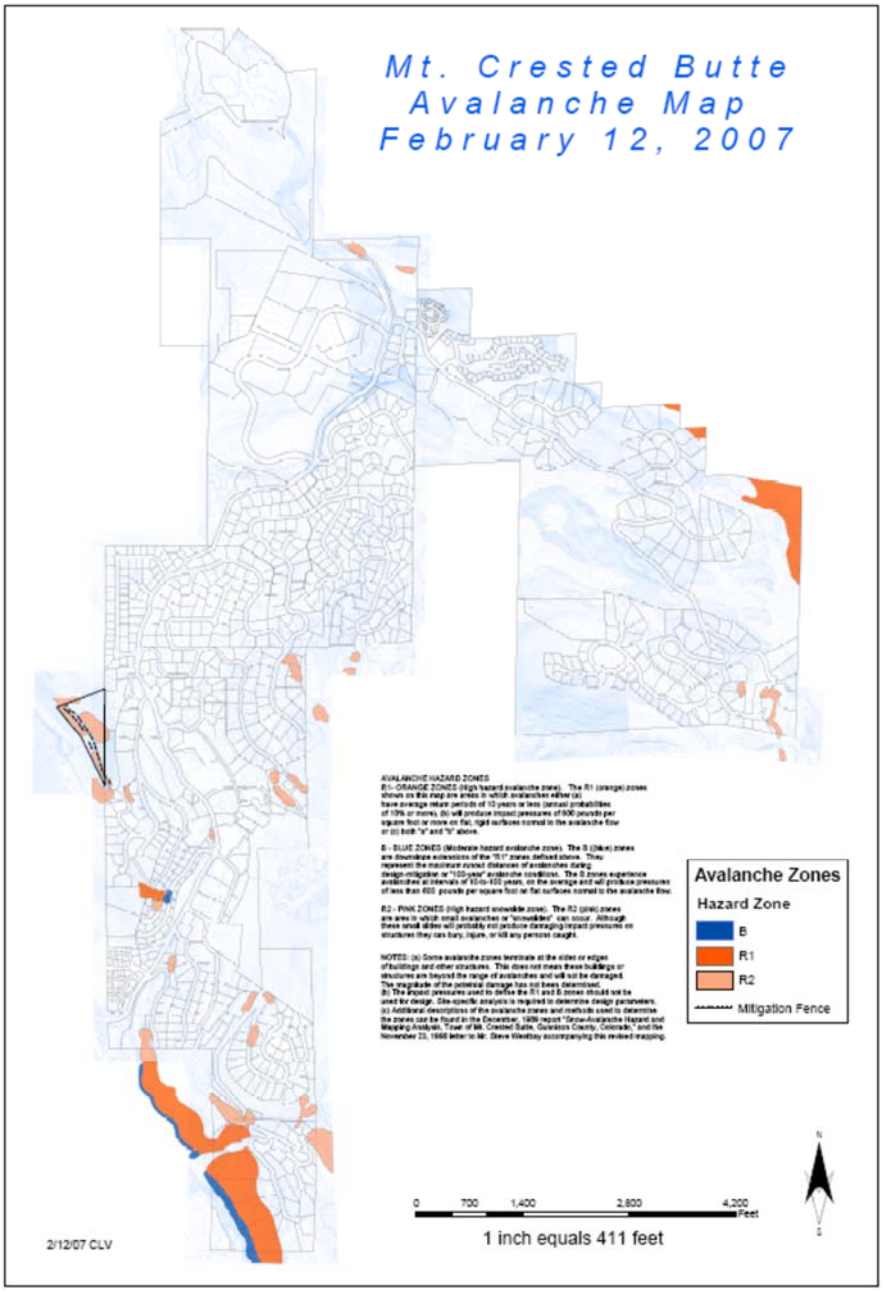
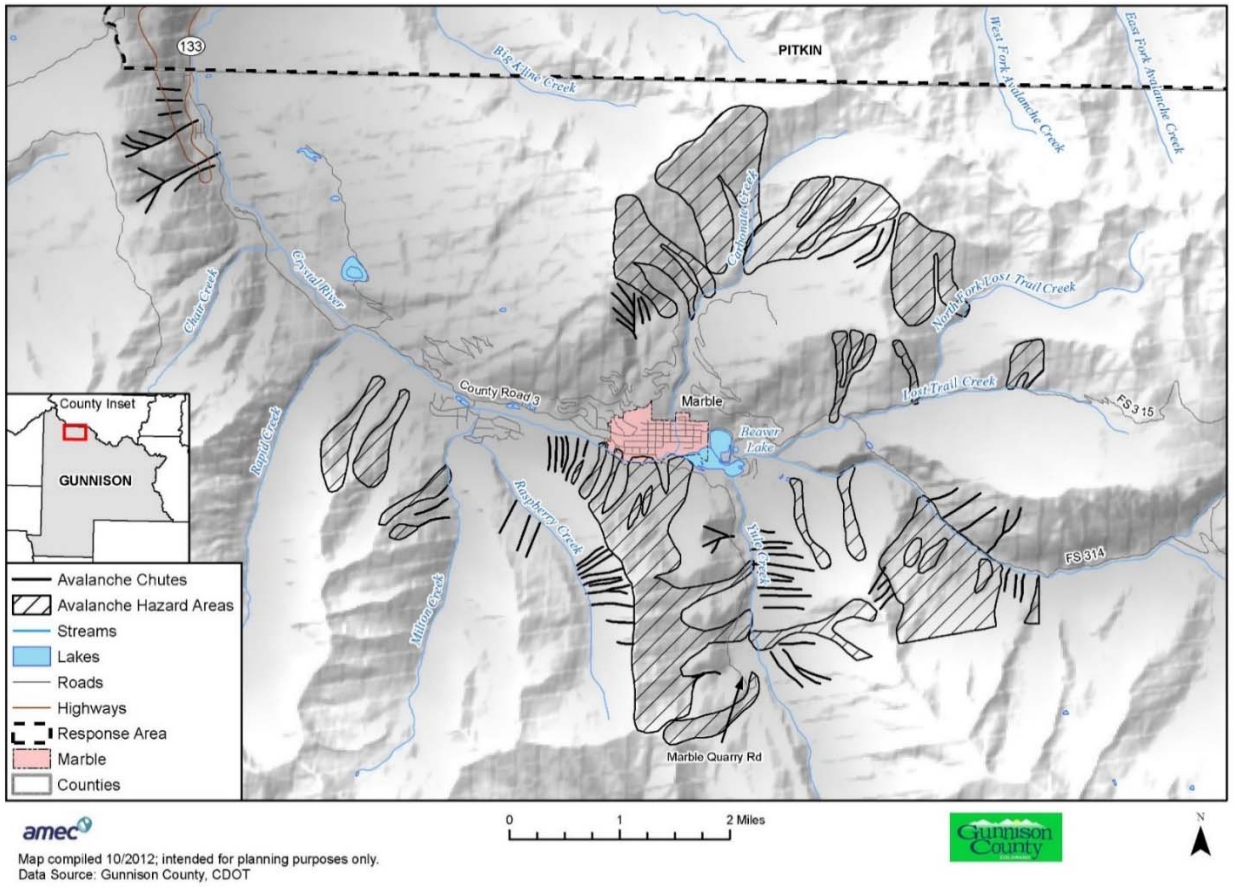
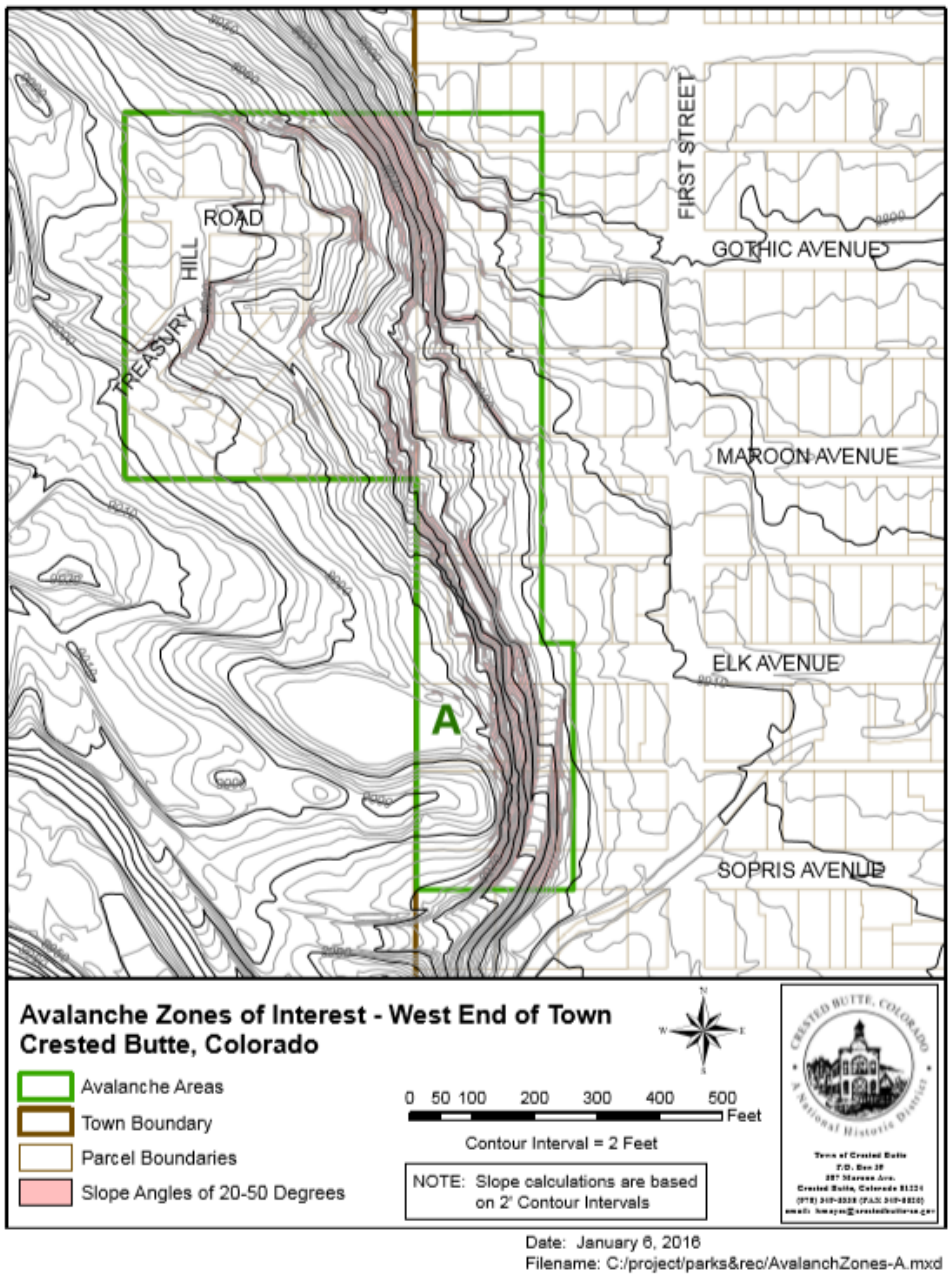


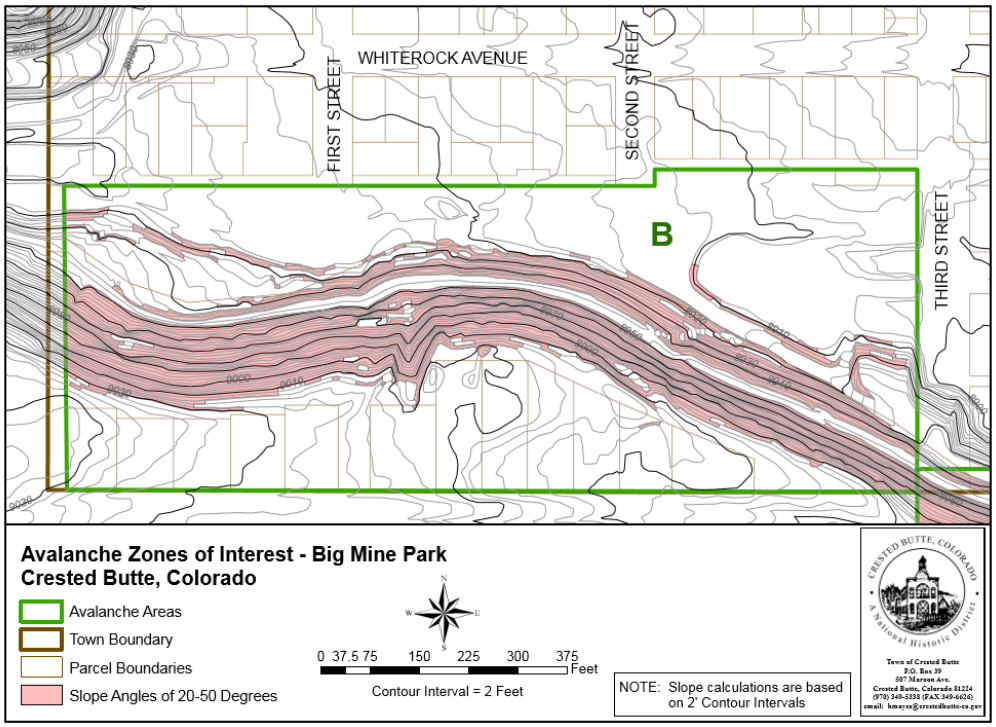
Figure 4.2. Town of Marble Avalanche Hazards

Avalanche hazards near the Town of Marble/Upper Crystal River Area are depicted in Figure 4.2.

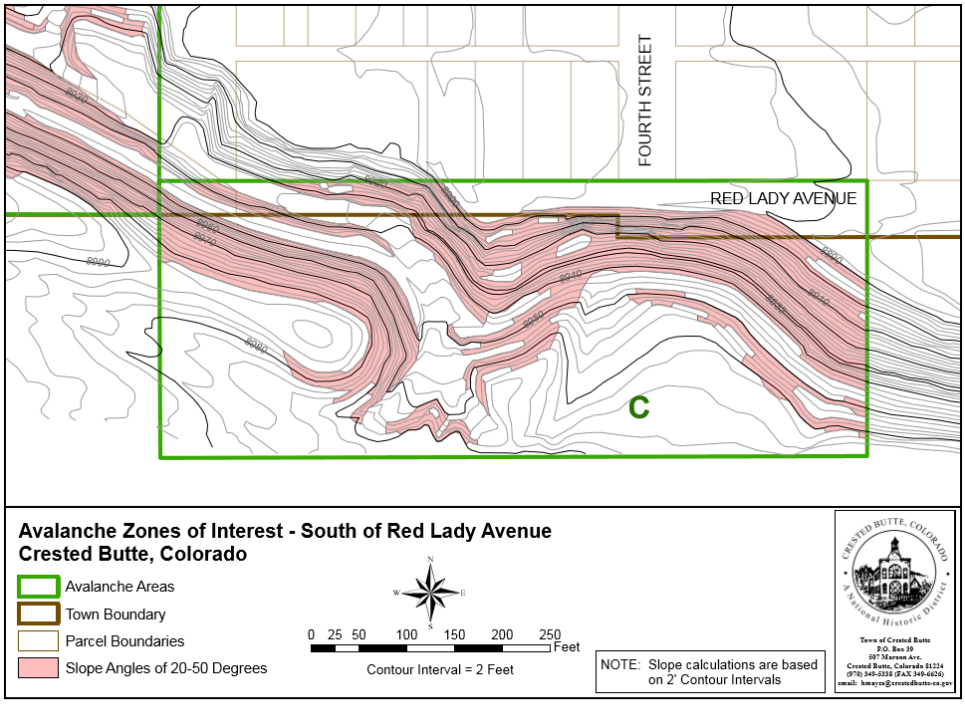


The Town of Crested Butte had avalanche zones of Interest mapped in a 2016. Below shows the following Avalanche Zones of Interest: West End of Town, Big Mine Park, South of Red Lady Avenue, and Avalanche Park.

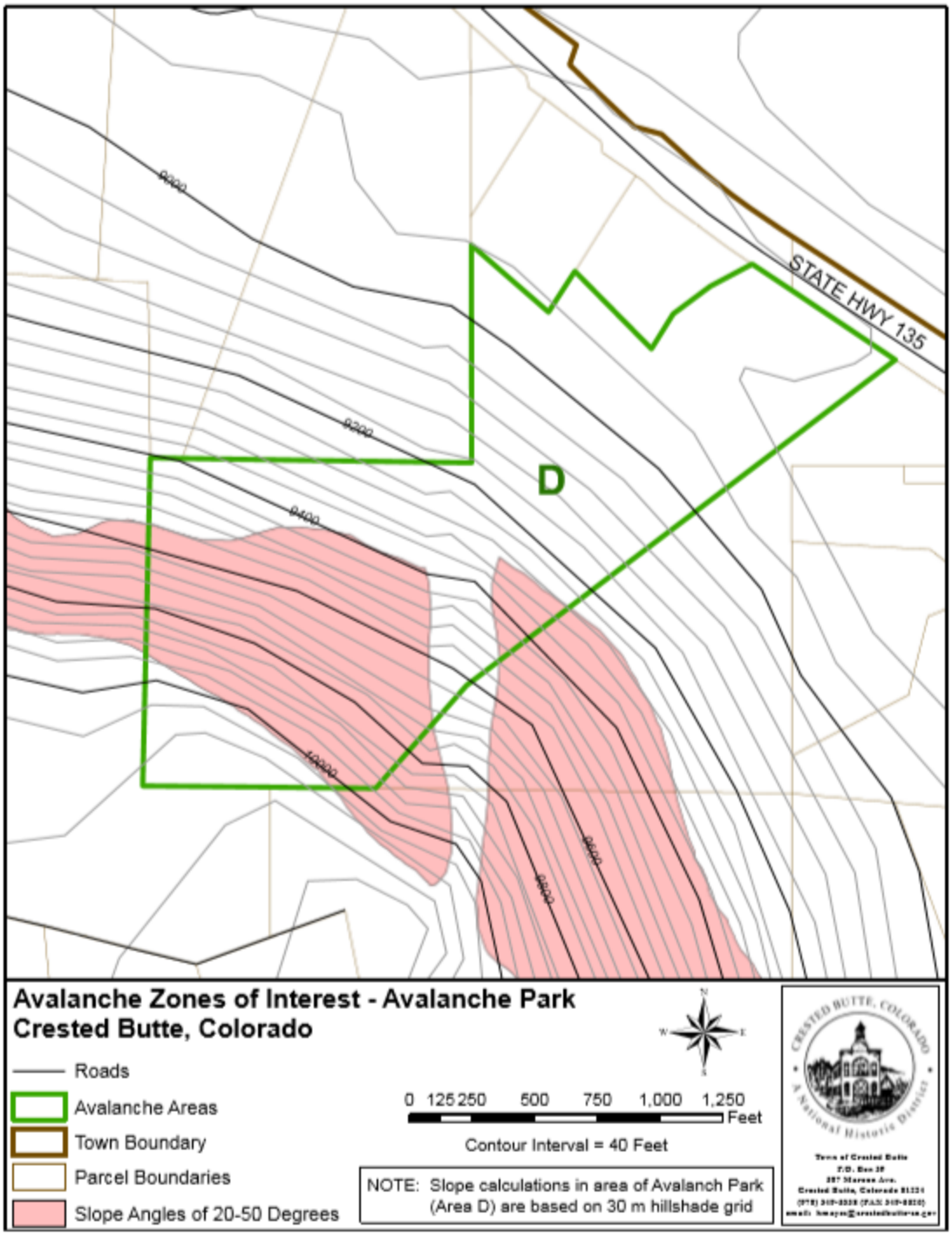




Date: January 6, 2016
Filename: C:/project/parks&rec/AvalanchZones-B.mxd



Date: January 6, 2016
Filename: C:/project/parks&rec/AvalanchZones-C.mxd


STATE HWY 135
D
Avalanche Zones of Interest - Avalanche Park
Crested Butte, Colorado
Roads
Avalanche Areas
Town Boundary
Parcel Boundaries
Slope Angles of 20-50 Degrees
0 125 250 500 750 1,000 1,250
Feet
Contour Interval = 40 Feet
NOTE: Slope calculations in area of Avalanch Park (Area D) are based on 30 m hillshade grid
Date: January 6, 2016
Filename: C:/project/parks&rec/AvalanchZones-D.mxd

The Gunnison County Land Use Resolution classifies avalanche zones into two categories:

Red (High Hazard) Zone – The Red Zone is an area affected by avalanches with return periods of 30 years or less and/or by avalanches producing impact pressures on flat surfaces normal to the flow direction of 600 lbs./ft.^{2} or more. Residential building construction shall be prohibited in Red Zones; driveways and subdivision roads shall avoid areas where avalanches have return periods of fewer than 10 years; utilities shall be buried or otherwise designed to minimize avalanche exposure.

Blue (Special Engineering) Zone – The Blue Zone is an area affected by avalanches with return periods of more than 30 but fewer than 300 years and by avalanches capable of producing impact pressures on flat surfaces normal to the flow direction of less than 600 lbs./ft.^{2}. Residential building construction shall be permitted in the Blue Zone only if that construction has been certified by a qualified professional engineer licensed in the State of Colorado to withstand avalanche impact and static loads and that the structure has been otherwise protected by external avalanche-defense structures that have been similarly certified by that engineer, and the following standards have been met:

(a.) Design loading and other design criteria – Design-loading criteria and other criteria used to design avalanche defense structures shall be developed on a site-specific basis by the engineer, who must explicitly identify the methods used to develop those criteria.

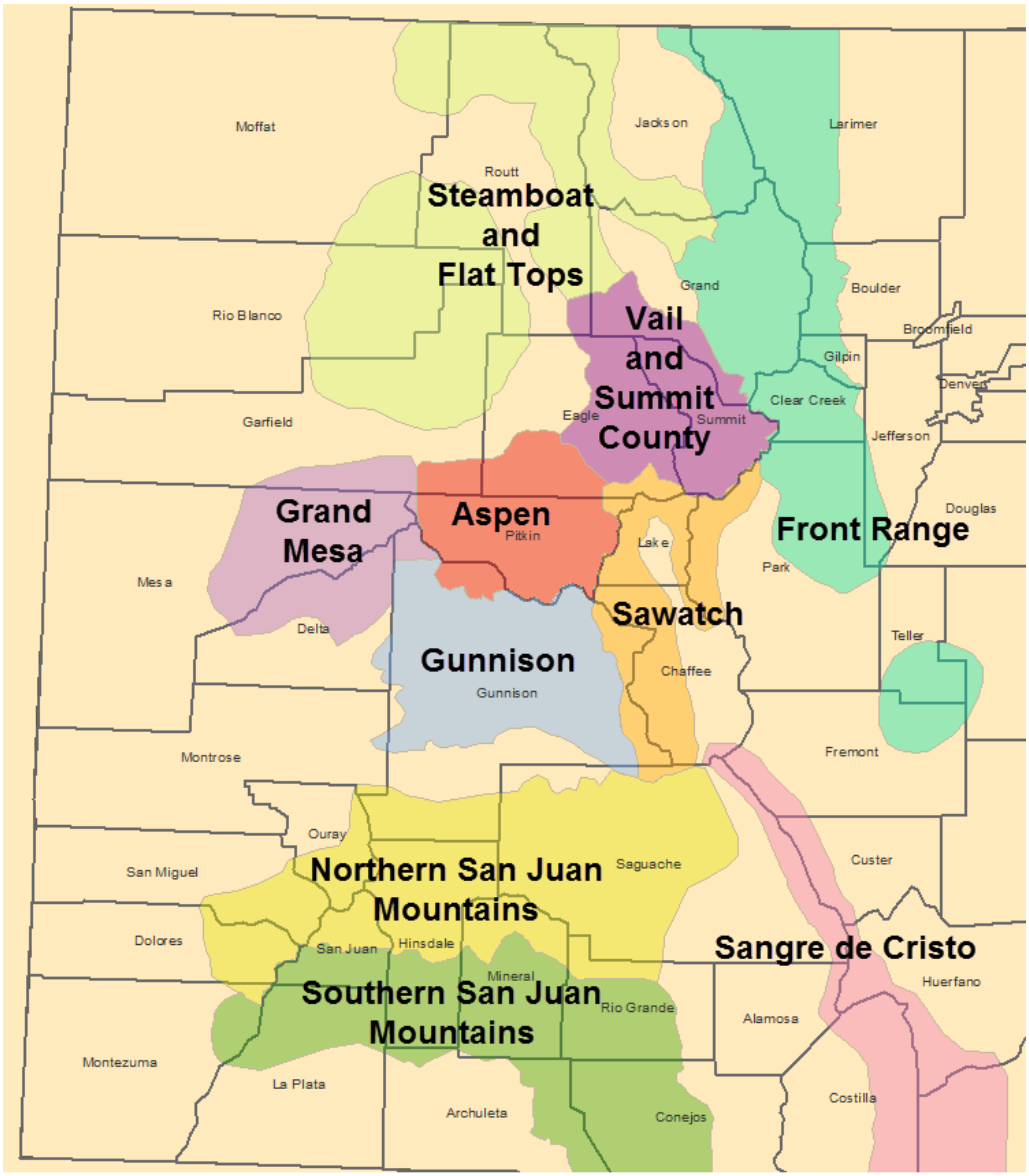
(b.) Structural barriers – When the proposed location of development alone will not provide adequate protection for people and structures from avalanche hazards, then structural barriers shall be placed in the avalanche starting zone, track or runout zone (including, but not limited to excavations, berms, dams, retaining structural walls, direct protection structures and similar devices), or accepted avalanche diversion or control practices shall be used.

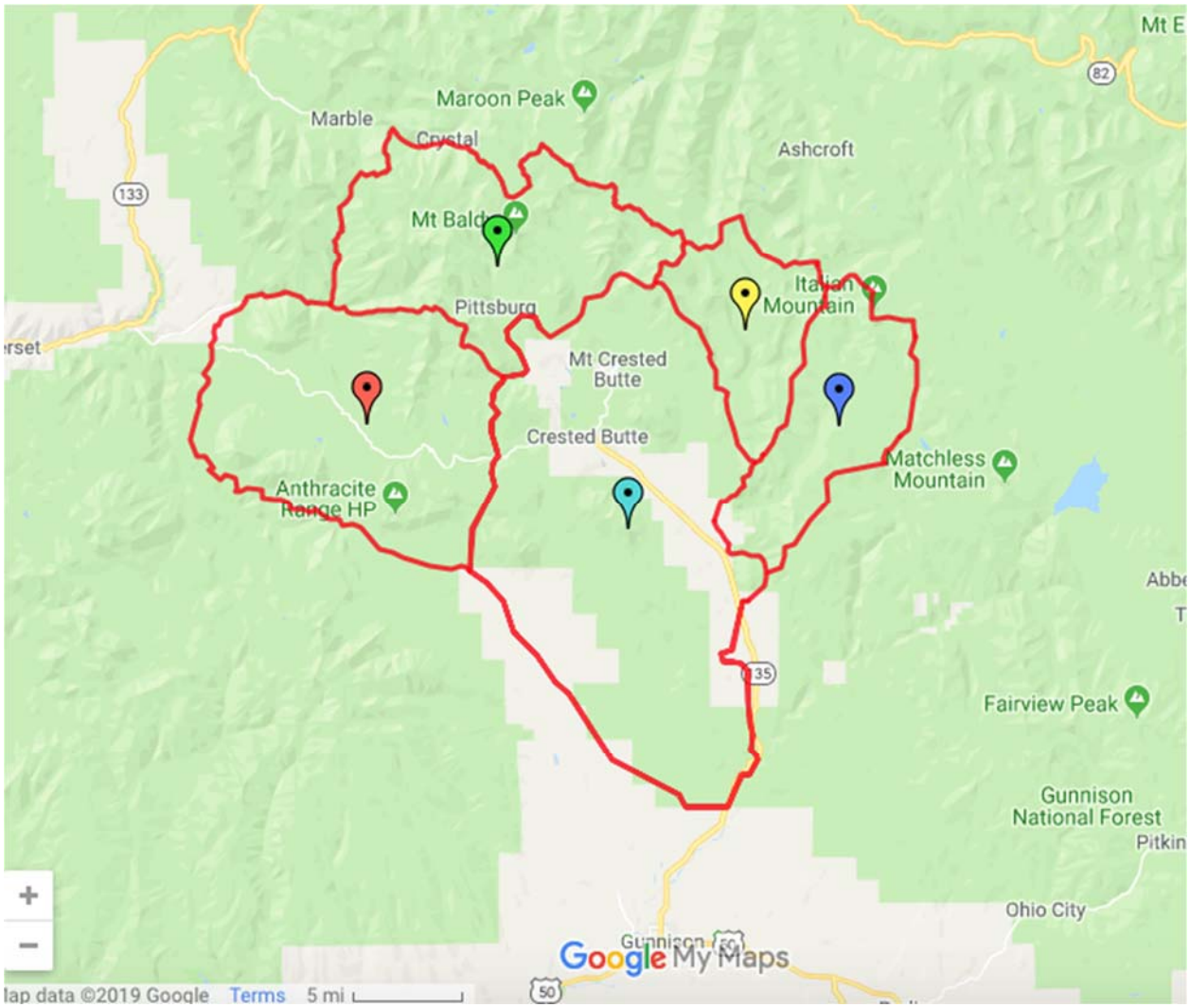
1) Design – All proposed structural barriers shall be designed to withstand snow creep and vertical forces, avalanche impact and deposition forces, and air pressures. The proposed locations, dimensions, and specifications of those structural barriers shall be included in the application. The dynamic characteristics of the design avalanche upon which the structural design is based shall be specified, including avalanche runout distance, velocity, flow depth, density, and impact pressure potential.

(c.) Diverted path – If an application proposes to divert potential avalanches from the proposed development or in any manner alter an existing avalanche path, the plans shall clearly show the anticipated path the diverted avalanche is expected to follow.

Figure 4.3. Colorado Avalanche Information Center Avalanche Forecast Zones

Five avalanche zones, as defined by the CAIC for avalanche forecasting purposes, are recognized in the Gunnison County response area, including the Grand Mesa, Aspen, Gunnison, Sawatch, and North San Juan zones. Together, these five zones cover most of the response area except for portions of southern Gunnison County. Figure 4.3 depicts the CAIC avalanche zones in Colorado. CAIC points out that the zone boundaries are not rigid demarcations; people traveling along the zone boundaries should still be aware of avalanche hazards and check avalanche forecasts.





Source: CAIC, https://avalanche.state.co.us/?s=zones

The Mt. Crested Butte and Marble mapping is valuable for the county for planning purposes. The CIAC included several additional maps for Crested Butte. There are several small hillsides around Crested Butte that can produce small but dangerous slides, and one larger slope that threatens the Gunnison County building immediately south of town.

Potential Magnitude

Loss of life and infrastructure damage are the primary areas of concern regarding avalanches. According to the 2018 Colorado Hazard Mitigation Plan (Fig 3-68, page 3-315) , Gunnison County is ranked fourth in the State for the highest number of avalanche fatalities by county. Twenty avalanche fatalities occurred in Gunnison between 1950 and 2016 . No fatalities were listed for the portion of Saguache County in the Gunnison first response area during that time period. Additionally, backcountry avalanche incidents involve search and rescue teams and resources, which can put these personnel in areas of risk.

Between 1950 and 2017 there has been 276 fatalities in Colorado. From 1950 – 2019 there has been 23 fatalities in Gunnison County – 13 of which occurred since 1999. Avalanches can also create economic impacts due to road closures and travel restrictions. Closed roads can impact tourism, food/medicine delivery, or possibly emergency response operations given the limited number of roads in the response area. Overall, the HMPC believes that the avalanche impacts would likely be **limited** in the Gunnison County response area, with 10 to 25% of the area affected and the potential for injuries and loss of life.

Likelihood/Frequency of Occurrence

Avalanches are **highly likely** to occur in the Gunnison County response area in any given year. The winter of 2018/2019 there were several roof slide accidents in the Crested Butte area. The Sheriff's Department now carries shovels and probes so that deputies (or any other first responders), who are often first on scene, have the means to look for and save roof slide victims.

Avalanches that cause injuries, fatalities, or property damages may be less likely to occur.

4.2.3 Dam Failure

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. Two factors that influence the potential severity of a full or partial dam failure are the amount of water impounded and the density, type, and value of downstream development and infrastructure. 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.

Colorado Dam Safety Branch of the State Engineer's Office assigns hazard ratings to all dams within the State. Dams are classified in three categories determined by analysis of potential consequences from failure of the dam.:

- **High Hazard**. A dam for which life loss is expected to result from failure of the dam.
- **Significant Hazard**. A dam for which significant damage, but no life loss is expected to result from failure of the dam. Significant damage is defined as damage to structures where people generally live, work, or recreate, including public and private facilities. Significant damage is determined to be damage sufficient to render structures or facilities uninhabitable or inoperable.
- **Low Hazard**. A dam for which neither life loss nor significant damage as defined for a Significant Hazard dam are expected to result from failure of the dam.

Privately owned High and Significant hazard dams are required by Colorado regulations to have Emergency Action Plans (EAPs) in place. Federally-owned High hazard dams are also required to have EAPs by federal regulations.

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.

Geographical Area Affected

According to the Dam Safety Branch, Gunnison County has 27 jurisdictional sized dams. Seven of these dams are High hazard, including Beaver, Blue Mesa, Lake Grant, Paonia, Silver Jack, Spring Creek, and Taylor Park. There are also five Significant hazard dams in Gunnison County, including Lake Arrowhead, Meridian Lake Park #1, Monument, Fish Creek #2, and Tomahawk. The High hazard Vouga dam lies within the Saguache County portion of the response area, but would have consequences in Gunnison County in the event of failure. Gunnison County Emergency Management is provided with Emergency Action Plans for all of the High and Significant Hazard Dams, many of which include inundation maps.

Dam failure in general could impact a **significant** portion of the response area. Failure of the Blue Mesa Dam would impact everything downstream on the Gunnison and Colorado Rivers as far away as Moab, Utah. Morrow and Crystal Dams would also be impacted by failure of the Blue Mesa Dam. If Taylor Dam failed, people and structures from Almont to Gunnison would be affected. Taylor Canyon and Almont would be impacted by failure of the Spring Creek Dam. The Meridian Lake Park #1 Dam would affect several of Gunnison County's main population centers, including Gunnison, Crested Butte, and Almont. A breach in Paonia Dam would impact the towns

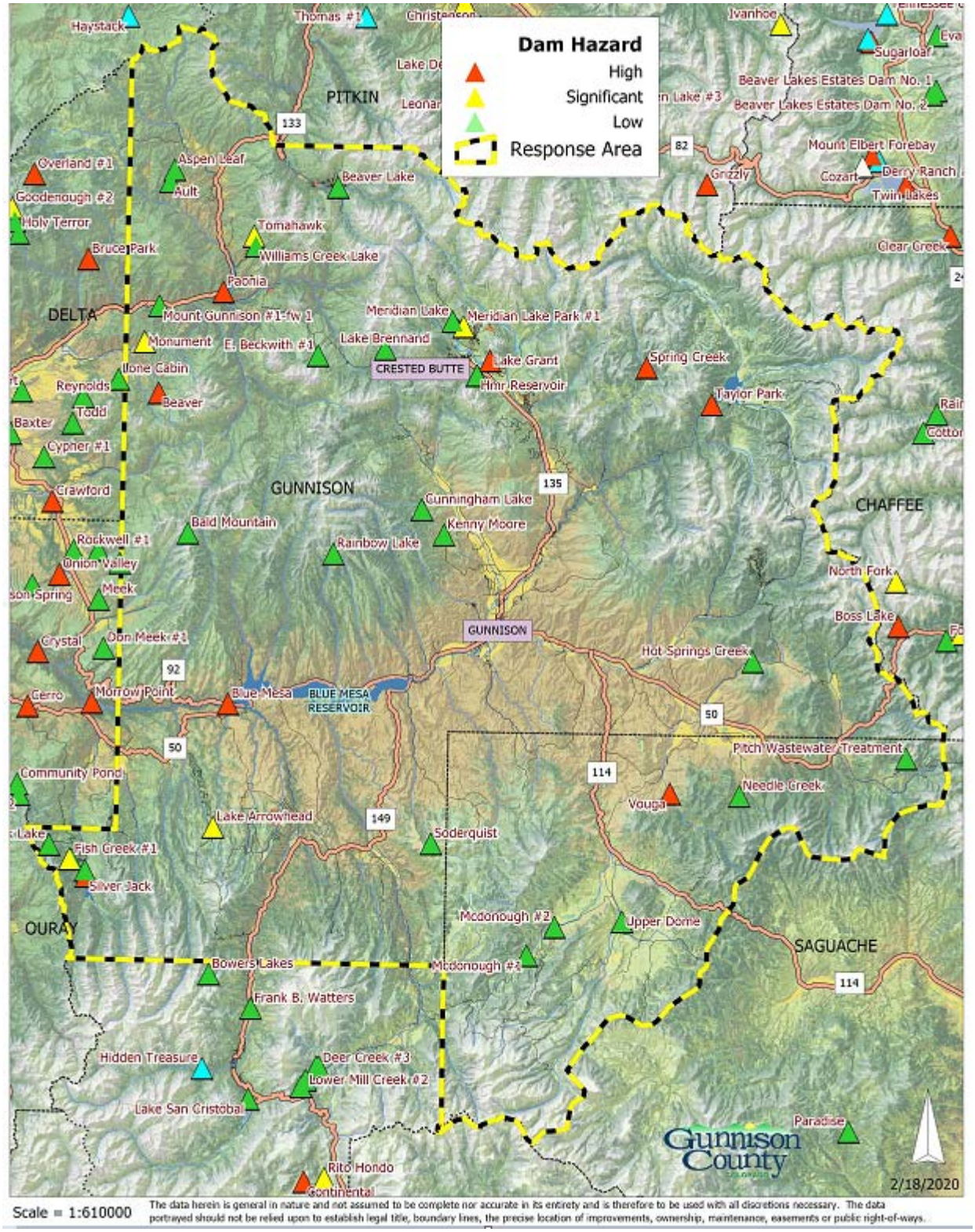
of Paonia, Hotchkiss, and Austin. The High and Significant hazard dams in the response area are described below in Table 4.6, and their location is illustrated in Figure 4.4. The EAP column indicates if the dam has an EAP or not.

Table 4.6 High and Significant Hazard Dams in Gunnison County Response Area

Name	Owner	River	Hazard Class	Nearest Downstream City	Distance to Nearest Downstream City (miles)	EAP
Gunnison County						
Beaver	Beaver Reservoir Company	Minnesota Creek-TR	High	Paonia	11	Y
Blue Mesa	Dept. of Interior Bureau of Reclamation (DOI BR)	Gunnison River	High	Delta	74	Y
Paonia	DOI BR	Muddy Creek	High	Somerset	7	Y
Silver Jack	DOI BR	East Fork Cimarron River	High	Cimmaron	17	Y
Spring Creek	Colorado Parks and Wildlife	Spring Creek	High	Almont, Gunnison	15	Y
Taylor Park	DOI BR	Taylor River	High	Gunnison	27	Y
Lake Arrowhead	Private owner	E Fork Little Blue Creek-OS	Significant	Arrowhead Community	2	Y
Lake Grant	Skyland Metropolitan District	Slate River-TR	High	Skyland Metro		Y
Meridian Lake Park #1	Pristine Point	Washington Gulch	Significant	Crested Butte	2	Y
Monument	Minnesota Ditch and Res. Co	Minnesota Creek-TR	Significant	Paonia	7	Y
Fish Creek #2	Cimmarron Canal & Reservoir Company	Fish Creek	Significant	Cimmaron	16	Y
Tomahawk	Volk Ranch, LLLP	Muddy Creek	Significant	Paonia	17	Y
Saguache and Hinsdale County Dams upstream of Gunnison County						
Vouga	Vouga Res. Assoc.	Razor Creek	High	Gunnison	24	Y

Source: 2019 Colorado Division of Water Resources, Dam Safety Division

Figure 4.4. Dams in the Gunnison County Response Area



Potential Magnitude

Overall, dam failure impacts would likely be **critical** in the Gunnison County response area with a large percentage of the response area affected, including the City of Gunnison. The most serious impacts within the response area would result from failure of the Taylor Park Dam. People and structures from Almont to Gunnison would be at risk if the Taylor Park Dam failed. Impacts could include casualties, destruction of buildings, loss of hydroelectric power generation, and transportation disruptions from infrastructure damage.

The potential magnitude of a dam failure in the response area could change in the future; the hazard significance of certain dams could increase if development occurs in inundation areas.

Frequency/Likelihood of Occurrence

There are no official recurrence intervals calculated for dam failures, so estimating the frequency of occurrence of dam failure is extremely difficult. Based on Colorado's dam failure history the HMPC estimates that the likelihood of dams failing in the County is **occasional**. The structural integrity of dams can decrease with age and other factors, thus regular inspections and maintenance should remain a priority, along with Emergency Action Planning as a risk reduction tool.

Dam Failure

Specific details regarding the population, property, critical infrastructure or community resources affected by potential dam failures will not be discussed in this plan due to Homeland Security reasons. In general, public safety is the primary concern. Several High and Significant hazard dams are located in the response area. Failure of Taylor Park Dam would likely cause the most serious impacts in the response area, affecting people, animals, property, and structures from Almont to Gunnison. Additionally, roads closed due to dam failure floods could result in serious transportation disruptions due to the limited number of roads in the County. A road closure could seriously impede response and recovery operations and hinder people from evacuating the affected area. The vulnerability to dam failure could increase if development occurs in inundation areas. Emergency Action Plans for dams in Gunnison County have inundation maps, and Gunnison County Emergency Management has incorporated this information, along with technical or other info from Dam Safety and/or the dam owners, into other emergency plans.

4.2.4 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 population growth. Lack of annual precipitation and poor water conservation practices can also 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 wildland 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 an expression of precipitation's departure from normal over some period of time. Meteorological measurements are the first indicators of drought.
- **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, wildland fire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. An ongoing drought may leave an area more prone to beetle kill and associated wildland fires. 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. The Gunnison County response area 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 2018 Colorado Drought Mitigation and Response Plan, Gunnison has experienced droughts and was included in USDA Disaster Declarations in 2006, 2011, 2012, 2013, 2015 and 2018. Although drought conditions can vary across the state, it is likely that the Gunnison County response area suffered during these dry periods listed in Table 4.7 are the historical dry and wet periods in Colorado.

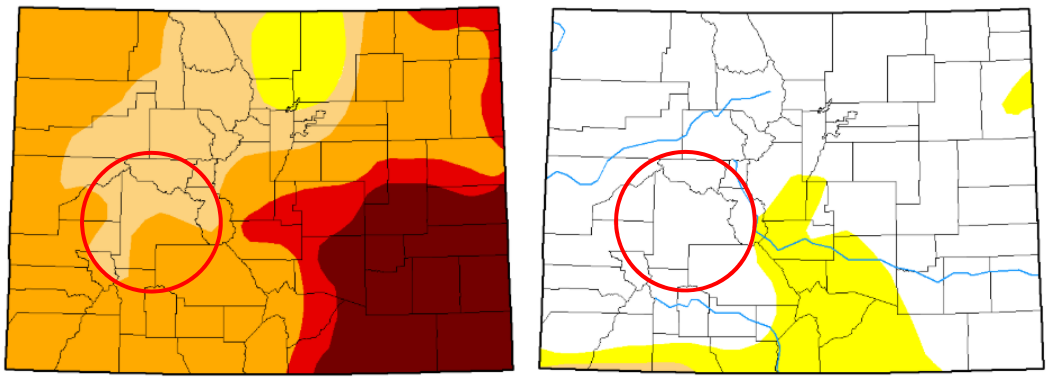
Table 4.7 Historical Dry and Wet Periods in Colorado

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
1965-1975		X	10
1975-1978	X		3
1979-1999*		X	20
2000-2006*	X		6
2007-2010*		X	3
2011-2013	X		2
2013 - 2015	X		2
2018	X		1
2019		X	TBD

Source: *Modified for the Colorado Drought Mitigation and Response Plan in 2018: http://cwcb.state.co.us/water-management/drought/Documents/2018DroughtPlan/1%20CO%20Drought%20Plan%202018.pdf

Figure 4.5 compares the severity of the drought in Colorado in May 2013 with the severity of the drought in May 2019. The maps illustrate improved conditions in Gunnison and Saguache County from extreme drought conditions across the entire response area in 2013 to abnormally dry drought conditions in May 2019.

Figure 4.5. U.S. Drought Monitor for Colorado, May 07, 2013 (left) vs. May 07, 2019 (right)



Statistics Comparison

Week	None	D0-D4	D1-D4	D2-D4	D3-D4	D4	DSCI
2013-05-07	0.00	100.00	95.49	75.99	26.97	17.93	316
2019-05-07	84.23	15.77	0.59	0.00	0.00	0.00	16
Change	84.23	-84.23	-94.90	-75.99	-26.97	-17.93	-300

Source: National Drought Mitigation Center, U.S. Drought Monitor (https://droughtmonitor.unl.edu/Maps/CompareTwoWeeks.aspx)

The Drought Impact Reporter was also used to identify past drought occurrences in the Gunnison County response area. 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 reports that from 1/1/2013 to 5/1/2019 the following were drought impacts to Gunnison County: 47 were reportedly for Agriculture, 4 for Business and Industry, 4 for Energy, 4 for Fire, 59 for Plants and Wildlife, 2 for Relief, Response and Restrictions, 6 for Society and Public Health, 14 for Tourism and Recreation, 23 for Water Supply and Quality, and 62 for General Awareness. (https://droughtreporter.unl.edu/map/)

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 and 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. Economic / tourism impacts of fires and restrictions.
- **Plants and 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 and 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 of 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 and 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 form 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 and 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 and 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 Gunnison County response area is at risk of developing drought conditions. Therefore, the spatial extent rating for drought in the response area is **extensive**.

Potential Magnitude

Overall, drought impacts could be **limited** in the Gunnison County response area, with 10 to 25% of the response area affected and 10 to 25% agricultural losses. The magnitude of a drought's impact will be directly related to the severity and length of the drought. Climatologists have expressed concern over drought conditions in Colorado.

Reservoir storage can be depleted rapidly in multi-year droughts. Water managers and government officials may implement water restrictions and conservation measures to help mitigate the effects

of the drought. (Water storage above a certain level in Blue Mesa Reservoir exacerbates the threat of ice jams upstream from the east end of the reservoir (1979 BoR Study, and numerous occurrences)

The impacts of a drought are also felt through secondary effects. A drought can increase susceptibility to wildland fires by reducing the moisture content in fuels. Drought can also reduce vegetation cover, which exposes soil to wind erosion. Reduced vegetation cover can exacerbate flooding and even cause mudslides. According to the 2018 Colorado Drought Mitigation and Response Plan, Gunnison County is highly vulnerable to drought. Most of the impacts in Gunnison County due to drought are from agriculture. Wildfire, impacts to society and public health, and increased relief, response and restrictions are other impacts, Secondary impacts include reduction in vegetation cover which exposes soil to wind erosion, exacerbating flooding. Recreation and tourism can also be affected. Reduced snowpack, low water levels in lakes and rivers, and increased wildland fire risk can harm the County's tourism industry and economy.

Likelihood / Frequency of Occurrence

Likely—Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less. Historical drought data for the response area indicates there have been 12 significant droughts in the last 69 years (1950-2019). This equates to a drought every 6 years on average or a 17% chance of a drought in any given year, which corresponds to a likely occurrence rating.

The 2010 drought vulnerability study prepared by the CWCB (Colorado Water Conservation Board) and the 2018 Drought Mitigation Response Plan discussed the potential for climate change to alter drought recurrence, length, and intensity. This study builds upon information obtained in Phase I of the CWCB's Colorado Water Availability Study. Based on these studies the average length of the observed drought in the Gunnison basin is five years (based on stream flows on the Gunnison River near Grand Junction). Average drought length in the Gunnison basin is anticipated to be 6.7 years based on an alternate historical hydrology, and ranges between 6.6-6.9 years based on various projected climate change scenarios. The chance of exceeding the drought longer than the observed record is 72.7 to 74.7%. Thus the potential likelihood and intensity of drought the Gunnison Basin could increase in the future due to climate change. While there is a large amount of uncertainty regarding future climate scenarios and how these may translate to physical conditions, it is clear that current climate is not stationary and that planning efforts should take into account this uncertainty.

The 2018 Colorado Drought Mitigation and Response Plan provided a summary of drought vulnerability by county. Gunnison County had a cumulative vulnerability score 13.61.

4.2.5 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 4.8 features abbreviated descriptions of the 12 levels of intensity.

Table 4.8 Modified Mercalli Intensity (MMI) Scale

Intensity	Shaking	Description/Damage
I	Not felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest,especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

Source: https://earthquake.usgs.gov/learn/topics/mercalli.php

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 aspects of earthquakes include surface rupture, fissure, settlement, and permanent horizontal and vertical shifts of the ground. Secondary impacts can include landslides, rock falls, liquefaction, fires, dam failure, and hazardous materials incidents.

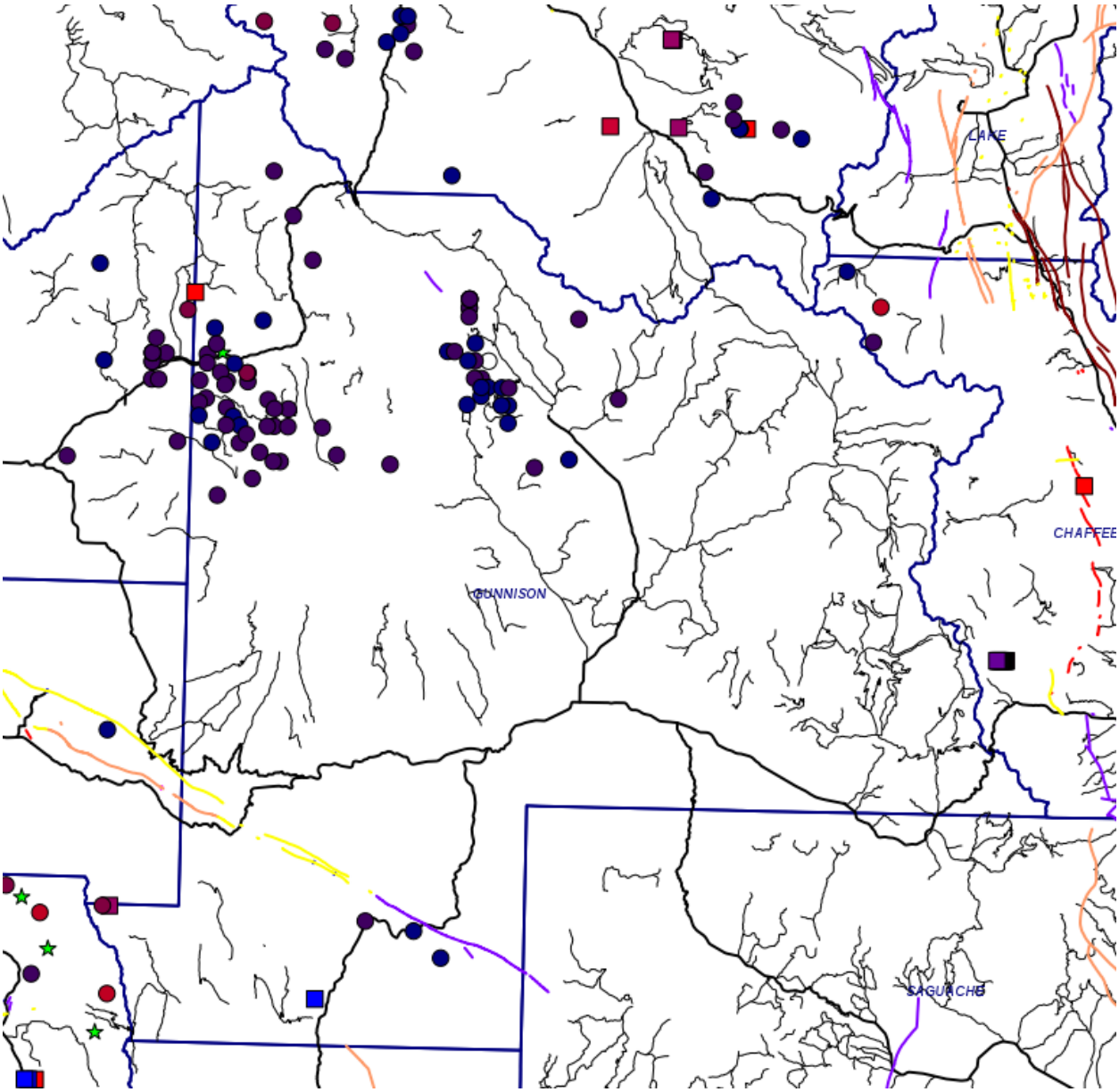
Part of what makes earthquakes so destructive is that they generally occur without warning. The main shock of an earthquake can usually be measured in seconds, and rarely lasts for more than a minute. Aftershocks can occur within the days, weeks, and even months following a major earthquake.

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. The Colorado Geological Survey created the interactive "Colorado Earthquake and Late Cenozoic Fault and Fold Map Server," which contains the location of all cataloged earthquakes in Colorado and the location of fault lines that are determined to have ruptured within the last 23 million years. An excerpt of this map displaying Gunnison County and vicinity is shown in Figure 4.6.

Figure 4.6. Statewide Earthquake Hazard Map Excerpt Showing Gunnison County



Source: Colorado Geological Survey http://dnrwebmapgdev.state.co.us/CGSOnline

Source: Colorado Geological Survey http://dnrwebmapgdev.state.co.us/CGSOnline

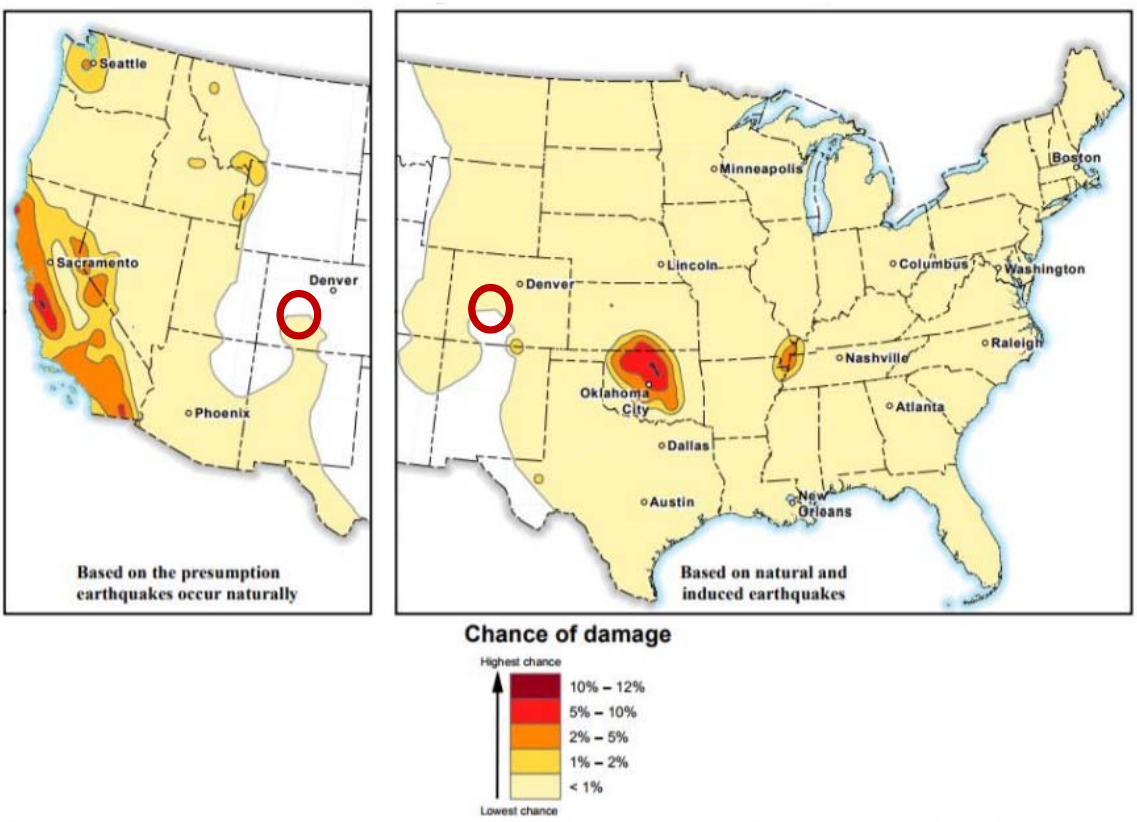
The map indicates that the northwestern and southwestern portions of the County have experienced earthquakes in the past since records began in 1867. One of strongest earthquakes experienced in the County occurred near the Delta-Gunnison County boundary on September 9th, 1944, which had a felt Intensity of VI (Source: Colorado Earthquake Information, 1867-1996, CGS). In 1960 an earthquake near Montrose/Ridgway had a 5.5 magnitude & V intensity. There have been no notable earthquakes since 2011 in Colorado. The CGS report does not mention impacts in Gunnison County, but felt reports ranged up to intensity VI at Basalt, Montrose, and Riland. The earthquake cracked walls and chimneys, rattled windows, and overturned small objects in Basalt. Buildings creaked, loose objects rattled, and some plaster was cracked in Montrose. Reports from Riland indicate a strongly built log house was moved slightly out of line. Aspen, Eagle, Edwards, Gilman, and Grand Junction experienced intensity V shaking.

A series of minor earthquakes occurred in the Crested Butte area in 1986. The first earthquake recorded in the area occurred on April 11, 1986. Activity increased dramatically in mid-August and continued through October 1986. The average magnitude of these earthquakes was 2.5. The earthquake with the highest magnitude, 3.5, occurred on September 3, 1986.

Dozens of earthquakes were recorded in the Paonia/Somerset area from the mid-1990s through 2011. It is possible that these earthquakes were caused by mining activity rather than natural plate tectonics. These earthquakes had an average magnitude of 2.9.

Maximum historical earthquake Intensities felt in Colorado are shown in Figure 4.7. This map includes past earthquakes that have affected neighboring Hinsdale, Ouray, and Delta counties, including an Intensity VI event on August 3, 1955 in Lake City.

Figure 4.7. Maximum Historical Earthquake Intensities in Colorado



USGS map displaying potential to experience damage from natural or human-induced earthquakes in 2017. Chances range from less than 1 percent to 12 percent.

Source: USGS, 2017

Source: 2018 Colorado Hazard Mitigation Plan; Red oval indicates approximate location of Gunnison County

Geographical Area Affected

The geographic extent rating for earthquakes in the response area is **extensive**. All of Gunnison County could be impacted by earthquakes. Based on a limited number of historic events the south western and north western portions of the County are likely to have the potential for higher ground shaking relative to other parts of the county. The City of Gunnison and Town of Crested Butte, 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 4.8 indicates the potentially active faults in Colorado.

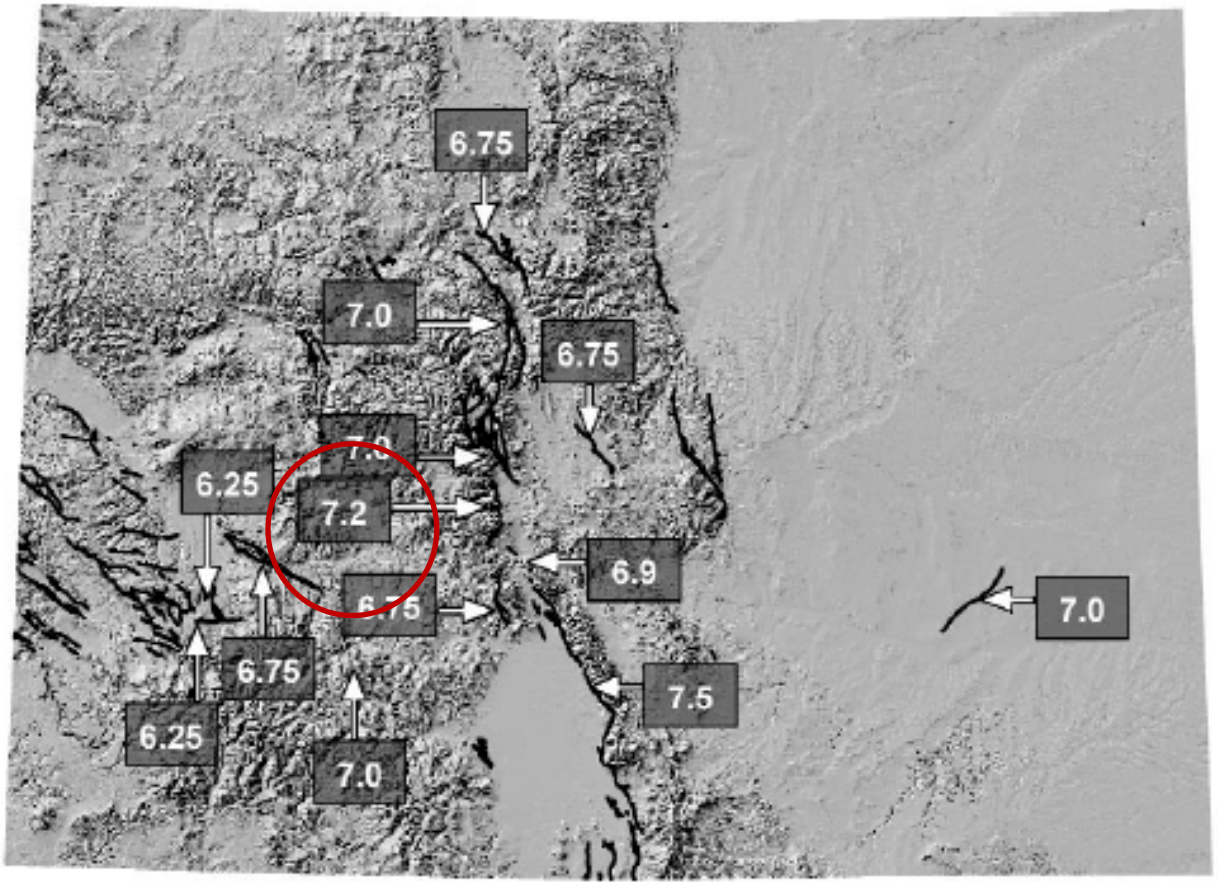
Faults are classified based on the time frame of their latest suspected movement (in order of activity occurrence, most recent is listed first):

- **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 Cimarron (Q, LQ, Q), Red Rocks (Q), and Treasure Mountain (LC) faults.

Other faults near the southwestern part of Gunnison County in Ouray County include the Busted Boiler (LQ), Cannibal (LQ), Cimarron (LQ, Q), and 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 Ouray County include the Cow Creek (LC), Log Hill Mesa Graben Faults (LQ), Montrose Faults SW (Q), Ridgway (Q), and Ridgway Quarry Faults (LC). The Cannibal fault in Hinsdale County is a Late Quaternary fault that has been identified (Source: State of Colorado Natural Hazards Mitigation Plan 2004 Earthquake Evaluation Report). No potentially active faults have been identified in the Saguache County portion of the Gunnison response area but the N Sangre de Cristo (H) is located in that County. Other faults that could impact the County include the N Sawatch (LQ) and S Sawatch (H) in Chaffee County to the east.

Figure 4.8. Potentially Active Faults in Colorado with Maximum Credible Earthquake Determinations from the Colorado Geological Survey



Red oval is approximate location of Gunnison County (Source: CGS RockTalk Pub Volume 5, No. 2 April 2002)

Potential Magnitude

Specific details about the earthquake potential in Gunnison County and Colorado in general remain largely unknown. A 2,500 year probabilistic earthquake scenario analysis was performed prior to development of this mitigation plan update. The results can be referenced in Table 4.34. 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 19% of the total number of buildings in the County to be affected, with roughly 1,854 buildings experiencing at least moderate damage. 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. Overall, earthquake impacts in Gunnison County could be **limited**, with 10 to 25% of the response area affected. Due to the low probability of a damaging earthquake occurring, as discussed below, the planning significance of earthquakes is considered low by the HMPC.

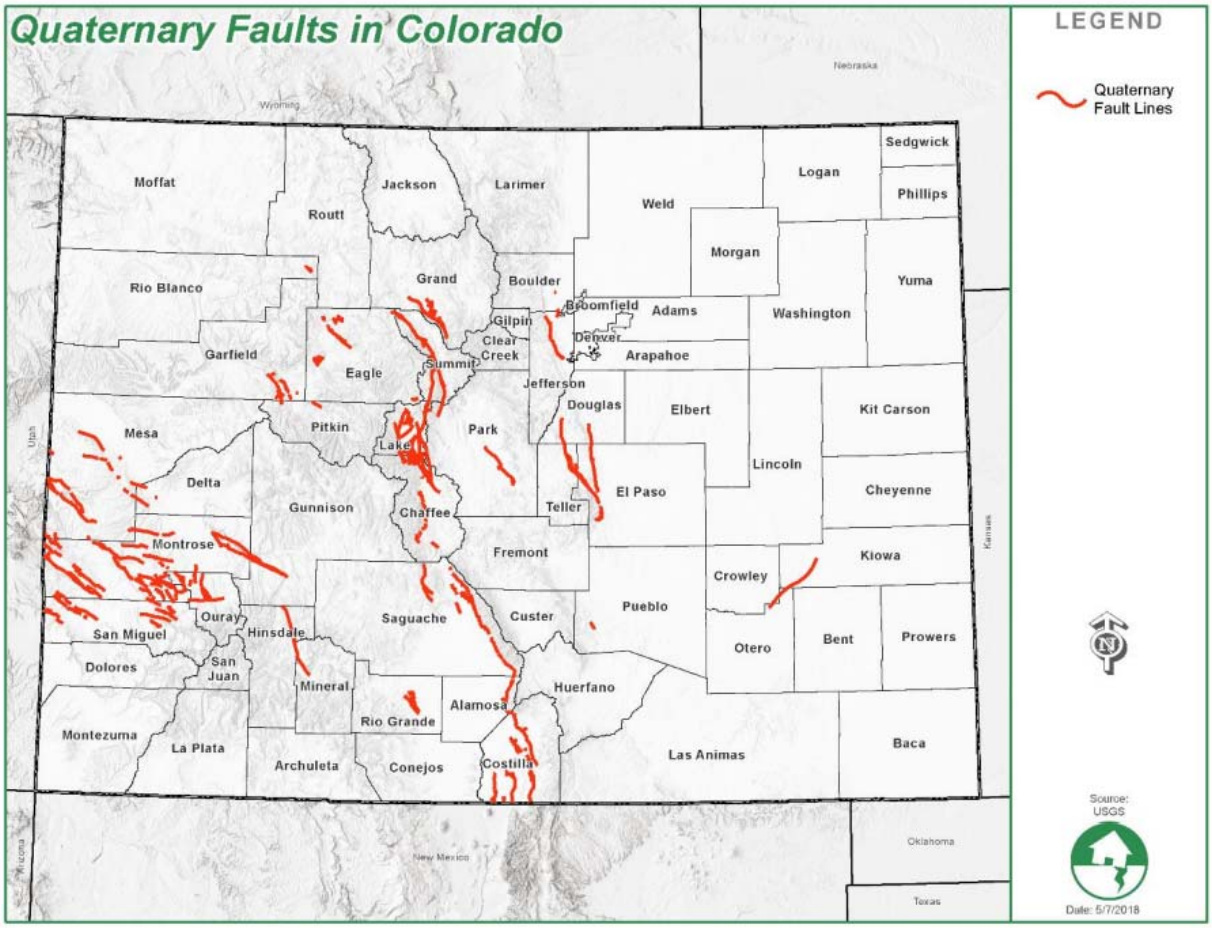
Likelihood/Frequency of Occurrence

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

According to the 2018 Colorado Hazard Mitigation Plan, because the occurrence of earthquakes is relatively infrequent in Colorado and the historical earthquake record is short (only about 140 years), it is challenging if not impossible to accurately estimate the timing or location of future dangerous earthquakes in Colorado. Although limited, available seismic hazard information can provide a basis for a reasoned and prudent approach to seismic safety. Scientists are constantly studying faults in Colorado to determine future earthquake potential. Based on the historical earthquake record and geologic studies in Colorado, an event of magnitude 6.5 to 7.5 could occur somewhere in the state. One study suggests an earthquake of magnitude 6.3 or larger has a one percent probability of occurring each year somewhere in Colorado (Charlie, Doehring, Oaks Colorado Earthquake Hazard Reduction Program Open File Report 93-01, 1993).

Figure 4.9 shows the locations of Colorado's quaternary faults. The quaternary faults are those that have slipped in the last 1.8 million years. It is believed that these faults are the most likely source of future earthquakes. Portions of the state show clustering such as near the Denver metro region, central mountains, and the southwestern and northwestern part of the state. Northeast Colorado is largely void of seismic activity.

Figure 4.9. Colorado's Quaternary Faults



Source: 2018 Colorado Hazard Mitigation Plan

4.2.6 Extreme Cold

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 hazard, including hurricanes.[1] Extreme heat was not considered to be a significant natural hazard for the Gunnison County response area due to the high elevation at which the County sits, so only extreme cold is profiled in this plan.

[1] 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.

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, February is the coolest month in the Gunnison County response area. The average last freeze/frost day in Gunnison County can vary. There is a 10% chance that the last frost day will occur before June 8, a 50% chance before June 27, and a 90% chance before July 16 (source: http://www.climate-charts.com/USA-Stations/CO/CO053662.php). Gunnison County and the City of Gunnison in particular are known for having some of the lowest temperatures in the state during the winter months. Denser cold air often settles in the Gunnison River and East River valleys near the City and forms a temperature inversion.

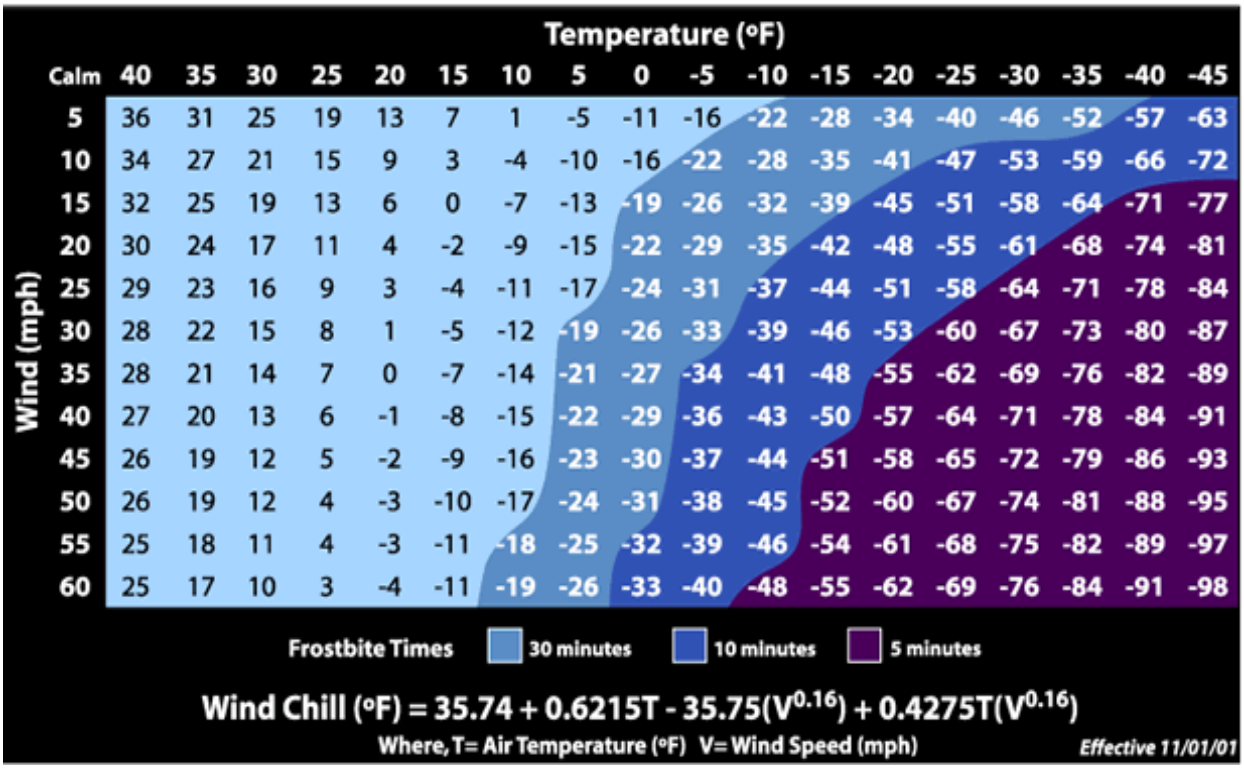
Prolonged exposure to the cold can cause frostbite and/or hypothermia and can become life-threatening. According to the Colorado Department of Public Health and Environment, from 2000-2015, elderly people aged 75 or more years were the most susceptible to hospitalization from extreme cold. Pipes may freeze and burst in homes or buildings that are poorly insulated or without heat. Extreme cold can disrupt or impair communications facilities. Extreme cold temperatures can destroy crops and cause utility outages, leaving people without water or power until the 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 within 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 updated the Wind Chill Temperature (WCT) Index to take advantage of advances in science and computer modeling technology (see Figure 4.10). This WCT was developed to describe the relative discomfort/danger resulting from the combination of wind and temperature.

Figure 4.10. National Weather Service Wind Chill Chart



Source: National Weather Service, https://www.weather.gov/oun/safety-winter-windchill.

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

Past Occurrences

Based on the 2011 SHMP and other records, that -60 degrees is the coldest recorded temp in Gunnison since 1961. Extreme cold is included in the SHMP under Severe Winter Weather. This was the second coldest recorded temperature in Colorado during that time period. Moffat County had the coldest recorded temperature at -61 degrees Fahrenheit. According to Figure 4.10, it is assumed that a person would develop frostbite within five to ten minutes of being exposed to such temperatures.

According to SHELDUS data, 17 damaging extreme cold weather events occurred in Gunnison County between 1960 and 2010. The National Oceanic and Atmospheric Administration records show one extreme cold event between 2010 and 2019. All of these events took place as a result of winter weather, but their primary feature was extreme cold. Therefore, they are profiled in Table 4.9 in this section rather than Section 0 Severe Winter Weather. It is important to note that SHELDUS casualty and damage estimates are calculated by averaging the damages among the impacted counties. This is why an event may be recorded as causing 0.03 injuries, for example.

Table 4.9 Extreme Cold Events: 1960-2010*

Date	Injuries	Deaths	Property Damage($)**	Crop Damage($)**
4/30/1960	0	0	0	793
1/10/1963	0	0	79	0
4/18/1966	0	0	79	7,936
4/20/1967	0	0	0	793
10/11/1969	0.03	0	793	793
10/13/1969	0	0	0	793
9/16/1971	0	0	793	0
5/20/1974	0	0	0	333
4/18/1978	0	0	0	3,125
12/5/1978	0	0.02	0	0
2/1/1982	0	0	79	0
1/30/1985	0	0.08	793	0
1/31/1985	0	0	793	0
2/1/1989	0.32	0	79,365	79,365
4/29/1996	0	0	0	2,266,667
4/12/1997	0	0	0	1,500,000
4/19/2007	0	0	0	2,500
2/1/2011	0	0	0	0
TOTALS	**0.35**	**.01**	**82,774**	**3,863,098**

Source: SHELDUS 1960 – 2010, NOAA 2010 – 2019
*Extent of Record
**Dollar value based on year of event

The Colorado Department of Public Health and Environment (CDPHE) tracks the number of hospitalizations due to extreme cold on the Colorado Health Information Dataset. In Gunnison County, four people were hospitalized due to extreme cold (at a rate of 1.7 per 100,000 people) from 1995 to 2015. These rates are considered lower than the rate for the state. Statewide statistics indicate that 1,767 people were hospitalized for extreme cold injuries during this time period, with an occurrence rate of 2.3 per 100,000. The region with the highest rate was the San Luis Valley (4.0 per 100,000), while the Foothills region was the lowest occurrence rate areas, a rate of 1.5 per 100,000.

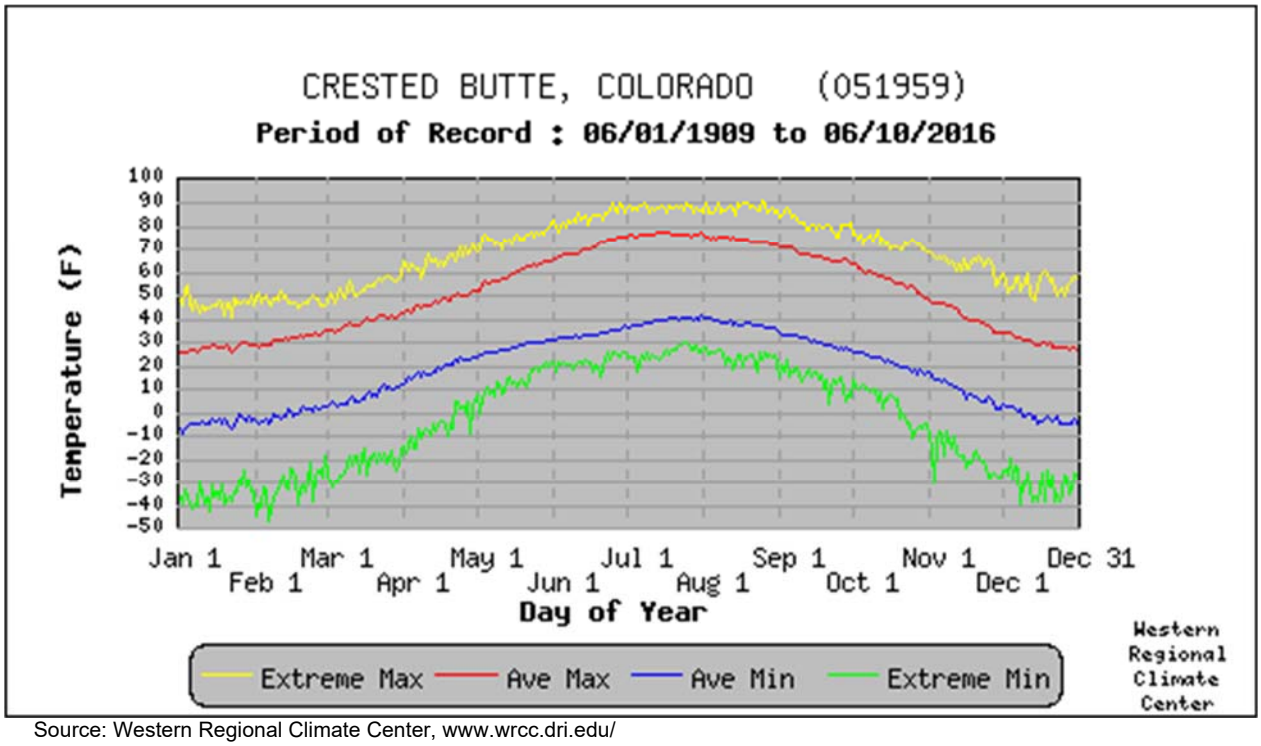
Temperature data was gathered from three Western Regional Climate Center weather stations in the Gunnison County response area: the Crested Butte station, and Gunnison station, and the Cochetopa Creek station. The Cochetopa Creek station is located near the southeastern border of Gunnison County and the northwestern border of Saguache County. 0 contains temperature summaries for the three stations. **Error! Reference source not found.**, Figure 4.12, and Figure 4.13 graph the daily temperature averages and extremes recorded over several decades at these three weather stations.

Table 4.10 Gunnison County Response Area Temperature Summaries

Station	Winter[1] Average Minimum Temperature	Summer[1] Average Maximum Temperature	Maximum Temperature	Minimum Temperature	# Days >90°F/ Year	# Days <32°F/ Year
Crested Butte[2]	-2.6°F	73.4°F	95°F July 17, 1949	-47°F February 6, 1982	0	275.9
Gunnison[3]	-4.0°F	78.5°F	105°F August 3, 1894	-47°F December 25, 1924	1.2	256.4
Cochetop a Creek[4]	-2.3°F	78.6°F	94°F July 14, 2002	-40°F January 6, 1971	1.4	257.4

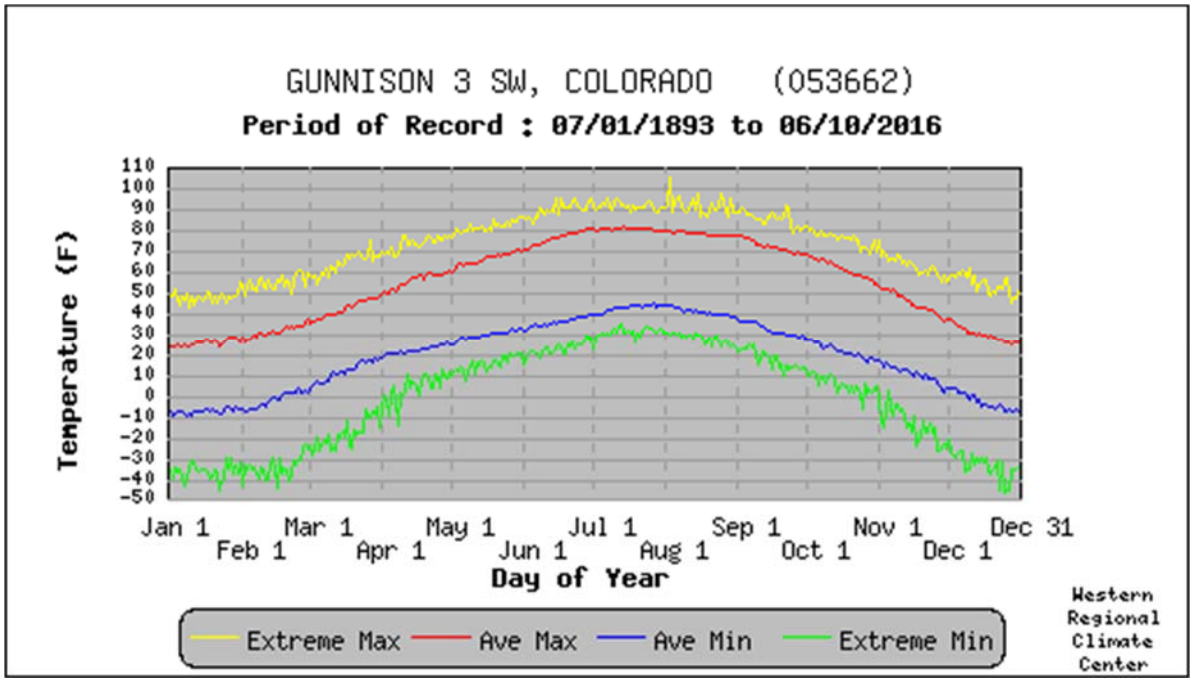
Source: Western Regional Climate Center, www.wrcc.dri.edu/
[1]Winter: December, January, February; Summer: June, July, August
[2]Period of record 1909-2012
[3]Period of record 1893-2012
[4]Period of record 1909-2011

Figure 4.11. Crested Butte Station Daily Temperature Averages and Extremes: 1909-2016



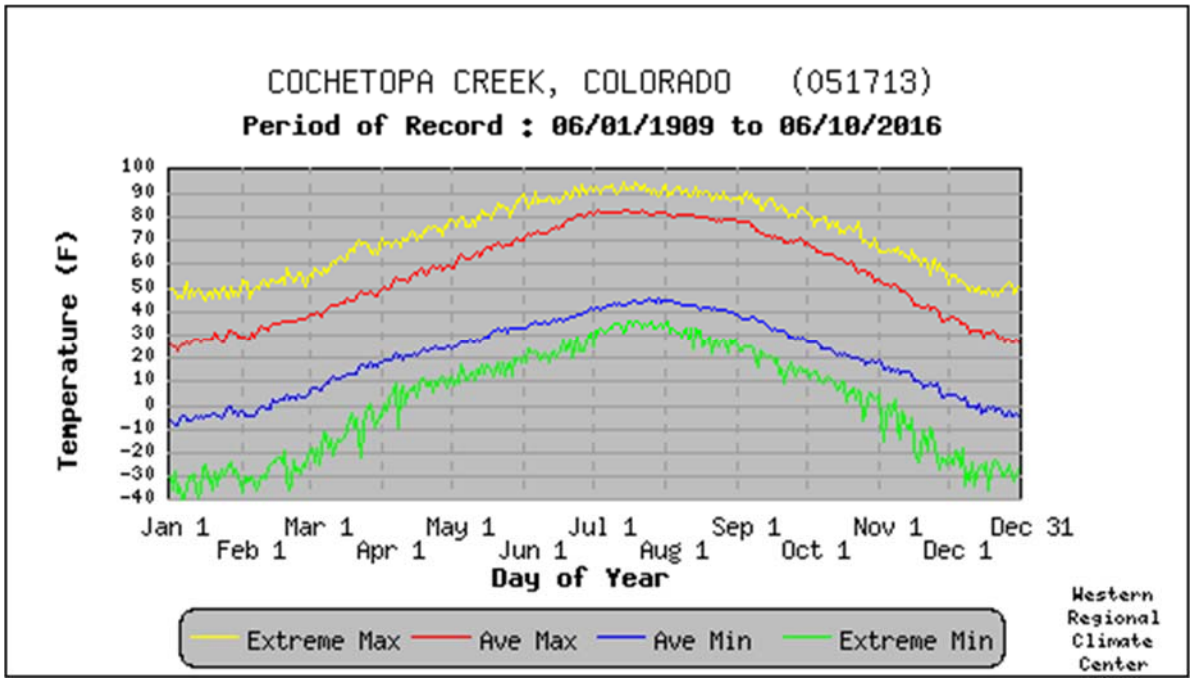
Source: Western Regional Climate Center, www.wrcc.dri.edu/

Figure 4.12. Gunnison Station Daily Temperature Averages and Extremes: 1893-2016



Source: Western Regional Climate Center, www.wrcc.dri.edu/

Figure 4.13. Cochetopa Creek Daily Temperature Averages and Extremes: 1909-2016



Source: Western Regional Climate Center, www.wrcc.dri.edu/

Geographic Area Affected

The geographic extent rating for this hazard is **extensive**. Extreme cold temperatures can impact the entire response area. The City of Gunnison, the Town of Crested Butte, and other areas located along valley bottoms are prone to more frequent extreme cold temperatures as the cold air tends to settle in these areas, particularly at night.

Potential Magnitude

In order to calculate a magnitude and severity rating for comparison with other hazards, and to assist in assessing the overall impact of the hazard on the response area, information from the event of record is used. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it is a reflection of common occurrence. Based on SHELDUS records, the event of record for extreme cold in Gunnison County occurred in April 1996. This event resulted in $2,266,667 in crop damages (in 1996 dollars).

Calculating the average annual damage from extreme cold is another method used in assessing potential magnitude. This is done by dividing the total damages by the number of years in the period of record. The period of record varies from hazard to hazard. Most NCDC or SHELDUS hazard records begin in the 1950s, 1960, or 1993. According to SHELDUS, 17 extreme cold events caused a total of $3,945,872 in damages over a 50-year span between 1960 and 2018. This averages out to $78,917 in damages per year. Therefore, Gunnison County could expect to sustain approximately $79,000 in damages from extreme cold in any given year. The majority of the impacts are to agriculture. Overall, extreme cold impacts would likely be **negligible** in the Gunnison County response area, with less than 10% of the response area affected and minimal impact to quality of life and critical facilities or services.

Likelihood/Frequency of Occurrence

According to SHELDUS data, there were 17 damaging extreme cold events in Gunnison County over a 58-year period between 1960 and 2018. Using the methodology described in Section 4.2.1, we can calculate the probability of an extreme cold event occurring in the County in any given year:

$$(17 \div 58) \times 100 = 29\%$$

Therefore, there is a 29% chance that a damaging extreme cold event will impact Gunnison County in any year. This corresponds to a probability of future occurrences rating of likely. However, extreme cold events may occur more frequently in the Gunnison County response area. These events may go unrecorded in databases such as SHELDUS if they do not result in any significant damages. Therefore, the likelihood rating for extreme cold is upgraded to **highly likely**.

4.2.7 Flooding and Ice Jam and Ice Jam Floods

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% 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 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 wildland fires. Wildland fires 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.

The Gunnison County response area is susceptible to the following causes of flooding:

- Rain in a general storm system
- Rain in a localized intense thunderstorm
- Melting snow
- Rain on melting snow
- Ice Jam – Ice Jam Floods
- Dam failure
- Urban stormwater drainage
- Rain on fire-damaged watershed

Slow-rise floods associated with snowmelt and sustained precipitation usually are preceded with adequate warning, though the event can last several days. Flash floods, by their nature, occur very suddenly but usually dissipate within hours. Even flash floods are usually preceded with warning from NWS in terms of flash flood advisories, watches, and warnings. The majority of Gunnison County's flood problems are caused by rapid snowmelt. Intense, short rainstorms or long-duration rainstorms can contribute to flooding. Some of the most severe floods in the County were caused by a combination of rapid snowmelt and long-duration rainstorms in late spring.

Gunnison County is also subject to winter flooding from ice jams and ice jam floods. Ice jams are caused by two phenomena. Streams in mountain floodplains can ice over during periods of

extended severe cold weather. The channels are frozen solid and overbank flow occurs, which results in ice inundation in the floodplains. Ice jam floods can also occur when frozen water in the upper reaches of a stream abruptly begins to melt due to warm Chinook winds. Blocks of ice floating downstream can become lodged at constrictions and form a jam. The jam can force water to divert from the stream channel, causing a flood. An ice jam can also break up, suddenly causing a surge of water as the "reservoir" that was formed behind it is suddenly released. In very rare circumstances, ice jams can be dynamited, allowing a controlled release of backed up water to flow downstream.

The Gunnison River and its tributaries present the primary flood hazards in Gunnison County. The Gunnison River is the fifth largest tributary of the Colorado River. It is formed in eastern Gunnison County where the Taylor and East Rivers converge at Almont. Tributaries of the Gunnison include Cochetopa Creek, Tomichi Creek, East River, and Taylor River. Other important channels in the County include Cebolla Creek, Quartz Creek, North Fork, Smith Fork, Lake Fork, Ohio Creek, Muddy Creek, Anthracite Creek, Clark Stream, Slate River, and the Crystal River. Flooding typically occurs during the spring and summer due to snowmelt runoff, but ice jam floods can occur in the winter. Localized thunderstorms during the summer can also result in flooding. The 2013 Gunnison County FIS states that flooding problems in the City of Gunnison area are exacerbated by poor drainage caused by vegetation and debris.

Information on flood hazards in Gunnison County was obtained from the HMPC, GIS sources, the 2013 Flood Insurance Study (FIS), and the preliminary Digital Flood Insurance Rate Map (DFIRM). The 2013 FIS updates flood hazard information from the 1989 FIS. The 1989 FIS examined three locations of flooding in detail in Gunnison County, including:

- The Gunnison River from the bridge at McCabe's Lane, located approximately 1.6 miles downstream from its confluence with Tomichi Creek, to the Colorado Highway 135 bridge over the Gunnison River, a reach of approximately 7.6 miles.
- The North Fork of the Gunnison River from the Delta County border, located approximately one mile upstream of the Hubbard Creek confluence, to a point approximately 1,625 feet upstream of the Somerset Bridge, a reach of approximately 2.4 miles.
- Tomichi Creek from its confluence with the Gunnison River to a point 500 feet downstream from the New Mexico Principal Meridian, a reach of approximately 4.9 miles.

The 2013 FIS expands on these three flooding sources in addition to studying four new flood sources in detail. The streams studied by detailed methods in the 2013 FIS include:

- Clark Stream from just upstream of Colorado State Highway 135 to approximately 710 feet upstream of Colorado State Highway 135.
- Crystal River from approximately 500 feet downstream of Gunnison County Road 3 to approximately 1,200 feet upstream of White House Mountain Drive. Approximately 4.5 miles in length.

- East River from its confluence with the Gunnison River to the confluence with the Slate River. Approximately 12.6 miles in length.
- Gunnison River from the McCabe Bridge to the confluence with the East and Taylor Rivers. Approximately 15.8 miles in length.
- The North Fork of the Gunnison River from the Gunnison County boundary to approximately 0.9 mile above Somerset Bridge. Approximately 3.2 miles in length.
- Slate River from the confluence with the East River to just downstream of Gunnison County Road 317. Approximately 9.4 miles in length.
- Tomichi Creek from the confluence with the Gunnison River to approximately 7 miles upstream.

Past Occurrences

The Gunnison County response area has witnessed several major floods along the Gunnison River and its tributaries. The 2013 Gunnison County FIS reported large floods in 1917, 1918, 1920, 1921, 1957, 1984, and 1985. The Gunnison County FIS does not mention the flooding of 1996, however it is documented by the Army Corp of Engineers (see below). These floods caused damages by "disrupting highway and railroad traffic and communication services, drowning livestock, and destroying agricultural lands, roads, bridges, and buildings (2013 Gunnison County FIS, pg. 6). Past gauge readings indicate that damaging floods occurred along the North Fork of the Gunnison River and the Gunnison River in 1928, 1929, 1932, 1957, 1973, 1984, 1985, 1996 and 2017. Some of the most noteworthy and recent floods are profiled in the following text:

- **August 8, 1941:** A flood moved the Horace Williams House 30 feet off of its foundation.

- **July 31, 1945:** High waters damaged several bridges on the Crystal River between Marble and Carbondale. The Crystal River and Town of Marble experienced several other flood events in 1917, 1938, 1949, 1952, 1953, 1957, 1965, 1971, and 1973.

- **1957:** Flooding along the Gunnison River resulted in $24,202,014 (2010) in damages in western Colorado.

- **1984:** One of the most severe floods in Gunnison County's history occurred in late May and early June of 1984. This flood was caused by intense spring runoff. The snow pack for the 1983-84 winter season had been above average, and extremely high spring temperatures and several rain-on-snow events caused approximately 80% of the snowpack in the Upper Gunnison Basin to melt in roughly four days. The resulting floods impacted the Gunnison River Valley (from Almont to Blue Mesa Reservoir) and from Tomichi Creek Valley to Gunnison. Approximately 20 homes suffered water damage, and several driveways and culverts were washed out. Some homeowners along Cebolla Creek and Tomichi Creek were stranded on their properties for several days after bridges and culverts on access roads were washed out. Damaged infrastructure included the County Road (CR) 32 bridge; culverts on CR 42, 44, 887, and 888; CRs 43, 45, 62, and 771; and USFS Roads

763 and 888. Several CRs were closed due to the damages. Crop damage was minimal, and the Gunnison nursing home was evacuated for access issues. A federal disaster declaration was issued for Gunnison County and several other counties in Colorado affected by snowmelt floods.

- **1993**: Debris washed downstream and got caught at the bridge where First Street crosses over Coal Creek, in Crested Butte. There was concern that the water would overtop the bridge. The bridge was not overtopped in the end, but both sides of the structure were damaged by trees and debris that got caught there. The State provided funding in 1994 to build gabion baskets to armor both sides of the creek.

- **1996:** The circumstances behind the late-May/early-June1996 flood along the Gunnison River were similar to those behind the 1984 flood. The snowpack for the 1995-1996 winter season was above average. Warm spring temperatures combined with rain-on-snow events caused most of the snowpack to melt in a very short period of time. The floods impacted the area east of the Slate River and from the Gunnison River Valleys to Blue Mesa Reservoir. The Alkali Basin Bridge was washed out, and CRs 771, 887, and 888 were closed. Overall, the damages from the 1996 flood were less severe than the 1984 flood; following the 1984 flood, US Army Corps of Engineers constructed a large diversion dike north of Gunnison off of CR 15 to push water back into the river channel. The diversion dike helped mitigate the impacts of the 1996 flood. This event did not result in a state or federal disaster declaration.

- **1997-1999:** The Town of Marble experienced several minor flash floods and mudslides. A September 1999 event left mud and debris two feet deep on the road after floodwaters receded.

- **August 1999:** Heavy rains eight miles southeast of the City of Gunnison caused flooding on several sections of Highway 50. The storm dropped an estimated 2.5 inches of precipitation per hour. In some places along the road, floodwaters were five feet deep.

- **July 2004:** Two miles southeast of the City of Gunnison, parts of Highway 50 were submerged under one-to-two feet of water. The same storm washed out a section of CR 72 along Tomichi Creek.

- **July 13, 2007:** An outbreak of heavy rain produced thunderstorms resulting in flash flooding and debris flows in northwest and west-central Colorado. The storm produced 0.75 inches of rain in 30 minutes. The water was one inch deep on Highway 135.

- **May 20-22, 2008:** Snowmelt runoff caused some streams and creeks to exceed bankfull resulting in minor flooding. A seasonal stream came out of its banks and flooded the basement of a home south of Crested Butte and threatened a couple of other homes. Privately contracted heavy equipment was used to build some dikes and divert the water.

Several homes were surrounded by water near the confluence of the Slate River and East River, which is about seven miles southeast of Crested Butte and ten miles north of Almont. The dirt roads leading to those residences were under three-to-six inches of water. Additionally, the East River overflowed at a few other locations which flooded pasture land.

The USACE Ice Jam Database includes several events in the Gunnison County response area: City of Gunnison (12), Sargents (10), Almont (7), Gunnison County (1) and Ohio City (1). Ten ice jams occurred in Sargents in northwestern Saguache County. The events are summarized in 0 and depicted in **Error! Reference source not found.**.

- **Dec 27, 2015-Jan 23, 2016:** Ice jams and ice jam floods occurred on several stretches of the Taylor and Gunnison Rivers, resulting in moderate damage to five homes. Significant mitigation work occurred at the County Road 742 Bridge over the Taylor River in Almont to prevent further flooding in Almont and damage to the county bridge.

Table 4.11 Ice Jam / Ice Jam Flood Events in the Gunnison County Response Area: 1919-2018

City	Jam Date	River
Almont	2/2/1919	Taylor River
Almont	1/10/1930	Taylor River
Almont	1/20/1931	Taylor River
Almont	1/7/1950	Taylor River
Almont	2/16/2004	Taylor River
Almont	2/13/2005	Taylor River
Almont	1/18/2008	Taylor River
Gunnison	3/28/1960	Tomichi Creek
Gunnison	1/1/1968	Gunnison River
Gunnison	1/1/1969	Gunnison River
Gunnison	12/1/1972	Gunnison River
Gunnison	12/3/1973	Gunnison River
Gunnison	12/1/1980	Gunnison River
Gunnison	1/1/1984	Gunnison River
Gunnison	12/9/1985	Gunnison River
Gunnison	2/23/2004	Ohio Creek
Gunnison	2/26/2004	Tomichi Creek
Gunnison	2/27/2006	Tomichi Creek
Gunnison	1/25/2010	Ohio Creek
Gunnison County	1/19/2010	Gunnison River

City	Jam Date	River
Ohio City	3/17/1960	Quartz Creek
Sargents	4/4/1947	Tomichi Creek
Sargents	4/2/1950	Tomichi Creek
Sargents	3/28/1951	Tomichi Creek
Sargents	4/1/1954	Tomichi Creek
Sargents	4/10/1955	Tomichi Creek
Sargents	4/1/1956	Tomichi Creek
Sargents	4/5/1959	Tomichi Creek
Sargents	3/24/1960	Tomichi Creek
Sargents	1/6/2004	Tomichi Creek
Sargents	3/13/2010	Tomichi Creek
Taylor Canyon, Almont, Gunnison	12/27/15 – 01/23/16	Taylor and Gunnison Rivers

SHELDUS data for Gunnison County included seven flood events between 1960 and 2010. Between 2010 and 2018, there was one minor flooding event in Gunnison County, that being the ice jams/ice jam floods that occurred between Dec 27, 2015 and Jan 23, 2016. The most damaging event occurred in June of 1965 and resulted in nearly $4M (in 1965 dollars) in property damage. 0 summarizes the SHELDUS flood records for Gunnison County.

Table 4.12 Gunnison County Flood Records, 1960-2010*

Date	# of Injuries	# of Deaths	Property Damages ($)**	Crop Damages ($)**
6/17/1965	0	0.08	3,846,154	0
6/9/1979	0	0	793	0
6/30/1984	0	0	172,413	172,413
8/26/1997	0	0	2,000	0
8/23/1999	0	0	30,000	0
9/16/1999	0	0	15,000	0
7/17/2004	0	0	15,000	0
TOTALS	**0**	**0.08**	**4,081,360**	**172,413**

Source: SHELDUS
*Extent of Record
**Dollar value based on year of event

Geographical Area Affected

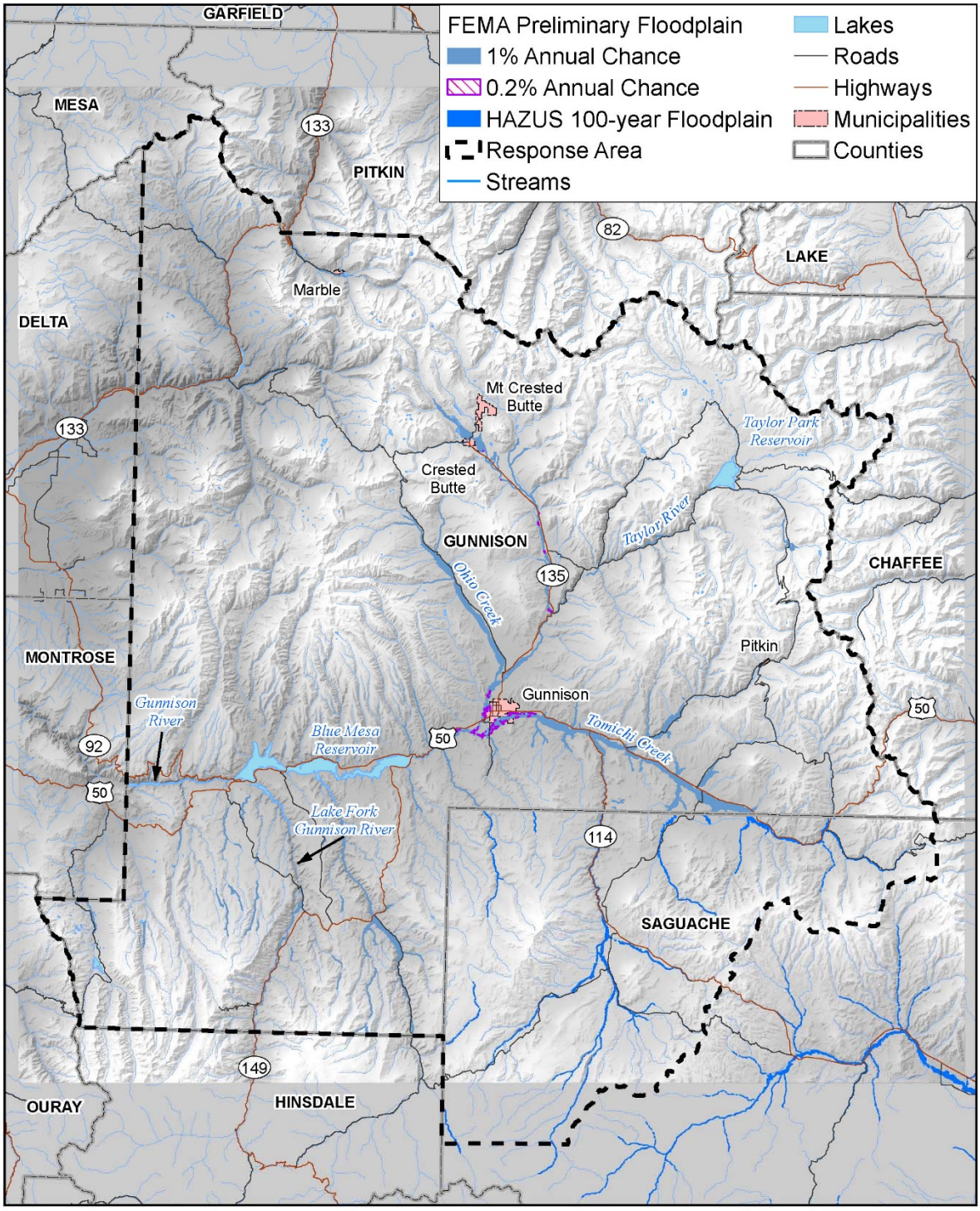
The Gunnison County response area lies within the Gunnison River basin and is formed in Almont by the confluence of the East River and Taylor River. The Gunnison River flows through the County into the Blue Mesa Reservoir, the largest body of water in Colorado. The Gunnison River continues westerly through the Black Canyon, feeding the Morrow Point and Crystal Reservoirs.

Eventually, the Gunnison River is joined by the Uncompahgre River, North Fork River, and Kannah Creek before emptying into the Colorado River near Grand Junction.

The Gunnison River and its tributaries are the main sources of flood problems for the response area. These rivers and creeks are highly subject to snowmelt and rainfall flooding. The smaller channels can quickly become overwhelmed and overtop their banks. Parts of the county have a high ground water table, which can lead to flooding in basements. This issue is especially prevalent near the Town of Crested Butte and in the City of Gunnison along the Ohio Creek, Tomichi Creek, and Gunnison River.

The geographic extent rating for flooding in Gunnison County is **significant**, meaning that a flood event could impact 10-50% of the response area. Figure 4.144 shows the 1% and 0.2% annual chance of flood hazards in the County. Figure 4.15 and Figure 4.16 show more detailed views of flood hazards in the City of Gunnison and the Town of Crested Butte, respectively. Maps that detail the flood hazards in the vicinity of the participating districts are in Section 4.3. Maps developed during the 2012 Hazard Mitigation Plan planning process are still current after the data was reviewed. Mt. Crested Butte does not have flood plain maps.

Figure 4.14. 1% and 0.2% Annual Chance of Flood Hazards in Gunnison County



Map compiled 4/2012; intended for planning purposes only.
Data Source: Gunnison County, CDOT,
FEMA Preliminary DFIRM November 29, 2010
FEMA - HAZUS-MH MR4

Figure 4.15. 1% and 0.2% Annual Chance of Flood Hazards in the City of Gunnison

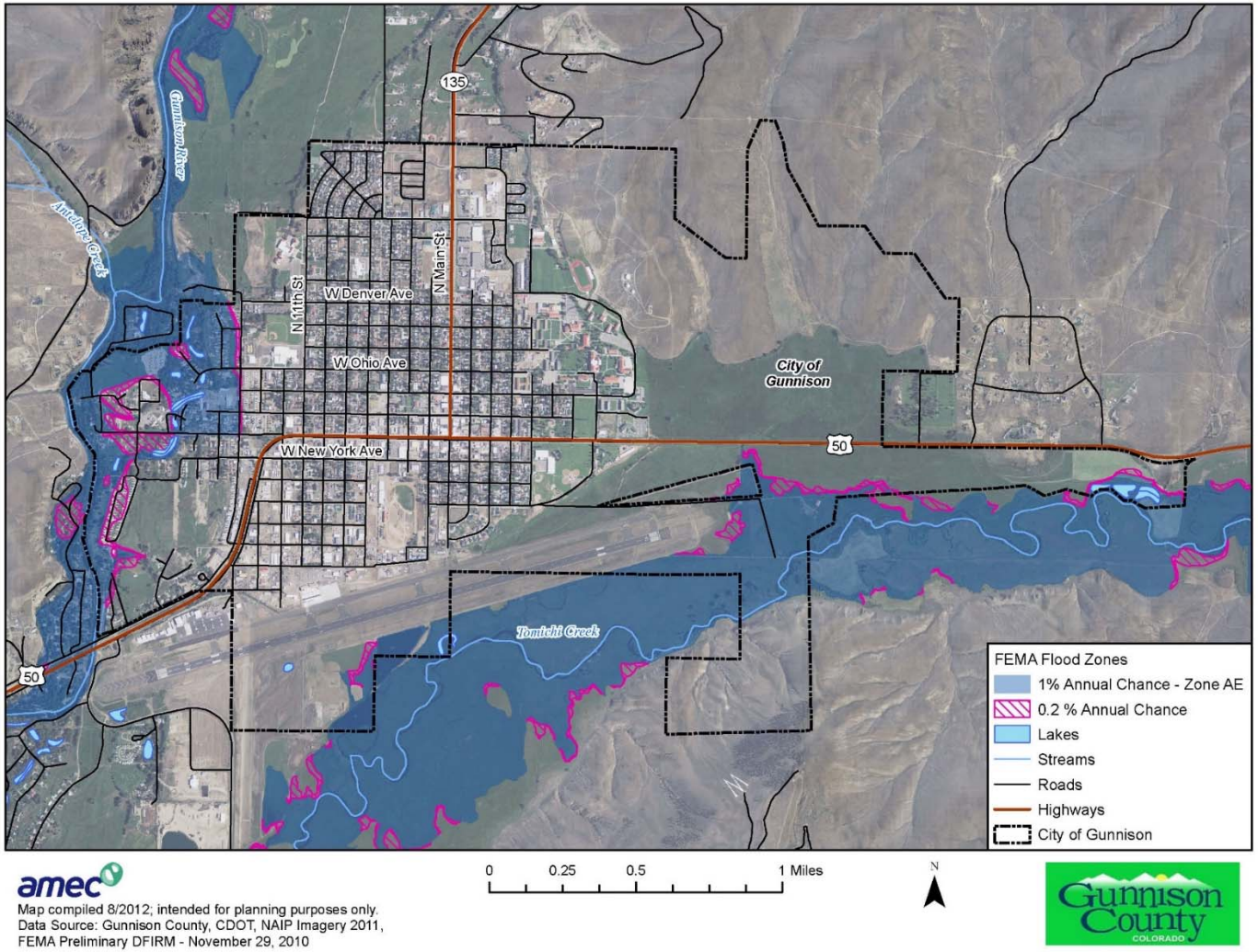
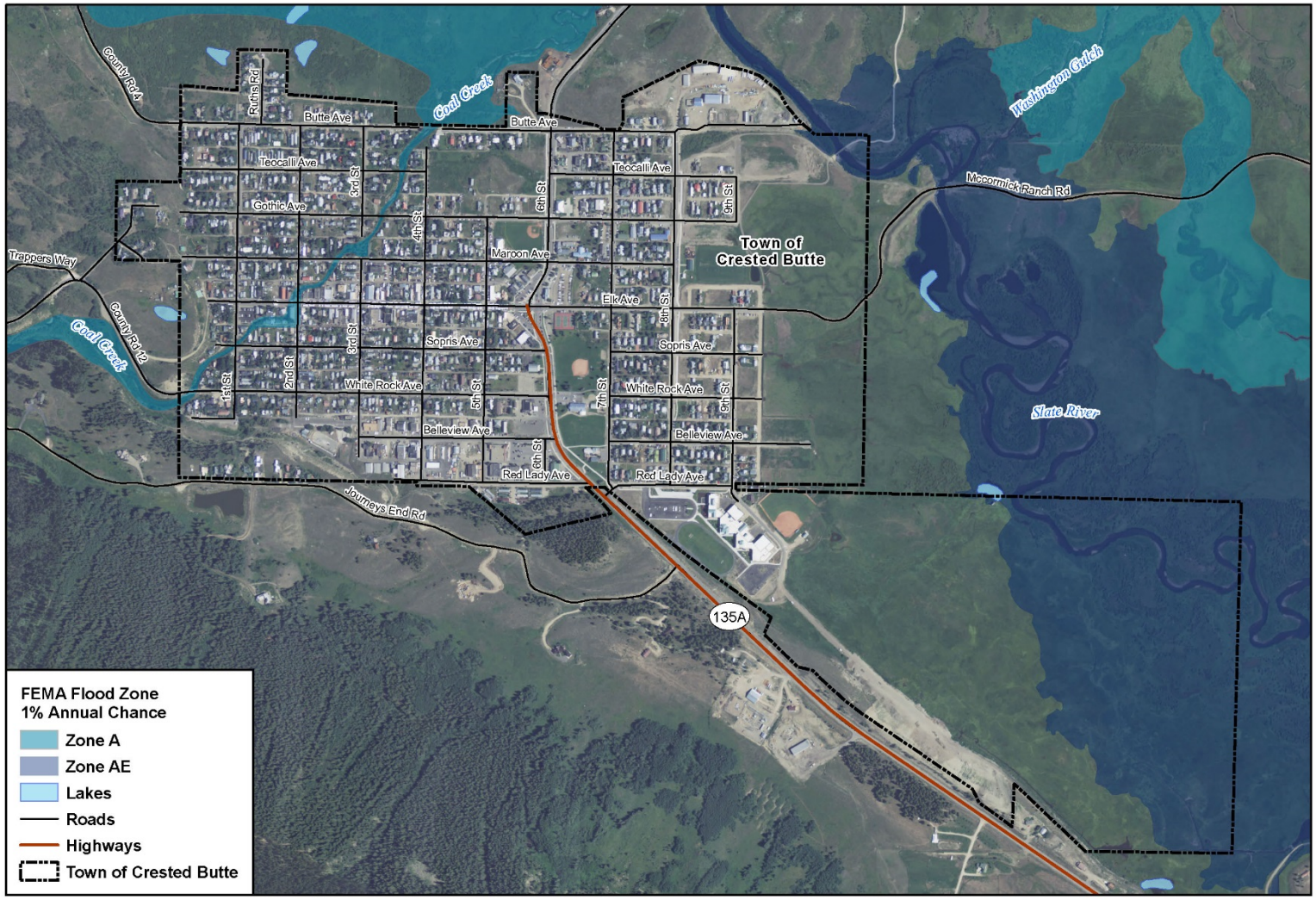


Figure 4.16. 1% Annual Chance Flood Hazards in the Town of Crested Butte



Potential Magnitude

Magnitude and severity can be described or evaluated in terms of a combination of the different levels of impact that a community sustains from a hazard event. Specific examples of negative impacts from flooding in Gunnison County span a comprehensive range and are summarized as follows:

- Floods cause damage to private property that often creates financial hardship for individuals and families;
- Floods cause damage to public infrastructure resulting in increased public expenditures and demand for tax dollars;
- Floods cause loss of personal income for agricultural producers that experience flood damages;
- Floods cause loss of income to businesses relying on recreational uses of county waterways;
- Floods cause transportation disruptions;
- Flood-fighting efforts stress available resources and response personnel;
- Floods cause emotional distress on individuals and families; and
- Floods can cause injury and death.

The magnitude and severity of the flood hazard is usually determined by not only the extent of impact it has on the overall geographic area, but also by identifying the most catastrophic event in the previous flood history. Sometimes it is referred to as the "event of record." The flood of record is almost always correlated to a peak discharge at a gauge, but that event may not have caused the worst historic flood impact in terms of property damage, loss of life, etc. The spring 1984 flood is considered to be the flood of record for Gunnison County. This event resulted in widespread damage to roads, bridges, and culverts. Events of similar magnitude may be possible, although mitigation activities have greatly decreased the flood risk in some areas of the county.

Average annual damages can also be used to gauge the potential magnitude of a flood in any given year. Based on data from SHELDUS, seven floods in the Gunnison County response area resulted $4,253,773 in damages between 1960 and 2010. Thus, $4,253,773 in damages over a 50-year span of time equates to an average of $85,075 per year. This figure is not fully representative due to the fact that not all flooding events profiled in this plan included a damage estimate, and it does not account for inflation.

The impact of a flood event can vary based on geographic location to waterways, soil content and ground cover, and construction. The extent of the damage of flooding ranges from very narrow to widespread based on the type of flooding and other circumstances such as previous rainfall, rate of precipitation accumulation, and the time of year.

The HMPC estimates that the potential magnitude for a flood event in Gunnison County is **critical**. An event of critical magnitude would result in multiple severe injuries, complete shutdown of critical facilities and services for at least two weeks, and severe damage to more than 25% of property in the response area. 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.

Likelihood/Frequency of Occurrence

The HMPC estimates that floods are **likely** to occur somewhere in the response area in any given year. SHELDUS recorded only seven damaging floods between 1960 and 2010, which yields a 14% change that a damaging flood will occur in any given year and corresponds to a **likely** recurrence rating. The USACE Ice Jam Database lists 31 events in the Gunnison County response area between 1919 and 2010. Based on this information, ice jams have a 34% chance of occurring somewhere in the response area in any given year, which also corresponds to a **likely** probability rating.

4.2.8 Hailstorm

Hazard/Problem Description

Hailstorms are any storm events where hailstones fall. Hailstones, often abbreviated to 'hail,' form when updrafts carry raindrops into extremely cold areas of the atmosphere where the drops freeze into ice. Hail falls when it becomes heavy enough to overcome the strength of the updraft and is pulled by gravity towards the earth. The process of falling, thawing, moving up into the updraft, and refreezing before failing again may repeat many times, increasing the size of the hailstone. Usually hailstones are less than 2" in diameter, but have been reported much larger and may fall at speeds of up to 120 mph. Hailstorms occur throughout the spring, summer, and fall in the region, but are more frequent in late spring and early summer. These events are often associated with thunderstorms that may also cause high winds and tornadoes. Hail causes nearly $1 billion in damage to crops and property each year in the United States. Hail is also one of the criteria which NWS uses to classify thunderstorms as 'severe.' If hailstones of more than 1" diameter are produced in a thunderstorm, it qualifies as severe.

NWS classifies hail by diameter size and corresponding everyday objects to help relay scope and severity to the population. 0 indicates the hailstone measurements utilized by NWS.

Table 4.13 Hailstone Measurements

Average Diameter	Corresponding Household Object
.25 inch	Pea
.5 inch	Marble/Mothball
.75 inch	Dime/Penny
.875 inch	Nickel
1.0 inch	Quarter
1.5 inch	Ping-pong ball

Average Diameter	Corresponding Household Object
1.75 inch	Golf Ball
2.0 inch	Hen Egg
2.5 inch	Tennis Ball
2.75 inch	Baseball
3.00 inch	Teacup
4.00 inch	Grapefruit
4.5 inch	Softball

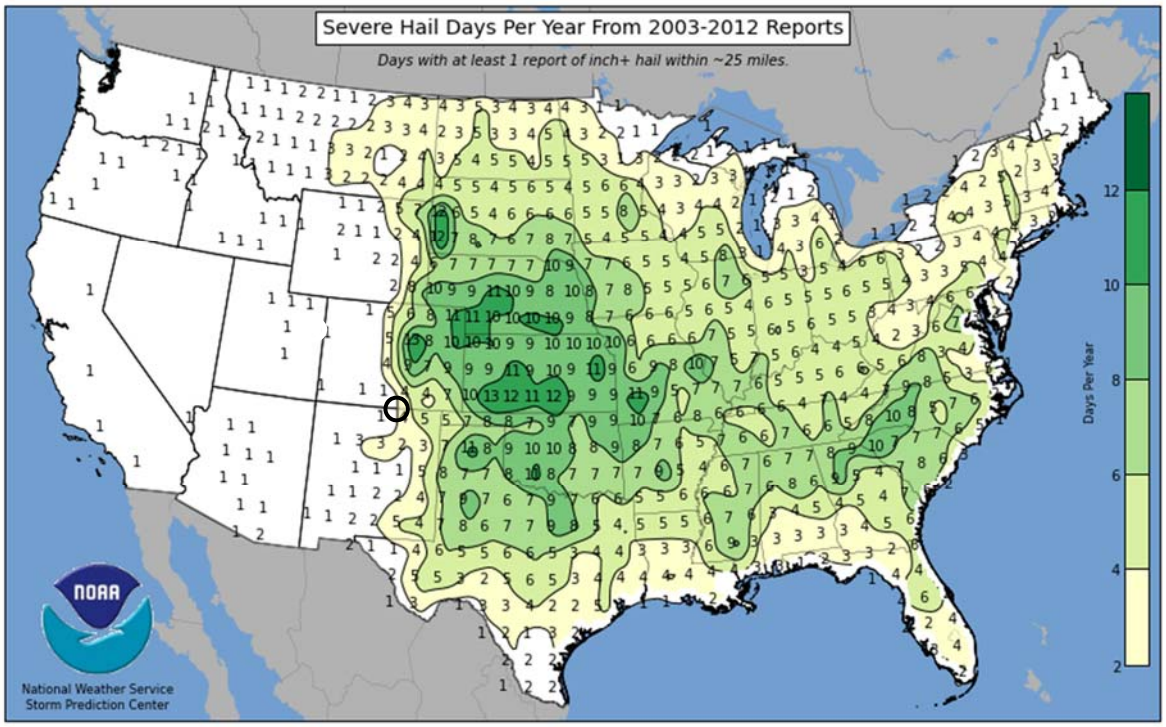
Source: National Weather Service

There is no clear distinction between storms that do and do not produce hailstones. Nearly all severe thunderstorms produce hail aloft, though it may melt before reaching the ground. Multi-cell thunderstorms produce many hailstones, but not usually the largest hailstones. In the life cycle of the multi-cell thunderstorm, the mature stage is relatively short so there is not much time for growth of the hailstone. Supercell thunderstorms have sustained updrafts that support large hail formation by repeatedly lifting the hailstones into the very cold air at the top of the thunderstorm cloud. In general, hail 2" (5 cm) or larger in diameter is associated with supercells (close to the size of a Billiard ball, which the NWS says is 2-1/8" (or 5.4 cm). Non-supercell storms are capable of producing golf-ball size hail.

Nebraska, Colorado, and Wyoming usually have the most hail storms of anywhere in the country. The area where these three states meet – "hail alley," averages 7-9 hail days per year. The reason why this area is so prone to hail is that the freezing levels (the area of the atmosphere at 32º Fahrenheit or less) in the high plains are much closer to the ground than they are at sea level, where hail has plenty of time to melt before reaching the ground.

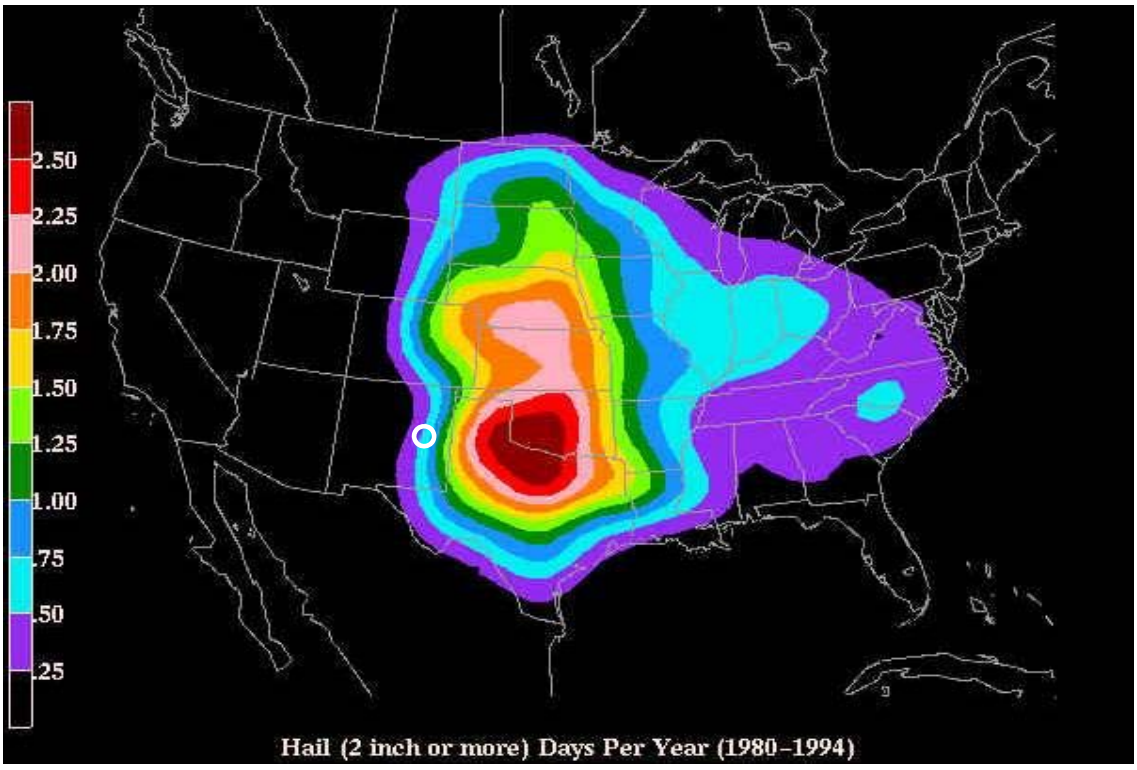
When viewed from the air, it is evident that hail falls in paths known as hail swaths that can range in size from a few acres to an area 10 miles wide and 100 miles long. Hail swaths have been so deep that snow plows were required to remove them and, occasionally, hail drifts have been reported. Figure 4.17 shows the average number of days of hail per year in the United States, with the response area indicated by a black circle. Figure 4.18 shows the average number of days of severe hail (over 2" in diameter) per year in the United States, with the response area outlined in a white circle.

Figure 4.17. Average Number of Days of Hail per Year



Source: NOAA National Severe Weather Laboratory

Figure 4.18. Average Days of Large Hail (2 inches or more) in the Response Area



Source: NOAA National Severe Weather Laboratory (this is still most recent, 07/15/19)

Geographical Area Affected

Hailstorms occur during severe storms, which are regional in nature. However, just as the amount of precipitation in the form of snow or rain may vary significantly within a single storm, so may the amount, size, and duration of hail within a severe storm. This can have a wide range of impacts. In general, hail can fall anywhere in Colorado. As described in the *hazard/problem description* section, the area where Wyoming, Nebraska, and Colorado meet is known as "Hail Alley." This region is battered by more hailstorms than any other part of the United States. Hailstorms can occur anywhere in the Gunnison County response area. However, hail tends to strike in swaths rather than impacting the entire response area at once. Based on this information, the geographic extent rating for hailstorms is **limited**.

Past Occurrences

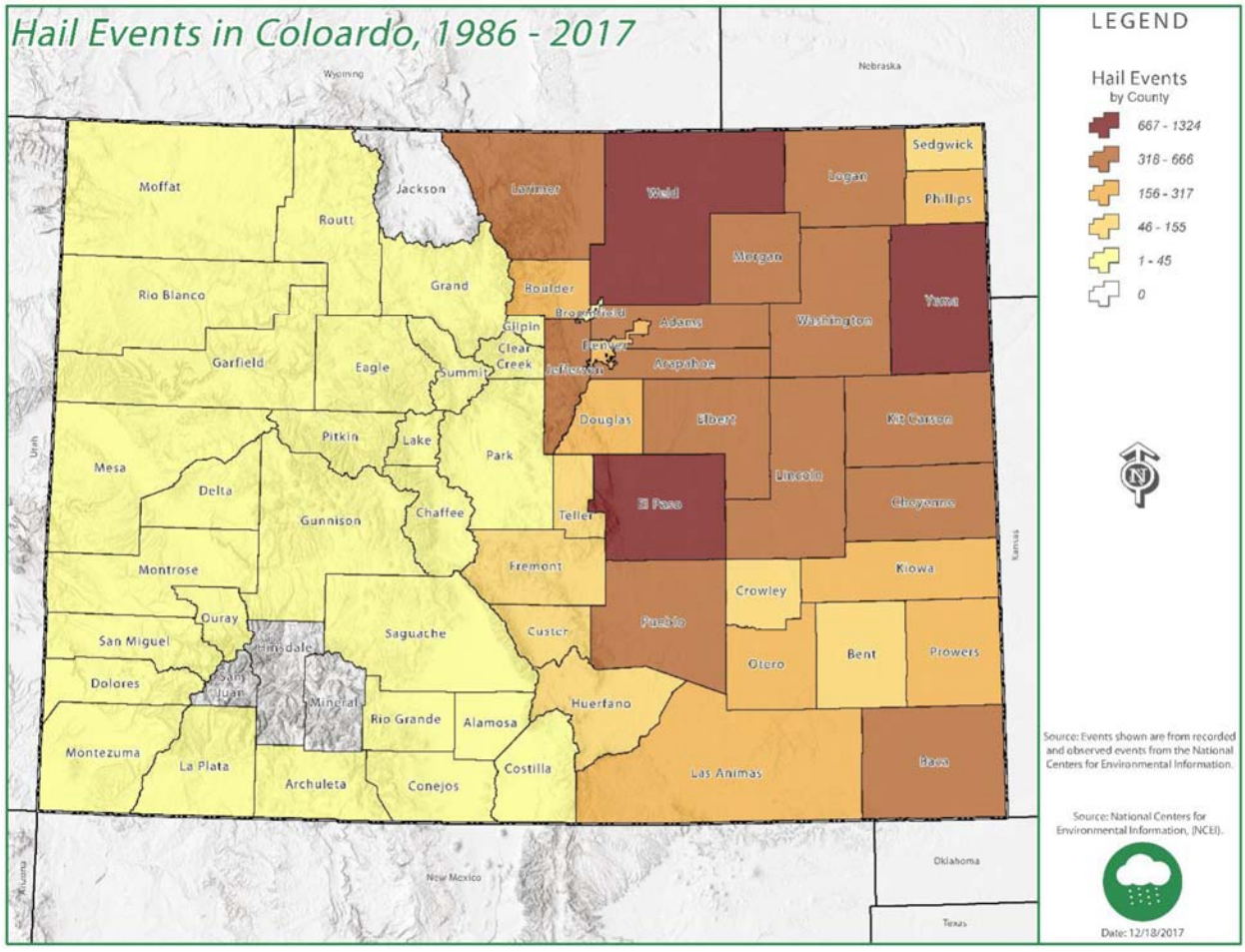
No significant hailstorms have occurred in the response area based on the criterion that a significant hailstorm generates hailstones of one inch or more in diameter. A SHELDUS query returned one hailstorm event that resulted in damages. The NOAA National Center for Environmental Information listed one event, which caused no injuries or damage. 0 presents a historical overview of damaging hail storms in Gunnison County. Figure 4.1919 depicts the number of reported hail events in each county in Colorado between 1986 and 2017. The 2018 Colorado SHMP states that two hail events were reported in Gunnison County during that time period. This data was obtained through NCDC. The two events did not cause any casualties or damages.

Table 4.14 Reported Hailstorms in Gunnison County: 1960-2019*

Date	Injuries	Deaths	Estimated Property Damage ($)**	Estimated Crop Damage ($)**
7/14/1961	0	0	0	454
7/15/2000	0	0	0	0
TOTALS	**0**	**0**	**0**	**454**

Source: SHELDUS and NOAA National Center for Environmental Information
*Extent of Record
**Dollar value based on year of event

Figure 4.19. Reported Hail Events by County in Colorado: 1986 - 2017



Source: 2018 Colorado Natural Hazard Mitigation Plan

Potential Magnitude

According to national databases, no severely damaging hailstorms were reported in Gunnison County between 1950 and 2010. The NOAA National Center for Environmental Information reports no damaging hail events in Gunnison County between 2010 and 2019. In order to calculate a potential magnitude rating for comparison with other hazards, and to assist in assessing the overall impact of the hazard on the response area, information from the event of record is used. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it is a reflection of common occurrence. Only one reported hail event resulted in damages, so that is automatically used as the event of record. In terms of average annual damages, one hail event resulted in approximately $455 in damages over a 51-year time span between 1960 and 2010. This averages out to $9.10 in damages per year. Based on this information, the HMPC considers that hailstorms are more likely to have a **negligible** potential magnitude, which is also offset by the fact that most hail damage is covered by insurance.

Likelihood/Frequency of Occurrence

According to NCDC data, there were two reported hailstorms in Gunnison County over a 61-year period between 1950 and 2010. Using the methodology described in Section 4.2.1, we can calculate the probability of a severe hailstorm occurring in the County in any given year:

$$(2 \div 60) \times 100 = 3\%$$

Therefore, there is a 3% chance that a damaging, severe hailstorm will hit Gunnison County in any given year. This corresponds to a probability of future occurrences rating of **occasional**. It is important to note that this calculation pertains to *severe* hailstorms only. NCDC and SHELDUS did not include records on less-severe storms.

4.2.9 High Winds

For planning purposes, windstorms and thunderstorm winds are combined into one profile. Although the hazard rankings between the two weather events may vary, the hazards that they create and the mitigation actions for addressing those hazards are similar.

Hazard/Problem Description

High Winds

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. There are several different types of high 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 (2018 Colorado SHMP, pg. 3-164).

FEMA recognizes four wind zones in the U.S., depicted in Figure 4.20. The Gunnison County response area falls into Zone I. Winds speeds reach up to 130 miles per hour in Zone I.

Figure 4.20. Wind Zones in the United States

Source: FEMA

Past Occurrences

According to SHELDUS, there were 37 notable wind events in Gunnison County between 1960 and September 2009. Between Oct 2009 and July 2019, the NOAA National Center for Environmental Information reported 10 high wind events in the area. These events are captured in 0. SHELDUS also reports wind events associated with winter weather. Those events were not included in this chapter because their primary feature was winter weather. See Section 0 Severe Winter Storms for more information about wind events associated with winter weather.

NCDC records used in the 2018 Colorado NHMP indicate that 11 severe high wind events were reported in Gunnison County between 1996 and 2017, with no deaths, injuries or damages. Figure 4.211 depicts reported wind events by county in Colorado. Gunnison County falls in the middle of the range. Saguache County is ranked low-moderate.

Table 4.15 Gunnison County Wind Events: 1960-2019*

Date	Injuries	Deaths	Estimated Property Damage ($)**	Estimated Crop Damage ($)**
5/16/1962	0	0	45	454
10/16/1996	0	1	0	0
6/8/1974	0	0	79	0
4/16/1960	0.08	0	793	0
4/7/1962	0.02	0	781	0
4/4/1963	0	0	454	0
6/17/1964	0	0	79	0
1/7/1969	0.96	0.08	19,230	0
4/6/1969	0.02	0	79	0
4/14/1970	0	0	79	0
11/30/1970	0	0	793	0
3/17/1971	0	0	79	0
5/19/1974	0	0	294	0
11/30/1975	0	0	2173	0
2/17/1976	0	0	1,785	0
4/18/1978	0	0	17	178
9/24/1986	0.02	0	7,936	0
5/1/1988	0	0	12,500	0
5/6/1988	0	0	7,936	7,936
2/1/1989	0	0	793	0
4/7/1989	0	0	2,941	0
1/8/1990	0	0	3,571	0
5/2/1991	0	0	1,923	0
2/14/1995	0	0	6,666	0
11/22/1996	0	0	5000	0
3/31/1999	0	0	1,250	0
4/18/2000	0	0	78,947	0
4/20/2001	0	0	2,055	0
5/21/2002	0	0	25,000	0
5/11/2004	0	0	222	0
2/15/2006	0	0	2000	0
6/6/2006	0	0	2500	0
6/14/2006	0	0	250	0
3/26/2007	0	0	600	0
4/18/2007	0	0	6250	0
6/6/2007	0	0	181	0
9/30/2009	0	0	250	0

Date	Injuries	Deaths	Estimated Property Damage ($)**	Estimated Crop Damage ($)**
2/16/2011	0	0	0	0
12/31/2011+	0	0	0	0
12/31/2011	0	0	0	0
01/18/2012	0	0	0	0
3/26/2012	0	0	0	0
12/21/2014	0	0	0	0
2/18/2016	0	0	0	0
2/18/2016+	0	0	0	0
11/17/2017	0	0	0	0
2/19/2018	0	0	0	0
4/12/2018	0	0	0	0
4/17/2018	0	0	0	0
TOTALS	**1.1**	**1.08**	**195,543**	**8,569**

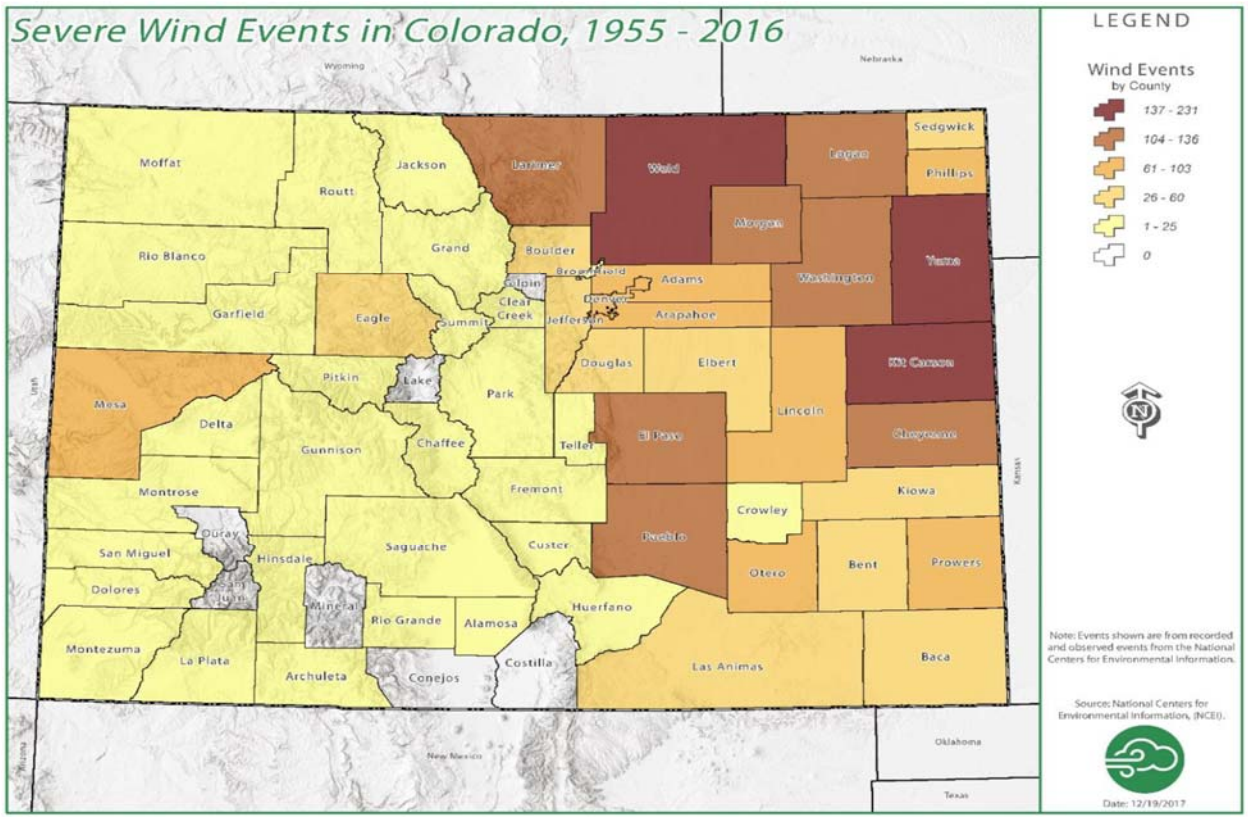
Source: SHELDUS, NOAA and Colorado SHMP

*Extent of Record

**Dollar value based on year of event

+Same dates, different times

Figure 4.21. Reported Significant Wind Events by County in Colorado: 1955-2016



Source: 2018 Colorado State Hazard Mitigation Plan

Geographical Area Affected

The spatial extent rating for high-wind hazards is **extensive**. Windstorms could occur anywhere in the Gunnison County response area. The windstorms themselves can also occur over a large area. Bora winds can cause widespread rather than localized damage.

Potential Magnitude

In order to calculate a magnitude and severity rating for comparison with other hazards, and to assist in assessing the overall impact of the hazard on the response area, information from the event of record is used. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it is a reflection of common occurrence. Based on SHELDUS and NOAA records, the event of record for damaging winds in Gunnison County occurred on April 18, 2000. This event resulted in $78,947 in damages (in 2000 dollars).

Calculating the average annual damage from damaging winds is another method used in assessing potential magnitude. According to SHELDUS and NOAA, 37 damaging wind events caused a total of $204,113 in damages over a 50 year-span between 1960 and 2019. This averages out to $4,082 in damages per year. Therefore, Gunnison County could expect to sustain roughly $4,000 in damages from severe winds in any given year.

Overall, windstorm impacts in Gunnison County would likely be **negligible**, with less than 10% of the response area affected. The impact to quality of life or critical facilities and functions in the affected area would be minimal.

Likelihood/Frequency of Occurrence

Using the formula described in Section 4.2.1, the likelihood that a damaging high wind event will occur in any given year is 71%. This corresponds to a **likely** probability of occurrence. In terms of frequency, damaging high wind events seem to occur roughly every 18 months to two years.

4.2.10 Landslide/Rockfall/Debris Flow

Geologic hazards in the Gunnison County response area are discussed in this single hazard profile and include landslides, rockfall, debris flows and fans, and high water table areas. The various geologic hazards, or constraints, were defined using the definitions from the Gunnison County Land Use Resolution (LUR) for consistency with other planning mechanisms.

Landslide-Earthflow Area

A landslide or earthflow is an area with demonstrated active natural movement. Evidence for modern slope movements includes distinctive physiography and disrupted vegetation or structures. 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. By definition in the Gunnison County LUR, landslide hazard area means an area where falling, slipping, or mass movement of land occurs due to a distinct surface rupture or zone of weakness. Landslides include slope failure complexes, debris slides, bedrock slides, and areas of accelerated soil creep. 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.

Unstable Slopes

Unstable slopes display landslide or earth flow characteristics, but modern movement is not apparent or certain.

Potentially Unstable Slope

A potentially unstable slope displays most attributes of an unstable slope, but past or present slope failure is not apparent or certain. Such areas have undergone slope movement in the recent geologic past, though. By definition in the Gunnison County LUR, unstable slope means a slope with landslide/earthflow physiography, where recent slope movement may not be apparent or is uncertain. Such an area may have undergone slope movement in the recent geologic past and may be susceptible to landslide, mudflow, rockfall or accelerated creep of slope-forming materials.

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. By definition in the Gunnison County LUR, rockfall hazard area means an area of either active or potential falling, rolling, or sliding of large bedrock blocks or rocks. 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. Rockfall and landslides are influenced by seasonal

patterns, precipitation and temperature patterns. Earthquakes could trigger rockfalls and landslides too.

Rockfall areas are subject to rapid, intermittent, nearly unpredictable rolling, sliding, bounding, or free falling of large masses of rock, debris, or individual rock blocks. Such areas are most commonly adjacent to unvegetated, barren, steep, and/or fractured and jointed bedrock cliffs.

Debris Flows/Mudflows/Debris Fan

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. Mudflows are areas subject to rapid mud and debris movement after mobilization by heavy rainfall or snow runoff.

By definition in the Gunnison County LUR, debris flow means an event of rapid movement of mud and fine-grained earth materials in which more than one-half the solids in the mass are larger than sand grains (including rocks, stones and boulders).

Mudflow hazard area means an area subject to rapid movement of mud and fine-grained earth materials that flow down a stream, ravine, canyon, or gulch after a heavy rainfall or snowmelt runoff. Such an area is formed by successive episodes of deposition of mud and fine-grained materials. If more than one-half of the solids in the mass are larger than sand grains (including rocks, stones, and boulders) then the event is a debris flow and the area is an alluvial fan.

Alluvial fan means a sloping, wedge-shaped deposit of loose rock, earth, and vegetative debris near or at the junction of a smaller stream with a larger stream valley, or where the gradient of a stream abruptly decreases. It is created by a debris flow, that is the downstream or down slope propulsion of rocks, vegetative matter, and other materials in a watery, muddy slurry.

For the purposes of this plan the term debris flow is meant to be a global term to include mudslides, mudflows, and debris fans. Debris flows and mudflows usually occur in the upper reaches of a drainage basin or its contiguous side slopes. A debris or alluvial fan is formed by successive episodes or deposition of mud and debris. 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 wildland fires that remove vegetation that serves to stabilize soil from erosion. Heavy rains on the denuded landscape can lead to rapid development of destructive mudflows. This has occurred in other areas of Colorado. For example, La Plata County experienced damaging mudflows in the area burned by the Missionary Ridge Fire in 2002. Boulder County has experienced mudslides and flash floods following the Four Mile Fire in 2010.

High Water Table Area

High water tables are indicated by an area where ground water is at or near the surface much of the year. These areas, shown only in places adjacent to major drainages, are evidenced by the riparian vegetation and stream bank physiography. Numerous high water tables in the response area are found contiguous to smaller drainages or associated with ancient and modern landslides and earthflows. These areas are also more susceptible to liquefaction from earthquakes.

Physiographic Floodplain

A physiographic floodplain is an area that shows historical shifting of the riverbed, which indicates frequent likelihood for flooding. See the flood hazard profile for further discussion of the flood hazard.

Collapsible Soils

Collapsible soils are broadly defined as soils that rapidly settle when exposed to water. These soils are a significant geologic hazard in Colorado and other Western States of the United States having semiarid to arid climates. The collapse can occur under the weight of the soil alone (overburden pressure) or under the additional load of a building or other structure. Most collapse occurs through mechanical means where dry, low-density, high-porosity soil becomes denser when the soil-particle binding agents weaken or break after wetting. The destruction and recompaction of the soil structure under moister conditions cause settlement of the ground surface.

Collapsible soil forms in specific, geologically recent (Holocene) sediments that have been deposited in arid to semiarid environments. The deposits include (1) hillside gravity and slope-wash deposits, called colluvium; (2) accumulations of rapidly deposited, unsorted, water-borne mud in alluvial and debris-flow fans; (3) aggraded overbank deposits, called alluvium (silt and clay recently laid along tributary streams, flood plains, and gently sloped mud flats); and (4) windblown deposits of dust, silt, and fine-grained sand, called loess.

During and after development, moisture can be introduced to the subsurface soil through field irrigation, lawn and landscaping irrigation, capillary action under impervious slabs, leaking or broken water and sewer lines, and altered surface and subsurface drainage. Soil collapse adversely affects land use and can be quite destructive to foundations, roadways, buried utility lines, septic systems, and water diversion and retention structures (canals, irrigation ditches, and dams).

In regions containing collapsible soils, it is important that the geomorphology and surficial soil deposits be accurately mapped and that site-specific geotechnical investigations be completed so that structures can be appropriately designed. Mitigation of the potential hazard at the time of construction is always less expensive than future remedial repair work. Water and drainage management are important not only for new construction but also for maintenance of existing structures, which might have been designed without knowledge or consideration of collapsible-soil hazards.

Past Occurrences

Gunnison County has a long history of debris flows and mudslides. Debris flows in the 1930s and 1940s nearly destroyed the Town of Marble. In August 1941, a flash flood and mudslide tore down Carbonate Creek. Another mudslide followed in July 1945, when "a 30-40 foot wall of water, mud, and rocks" hit the town (source: http://www.crystalriverjeeptour.smithfamilycolorado.com/MarbleHistory.htm).

SHELDUS records show three landslide events in Gunnison County between 1960 and 2010. Refer to 0.

Table 4.16 Landslide Events in Gunnison County: 1960-2010*

Date	Injuries	Deaths	Estimated Property Damage ($)**	Estimated Crop Damage ($)**
4/24/2006	0	0	1,666	0
7/30/2006	0	0.2	2,000	0
4/19/2007	0	0	16,666	0
TOTALS	**0**	**0.2**	**20,333**	**0**

Source: SHELDUS
*Extent of Record
**Dollar value based on year of event

Geographic Area Affected

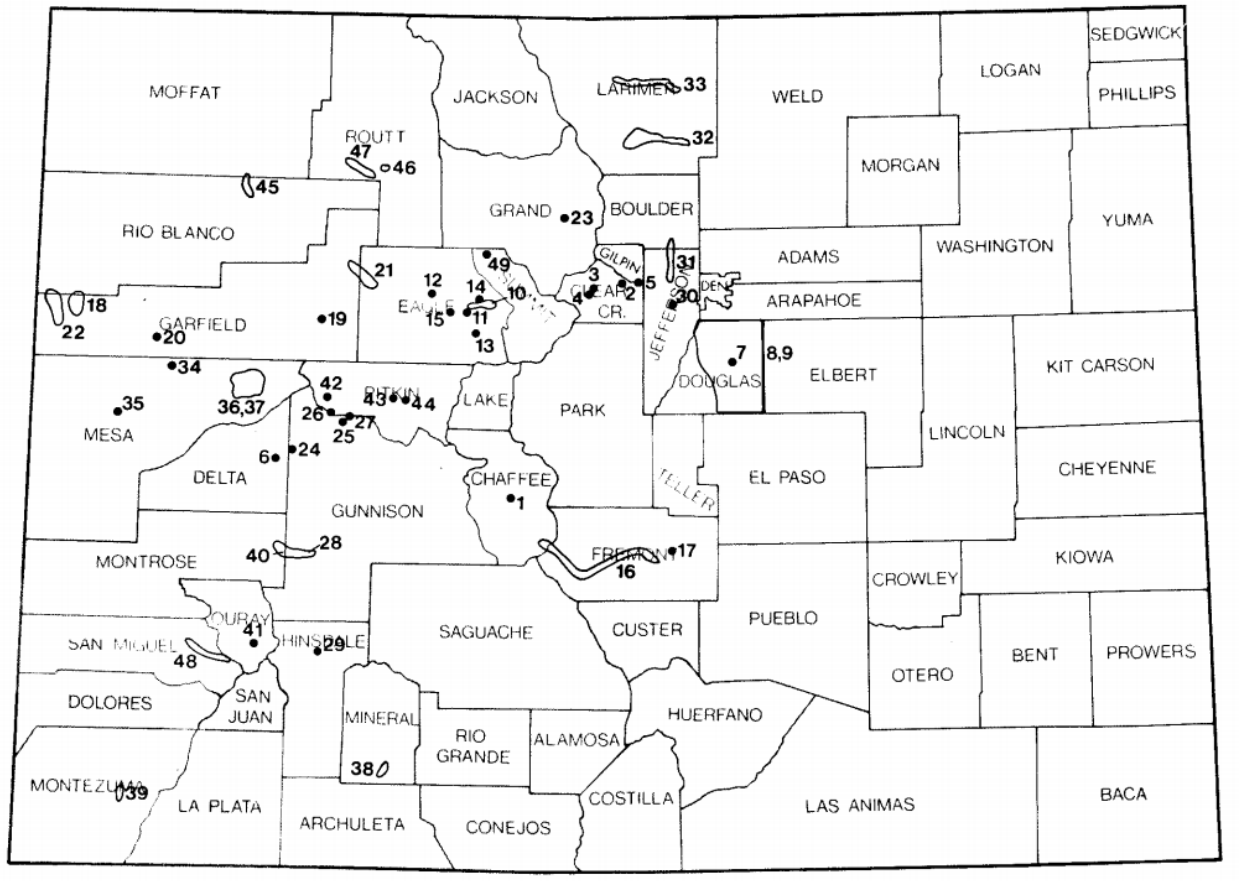
The geographic extent rating for landslides, rockfall, mudflows, and debris flows is **limited**. The 2012 Gunnison County Multi-Hazard Mitigation Plan identified three high-risk areas for landslide activity. These areas include Muddy Creek, Ohio Creek along CR 730, and Slate Creek in Marble. The CGS identified five at-risk areas in or near Gunnison County in the 1988 Colorado Landslide Hazard Mitigation Plan. Three of the at-risk areas identified by CGS lie along the border between Gunnison and Pitkin Counties. These three at-risk areas include Marble, the west side of McClure Pass along Lee Creek, and Mount Daly. Muddy Creek is the fourth site, and State Highway 91 near Black Mesa is the fifth. CGS did not identify any landslide risk areas in northwestern Saguache County. 0 details the types of landslides at these five sites, the facilities at risk, and the mitigation activities performed at the sites as of 1988. Figure 4.222 depicts the location of Colorado communities vulnerable to landslides as of 1988.

Table 4.17 Communities, Areas, and Facilities at Risk to Landslides in Gunnison County

Site	ID # in Figure 4.22	Type of Landslide	Facilities at Risk	Mitigation Activity
East Muddy Creek, starting about 0.6 miles above Paonia Reservoir	24	Earth flow and complex slope failures-currently showing considerable movement	State Hwy 133, Paonia Reservoir, and downstream communities in Gunnison and Delta Counties	Joint co-op project between CGS, CDOT, and BUREC to monitor and study landslide. Drilling project completed. Technical report due in 1988. Ongoing EDM and instrument monitoring. Continuing "creep" on southern landslide during summer of 1987.
Marble and vicinity	25	Debris flows	Most of town and facilities	Detailed hazard assessment and mapping done in 1972 by CGS.
West side of McClure Pass along Lee Creek	26	Primarily translational landslides, earthflows	State Hwy 133	Very expensive and short-lived reconstruction; future mapping of landslide areas to be done by CGS.
Mount Daly (adjacent to Carbonate Creek north of Marble)	27	Translational rock slides on sedimentary rock bedding planes moving toward Carbonate Creek	Town of Marble and water intake facility (could contribute to very large debris flow or create a large flood crest if a landslide dam failed. Blockage of Crystal River is also possible)	
State Hwy 92 in vicinity of Black Mesa	28	Multiple landslides	State Hwy 92	CDOT repairs on a yearly basis.

Source: 1988 Colorado Landslide Hazard Mitigation Plan

Figure 4.22. Communities, Areas, and Facilities at Risk to Landslides in Gunnison County



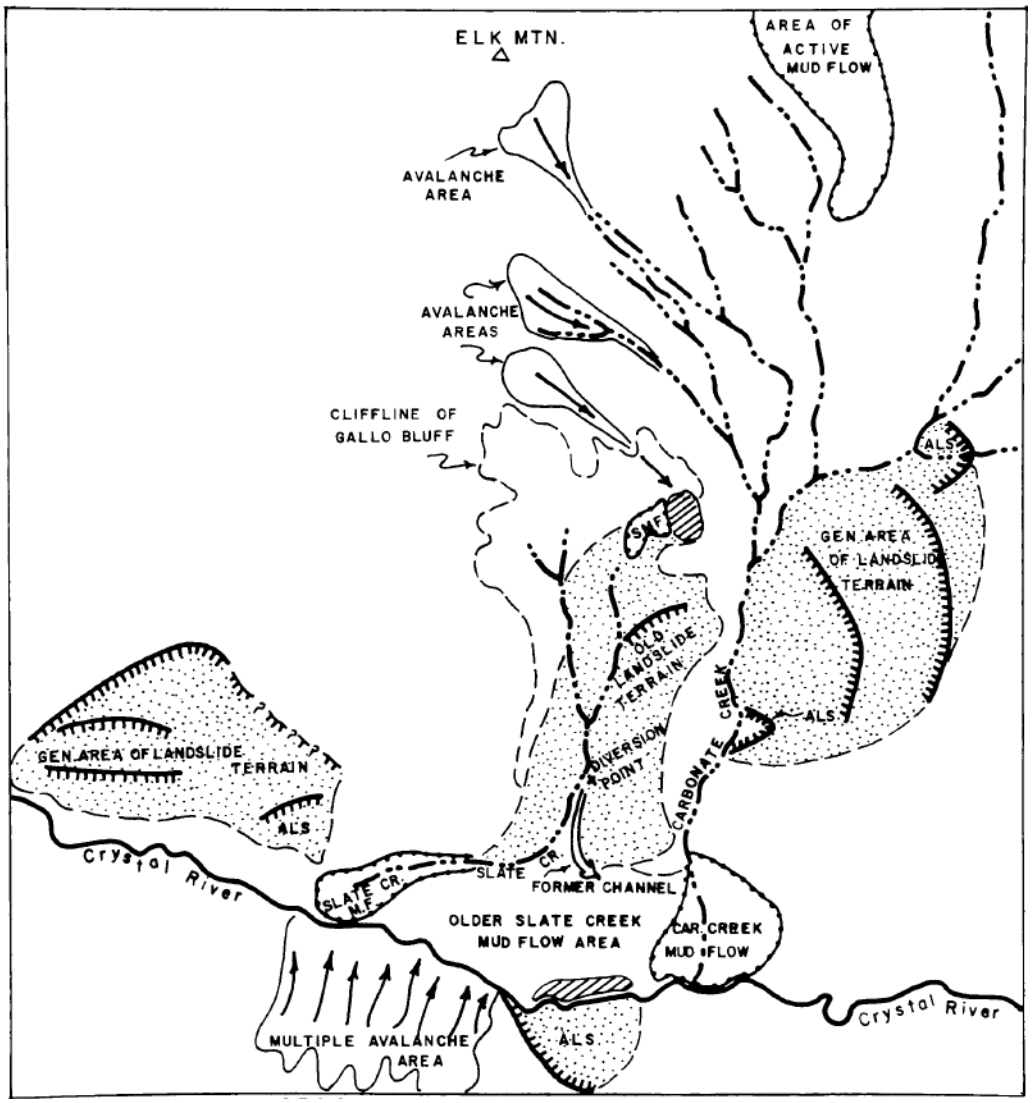
Source: 1988 Colorado Landslide Hazard Mitigation Plan

The CGS published a study entitled "Geologic Hazards in the Crested Butte-Gunnison Area" in 1975. The study examined six classes of geologic hazards, including landslide-earthflow areas, unstable slopes, potentially unstable slopes, rockfall areas, mudflow-debris fan areas, and high water table areas. All six hazards were defined previously in the hazard description. Figure 4.24 depicts these known geologic hazards in Gunnison County. Figure 4.25 through Figure 4.28 depict landslide hazards specifically, based on various hazard-mapping studies. This information was provided by the CGS to supplement the geologic hazards data presented. A CGS geologist helped classify the various landslide deposits into a low-, moderate-, and high-hazard designations. Land without existing landslides were classified as low-to-moderate (depending on location and steep slopes). Areas with shallow slope failures or old, inactive landslides were considered to be moderate and land with active or younger slides, earthflows, debris flows, etc. were considered high.

According to the 1975 study, the increased ground moisture in the northern part of the Crested Butte-Gunnison area makes active landslides and earthflows much more common. The southern vicinity near Gunnison tends to have a drier climate, and thus is at less risk to landslide-earthflow

hazards. The southern part of this area does show evidence that slope failures occurred in the recent geologic past, however. These past slope-failure areas, mostly located between Gunnison and Almont, appear to have stabilized though. Typically, north-facing slopes will be more stable due to heavier vegetation which provides anchoring for the soil. This is not always true, however, as debris fan/mudflow hazards can occur on any slope. Figure 4.23 depicts major features and geologic constraints in the Marble area. "ALS" refers to active landslides, and "SMF" indicates small mudflows. Note the avalanche chutes in addition to the identified active landslide and mudflow areas. The heavy lines with teeth indicate the direction of downslope movement for each identified slide area.

Figure 4.23. Photogeologic Interpretation of Major Features and Geologic Constraints in the Marble Area



Source: Rogers, William P. and Rold, John W. "Engineering Geologic Factors of the Marble Area, Gunnison County, Colorado." Department of Natural Resources, Colorado Geological Survey. Denver, Colorado. 1972

Figure 4.24. Geologic Hazards in Gunnison County

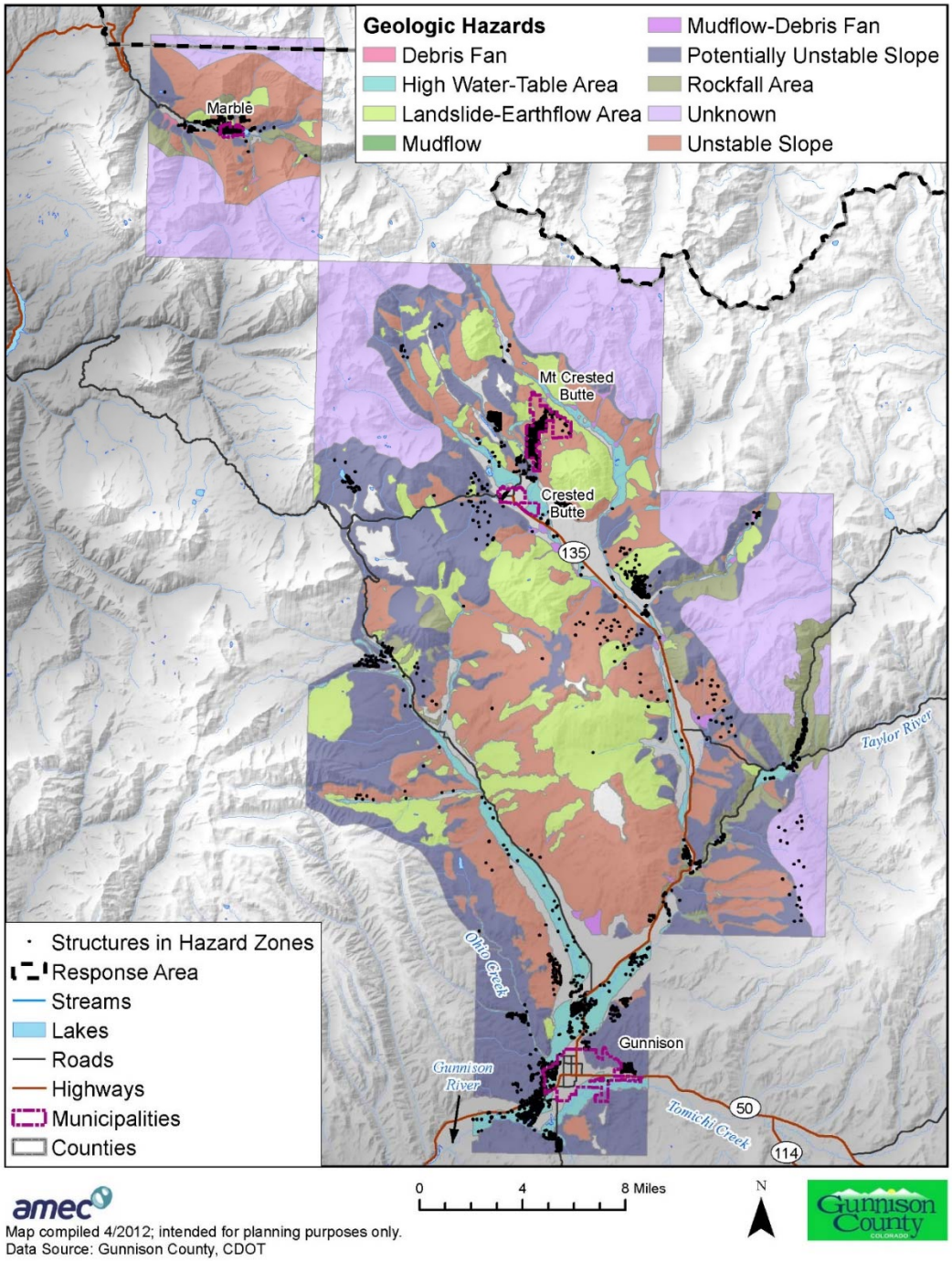
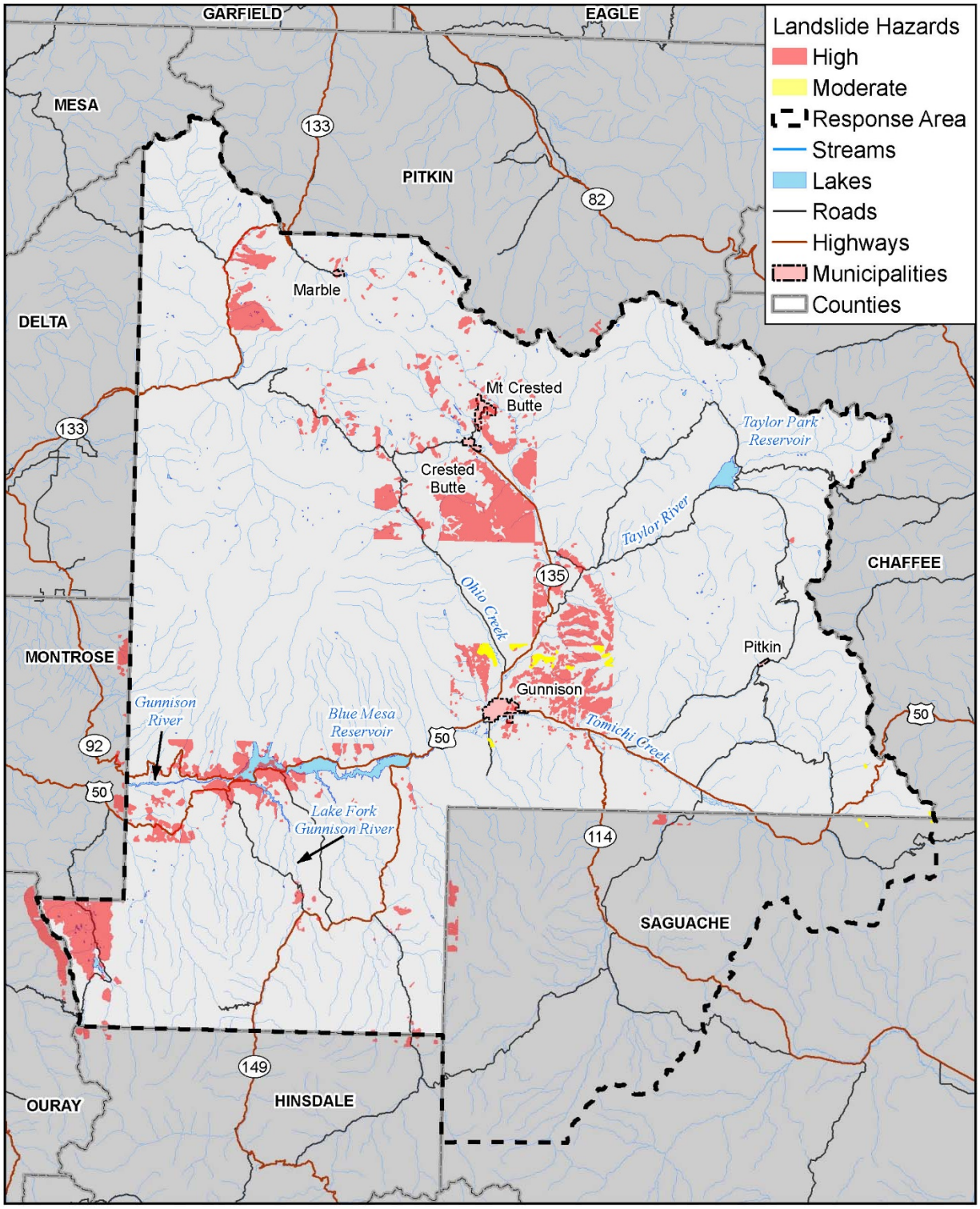
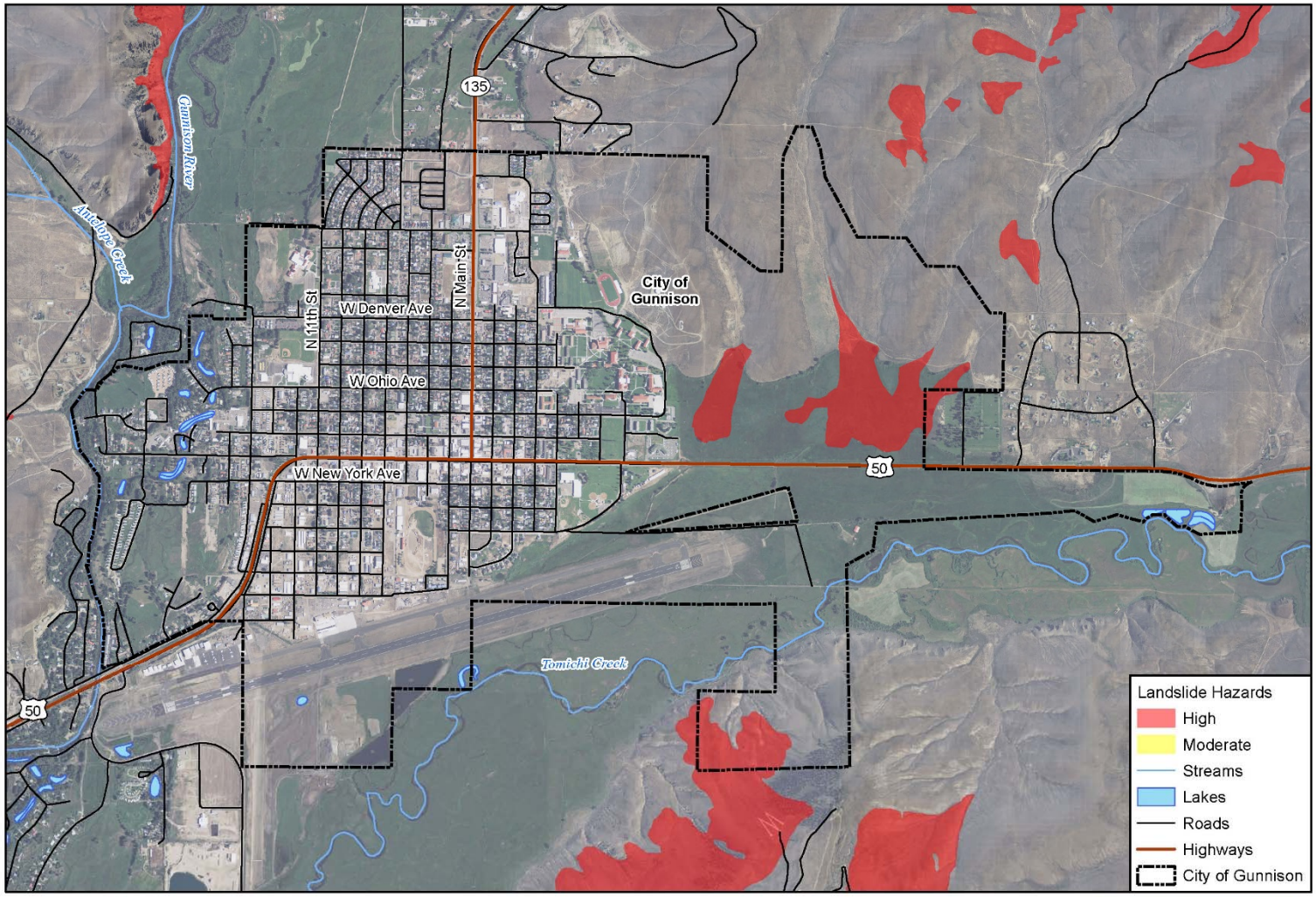


Figure 4.25. Gunnison County Landslide Hazards



Map compiled 8/2012; intended for planning purposes only.
Data Source: Gunnison County, CDOT, Colorado Geological Survey

Figure 4.26. City of Gunnison Landslide Hazards



amec

Map compiled 8/2012; intended for planning purposes only.
Data Source: Gunnison County, CDOT, NAIP Imagery 2011,
Colorado Geological Survey

Gunnison County COLORADO

Figure 4.27. Town of Crested Butte Landslide Hazards

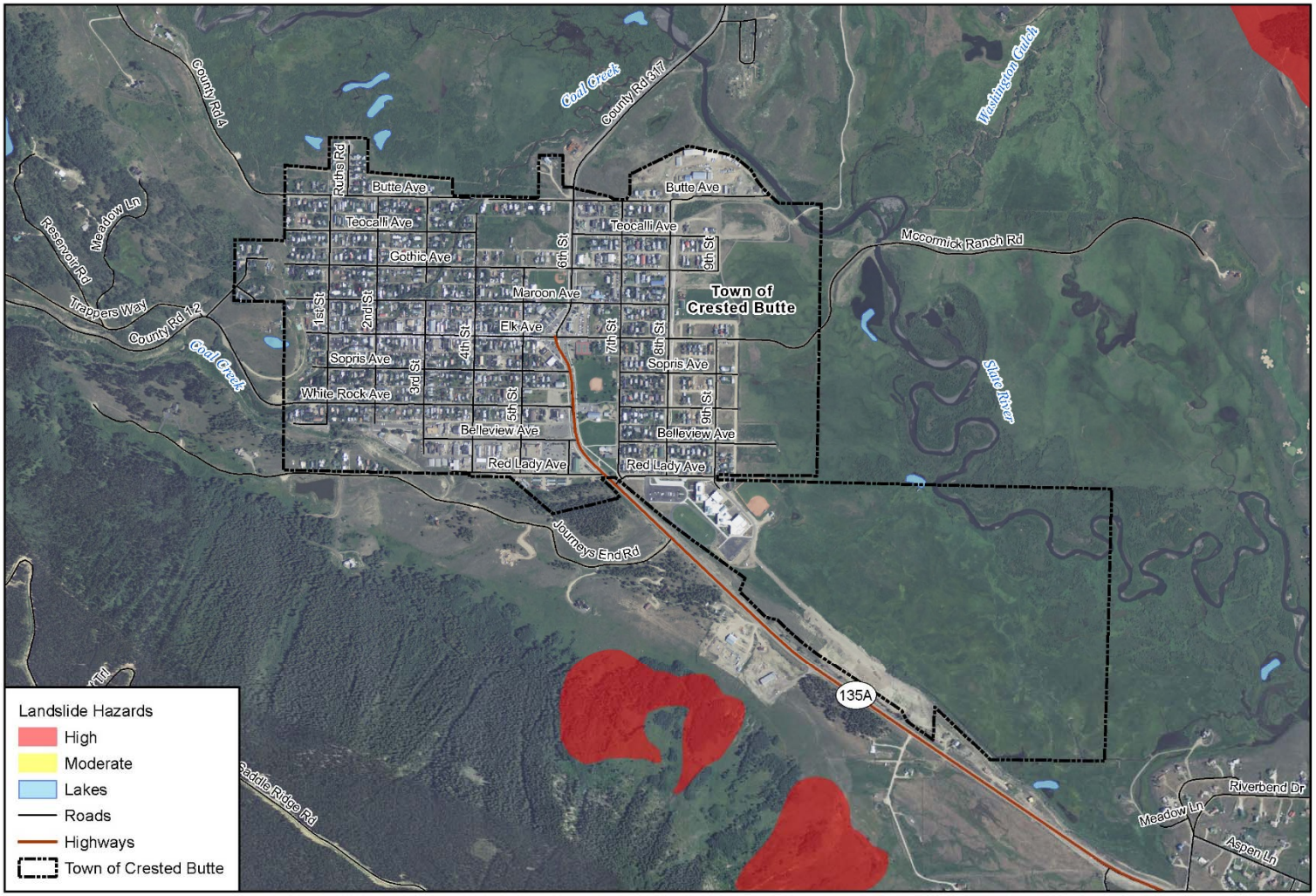
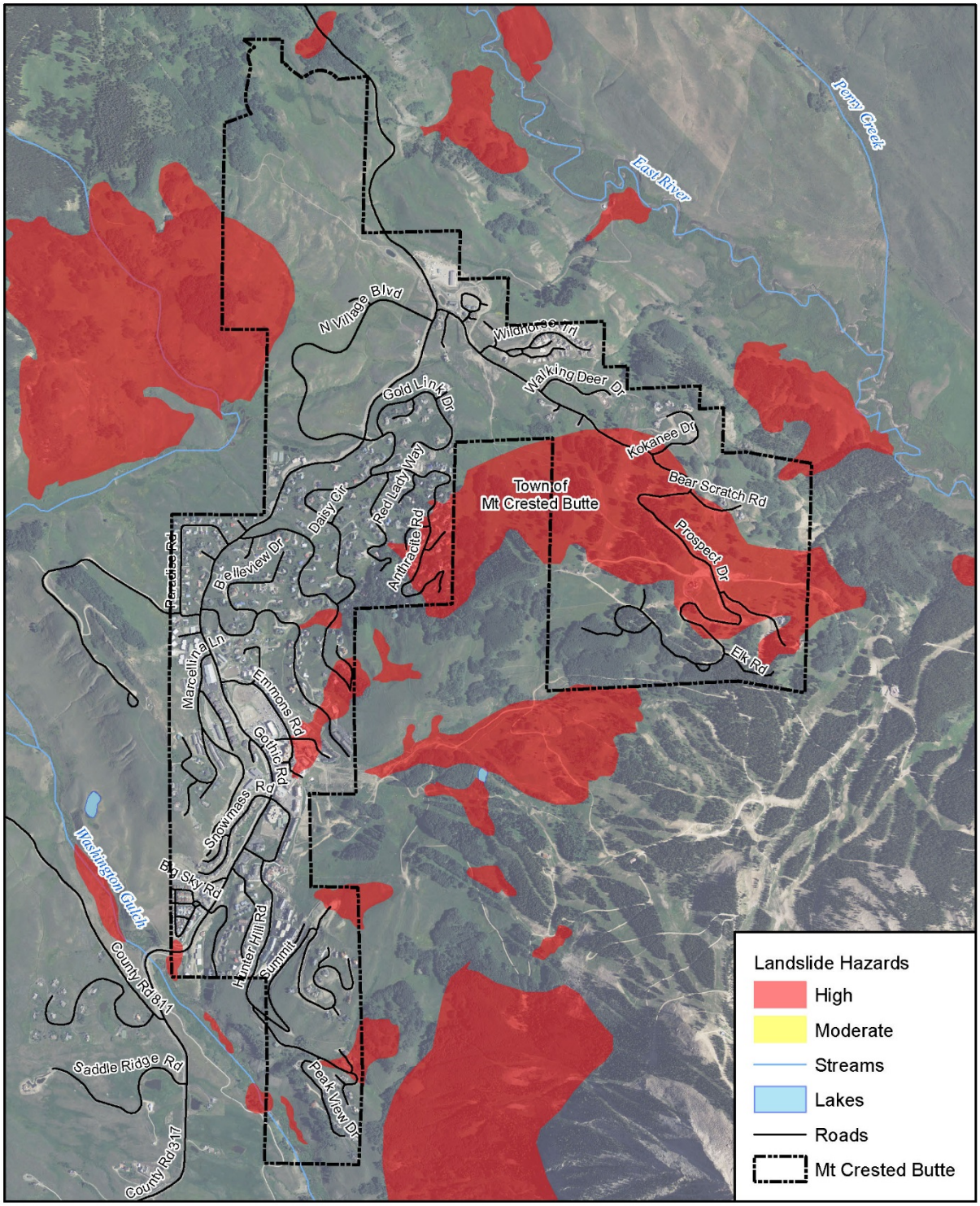
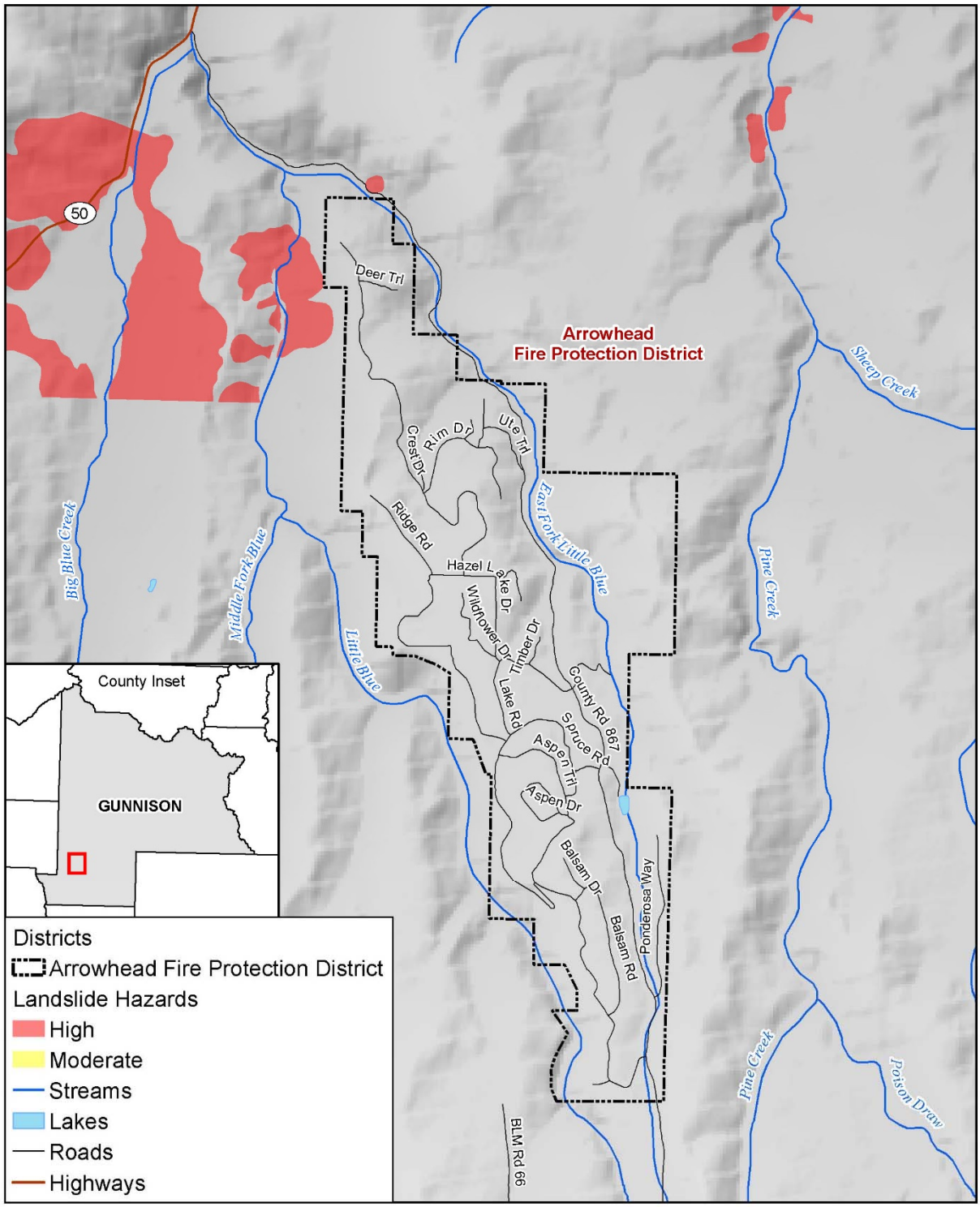


Figure 4.28. Town of Mt. Crested Butte Landslide Hazards



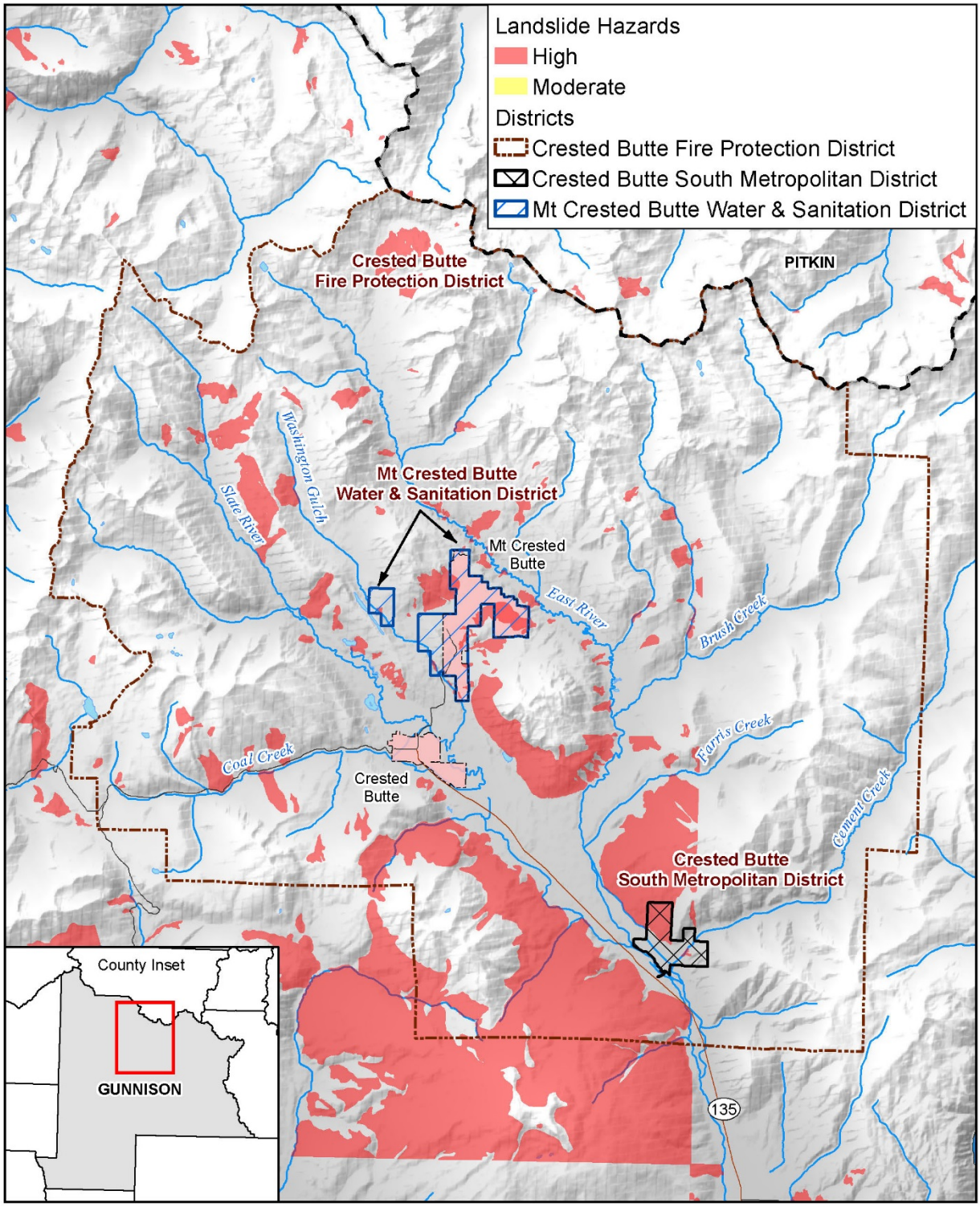
Map compiled 8/2012; intended for planning purposes only.
Data Source: Gunnison County, Mt Crested Butte,
Colorado Geological Survey

Figure 4.29. Arrowhead FPD Landslide Hazards



Map compiled 10/2012; intended for planning purposes only.
Data Source: Gunnison County, CDOT,
Colorado Geologic Survey

Figure 4.30. Gunnison County Special Districts Landslide Hazards



Map compiled 10/2012; intended for planning purposes only.
Data Source: Gunnison County, CDOT,
Colorado Geological Survey

Figure 4.31. Crested Butte South Metropolitan District Landslide Hazards

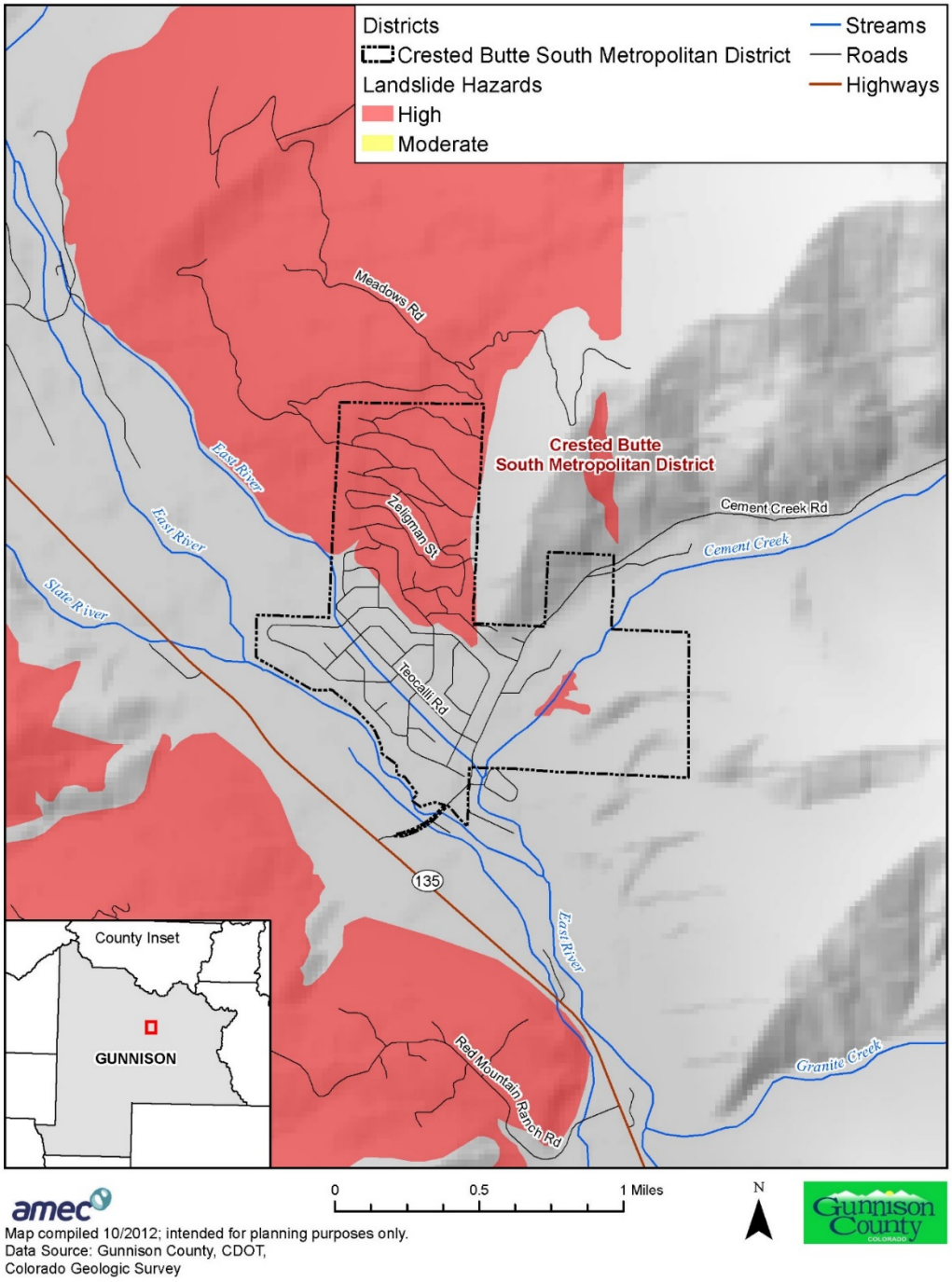
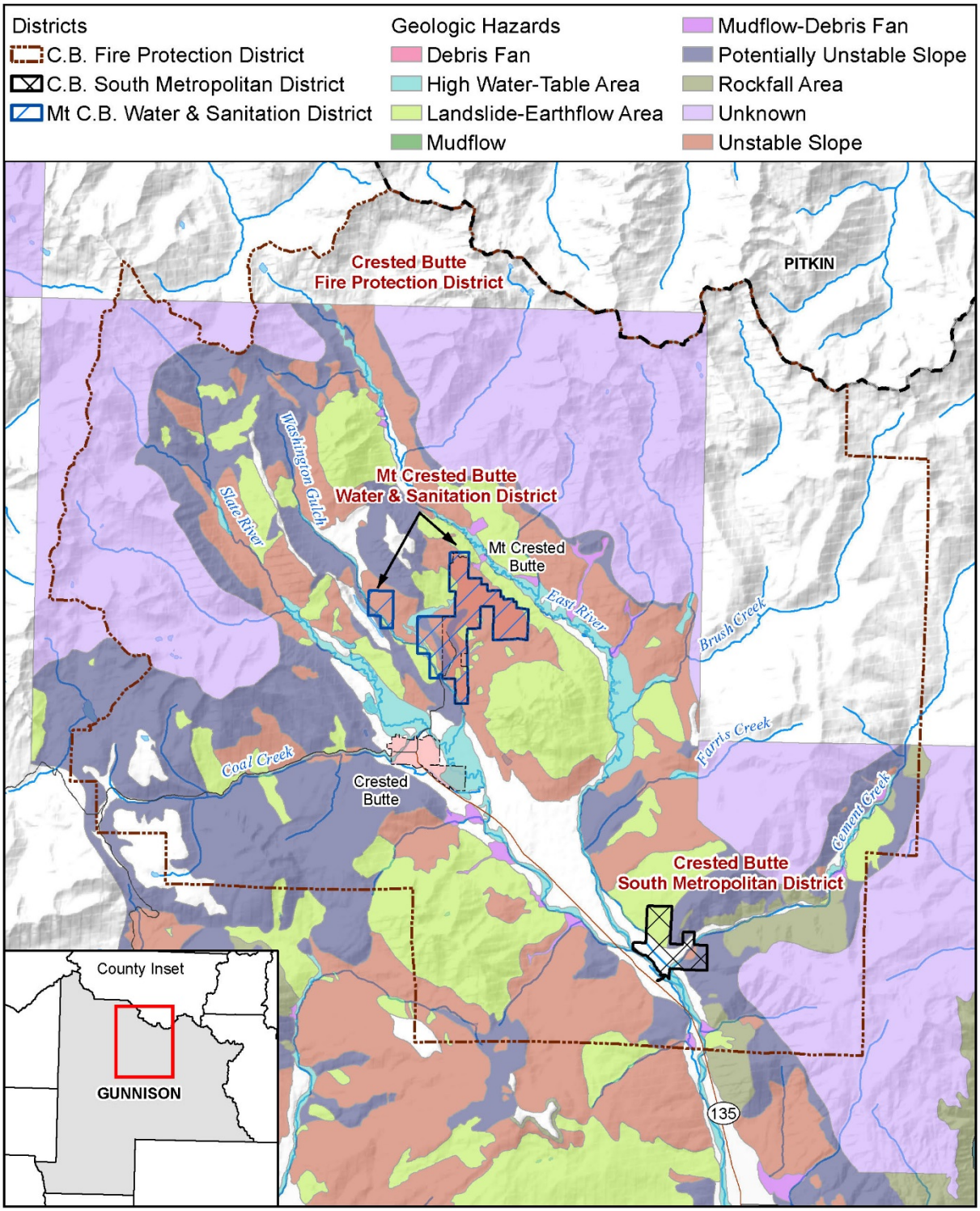
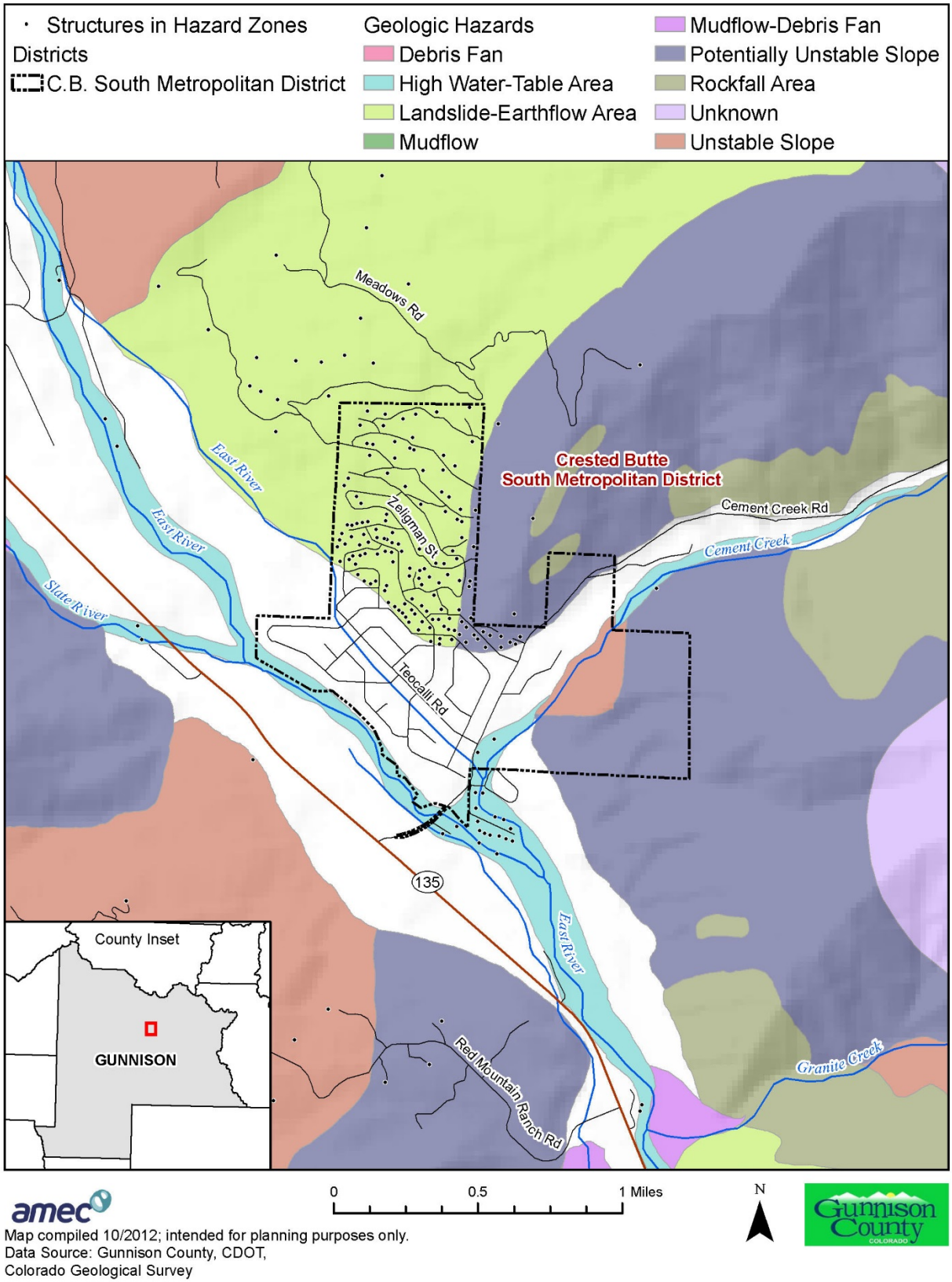


Figure 4.32. Gunnison County Special Districts Geologic Hazards



Map compiled 10/2012; intended for planning purposes only.
Data Source: Gunnison County, CDOT,
Colorado Geological Survey

Figure 4.33. Crested Butte South Metropolitan District Geologic Hazards



Map compiled 10/2012; intended for planning purposes only.
Data Source: Gunnison County, CDOT,
Colorado Geological Survey

CDOT identified 756 sites throughout Colorado that have ongoing issues with rockfall. There are 47 such sites in the response area: 44 in Gunnison County and 3 in Saguache County on U.S. Highway 50. CDOT identified 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. The CRHRS compares each rockfall area to all other identified rockfall areas in the state and generates a relative ranking. A low hazard-rank score in the CRHRS indicates a more dangerous, higher hazard area. 0 below details the 47 rockfall hazards in the response area by mile marker and lists each site's overall hazard ranking out of the 756 rockfall hazard areas in the State. Five sites in the response area are ranked within the top 100 rockfall hazard areas in Colorado. All five sites are located along State Highway 133, approximately within the same general area as indicated by their beginning and ending mile markers in 0. Motorists should be particularly careful and aware of the rockfall hazards along those stretches of highway.

Table 4.18 Rockfall Hazard Areas and Rankings in Gunnison County Response Area

County	Route	Beginning Mile Marker	Ending Mile Marker	Hazard Rank
Gunnison	SH133	24.790	24.860	11
Gunnison	SH133	24.060	24.350	14
Gunnison	SH133	24.380	24.620	18
Gunnison	SH133	24.680	24.760	53
Gunnison	SH133	30.070	30.180	72
Gunnison	SH133	23.870	24.020	131
Gunnison	US50	194.279	194.347	131
Gunnison	SH133	27.150	27.230	179
Gunnison	SH133	42.970	42.990	218
Gunnison	SH133	29.900	30.000	229
Gunnison	SH133	29.540	29.900	232
Gunnison	US50	193.108	193.218	241
Gunnison	SH133	25.010	25.150	269
Gunnison	SH133	30.750	30.900	284
Gunnison	SH133	25.530	25.570	321
Gunnison	SH133	25.610	25.650	325
Gunnison	US50	193.623	193.771	338
Gunnison	US50	193.804	193.941	338
Gunnison	SH133	26.390	26.500	358
Gunnison	US50	193.330	193.404	358
Gunnison	SH133	25.400	25.480	397
Gunnison	US50	194.735	194.858	420
Gunnison	SH133	42.940	42.970	436
Gunnison	SH133	25.850	25.910	462
Gunnison	SH133	25.990	26.280	493

County	Route	Beginning Mile Marker	Ending Mile Marker	Hazard Rank
Gunnison	SH133	43.240	43.330	493
Gunnison	US50	192.859	192.914	493
Gunnison	SH92	70.605	70.716	527
Gunnison	SH92	64.072	64.128	557
Gunnison	SH92	56.659	56.757	572
Gunnison	SH92	72.394	72.489	572
Gunnison	SH92	71.360	71.484	584
Gunnison	SH135	10.000	10.077	587
Gunnison	SH92	63.153	63.215	587
Gunnison	SH92	69.448	69.660	602
Gunnison	US50	194.028	194.081	632
Gunnison	US50	194.159	194.207	636
Gunnison	US50	195.200	197.300	641
Gunnison	SH92	72.059	72.130	649
Gunnison	US50	201.720	202.000	666
Gunnison	US50	202.356	202.583	666
Gunnison	SH92	71.196	71.236	677
Gunnison	US50	208.400	208.600	697
Gunnison	SH92	64.505	64.575	701
Saguache	US50	184.970	185.012	404
Saguache	US50	188.049	188.091	404
Saguache	US50	188.341	188.395	462

Source: Colorado Department of Transportation

Potential Magnitude

The potential magnitude of impacts from landslides, rockfall, debris flows, or mudslides in the Gunnison County response area is generally **limited,** with some exceptions. The impacts are typically isolated, and many of the issues can be mitigated with proper awareness and engineering design. However, the Town of Marble has been threatened repeatedly by mudslides and was identified as an area of high concern by the CGS. Landslide areas in Gunnison County also threaten the Crystal River and Paonia Reservoir. Landslides could create flood hazards by blocking up rivers or by causing dam failures. Landslides and rockfall hazards threaten several transportation corridors in the response area. 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 also pose a threat to power lines and infrastructure. A landslide could uproot power poles, throwing nearby municipalities into an extended blackout.

Many of the geologic constraint areas in Gunnison County are found in very scenic areas, making them a tempting location for development or land use. Development may be suitable in areas of unstable slopes where recent movement is not apparent or certain, provided that the nature of the unstable slope hazard in a given area is well-understood. Developers must still exercise precautions, such as ensuring sufficient drainage and construction design. Many areas between Crested Butte and Gunnison are in their natural state or used only for low intensity land uses, so many of the mapped geologic constraints pose little threat to human activities and development. The County's land use resolution takes into account geologic constraints, where mapped, and guides land-development decisions.

SHELDUS data indicates that Gunnison County's average annual loss from landslides is $406.67. The County shouldn't 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 in April 2011. The event resulted in an estimated $60,000 in damages due to the cost of slope stabilization efforts.

Likelihood/Frequency of Occurrence

Landslides and debris flows are **likely** to occur in the response area, meaning these hazards have between a 10 and 100% chance of occurrence in next year, or have a recurrence interval of 10 years or less. Rockfall also has a **likely** occurrence rating. Five sites in the response area on Highway 133 are ranked in the top 100 in Colorado for frequent rockfall issues.

The potential exists for humans to cause slope failures in previously unknown geologic constraint hazard areas. It is extremely difficult, if not impossible, to determine a likelihood of occurrence for this potential event and plan accordingly.

According to the 2018 Colorado State Hazard Mitigation Plan, Gunnison County has a High Growth Risk Rating for future landslides.

4.2.11 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 wildland 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 charges to earth. However, a large minority of flashes carry positive charges 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 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.

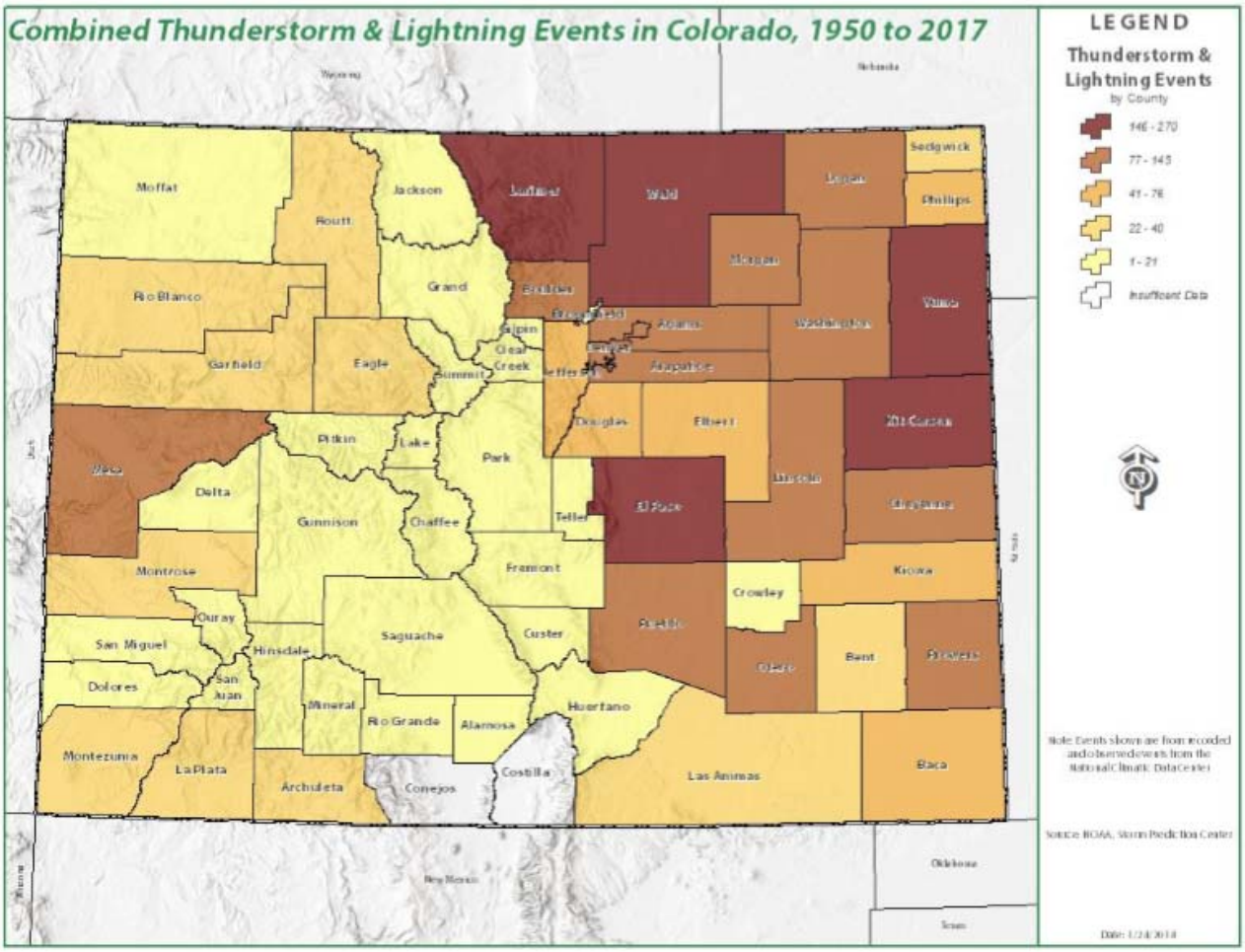
The ratio of cloud-to-ground and intracloud lightning can vary significantly from storm to storm. Depending upon cloud height above ground and changes in electrical field strength between the cloud and earth, the discharge stays within the cloud or makes direct contact with the earth. If the field strength is highest in the lower regions of the cloud, a downward flash may occur from the 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 NOAA 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

According to the 2018 Colorado State Hazard Mitigation Plan, between 1950 and 2017, NOAA reported lightning and thunderstorms occurrences that had "sufficient intensity to cause loss of life, injuries, significant property damage, and/or disruption to commerce." Gunnison County had 5 lightning and 11 thunderstorm events, with only 1 of those events resulting in death and 8 resulting in injury. Gunnison County also reported between 1950-2017 property damage of $41,500 from lightning and $50 from thunderstorms. **Error! Reference source not found.**4 shows the estimated lightning damage from thunderstorms, by county.

Figure 4.34. Combined Thunderstorm and Lightning Events in Colorado, 1950-2017



Source: 2018 Colorado State Hazard Mitigation Plan

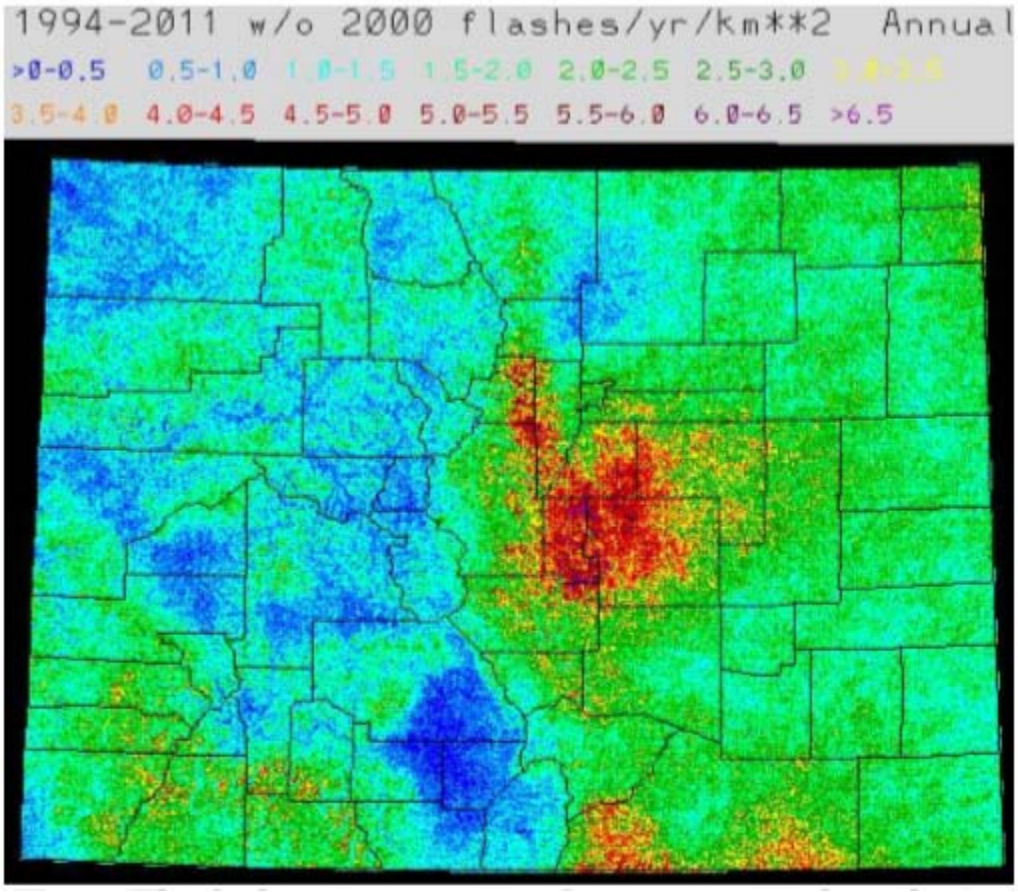
Geographical Area Affected

The geographic extent for lightning may be examined in two ways. In one regard, 'lightning' is a regional hazard measured by the possible places of occurrence. In the other, 'lighting incidents' refer to single-point occurrences and are measured according to density. Acknowledging that lightning may occur anywhere in Colorado or in the Gunnison County response area is important,

but does not provide particularly insightful information. Examining the density of the lightning may yield more useful information, particularly when the impacts of the hazard are examined. Figure 4.35 indicates that, for the most part, Colorado experiences a low-to-average density rating, based on the number of flashes per square kilometer per year. According to data compiled by the Vaisala Group, Colorado ranked 32nd in the nation for cloud-to-ground flash densities from 1997 to 2010 with 5.0 flashes per square mile. Therefore, while 100% of the response area is vulnerable to lightning strikes, the density of these single-point occurrences is fairly limited.

Based on this information, the geographic extent rating for lightning is **limited**.

Figure 4.35. Flash Density Map for Colorado: 1994-2011, without 2000



Source: Vaisala National Lightning Detection Network

Potential Magnitude

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:

- Electrocution, 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 a result of a lightning strike.

Likelihood/Frequency of Occurrence

Available by Vaisala, according to the *Lightning Climatology for the State of Colorado* scientific paper, "there is little relationship between the height of the mountain and the amount of cloud to ground lightning activity. Some of the taller mountain ranges locating in the west central/central part of the state, including the Sawatch range and Elk range do not show much in the way of lightning activity." Dividing the number of damaging events (5) by the available historic record (2017–1950=67), then multiplying by 100 to calculate the probability percentage yields a 7% probability that a damaging lightning event will occur in any given year in Gunnison County. Therefore, the likelihood of occurrence is **occasional**—0-10% 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 by 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 the Gunnison County response area can include strong winds and blizzard conditions. Severe winter storms 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 the 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

Several major winter storms and blizzards have occurred in the response area over the past several decades. NWS recorded there were 13 blizzards events, 3 cold wind chill events, 1 extreme cold/wind chill events, 437 winter storm events, and 644 winter weather events between 1960 and 2017. That's a total of 1,098 winter weather events. Some of these events are captured in 0. Events that are primarily related to extreme cold are profiled in Section 0 Extreme Cold.

Table 4.20 Gunnison County Winter Weather Events: 1960-2017*

Date	Injuries	Deaths	Property Damage ($)**	Crop Damage ($)**
1/14/1960	0	0	12	0
9/2/1961	0	0	1,315	1,315
9/20/1961	0	0	312	3,125
1/25/1969	0.06	0	27	0
10/29/1969	0	0	0	135
3/1/1970	0	0	312	0
2/19/1976	0	0.02	0	0

Date	Injuries	Deaths	Property Damage ($)**	Crop Damage ($)**
12/17/1978	0	0.14	0	0
5/7/1979	0	0	12	0
11/19/1979	0.02	0	793	0
12/21/1981	0	1	0	0
12/23/1982	0	0.1	793,651	7,936
3/14/1983	0	0	793	0
6/6/1984	0	0	4,166	0
10/10/1986	0	0	847	84
2/1/1989	0.05	1	793	0
3/2/1992	0.02	0	1,063	0
1/10/1993	0	0	2,777	0
2/8/1995	0	0	40,697	0
2/20/1996	0.1	0.05	0	0
2/22/1996	0.36	0	0	0
12/8/1998	0	0	15,000	0
10/18/2005	0	0	384	0
10/25/2006	0	0	700	0
12/1/2008	0	0	3,000	0
4/22/2010	0	0	0	0
Total	**0.93**	**2.41**	**948,647**	**12,595**

Source: SHELDUS
*Extent of Record
**Dollar value based on year of event

The Western Regional Climate Center (WRCC) reports current data from two weather stations in the Gunnison County response area: Crested Butte and Cochetopa Creek. 0 contains snowfall and snowdepth summaries for the stations. Figure 4.366 through **Error! Reference source not found.** show the monthly snow density and snowdepth averages for these stations.

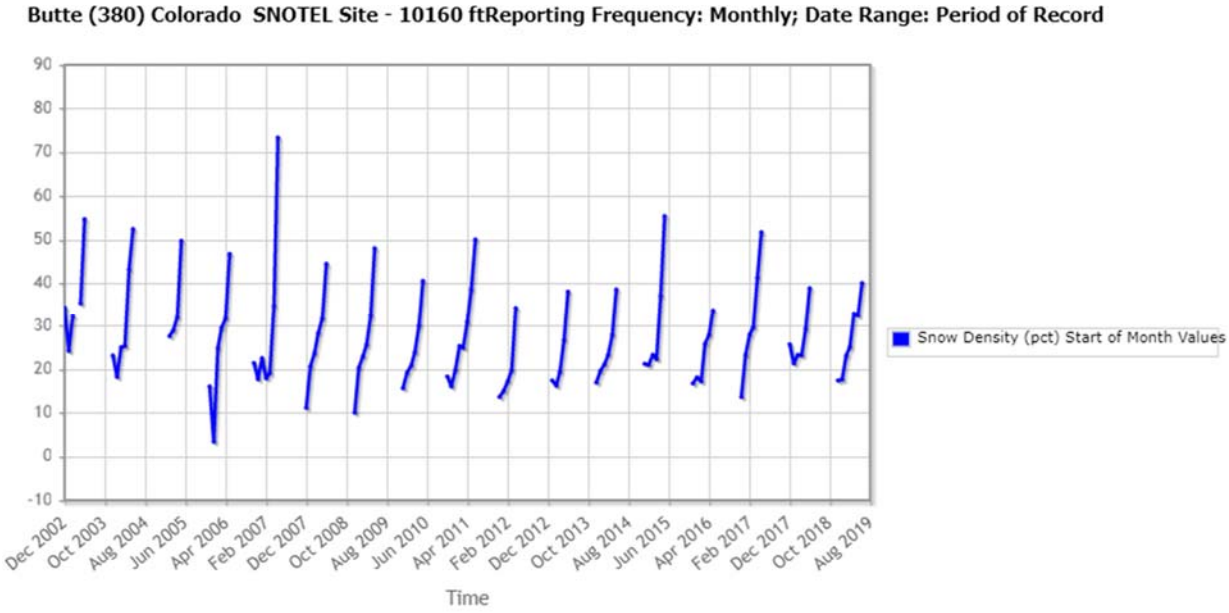
Table 4.21 Gunnison County Response Area Snow Density and Snow depth Summaries

Station	Average Annual Snowfall	Snowiest Month/Average Snowfall	Highest Monthly Snowfall	Highest Seasonal Snowfall[5]
Crested Butte	197.7	January/39.9	146.5 January 1957	226.6 Winter 1978
Cochetopa Creek	50.4	January/10.4	50 December 1983	78.7 Winter 2008

Source:
- Natural Resources Conservation Services (NRCS) Report Generator: https://wcc.sc.egov.usda.gov/reportGenerator/edit/customChartReport/daily/start_of_period/380:CO:SNTL%7Cid=%22%22%7Cname/CurrentWY,CurrentWYEnd/WTEQ::value,WTEQ::median_1981,PREC::value,PREC::average_1981?fitToScreen=false&useLogScale=false
- https://wrcc.dri.edu/

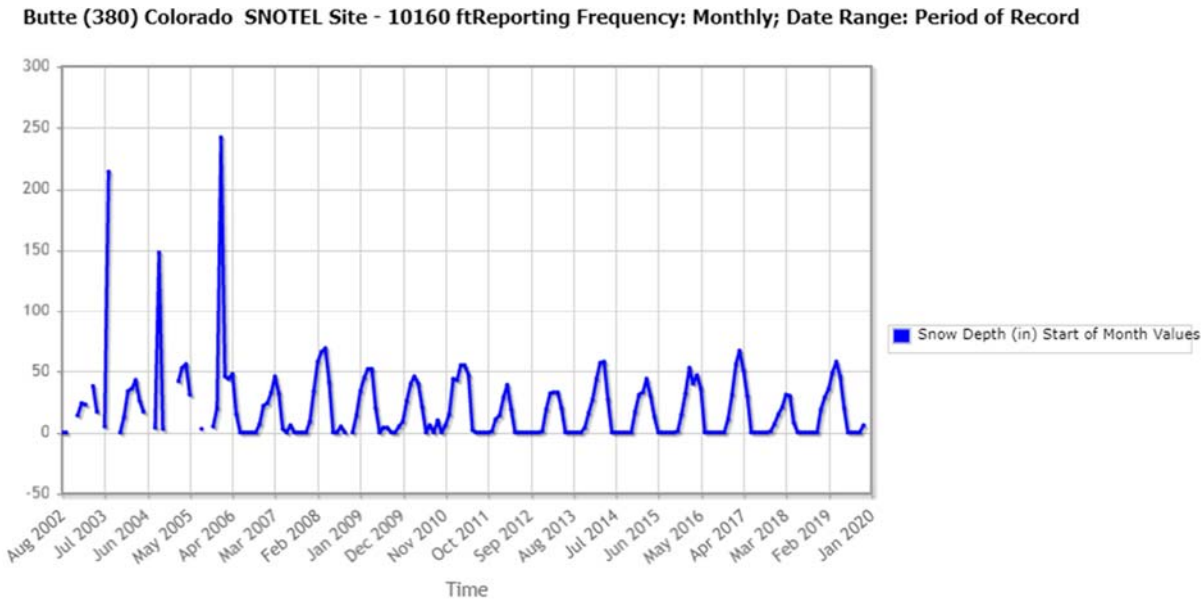
- https://www.nohrsc.noaa.gov/nsa/index.html?region=Central_Rockies&year=2012&month=1&day=1&units=e#snow_reports
- http://cbavalanchecenter.org/wp-content/uploads/2015/10/2011_2012_Seasonal.pdf

Figure 4.36. Crested Butte Station Snow Density: Dec 2004 – Nov 2019



Source: Natural Resources Conservation Services (NRCS) Report Generator: https://wcc.sc.egov.usda.gov/reportGenerator/edit/customChartReport/daily/start_of_period/380:CO:SNTL%7Cid=%22%22%7Cname/CurrentWY,CurrentWYEnd/WTEQ::value,WTEQ::median_1981,PREC::value,PREC::average_1981?fitToScreen=false&useLogScale=false

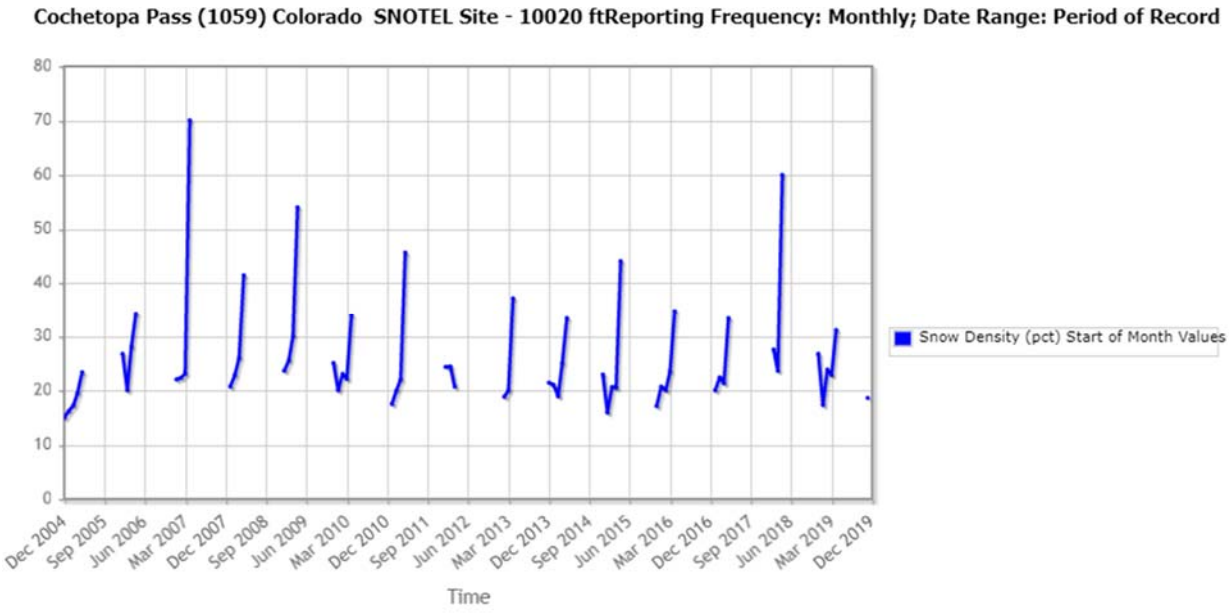
Figure 4.37. Crested Butte Station Snowdepth Average: Oct 2004 – Nov 2019



Source: Natural Resources Conservation Services (NRCS) Report Generator: https://wcc.sc.egov.usda.gov/reportGenerator/edit/customChartReport/daily/start_of_period/380:CO:SNTL%7Cid=%22%22%7Cn

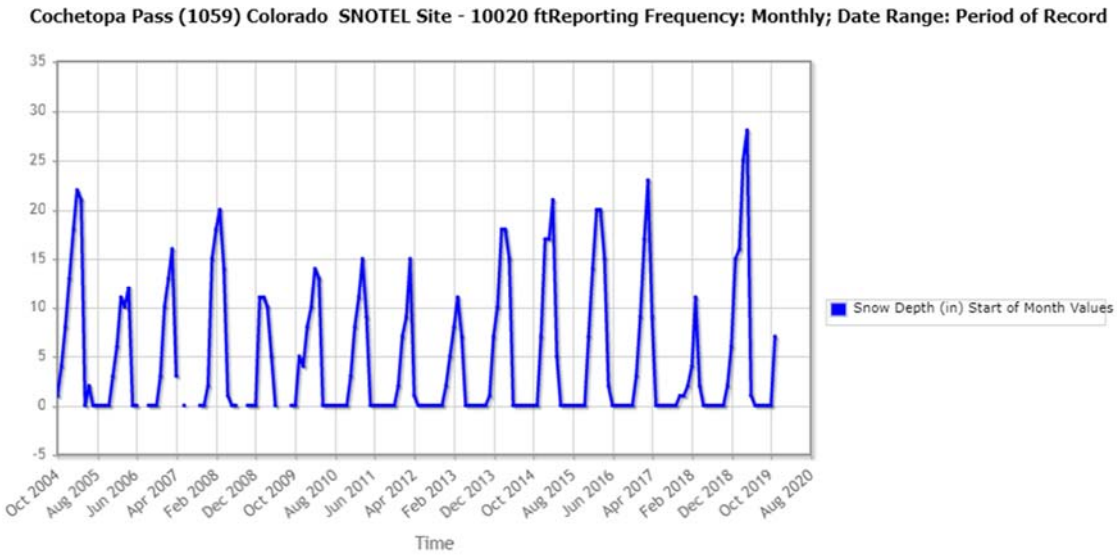
ame/CurrentWY,CurrentWYEnd/WTEQ::value,WTEQ::median_1981,PREC::value,PREC::average_1981?fitToScreen=false&useLogScale=false

Figure 4.38. Cochetopa Creek Station Snow Density: Dec 2004 – Nov 2019



Source: Natural Resources Conservation Services (NRCS) Report Generator: https://wcc.sc.egov.usda.gov/reportGenerator/edit/customChartReport/daily/start_of_period/380:CO:SNTL%7Cid=%22%22%7Cname/CurrentWY,CurrentWYEnd/WTEQ::value,WTEQ::median_1981,PREC::value,PREC::average_1981?fitToScreen=false&useLogScale=false

Figure 4.39. Cochetopa Creek Station Snowdepth Average: Oct 2004-Nov 2019



Source: Source: Natural Resources Conservation Services (NRCS) Report Generator: https://wcc.sc.egov.usda.gov/reportGenerator/edit/customChartReport/daily/start_of_period/380:CO:SNTL%7Cid=%22%22%7Cn

ame/CurrentWY,CurrentWYEnd/WTEQ::value,WTEQ::median_1981,PREC::value,PREC::average_1981?fitToScreen=false&useLogScale=false

Geographical Area Affected

Extensive - The entire response area, due to its high mountain setting, is susceptible to severe winter storms.

Potential Magnitude

Overall, severe winter storm impacts could be **limited**. Most residents take severe winter weather in stride as part of mountain living. Most problems with winter storms are related to vehicle accidents and contribute to avalanche hazards. There are a number of mountain passes in Gunnison County located at or over 12,000 feet in elevation. These passes can become very dangerous in snowy or icy conditions, increasing the risk of traffic accidents that could result in fatalities. Dangerous roadways may be closed in adverse weather, which can impact the economy by impeding travel, deliveries, etc. 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.

Likelihood/Frequency of Occurrence

The HMPC estimates that severe winter storms or blizzards are **highly likely** to occur in any given year. More damaging severe storms may have a slightly lower frequency of occurrence. Based on the data presented in this section, it is **likely** that a damaging winter storm will occur. According to the SHELDUS data table, damaging severe winter storms occur about every two years (50 year period of record divided by 26 events).

4.2.13 Wildland Fire

Hazard/Problem Description

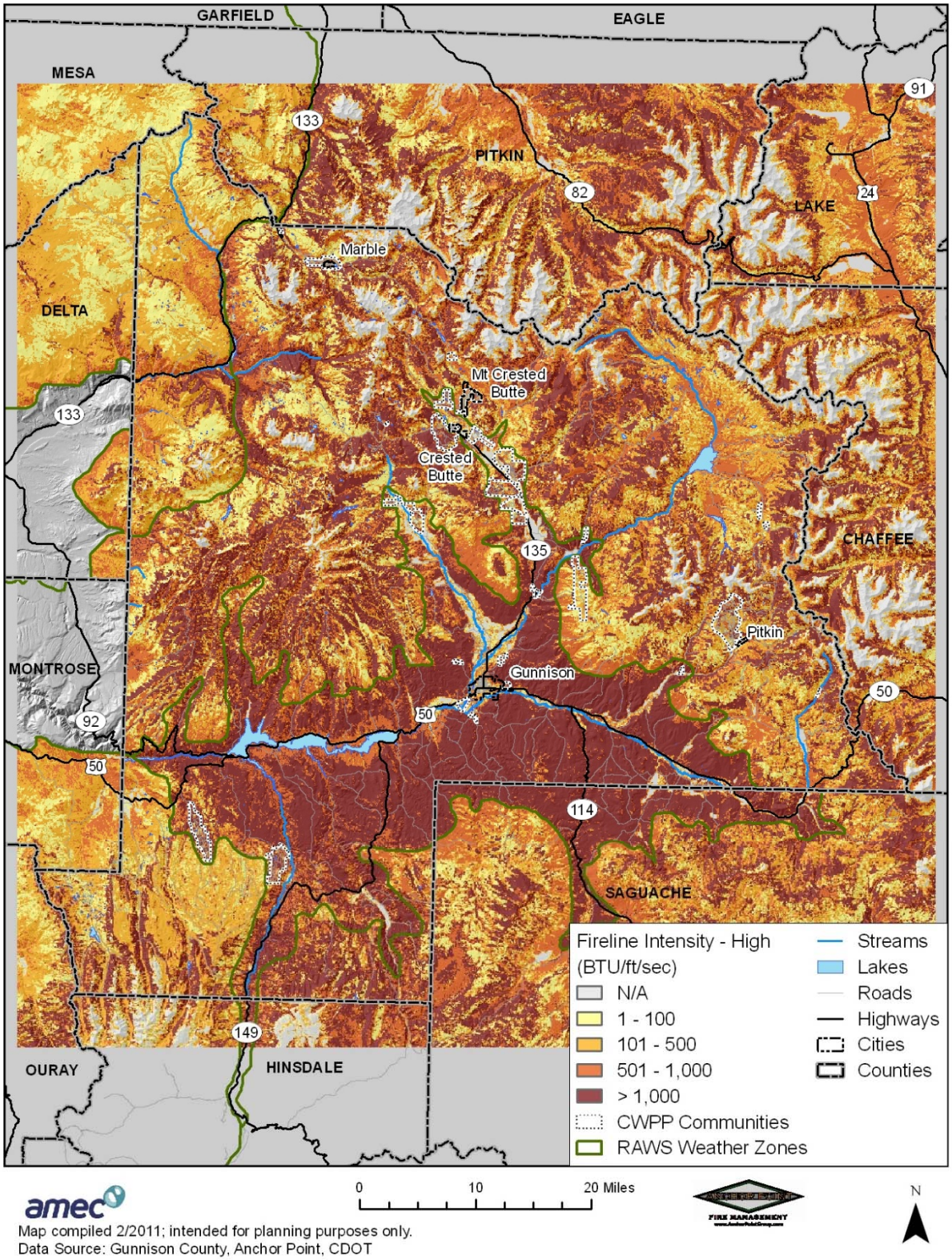
Wildland fires are an ongoing concern for the Gunnison County response area. The predominant values at risk are the population, residences, and businesses of the WUI (Wildland-Urban Interface) communities. Habitat, watersheds, travel corridors, infrastructure systems, and cultural and natural resources are among the extensive list of additional significant values at risk within the area.

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 the impacts of seasonal or prolonged drought, frost-killed brush, and beetle-killed trees increase the potential for a wildland fire 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 response area complicates evacuation and control options and constitutes serious life risk to residents and emergency responders alike.

In wildland fire vernacular, hazard is described in terms of probability and intensity i.e., that is, based on historic fire occurrence and fuel characteristics. Risk is defined in terms of the three components of the risk triangle – e.g. probability+intensity+susceptibility. In other words a combination of how likely an area is to burn, the intensity at which it will burn, and the exposure of values at risk. 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 4.40 from the 2011 County Community Wildfire Protection Plan (CWPP) depicts the predicted fireline intensity in the response area under high fire weather conditions. This Fireline intensity analysis is the most current and still accurate. 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 catalysts 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 the Gunnison County response area. 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' availability 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 the Gunnison County response area 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 Gunnison County or northwest Saguache County.

Figure 4.40. Predicted Fireline Intensity Under High Weather Conditions



Source: 2011 Gunnison County CWPP (still most current analysis)

Past Occurrences

The majority of wildland fires in Gunnison County occur between June and October. Most wildland fires in Gunnison County are relatively small and never make the list of large fires. However, even small fires can threaten life safety and property in the response area. The size of a fire will largely be dependent on the availability of fuels plus location in the Wildland Urban Interface (WUI), which can dictate emergency response times and availability of water. Although we have not seen a large fire recently, local wildland fire experts agree that Gunnison County has the appropriate conditions (fuels, weather and topography) to support a large-scale wildfire event. In addition, the onslaught of bark beetles in the last decade have caused wide-spread tree mortality and significantly altered forest conditions in the county.

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 run by the Departments of Agriculture and Interior as processed by the USGS (https://wildfire.cr.usgs.gov/firehistory/data.html). The Federal Wildland Fire Occurrence data recorded 626 wildland fires in Gunnison County between 1980 and 2016. 44 of these wildland fires were over 10 acres in size. The largest wildland fire in Gunnison County was the July 2008 West Elk fire at 1,587 acres, while the largest wildland fire in the response area was the Mustang Creek fire in 2000. Figure 4.41 depicts the location of the wildland fires greater than or equal to 10 acres in the response area between 1980 and 2010.

Gunnison County's Upper Crystal River Valley lies within the Sopris Ranger District of the White River National Forest. Although no large fires have occurred in the Sopris District in recent history, other parts of the White River National Forest have been subjected to wildland fires several thousand acres in size. Three major wildland fires occurred in the White River National Forest in 2002, one of the worst wildland fire seasons in Colorado history. The Coal Seam Fire burned 12, 209 acres, the Spring Creek Fire burned 13,493 acres, and the Big Fish Fire burned 17,056 acres. The 2008 County Road 100 Fire, which fell within the Carbondale and Rural Fire Protection District (CRFPD) response area, burned roughly 1,000 acres.

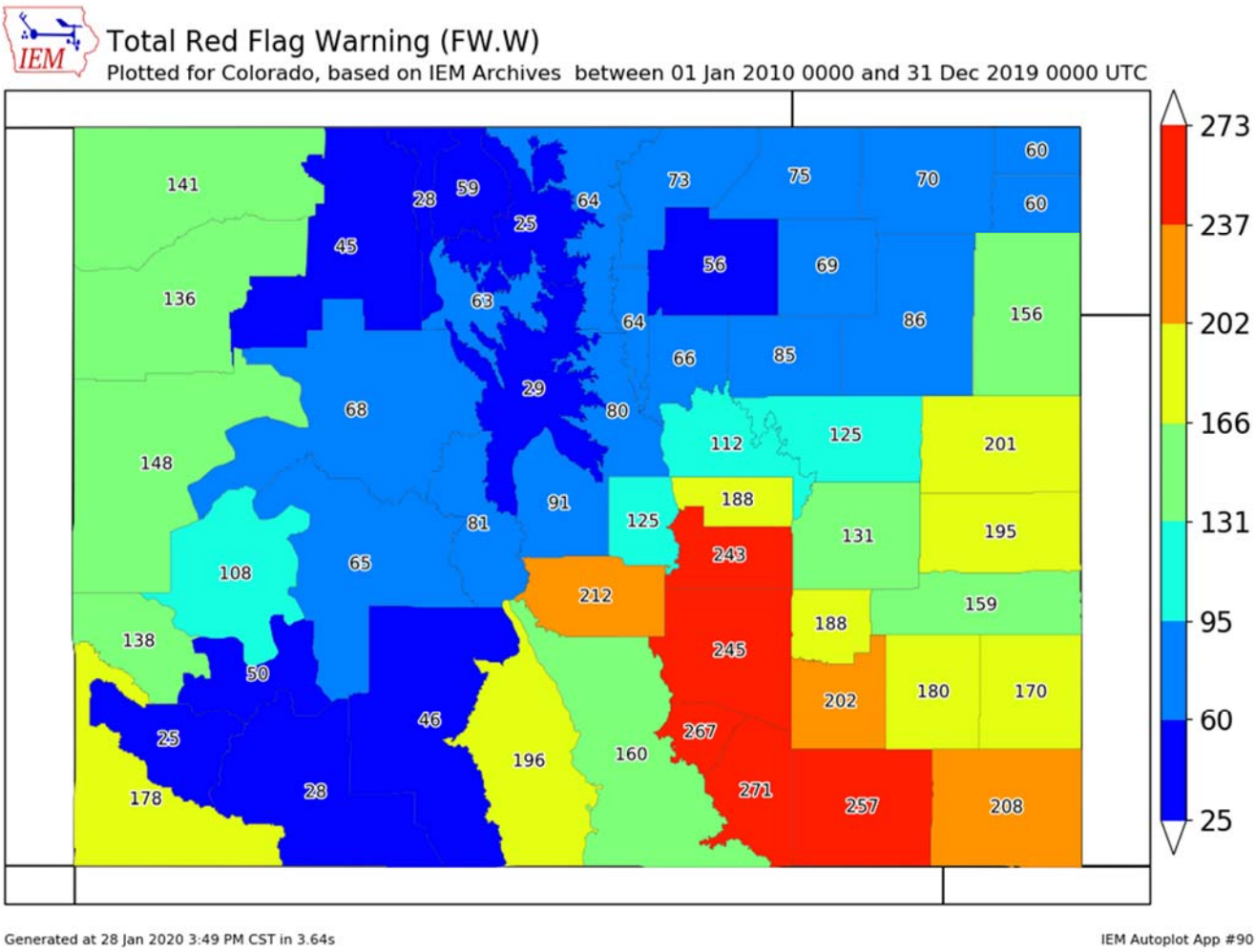
The HMPC provided details on smaller fires that have occurred in Gunnison County. In the summer of 2001, a fire ignited in the Antelope Hills Subdivision, approximately four miles north on County Road 15 from Highway 50. The fire did not result in any damages or casualties, but CR 17 was closed for about 12 hours, and the Antelope Hills Subdivision was evacuated.

In the summer of 2016, on June 28th a lightning strike sparked a fire in the vicinity of Pitkin and Ohio City, east of Gunnison. This fire was labelled the Rosebud Fire and had the potential to threaten residents in the area, so residents were placed on a pre-evacuation notice. The Rosebud Fire grew to 52 acres, and after two days the pre-evacuation notice was lifted once the fire was 95 % contained. No structures were lost.

The summer of 2018 shown signs of an active fire season following a low snowpack and unusually warm temperatures. On August 11, 2018 the Russell Fire occurred in Gunnison County near the

Arrowhead Subdivision on private property. The fire threatened homes the Arrowhead subdivision, and a pre-evacuation warning was sent to 166 residents. The fire burned approximately 158 acres and was contained on August 13, 2018. Shown in Figure 4.41 Gunnison County has had 65 Red Flag Warnings issued from 2010 through 2019. Which is approximately 6.5 warnings a year, 5 last season and 13 in 2018.

Figure 4.41. Red Flag Warnings: 2010-2019



Geographical Area Affected

The 2011 Gunnison 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. Some areas, including those within the City of Gunnison, were not included because they were not determined to be threatened by wildland fire. The CWPP identified 32 communities and seven 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 ASIs are shown on a map in section 4.2 of this plan where other critical facilities and assets at risk are discussed. Most of Gunnison County is in the WUI; wildland fires affect an **extensive** portion of the response area.

Figure 4.42. Gunnison County WUI Boundary

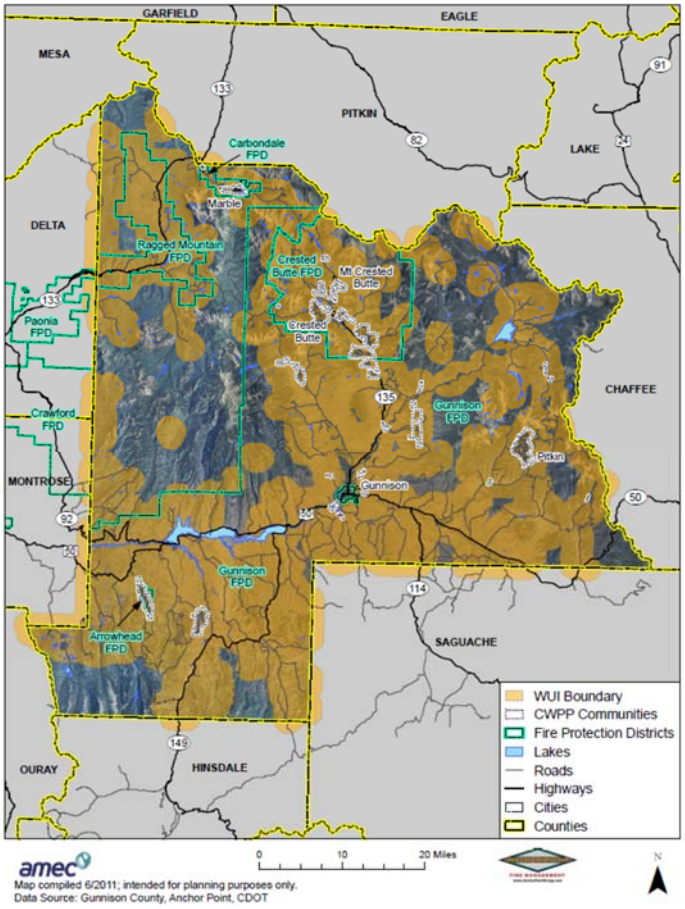
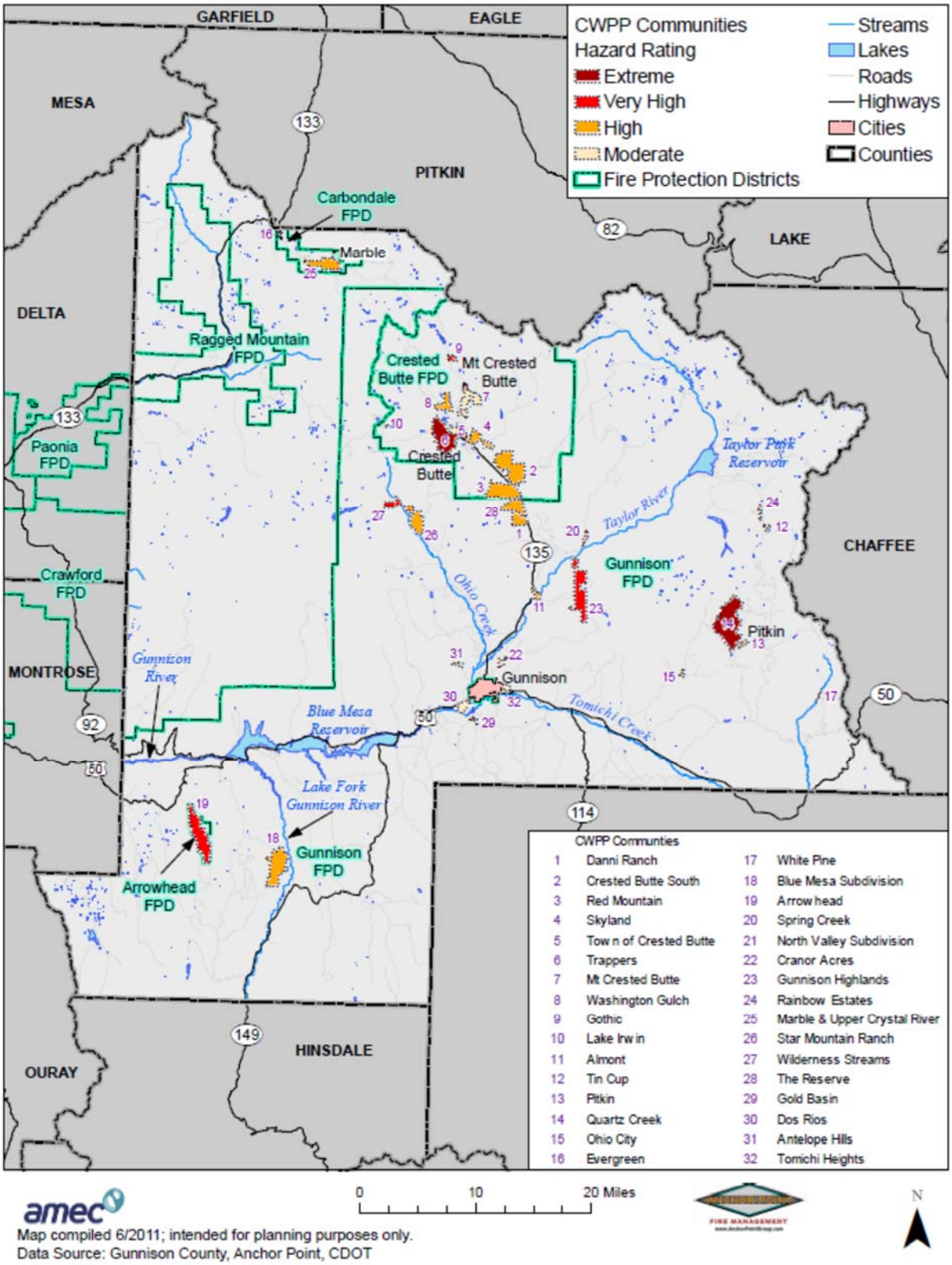


Figure 4.43. Gunnison County CWPP Communities and Hazard Rating



Potential Magnitude

The magnitude of a wildland fire in the Gunnison County response area could be **critical**. It is a practical certainty that at least small wildland fires will occur every year in the Gunnison County response area. 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.

Wildland fire poses a major public safety hazard in the Gunnison County response area. Life safety and human health are serious concerns due to most of the County being considered a wildland urban interface area and the high influx of visitors during the prime wildland fire months. Wildland fire has the potential to cause widespread and severe damage to watersheds and property in the response area. Although a natural process, wildland fires can mar scenic view-sheds, potentially reducing property values and negatively impacting the tourism-based economy. Fires can be intensified by drought.

Gunnison County is located at the headwaters of the Gunnison River and the Colorado River, and severe wildfire impacts would greatly impact downstream communities drinking water and infrastructure. A severe wildfire in Gunnison County would have a snowball effect on downstream water users.

The 32 CWPP communities in Gunnison County were organized by hazard rating in the 2011 Gunnison 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. 0 lists the 32 communities, their hazard rating, and the fire protection district that would respond to each community. Gunnison County Emergency Management consulted with our local Colorado State Forester, and they agreed to utilized the CWPP for this plan, instead of the CO-WRAP, because the CWPP is more specific to our hazard ratings to our communities.

Table 4.22 WUI Community Hazard Ratings

Community Name	Fire Protection District	Hazard Rating
Cranor Acres	Gunnison	Moderate
Dos Rios	Gunnison	Moderate
Mt. Crested Butte	Crested Butte	Moderate
North Valley Subdivision	Gunnison	Moderate
Tomichi Heights	Gunnison	Moderate
Town of Crested Butte	Crested Butte	Moderate
Almont	Gunnison	High

Community Name	Fire Protection District	Hazard Rating
Antelope Hills	Gunnison	High
Blue Mesa Subdivision	Gunnison	High
Crested Butte South	Crested Butte	High
Danni Ranch	Gunnison	High
Evergreen	Carbondale	High
Gold Basin Meadows	Gunnison	High
Marble and Upper Crystal River	Carbondale	High
Ohio City	Gunnison	High
Pitkin	Gunnison	High
Rainbow Estates	Gunnison	High
Red Mountain	Crested Butte	High
Skyland	Crested Butte	High
Star Mountain Ranch	Gunnison	High
The Reserve	Gunnison	High
Tin Cup	Gunnison	High
Washington Gulch	Crested Butte	High
Arrowhead	Arrowhead	Very High
Gothic	Crested Butte	Very High
Gunnison Highlands	Gunnison	Very High
Spring Creek	Gunnison	Very High
White Pine	Gunnison	Very High
Wilderness Streams	Gunnison	Very High
Lake Irwin	Crested Butte	Extreme
Trappers	Crested Butte	Extreme
Quartz Creek	Gunnison	Extreme

*- this community has its own CWPP.

Likelihood/Frequency of Occurrence

Highly Likely— It is a virtual certainty that wildland fires will occur in the Gunnison County response area every year. The number, extent, and severity of these fires are subject to numerous climatic, weather, and random factors. Historic trends and the condition of the local forests indicate that the occurrence of a large fire is a matter of time.

4.3 Assessing Vulnerability

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 the Gunnison County response area's hazards identified and profiled, the HMPC conducted a vulnerability assessment to describe the impact that the more significant hazards would have on the response area. 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 *Local Mitigation Planning Handbook* (2013). 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.

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

- County GIS data (hazards, base layers, and assessor's data)
- FEMA's HAZUS 2.1 GIS-based inventory data
- Digital Flood Insurance Rate Maps (DFIRMs)

- Written descriptions of inventory and risks provided by participating jurisdictions
- Existing plans and studies
- Personal interviews with planning team members, hazard experts, and staff from Gunnison County and participating jurisdictions

The scope of the vulnerability assessment was to describe the risks to the Gunnison County response area 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 response area.

The vulnerability assessment first describes the assets in the Gunnison County response area, 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 the Gunnison County response area at risk to hazards identified in this plan. It begins with an inventory of people and buildings (total exposure) in the response area to provide a baseline for evaluating vulnerability by hazard.

Total Exposure to Hazards

Table 4.10 shows the population exposure to hazards based on estimates from the U.S. Census Bureau.

Table 4.10 Population Exposure by Jurisdiction

Jurisdiction	2010 Population	2017 Population
Town of Crested Butte	1,487	1,656
City of Gunnison	5,854	6,443
Town of Marble	131	141
Town of Mt. Crested Butte	801	850
Town of Pitkin	66	71
Unincorporated County	6,985	7,710
Total County	**15,324**	**16,871**

Source: State Demography Office: https://demography.dola.colorado.gov/population/data/historical_census/

Note that the information above does not take in account the seasonal populations surges due to tourism and seasonal residents. Approximately 61% of the homes in Gunnison County are second or seasonal homes, so the population at risk to hazards will increase or decrease depending on the time of year.

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

- Respiratory issues among the elderly due to wildland fires
- Flooding issues in lower income populations due to a mobile home park located in the Special Flood Hazard Area
- Access and evacuation issues for the Gunnison Nursing home which is surrounded by Flood Zone A

Exposure/Potential Dollar Loss

Assessments in this plan are based on building inventories from Gunnison County's Assessor's Office. Table 4.24 and Table 4.25 show the value of the buildings from the Assessor's Office (December 2019). According to the assessor's data, the sum of the actual value improvements in the County is $7,742,476,821 (total building exposure). Contents exposure is estimated as a percent of the improvement value (specifically, 50% of the improvement value for residential structures, 150% for industrial structures, 100% for agricultural structures, 100% for commercial structures, 150% for natural resources, 0% for vacant land, and 100% for exempt structures), based on standard FEMA methodologies.

Included in the exposure analysis is an estimate of structures located within the Saguache County portion of the response area. HAZUS-MH version 2.1 inventory data was used for the estimate, based on the Census Blocks within the response area. There are roughly 102 structures in the area with a total building value of $9,418,000. Total building and contents value equals $14,283,000. Nearly all of these structures are residential with the exception of one commercial building with a total value of $118,000 and one agricultural building with a total value of $116,000.

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 4.24 Building Exposure by Jurisdiction (Assessor's Office)

Jurisdiction	Building Count	Improvement Value	Contents Exposure*	Total Exposure
City of Gunnison	2,788	$590,880,666	$386,512,985	$977,393,651
Crested Butte	1,509	$829,293,664	$475,389,940	$1,304,683,604
Marble	136	$32,093,083	$17,586,004	$49,679,087

Jurisdiction	Building Count	Improvement Value	Contents Exposure*	Total Exposure
Mt Crested Butte	2,346	$1,036,578,835	$552,533,637	$1,589,112,472
Pitkin	231	$29,886,289	$16,189,298	$46,075,587
Unincorporated	9,451	$2,434,027,780	$1,341,504,640	$3,775,532,420
Total County	**16,461**	**$4,952,760,318**	**$2,789,716,503**	**$7,742,476,821**

Source: Gunnison County Assessor's Office

Table 4.25 Building Inventory Valuations by Property Type—Unincorporated Gunnison County (Assessor's Office)

Property Type	Building Count	Improvement Value	Contents Exposure*	Total Exposure
Agricultural	2,062	$113,971,179	$113,971,179	$227,942,358
Commercial	629	$57,947,943	$57,947,943	$115,895,886
Exempt	275	$38,484,996	$38,484,996	$76,969,991
Industrial	25	$3,820,396	$5,730,594	$9,550,991
Natural Resources	36	$16,874,043	$25,311,065	$42,185,108
Residential	6,340	$2,200,117,725	$1,100,058,863	$3,300,176,588
Vacant	84	$2,811,498	-	$2,811,498
Total	**9,451**	**$2,434,027,780**	**$1,341,504,640**	**$3,775,532,420**

Source: Gunnison County Assessor's Office

Critical Facilities, Infrastructure, and Other Important Community Assets

Gunnison County Emergency Management is in the process of collecting critical facility information as part of a Rapid Needs Assessment (RNA). This entails identifying the location of major structures and geographic features, as well as pinpointing intelligence targets that the community must assess immediately in an emergency. The following guidelines were used to identify the critical assets in the Gunnison County response area.

Rapid Needs Assessment Categories:

- Life Safety Operations: search and rescue, evacuation and sheltering
- Lifelines: transportation, communications, gas, electric, water, and sewer/sanitation
- Facilities: fire stations, police stations, EMS stations, hospitals/clinics, dispatch/public safety access point (PSAPs), schools, and other government facilities

These are prioritized as follows:

- Priority 1: Essential facilities
  - Dispatch/PSAPs
  - Hospitals/clinics
  - Fire stations
  - EMS stations
  - LE stations
  - Shelters
  - Public safety communications systems
- Priority 2: Life Safety
  - Vulnerable populations (schools, nursing homes, etc.)
  - High density populations (schools, colleges, office buildings, motels, etc.)
  - Functional needs populations
  - Hazardous material facilities
- Priority 3: Lifelines
  - Electric
  - Propane / natural gas
  - Water
  - Sewer / sanitation
  - Landline phone systems
  - Cellular phone systems
  - Public radio / TV
  - Transportation systems

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 4.26 displays the inventory of these assets in Gunnison County, by jurisdiction, as provided by the HMPC. This table has been supplemented with GIS-based critical facility data from the County, for purposes of hazards analysis. Figure 4.44 depicts the location of critical facilities in Gunnison County.

Table 4.26 Gunnison County Asset Inventory

Name of Asset	Facility Type	Facility Category*	Jurisdiction
Arrowhead Fire Station	Fire	Essential Facility	Arrowhead FPD
Arrowhead Improvements Association's Equipment Storage and Building Shop	equipment	Lifeline	Arrowhead FPD
Arrowhead Improvements Association's Heavy Equipment: road grader, front end loader, water tender, and snowcat	Equipment	Lifeline	Arrowhead FPD
Arrowhead Water Company	Water	Lifeline	Arrowhead FPD
Nucla-Naturita Phone Company Facility	Communications	Lifeline	Arrowhead FPD
CB South General Store	Store	Life Safety	CB South Metro Dist.

Name of Asset	Facility Type	Facility Category*	Jurisdiction
CB South Metro Dist.	Fire	Essential Facility	CB South Metro Dist.
Crested Butte (CB) South Fire Dept.	Fire	Essential Facility	CB South Metro Dist.
Heavy Equipment including: Excavator; Loader; Dump Truck; Pumper Truck: Motor Grader: Backhoe	Equipment	Lifeline	CB South Metro Dist.
Little Red School House	School	Life Safety	CB South Metro Dist.
Three water wells	Water	Lifeline	CB South Metro Dist.
Wastewater Treatment Plant	Wastewater	Lifeline	CB South Metro Dist.
Water Tanks 1 and 2	Water	Lifeline	CB South Metro Dist.
Airport Administration	Government	Lifeline	City of Gunnison
Blackstocks Government Center	Government	Essential Facility	City of Gunnison
City Community Recreation Center	Shelter	Essential Facility	City of Gunnison
City Hall	Government	Essential Facility	City of Gunnison
City Public Works Shop Facilities	Essential/Life Line Facilities	Essential Facility/Lifeline	City of Gunnison
Commercial Business Zones	Life Safety Facilities	Life Safety Facilities	City of Gunnison
County Public Works	Government	Essential Facility/Lifeline	City of Gunnison
Cupola Hill 44	Communications-Repeater	Essential Facility	City of Gunnison
Division of Wildlife	Government	Essential Facility	City of Gunnison
Domestic Water Well Facilities (9 well houses)	Water Facilities	Lifeline	City of Gunnison
Electrical Sub-Station on Wilson Road	Electric Power	Lifeline	City of Gunnison
Emergency Operations Center	Emergency Ops Center	Essential Facility	City of Gunnison
Forest Service Gunnison Basin Field Office Garage	Government	Essential Facility	City of Gunnison
Forest Service/BLM/NRCS Office Building	Government	Essential Facility	City of Gunnison
Fred Field Western Heritage Center	Shelter	Essential Facility	City of Gunnison
Gunnison Assisted Living Community	Nursing Home	Life Safety	City of Gunnison
Gunnison Communication Center	Communications	Essential Facility	City of Gunnison
Gunnison Community School	School	Life Safety	City of Gunnison
Gunnison County Courthouse	Government	Essential Facility	City of Gunnison
Gunnison County Library	Government	Essential Facility	City of Gunnison
Gunnison County Public Safety Center	Government	Essential Facility	City of Gunnison
Gunnison Fire Station	Fire	Essential Facility	City of Gunnison

Name of Asset	Facility Type	Facility Category*	Jurisdiction
Gunnison High School	School	Life Safety	City of Gunnison
Gunnison Nursing Home	Vulnerable Facility	Life Safety	City of Gunnison
Gunnison Police Station	Police Station	Essential Facility	City of Gunnison
Gunnison Valley Hospital	Hospital	Essential Facility	City of Gunnison
Gunnison/Crested Butte Regional Airport	Transportation	Lifeline	City of Gunnison
Housing Authority and Tourism	Government	Essential Facility	City of Gunnison
IC Office	Communications – I.C. Wireless	Essential Facility	City of Gunnison
Mountain Meadow Research Center/CSFS	Government	Essential Facility	City of Gunnison
Office	Communications - Television	Essential Facility	City of Gunnison
Oleary Building	Government	Essential Facility	City of Gunnison
Public Works Garage	Government	Essential Facility/Lifeline	City of Gunnison
Rodeo Grounds and Extension Office	Government	Essential Facility	City of Gunnison
Sewer Treatment Plant	Wastewater Facility	Lifeline	City of Gunnison
U.S. Forest Service Office	Government	Essential Facility	City of Gunnison
Western State College	School	Life Safety	City of Gunnison
	Fuel Farm	Lifeline	City of Gunnison
	Power Station	Lifeline	City of Gunnison
	Shelter	Shelter	City of Gunnison
Alpine	Communications – I.C. Wireless	Essential Facility	Crested Butte
CBFPD EMS Station	EMS	Essential Facility	Crested Butte
Crested Butte Community School	School	Life Safety	Crested Butte
Crested Butte FPD Fire Station	Fire	Essential Facility	Crested Butte
Crested Butte Police Station	Police Station	Essential Facility	Crested Butte
Crested Butte Town Hall	Government	Essential Facility	Crested Butte
Electric Infrastructure	Utility	Lifeline	Crested Butte
Elk Node	Communications – I.C. Wireless	Essential Facility	Crested Butte
Landline Phone Systems	Utility	Lifeline	Crested Butte
Natural Gas Infrastructure	Utility	Lifeline	Crested Butte
Public Radio	Communication	Essential Facility	Crested Butte
Transportation Systems	Transportation System	Lifeline	Crested Butte
	Fuel Farm	Fuel Farm	Gunnison County
	Waste Disposal	Lifeline	Gunnison County
Almont Fire Station	Fire Station	Essential Facility	Gunnison County

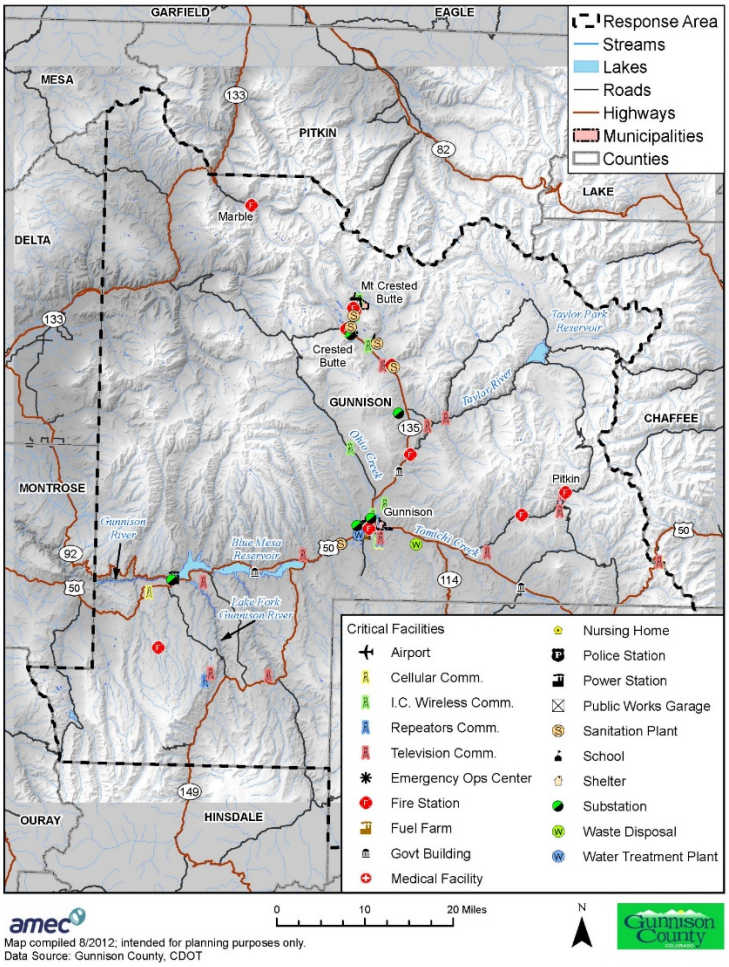
Name of Asset	Facility Type	Facility Category*	Jurisdiction
Blue Mesa	Communications - Cellular	Essential Facility	Gunnison County
Brush Creek Private Airport	Airport	Lifeline	Gunnison County
CB South	Communications – I.C. Wireless/Television	Essential Facility	Gunnison County
Comstock	Communications – Cellular/Television	Essential Facility	Gunnison County
County Public Works Shop	Government	Essential Facility/Lifeline	Gunnison County
Cranor Hill	Communications – I.C. Wireless	Essential Facility	Gunnison County
Crested Butte 71	Communications - Repeater	Essential Facility	Gunnison County
Curecanti National Recreation Area	Government	Essential Facility	Gunnison County
Dos Rios Water Treatment Plant	Water Treatment Plant	Lifeline	Gunnison County
Eagle Ridge	Communications – I.C. Wireless	Essential Facility	Gunnison County
East River Regional Sanitation Plant	Sanitation Plant	Lifeline	Gunnison County
Electric Substation - Alkali	Substation	Lifeline	Gunnison County
Electric Substation - Blue Mesa Dam	Substation	Lifeline	Gunnison County
Electric Substation - CB	Substation	Lifeline	Gunnison County
Electric Substation - North of Gunnison	Substation	Lifeline	Gunnison County
Electric Substation - Skito	Substation	Lifeline	Gunnison County
Gateview	Communications - Television	Essential Facility	Gunnison County
Gunnison Sanitation Plant	Sanitation Plant	Lifeline	Gunnison County
Lacy Arena	Communications – I.C. Wireless	Essential Facility	Gunnison County
Monarch	Communications – Cellular/Television	Essential Facility	Gunnison County
Monarch 20	Communications - Repeater	Essential Facility	Gunnison County
Ohio City Fire Station	Fire Station	Essential Facility	Gunnison County
Parlin	Communications - Television	Essential Facility	Gunnison County

Name of Asset	Facility Type	Facility Category*	Jurisdiction
Pitkin	Communications - Television	Essential Facility	Gunnison County
Powderhorn	Communications - Television	Essential Facility	Gunnison County
Roaring Judy Fish Hatchery	Government	Essential Facility	Gunnison County
Rose Ridge 63	Communications - Repeater	Essential Facility	Gunnison County
Sapinero	Communications - Television	Essential Facility	Gunnison County
Spring Creek	Communications - Television	Essential Facility	Gunnison County
Steuben Creek	Communications - Television	Essential Facility	Gunnison County
Sunlight	Communications – Cellular/I.C. Wireless	Essential Facility	Gunnison County
Sunlight Ridge	Communications - Television	Essential Facility	Gunnison County
Tree Dump	Communications – I.C. Wireless	Essential Facility	Gunnison County
U.S. Forest Service Shop Building	Government	Essential Facility	Gunnison County
W Mountain	Communications – I.C. Wireless/Television	Essential Facility	Gunnison County
W Mountain 44	Communications – Repeater	Essential Facility	Gunnison County
W Mtn	Communications – Cellular	Essential Facility	Gunnison County
Waunita	Communications – Television	Essential Facility	Gunnison County
Willows Assisted Living	Nursing Home	Life Safety	Gunnison County
W-Mountain	Communications – I.C. Wireless	Essential Facility	Gunnison County
Bridges and culverts	Transportation System	Lifeline	Gunnison/Saguache County
County Roads	Transportation System	Lifeline	Gunnison/Saguache County
Marble Fire Station	Fire Station	Essential Facility	Marble
Bachelor	Communications	Essential Facility	Mt. Crested Butte
Condominiums/Hotels	High Density Population	Life Safety	Mt. Crested Butte
Crested Butte Ski Area	High Density Population	Life Safety	Mt. Crested Butte
Mt. Crested Butte Fire Station	Fire Station	Essential Facility	Mt. Crested Butte

Name of Asset	Facility Type	Facility Category*	Jurisdiction
Mt. Crested Butte Police Station	Police Station	Essential Facility	Mt. Crested Butte
Mt. Crested Butte Town Hall	Government	Essential Facility	Mt. Crested Butte
Mt. Crested Butte Water/Sanitation Dist. Facilities	Water/Wastewater Facilities	Lifeline	Mt. Crested Butte
Police Station/Repeaters	Police/Communication	Essential Facility	Mt. Crested Butte
RTA and Mountain Express Public Bus Service	Transportation System	Lifeline	Mt. Crested Butte
Ski area medical clinics	Medical	Life Safety	Mt. Crested Butte
Water and Sanitation	Communications – I.C. Wireless	Essential Facility	Mt. Crested Butte
East River Pump Station	Water	Lifeline	Mt. Crested Butte Water/Sanitation Dist.
Pitkin Fire Station	Fire Station	Essential Facility	Pitkin

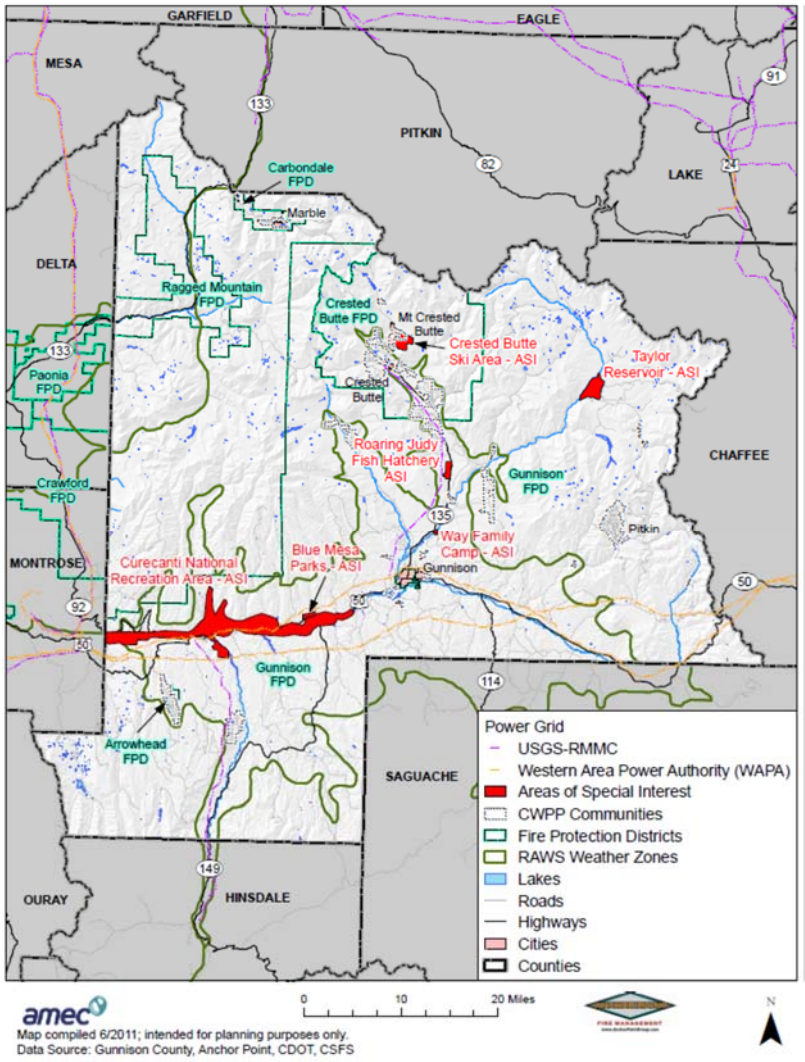
Source: HMPC and Gunnison County GIS
*Based on Rapid Needs Assessment Categories: Essential Facilities, Life Safety, and Lifelines

Figure 4.44. Gunnison County Critical Facilities



Several ASIs were identified during the development of the 2011 Gunnison County CWPP. ASIs are areas that could be threatened by natural hazards and have social or economic value which is based on recreation, natural resources, or infrastructure rather than residential development. Seven ASIs were identified in Gunnison County, including the Crested Butte Ski Area, Taylor Reservoir, Blue Mesa Recreation Area, Roaring Judy and Pitkin Fish Hatcheries, Way Family Camp, the Black Canyon of Gunnison National Park, and the Curecanti National Recreation Area. Figure 4.45 depicts the location of the ASIs within Gunnison County. The Rocky Mountain Biological Laboratory (RMBL) is another important value within the County but was not included in the list of ASIs due to the residences located in the area and thus is included as part of the Gothic CWPP community. The RMBL is an environmental science center devoted to studying the high-altitude ecosystems in the County and serves as an important source of knowledge and research.

Figure 4.45. Gunnison County Areas of Special Interest



Natural, Historic, and Cultural Assets

Assessing the vulnerability of the Gunnison County response area 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 the Gunnison County response area. 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 its communities. Timber markets are becoming more of an economic driver recently and the potential for biomass/alternative energy is also coming online. Healthy forest resources would be crucial to providing forest products. Several national and state parks, national recreation areas, scenic and historic trails, canyons, wilderness areas, and rivers are located in the Gunnison County response area. These natural resources are important assets to the response area's economy, culture, and character.

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. The Gunnison Wetland Focus Area Committee and the State of Colorado have conducted several conservation and mapping projects to identify wetland areas in the Gunnison River basin.

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 response 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 June 2018, there are ten federal endangered, threatened, recovering, or candidate species in Gunnison County. These species are listed in Table 4.27.

Table 4.27 Select List of Important Species Found in Gunnison County

Common Name	Scientific Name	Status
Bonytail chub*	Gila elegans	Endangered
Canada lynx	Lynx canadensis	Threatened
Colorado pikeminnow*	Ptychocheilus lucius	Endangered
Greenback cutthroat trout #	Oncorhynchus clarki stomias	Threatened
Gunnison sage -grouse ©	Centrocercus minimus	Threatened
Humpback chub*	Gila cypha	Endangered
Razorback sucker *	Xyrauchen texanus	Endangered
Skiff milkvetch	Astragalus microcymbus	Candidate
Uncompahgre fritillary butterfly	Boloria acrocnema	Endangered
Wolverine	Gulo gulo luscus	Proposed
Yellow-billed Cuckoo ©	Coccyzus americanus	Threatened

Source: Endangered, Threatened, Proposed, and Candidate Species Colorado Counties (June 2018),

Historic and Cultural Resources

There are many important historic resources within Gunnison County. 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.

GUNNISON COUNTY HISTORIC SITES		
Name	**Address**	**Current Use**
8th Street School	101 N. 8th Street, Gunnison	Restore/No entry; New school on site
Aberdeen Quarry	14 miles SW of Gunnison	Museum Tours
Alpine Guard Station	7 miles from Lake Fork Highway Turnoff	Forest Service Use
Bomber Crash Site	21 miles NE of Gunnison	Tourist site
Bon Ton Hotel	329 Main Street, Pitkin	Rustic Hotel
Chance Gulch Site	2.5 miles SE of Gunnison	Grazing

Dorchester Guard Station	Taylor Park	Tourist site
Fairview Peak Fire Lookout	Fairview Peak, Pitkin	Forest Service/Tourist site
Fairview School House	4514 CR 730, Ohio Creek	Community Center
Gothic Townsite Buildings	Gothic	Tourist site
Great Wall	23 miles N. of Gunnison	Tourist site
Johnson Building Gallery	124 N. Main St. Gunnison	Art Gallery
Mountaineer Site	Top of Tenderfoot Mountain	Radio Transmitters
Narrow Gauge Railroad Exhibit	803 W. Tomichi	Museum Exhibit
Ohio City Jail	Miners Avenue, Ohio City	Storage & Mailboxes
Ohio City School	Miners Avenue, Ohio City	Community Building
Ohio City Town Hall	8502 CR 76, Ohio City	Community Center
Rock Culverts & Railbed Trail	23 miles N. of Gunnison	Tourist site
Sewell's Gulch Gravesite	10 miles E. of Gunnison	Cemetery/no entry
Smith Opera House	114 N. Boulevard, Gunnison	Office building
Spencer School	21 miles SW of Gunnison	Tourist site/no entry
Star Mine	Taylor Park	Tourist site/no entry
Water Tank at Gothic Mill	Gothic	Tourist site

Source: Gunnison County Historic Preservation Commission https://www.gunnisoncounty.org/785/Historic-Sites

Information about historic assets in Gunnison County came from local sources as well as two 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.

Table 4.28 lists the properties and districts in Gunnison County that are on the Colorado State Register of Historic Properties. Current uses are listed by exception, where known.

Table 4.28 Gunnison County Historic Properties/Districts in State and National Registers

COLORADO STATE HISTORIC SITES		
Name	**Address**	**Current Use**
Bon Ton Hotel	329 Main Street, Pitkin	Rustic Hotel
CF&I Superintendant House	721 Maroon Avenue, Crested Butte	
Doyleville Schoolhouse	Pioneer Museum, Doyleville	
Gunnison Hardware (GAC)	102 S. Main, Gunnison	
Haystack Cave	Gunnison	
Leslie J. Savage Library	Western State College, Gunnison	
Marble St. Bank Building	105 W. Main, Marble	
Municipal Building	201 Virginia Avenue, Gunnison	
Murray House	211 S. Main, Gunnison	
Pitkin Schoolhouse	800 Main Street, Pitkin	
Pitkin Town Hall	400 4th Street, Pitkin	
Rimrock School	Co Road 24, Sapinero	
Spencer School	21 miles SW of Gunnison	Tourist site/no entry
Star Mine	Taylor Park	Tourist site/no entry
Tays House	Crystal	
Tenderfoot Archaelogical Site	Gunnison	
NATIONAL HISTORIC SITES		
Name	**Address**	**Current Use**
Alpine Tunnel Historic District	Pitkin	
Crystal Mill	Crystal	

Curecanti Archaeological District	West of Gunnison	
D&RG RR Depot	716 Elk Avenue, Crested Butte	
Edgerton House	514 Gunnison Avenue, Gunnison	
Fisher-Zugelder & Smith Cottage	601 N. Wisconsin, Gunnison	
Gunnison RR Bridges I	Highway 50 Frontage, Gunnison	
Gunnison RR Bridges II	Highway 50 Frontage, Gunnison	
Haxby House	101 W. Silver, Marble	
Historic District	Crested Butte	
Johnson Building Gallery	124 N. Main St. Gunnison	Art Gallery
Marble High School	412 Main, Marble	
Marble Mill Site / CO Yule Co.	Park & W. 3rd, Marble	
Marble St. Bank Building	105 W. Main, Marble	
Marble Town Hall	407 Main Street, Marble	
Rimrock School	Co Road 24, Sapinero	
St. Paul's Church	123 State Street, Marble	
Webster Building	229 N. Main, Gunnison	Interiors Furniture Store
Wm. D. Parry House	115 Main Street, Marble	

Source: Gunnison County Historic Preservation Commission https://www.gunnisoncounty.org/785/Historic-Sites

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.

Given the 50-year threshold for buildings to be eligible for consideration as a historic resource, many of the buildings in the County or response area are potentially eligible for consideration. Several of the buildings in the area were built several decades ago and serve as important cultural and historic resources for the community. In addition to preserving such resources, joining a historic register can also provide tax incentives and preservation assistance. A list of locally designated historic properties is displayed below in Table 4.29.

Table 4.29 Locally Designated Historic Properties and Districts

Property	Location	Date Listed
Ohio City Town Hall	8502 CR 76, Ohio City	6/18/1996
Aberdeen Quarry	14 miles SW of Gunnison	12/17/1996
Sewell's Gulch Gravesite	10 miles E. of Gunnison	1/21/1997
Spencer School	21 miles SW of Gunnison	1/21/1997
Great Wall	23 miles N. of Gunnison	1/6/1998
Rock Culverts & Railbed Trail	23 miles N. of Gunnison	12/8/1998
Fairview School House	4514 CR 730, Ohio Creek	9/2/1999
Bomber Crash Site	21 miles NE of Gunnison	5/2/2000
Narrow Gauge Railroad Exhibit	803 W. Tomichi	7/5/2000
Dorchester Guard Station	Taylor Park	9/18/2001
Bon Ton Hotel	329 Main St., Pitkin	7/5/2000
Smith Opera House	114 N. Blvd., Gunnison	10/5/2000
Chance Gulch Site	2.5 miles SE of Gunnison	9/19/2000
Mountaineer Site	Top of Tenderfoot Mountain	9/19/2000
Ohio City Jail	Miners Avenue, Ohio City	1/22/2001
Ohio City School	Miners Avenue, Ohio City	5/4/2004
Gothic Townsite Buildings	Gothic	unknown
Star Mine	Taylor Park	1/21/2003
Johnson Building Gallery	124 N. Main St. Gunnison	unknown
Water Tank at Gothic Mill	Gothic	unknown
8th Street School	101 N. 8th St., Gunnison	unknown
Fairview Peak Fire Lookout	Fairview Peak, Pitkin	unknown
Alpine Guard Station	7 miles from Lake Fork Highway Turnoff	unknown

Source: Gunnison County Historic Preservation Commission

Cultural Assets

Cultural assets in the County include the Tenderfoot archaeological site, a Native American site located on Tenderfoot Mountain. Western State Colorado University students and faculty have been studying the area since 1991, hoping to gain insight into the Archaic inhabitants' environment and way of life.

Economic Assets

Gunnison County's spectacular scenery and recreation opportunities are its primary economic assets. Much of Gunnison County's economy is tourism-based due to the County's location in Colorado's mountainous western slope. Tourists often flock to the County in the winter months during ski season, which coincides with avalanche and severe winter storm season. However, tourism is also common in the summer months when hikers, rafters, and fishermen come to the area. People are also at risk in the summer during flood and wildland fire season. Flooding could cause short and long term negative economic impact. A large wildland fire could impact the scenic viewshed and have longer term negative economic and environmental impacts.

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 2017 estimated population of Gunnison County was 16,871. This is an increase of 9% from the 2010 census population of 15,324. Table 4.30 shows the total population, number of housing units, and percent change for each by jurisdiction between 2010 and 2017.

Table 4.30 Maximum Population and Housing Unit Exposure by Jurisdiction

Jurisdiction	2018 Pop. Estimate	2010 Pop.	# Change	% Change	2010 Housing Units Estimate	2018 Housing Units	# Change	% Change
Crested Butte	1,681	1,485	196	13.19%	1,070	1,071	1	.09%
Gunnison	6,594	5,849	745	12.7%	2,648	2,641	-7	.26%
Marble	144	131	13	9.9%	105	82	-23	-21.9%
Mt. Crested Butte	852	799	53	6.6%	1,510	1,776	266	17.61%
Pitkin	72	66	6	9.09%	214	233	19	8.87%
Unincorporated County	7,903	6,982	921	13.19%	5,880	6,051	171	2.9%
Total County	**17,246**	**15,324**	**1,922**	**12.54%**	**11,427**	**11,854**	**427**	**3.7%**

Source: U.S. Census Bureau

As indicated above, Gunnison County's population has grown moderately in recent years. The County estimates that growth has been relatively slow from year to year with an average increase of 1% to 3%. The population of the County increased by 12.5% between 2010 and 2018. The number of housing units in the County has increased in the past several years. Growth is projected to continue through 2040 at an average rate of 1.2% over every five-year period. Table 4.31 shows

the population projections for the County as a whole through 2040. Table 4.30 and Table 4.31 may indicate that the total population of Gunnison County and the municipalities will increase relatively slowly in the future, but second or seasonal home ownership in the County could increase rapidly.

The issue of growth is recognized in the County's comprehensive plans. The steering committees and planning commissions for the comprehensive plans mapped future growth scenarios, assuming that current growth trends would remain consistent into the future. Results indicated that existing subdivisions and lots would be built out to accommodate growth. Future growth is expected to occur in the West Gunnison Neighborhood and Gunnison Rising in particular. Gunnison Rising is a 650-acre property located along Tomichi Creek that was annexed into the City of Gunnison in 2010. Development in the Gunnison Rising annexation is prohibited within the 1% annual chance floodplain. Vulnerability to wildland fires may increase within Gunnison Rising; fringe areas and designated open space of the Gunnison Rising annexation are upland sage and, in some areas, floodplain meadows with varying amounts of potential fuel.

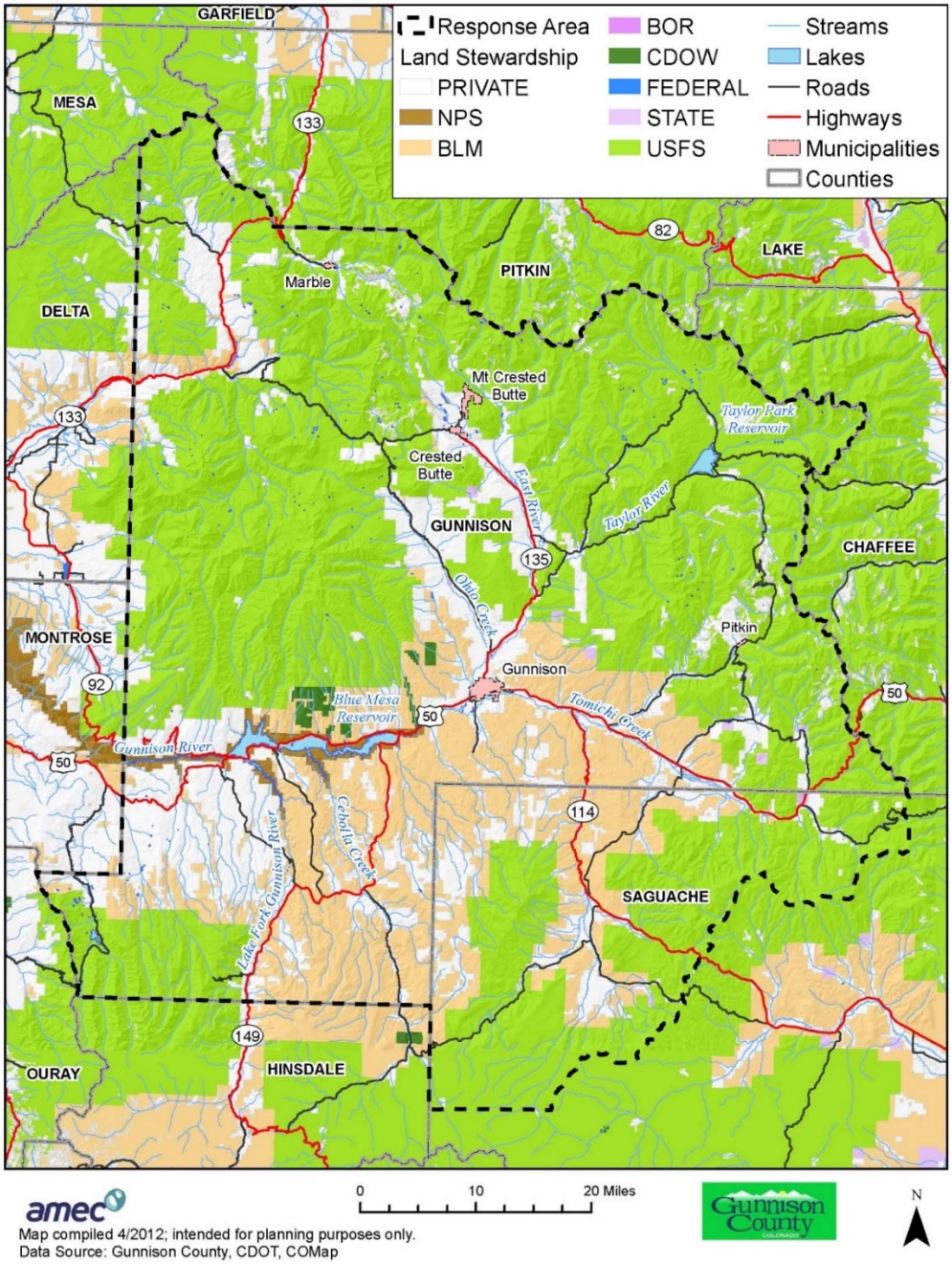
It is important to note that the steering committees and planning commissions for the comprehensive plans took natural hazards into consideration and controlled for areas impacted by slope failures, rockfall hazards, flooding, avalanches, etc. Growth is restricted in many areas due to the large amount of public land in the County. Roughly 25% of the County is privately owned, while the remaining 75% is held by federal and state governments. Land stewardship is depicted in Figure 4.46.

Table 4.31 Population Projections for Gunnison County, 2010-2040

	2010	2015	2020	2025	2030	2035	2040
Population	15,324	16,457	17,895	19,129	20,189	21,144	22,034
Percent Change (%)	-	1.5	1.7	1.3	1.1	0.9	0.8

Sources: Colorado Department of Local Affairs Demography Section

Figure 4.46. Gunnison County Response Area Land Stewardship



4.3.4 Vulnerability by Hazard

Avalanche

Overall, public safety is the primary concern in regards to avalanche hazards and vulnerability. Backcountry recreationalists, skiers, road crews, and motorists along steep mountain roads are the most at risk to avalanche dangers. Backcountry avalanche incidents involve search and rescue teams and resources, which can put these personnel in areas of risk.

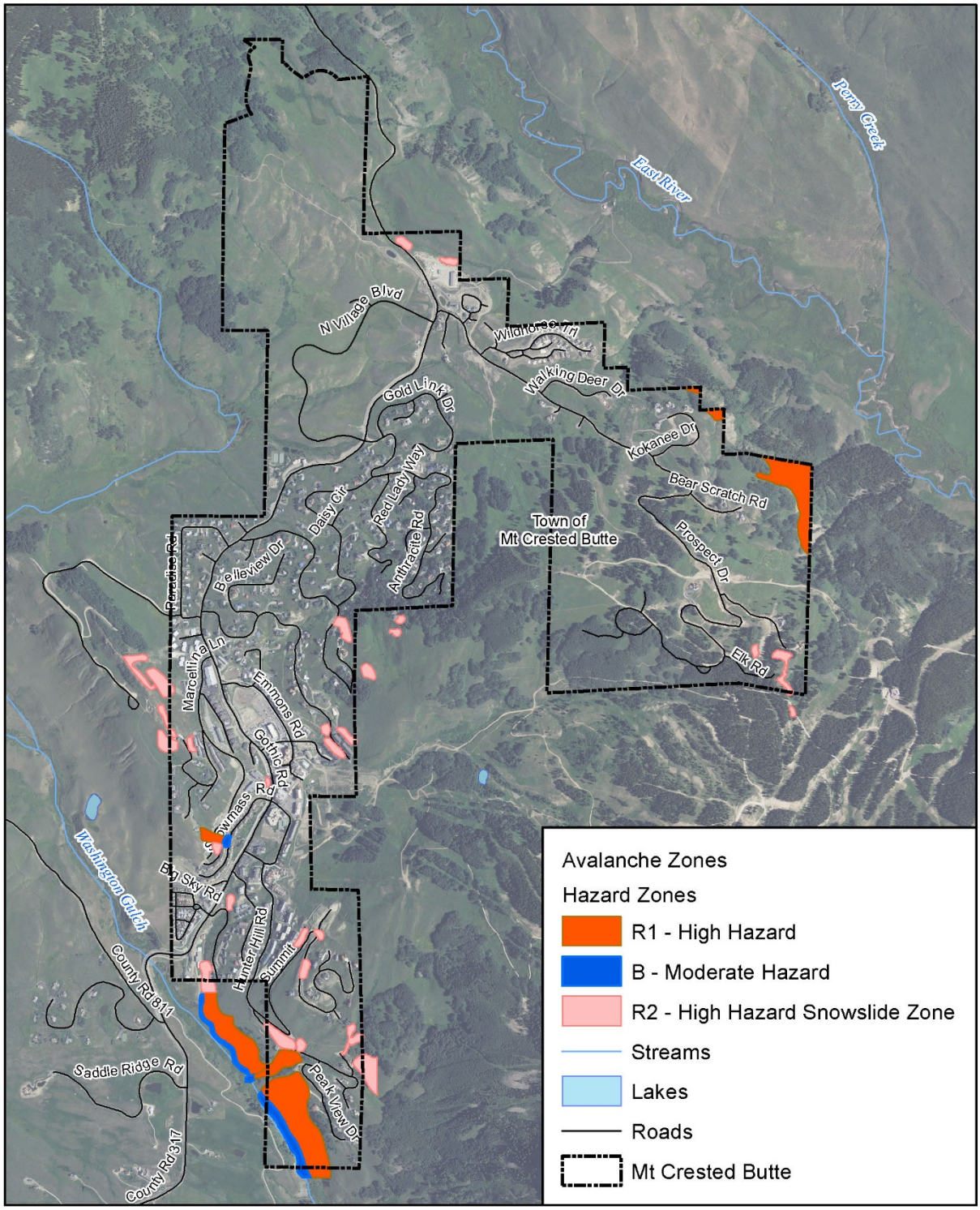
Gunnison County Public Works shop near the base of an avalanche runout zone near the Town of Crested Butte. Photo J. Brislawn 6/2012

Several avalanche hazard areas have been mapped in or near the Town of Mt. Crested Butte and have been used to guide planning and land use decisions. The potential for building impacts is possible, and have occurred in the past. The presence of the R2 Zone (or Pink Zones) means there is the potential to bury and injure or kill persons caught in small avalanches or "snowslides" within the Town limits. The avalanche hazard areas near Mt. Crested Butte are depicted in Figure 4.47. Table 4.32 summarizes the avalanche hazard analysis prepared with GIS data provided by Mt. Crested Butte. The analysis indicates that some residential properties are exposed to R2 and R1 zones. A Gunnison County Public Works shop is located near the base of an avalanche runout zone just south of the Town of Crested Butte. Mitigation measures are in place to protect the structure, but potential risk exists for staff or property at or adjacent to the shop. A road closed due to avalanche activity can also result in transportation disruptions, but is also an aspect of avalanche hazard mitigation. A report by CDOT rates the avalanche hazard on Monarch Pass along Highway 50 as low to very low, which is based on the hazard to moving or waiting traffic (CDOT-DTD-R-95-17 Avalanche Hazard Index for Colorado Highways 1995). Typical mitigation includes regular observation, closures, and explosive control (when advised by trained observers).

Table 4.32 Mt. Crested Butte Avalanche Hazard Analysis

Avalanche Zone	Property Type	Building Count	Improved Value	Content Value	Total Value
R1 – Orange Zones	Residential	3	$4,381,371	$2,190,686	$6,572,057
R2 – Pink Zones	Residential	35	$9,955,955	$4,977,977	$14,933,932
B- Blue Zones	-	-	-	-	-
Total		**38**	**$14,337,326**	**$7,168,663**	**$21,505,989**

Figure 4.47. Mt. Crested Butte Avalanche Hazard Areas



Map compiled 8/2012; intended for planning purposes only.
Data Source: Gunnison County, Mt Crested Butte, CDOT,
NAIP Imagery 2011, Colorado Avalanche Information Center

Dam Failure

Specific details regarding the population, property, critical infrastructure or community resources affected by potential dam failures will not be discussed in this plan due to homeland security reasons. In general, public safety is the primary concern. Several high and significant hazard dams are located in the response area. Failure of Taylor Park Dam would likely cause the most serious impacts in the response area, affecting people, animals, property, and structures from Almont to Gunnison. Additionally, roads closed due to dam failure floods could result in serious transportation disruptions due to the limited number of roads in the County. A road closure could seriously impede response and recovery operations and hinder people from evacuating the affected area. The vulnerability to dam failure could increase if development occurs in inundation areas.

Drought

Based on Gunnison County's past multi-year droughts and Colorado's drought history, it is evident that all of the Gunnison County response area is vulnerable to drought. However, the impacts of future droughts will vary by region. The 2010 Colorado Drought Plan identifies Gunnison County as having high vulnerability to drought in the state-operated recreational activity sector. This is likely due to the presence of the state-operated Roaring Judy and Pitkin fish hatcheries. The County also had a higher than average energy sector vulnerability due to the presence of coal mines in the northwest County, and water-dependent hydropower resources. Counties that are vulnerable in this drought sector are also typically in areas of moderate to high wildland fire risk. Saguache County was ranked as having high vulnerability in the socioeconomic sector, meaning that there is little economic diversity; Gunnison County's score was moderate.

The County's economy is largely dependent on tourism, recreation and, to a lesser extent, agriculture. The tourist industries in the Gunnison County response area are highly vulnerable to drought. A lack of precipitation can impact skiing, white water rafting, fishing and more. Drought can also exacerbate the potential occurrence and intensity of wildland fires. The wildland areas of the County will see an increase in dry fuels, beetle kill, and associated wildland fires and some loss of tourism revenue during the ski season. The agricultural areas of the County will experience hardships, including agricultural losses, associated with a reduction in water supply. Water supply issues for domestic needs will be a concern for the entire County during droughts, though the concern is offset somewhat by the abundance of water resources and large reservoirs in the County.

The decline in tourism and agricultural revenues could also impact the rest of the County's economy. According to the 2018 State of Colorado Drought Mitigation and Response Plan, "the multiplier effect of decreased business revenue can impact the entire economy. When an individual loses or decreases their income all of the goods and service providers they usually support will also be impacted" (Annex B, 367).

While widespread, the losses associated with drought are often the most difficult to track or quantify. FEMA requires the potential losses to structures to be analyzed, and drought does not normally have a structural impact. The most significant impacts are to water intensive activities

such as agriculture, wildland fire protection, municipal usage, commerce, tourism, and wildlife preservation.

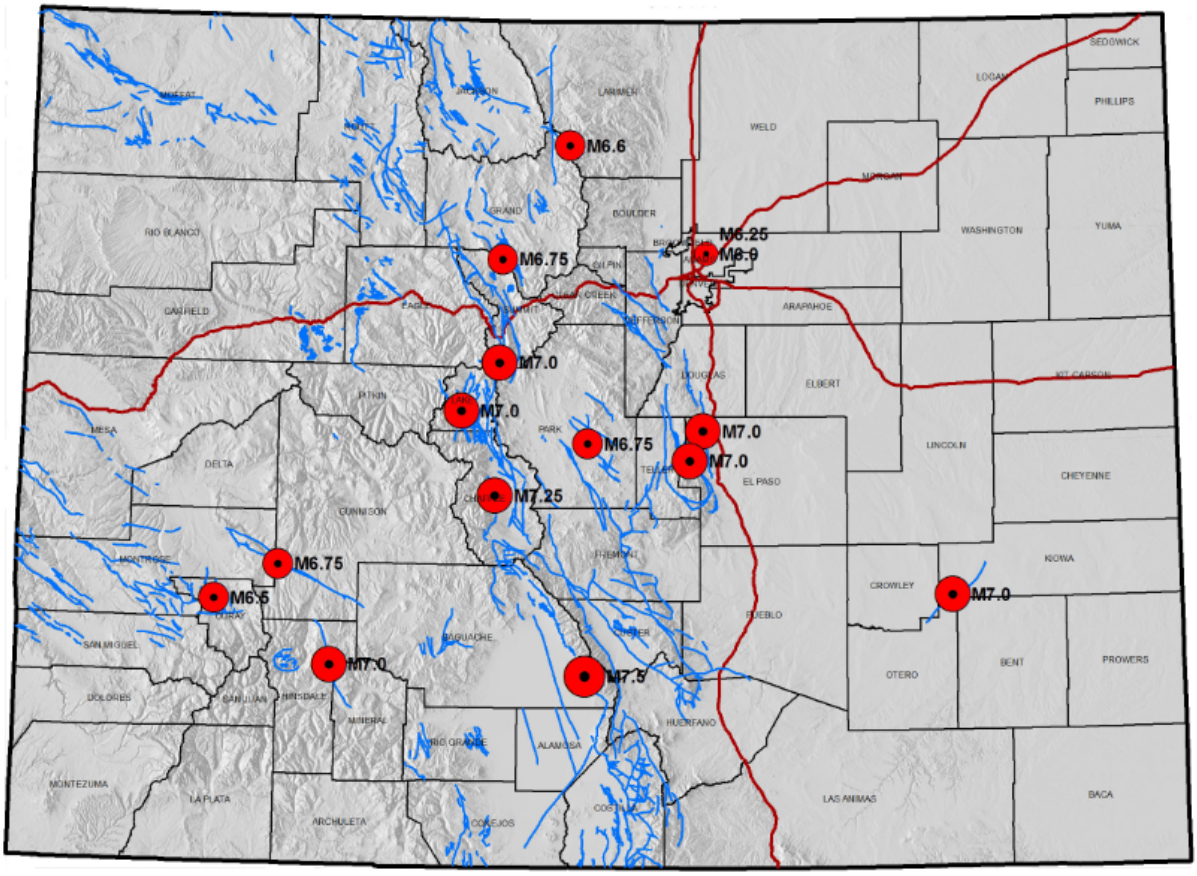
Earthquake

Earthquakes represent a low probability, but potentially high consequence hazard for Gunnison 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 Gunnison 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 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 Town of Crested Butte, 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). Falling items within buildings will likely pose the greatest risk to public safety. Also, earthquakes could affect the road infrastructure in the southwestern County.

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 USGS. The faults analyzed for Gunnison County were Busted Boiler, Cannibal, Cimarron, Roubideau Creek, N Sangre de Cristo, S Sawatch, and N Sawatch (Figure 4.48). Table 4.33 summarizes the results for Gunnison County. The analyses indicate how losses to Gunnison County will vary based on the fault, and magnitude associated with the event. According to this analysis the most damaging event would be a M 7.25 on the South Sawatch Fault, followed by a M 6.75 event on the Cimmaron Fault. None of the scenarios indicate fatalities.

Figure 4.48. Faults Analyzed for Potential Losses, Statewide



Source: Earthquake Evaluation Report, http://coloradogeologicalsurvey.org/geologic-hazards/earthquakes/risks-hazards-loss/potential-losses-hazus/

Table 4.33 Potential Earthquake Losses in Gunnison County by Fault

Fault/Magnitude	Fatalities	Total Economic Loss ($)*	Loss Ratio (%)**
Busted Boiler Fault			
M6.5	0	1.3 million	0.05
Cannibal Fault			
M7.0	0	12.2 million	0.44
Cimarron Fault			
M6.75	0	13.5 million	0.5
M6.5	0	8.5 million	0.3
M6.0	0	2.5 million	0.08
M 5.5	0	0.6 million	0.01
Roubideau Creek Fault			
M5.5 Normal	0	0.01 million	0.01

Fault/Magnitude	Fatalities	Total Economic Loss ($)*	Loss Ratio (%)**
M5.5 Reverse	0	0.02 million	0.01
N Sangre			
M 7.5	0	$3.95 million	0.14
N Sawatch			
M 7.0	0	$9.3 million	0.3
M 6.0	0	$1.1 million	0.03
S Sawatch			
M 7.25	0	17.9 million	0.6
M 6.75	0	6.75 million	0.2
M 6.0	0	1.0 million	0.03

Source: Earthquake Evaluation Report, 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% or greater are considered by FEMA to be critical)
Note: County HAZUS-MH Inventory (HAZUS-MH 2000): $2.78 Billion

Specific details about the earthquake potential in Gunnison County and Colorado in general remain largely unknown. A 2,500 year probabilistic earthquake scenario was performed as part of this mitigation plan development and the results can be referenced below in Table 4.34. 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 19% of the total number of buildings in the County to be affected. Overall, earthquake impacts in Gunnison County could be critical, with more than 25% of the response area affected. Due to the low probability of a damaging earthquake occurring, as discussed below, the planning significance of earthquakes is considered low by the HMPC.

Table 4.34 HAZUS-MH Earthquake Loss Estimation 2,500-Year Scenario Results

Type of Impact	Impacts to County
Total Buildings Damaged	Slight: 2,582 Moderate: 1,656 Extensive: 470 Complete: 46
Building and Income Related Losses	$102.70 million 59% of damage related to residential structures 28% of loss due to business interruption
Total Economic Losses (includes building, income and lifeline losses)	$105.75 million
Casualties (based on 2 a.m. time of occurrence)	Without requiring hospitalization: 17 Requiring hospitalization: 3 Life threatening: 0 Fatalities: 0
Casualties (based on 2 p.m. time of occurrence)	Without requiring hospitalization: 34 Requiring hospitalization: 6 Life threatening: 1

Type of Impact	Impacts to County
	Fatalities: 2
Casualties (based on 5 p.m. time of occurrence)	Without requiring hospitalization: 25 Requiring hospitalization: 5 Life threatening: 1 Fatalities: 1
Damage to Transportation and Utility Systems and Essential Facilities	No expected damage to utility pipeline systems Some damage to transportation systems for highway, bus and airport Airport: $2.10 million No expected damage shown to essential facilities, but could have impact on available hospital beds
Displaced Households	72
Shelter Requirements	47

Source: HAZUS-MH: Earthquake Event Report

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 Gunnison County are on the order of $3.20 million in total economic losses, with $0.15 million in building related losses. Transportation inventory damage is estimated at $3.10 million; Utility lifeline damage is estimated at $0.0 million.

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.

Extreme Cold

The impacts of extreme cold can be widespread, affecting population, property, and critical facilities and functions. While everyone is vulnerable to extreme cold/wind chill events, some populations are more vulnerable than others. Extreme cold/wind chill pose the greatest danger to outdoor laborers, such as highway crews, police and fire personnel, and construction. The elderly, children, people in poor physical health, and the homeless are also vulnerable to exposure. Lower-income populations can also face increased risk from extreme cold if they do not have access to adequate heating. Overall, the population has a significant exposure to severe cold.

Extreme cold/wind chill presents a minimal risk to the structures of the Gunnison County response area. Property damage occurs occasionally when water pipes freeze and break. Homes without adequate insulation or heating may put owners at a higher risk for damages or cold-related injury. In cases of periods of prolonged cold, water pipes may freeze and burst in poorly insulated or unheated buildings. Vehicles may not start or stall once started due to the cold temperatures and the risks of carbon monoxide poisoning or structure fires increases as individuals attempt to warm cars in garages and use space heaters. Stalled vehicles, or those that fail to start, may result in minor economic loss if individuals are unable to commute between work, school, and home. Driving conditions may deteriorate if extreme cold/wind chill prolongs icy road conditions, which will impact commutes and emergency response times as well. Landscaping and agricultural products may be damaged or destroyed by unseasonable occurrences of extreme cold/wind chill, causing plants to freeze and die. This may increase the indirect vulnerabilities to severe cold by causing greater economic costs and losses for the year. The overall vulnerability of general property is low.

In order to assist in assessing the potential financial impact of the hazard on the response area, information from the event of record is used. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it is a reflection of common occurrence. Based on SHELDUS records, the event of record for extreme cold in Gunnison County occurred on April 29, 1996. This event resulted in $2,266,667 in crop damages (in 1996 dollars).

Calculating the average annual damage from extreme cold is another method used in assessing potential magnitude. This is done by dividing the total damages by the number of years in the period of record. The period of record varies from hazard to hazard. Most NCDC or SHELDUS hazard records begin in the 1950s, 1960, or in 1993. According to SHELDUS, seventeen extreme cold events caused a total of $3,945,872 in damages over a 50 year span between 1960 and 2010. This averages out to $78,917 in damages per year. Therefore, Gunnison County could expect to sustain approximately $79,000 in damages from extreme cold in any given year. The majority of the impacts are to agriculture.

Overall, extreme temperature impacts would likely be **negligible** in Gunnison County, with less than 10% of the response area affected and minimal impact to quality of life and critical facilities or services. Extreme cold can occasionally cause problems with communications facilities and water lines. Extreme cold can also impact livestock and even crops if the event occurs during certain times of the year.

Flooding and Ice Jams

Potential losses to Gunnison County from flooding was analyzed by using a preliminary DFIRM with parcel data and building address point data provided by the Gunnison County Assessor's Office. Below is a discussion of the methodology, including limitations, assumptions, and observed trends of the methodology's results. Although Figures 4.49 – 4.56 were completed in

2012, a 2018 review of the 1% and 0.2% flood zones revealed no new structures were built there. These figures are still valid for planning purposes.

A flood vulnerability assessment was performed for Gunnison County using GIS. The county's parcel layer and associated assessor's building improvement valuation data were provided by the county and were used as the basis for the inventory. Gunnison County's preliminary DFIRM was used as the hazard layer. DFIRM is FEMA's flood risk data that depicts 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" represents the 0.2% annual chance hazard zone on the DFIRM. Gunnison County's preliminary DFIRM, dated November 2010, was determined to be the best available floodplain data.

GIS was used to create a centroid, or point, representing the center of each parcel polygon. Only parcels with improvement values greater than zero were used in the analysis, which assumes that improved parcels have a structure of some type. The DFIRM flood zones were overlaid in GIS on the parcel centroid data to identify structures that would likely be inundated during a 1% annual chance and 0.2% annual chance flood 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 Gunnison and the Town of Crested Butte. Results of the overlay analysis area shown in Table 4.35 and Table 4.36, and are sorted by flood zone, the parcel's occupancy type, and jurisdiction. Occupancy type refers to the land use of the parcel and includes residential, commercial, agricultural, industrial, 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, 150% for industrial structures, and 0% for vacant land use classifications. Building and contents values were totaled, and a 20% loss factor was applied to the totals, also based on FEMA depth damage functions, assuming a 2 foot deep flood.

There are 591 buildings in the 1% annual chance flood zone. The total improved market building value in that flood zone is $147 million; the sum of building and contents value in that flood zone is estimated to be $242 million. Assuming a 2 foot deep flood, losses could be on the order of $48 million from the 1% annual chance flood event in Gunnison County. The countywide loss ratio (the ratio of the building value at risk divided by the overall county building value) is 4.7%.

There are 54 additional buildings in the 0.2% annual chance flood zone with a total building value of $17.8 million. Table 4.36 shows the combined loss estimate from the 1% annual chance and the 0.2% annual chance flood events. The total building value in those 2 flood zones is $165 million; the sum of building and contents value in the flood zones is $286 million. Assuming a 2 foot flood depth, there could be an estimated $46 million in losses from the 0.2% annual chance flood event. The countywide loss ratio for this flood event is 5.3%.

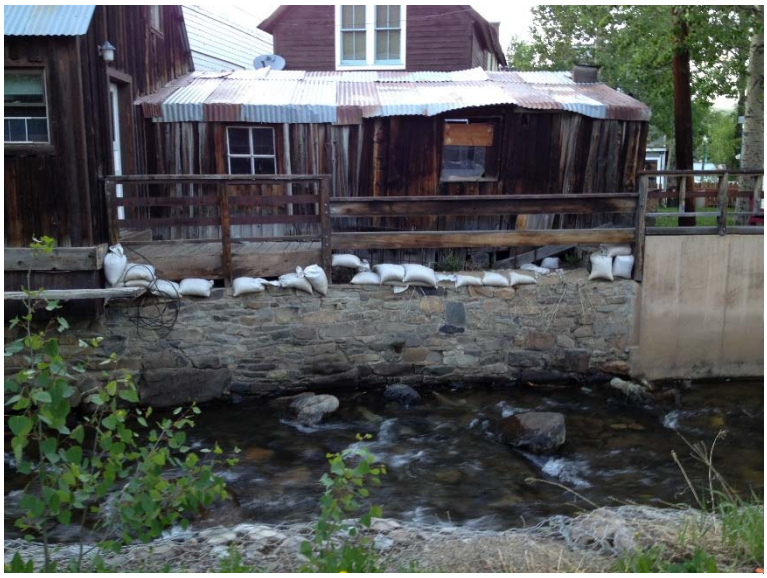
Note that the 0.2% annual chance flood zone within the County has not been comprehensively mapped and is primarily represented in the vicinity of The City of Gunnison and the Town of Crested Butte, and on the Gunnison River, Tomichi Creek, and sections of the East River, Slate River, and Coal Creek. Figure 4.49 through Figure 4.53 show the location of properties lying within the 1% and 0.2% annual chance flood zones in Unincorporated Gunnison County, City of Gunnison, and the Town of Crested Butte.

A flood wall along Coal Creek mitigates flooding in Crested Butte. Photo J. Brislawn 6/2012

The majority of estimated damage resulting from a 1% annual chance and a 0.2% annual chance flood event, both in terms building exposure and potential dollar losses, would occur in Unincorporated Gunnison County. The City of Gunnison has the second most exposure, in terms of the number of buildings and dollar loss, potentially at risk (see Table 4.36). There are 201 structures at risk within the City boundaries, representing 31% of the total estimated buildings at risk to flooding (inclusive of the 1% and 0.2% annual chance events) within Gunnison County. The analysis showed relatively low risk to the Town of Marble since there is no development in the FEMA mapped floodplain along the Crystal River; however, there is known debris flood risk not represented in the flood maps along Carbonate Creek. The Town of Pitkin has 2 structures within the FEMA 1% annual chance floodplain, but some structures located near Quartz Creek could be vulnerable if a larger flood occurred. The Town of Crested Butte has 14 structures potentially at risk to 1% annual chance flooding of Coal Creek. There is no risk to mapped flood hazards in the town of Mount Crested Butte along Washington Gulch.

Approximately 20% of the County's total dollar damage estimate for those flood events reflects a loss to structures in the City of Gunnison; this damage would result from flooding of the Gunnison River and Tomichi Creek. The City of Gunnison has 200 structures within the Gunnison River 1% and 0.2% annual chance floodplain and 1 structure in the Tomichi Creek 1% annual chance floodplain, illustrated in Figure 4.49, Figure 4.50, and Figure 4.52. Unincorporated Gunnison

County represents 75.8% of the County's total dollar damage loss estimate for structures located in the 1% and 0.2% annual chance floodplain. Within the 1% and 0.2% annual chance floodplains, a total of 645 structures are at risk. The Gunnison River accounts for 352 structures, 49 in Tomichi Creek, 43 structures in Ohio Creek, 36 in Willow Creek and 33 structures in the East River. Also, there are 20 structures located in unnamed waterways and 112 structures are dispersed among known rivers and creeks. Flood hazards and structures potentially at risk in the vicinity of the participating special districts (Mt Crested Butte Water and Sanitation District, Crested Butte South Metro, Crested Butte FPD and Arrowhead FPD) are shown in Figure 4.54 through Figure 4.56. As shown on these maps, the majority of the existing risk to the districts is minor with floodplain management administered by the County.



A Crested Butte resident uses sandbags to protect their home from flooding along coal Creek. Photo J. Brislawn 6/2012

In the Unincorporated County, 64% of its estimated building damage is to residential structures and 29% is to structures on agricultural land. The remaining damage in the Unincorporated County is dispersed among commercial, industrial, vacant and exempt land. In the City of Gunnison, 90% of its estimated building damage is to residential structures. Some of these structures represent manufactured housing and include the Wildwood Mobile Home and Twin Pines Mobile Home Park. These parks are represented as one address point, respectively, so the actual residential structure count is underestimated where manufactured homes are concerned. Based on air-photo interpretation one of these parks has approximately 40 homes, and the other has approximately 75. Remaining at-risk structures include commercial and exempt structures in the City.

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. The number of flood insurance policies held in areas outside of the A zones is an indication of this. See the discussion on the flood insurance policies later in this section. The Town of Crested Butte is built

on a debris fan. Other areas of the Town could be at risk to flood and debris should a flood leave the Coal Creek channel due 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 2.22 persons) to the number of residential structures identified in the flood hazard areas. Based on this estimate, a 1% annual chance flood would displace 1,052 (375 in the City of Gunnison and 18 in the Town of Crested Butte) people and a 0.2% flood would displace an additional 115 people. Of concern is the Gunnison Nursing Home population that could require evacuation assistance. The Home itself is not in the Zone A floodplain, but is surrounded by Zone A.

Table 4.35 100-Year Flood Loss Estimation

Jurisdiction	Occupancy Type	Building Count	Building Improved Market Value	Contents Value	Total Value	Loss Estimate
City of Gunnison	Commercial	5	$995,305	$995,305	$1,990,610	$398,122
	Exempt	1	$1,646,792	$1,646,792	$3,293,584	$658,717
	Residential	169	$23,998,444	$11,999,222	$35,997,666	$7,199,533
	Total	**175**	**$26,640,541**	**$14,641,319**	**$41,281,860**	**$8,256,372**
Crested Butte	Commercial	6	$2,884,399	$2,884,399	$5,768,798	$1,153,760
	Residential	8	$3,705,931	$1,852,966	$5,558,897	$1,111,779
	Total	**14**	**$6,590,330**	**$4,737,365**	**$11,327,695**	**$2,265,539**
Unincorporated Areas	Agricultural	77	$28,172,308	$28,172,308	$56,344,615	$11,268,923
	Commercial	20	$5,289,789	$5,289,789	$10,579,578	$2,115,916
	Exempt	2	$1,057,308	$1,057,308	$2,114,615	$422,923
	Industrial	3	$1,223,267	$1,834,900	$3,058,166	$611,633
	Residential	297	$78,321,623	$39,160,812	$117,482,435	$23,496,487
	Vacant	3	$114,296	$0	$114,296	$22,859
	Total	**402**	**$114,178,591**	**$75,515,116**	**$189,693,706**	**$37,938,741**
Total County		**591**	**$147,409,462**	**$94,893,800**	**$242,303,262**	**$48,460,652**

Table 4.36 Combined 100-Year and 500-Year Flood Loss Estimation

Jurisdiction	Occupancy Type	Building Count	Building Improved Market Value	Contents Value	Total Value	Loss Estimate
	Agricultural	1	$140,794	$140,794	$281,587	$56,317

Jurisdiction	Occupancy Type	Building Count	Building Improved Market Value	Contents Value	Total Value	Loss Estimate
City of Gunnison	Commercial	5	$995,305	$995,305	$1,990,610	$398,122
	Exempt	1	$1,646,792	$1,646,792	$3,293,584	$658,717
	Residential	194	$32,297,658	$16,148,829	$48,446,487	$9,689,297
	Total	**201**	**$35,080,549**	**$18,931,720**	**$54,012,268**	**$10,802,454**
Crested Butte	Commercial	6	$2,884,399	$2,884,399	$5,768,798	$1,153,760
	Residential	8	$3,705,931	$1,852,966	$5,558,897	$1,111,779
	Total	**14**	**$6,590,330**	**$4,737,365**	**$11,327,695**	**$2,265,539**
Unincorporated Areas	Agricultural	78	$29,081,757	$29,081,757	$58,163,514	$11,632,703
	Commercial	20	$5,289,789	$5,289,789	$10,579,578	$2,115,916
	Exempt	2	$1,057,308	$1,057,308	$2,114,615	$422,923
	Industrial	3	$1,223,267	$1,834,900	$3,058,166	$611,633
	Residential	324	$86,810,839	$43,405,420	$130,216,259	$26,043,252
	Vacant Land	3	$114,296	$0	$114,296	$22,859
	Total	**430**	**$123,577,256**	**$80,669,173**	**$204,246,429**	**$40,849,286**
Total County		**645**	**$165,248,135**	**$104,338,258**	**$269,586,392**	**$53,917,278**

Figure 4.49. Properties in 1% and 0.2% Annual Chance Flood Zones in Gunnison County

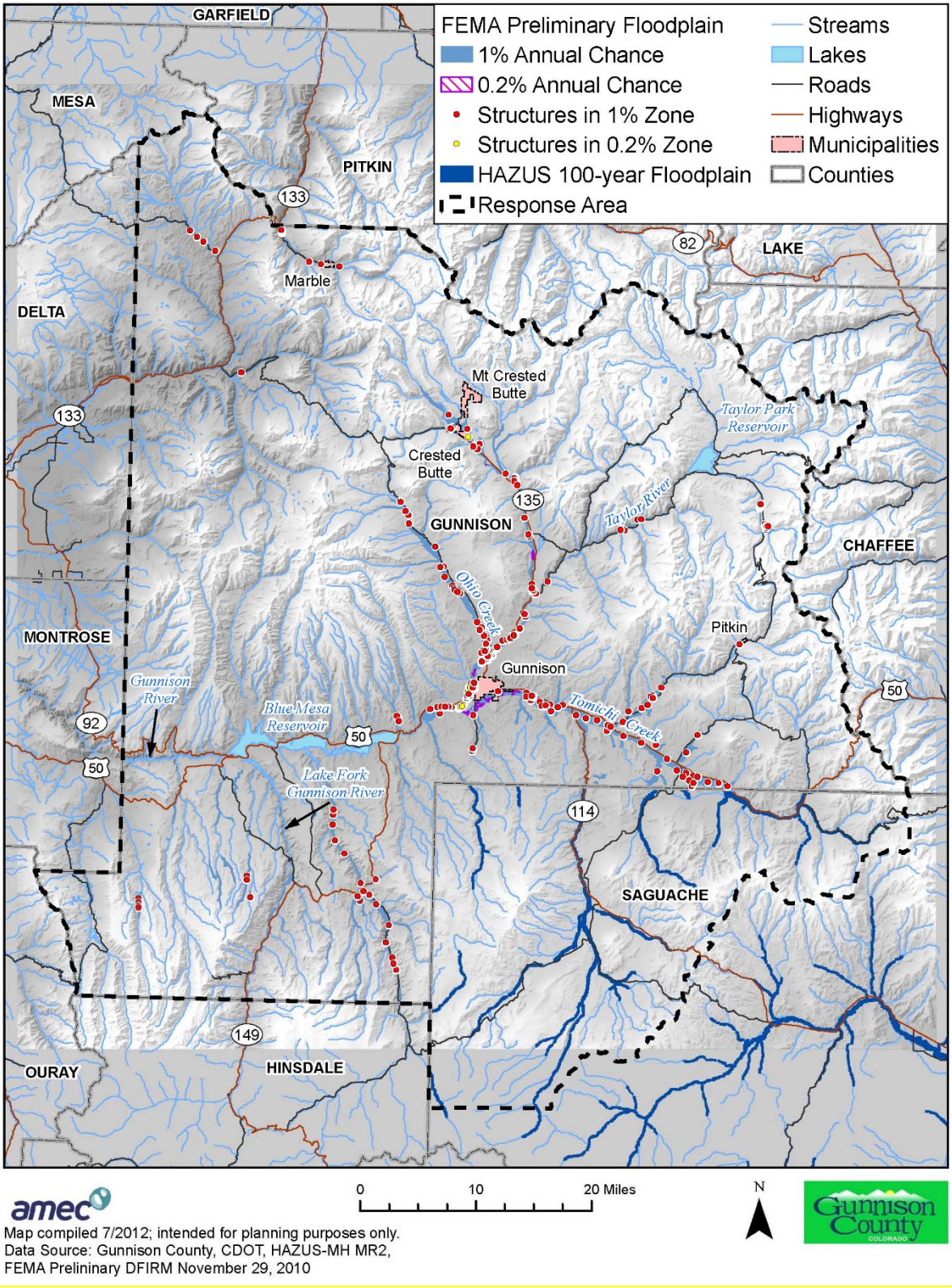


Figure 4.50. Properties in 1% and 0.2% Annual Chance Flood Zones in Central Gunnison County

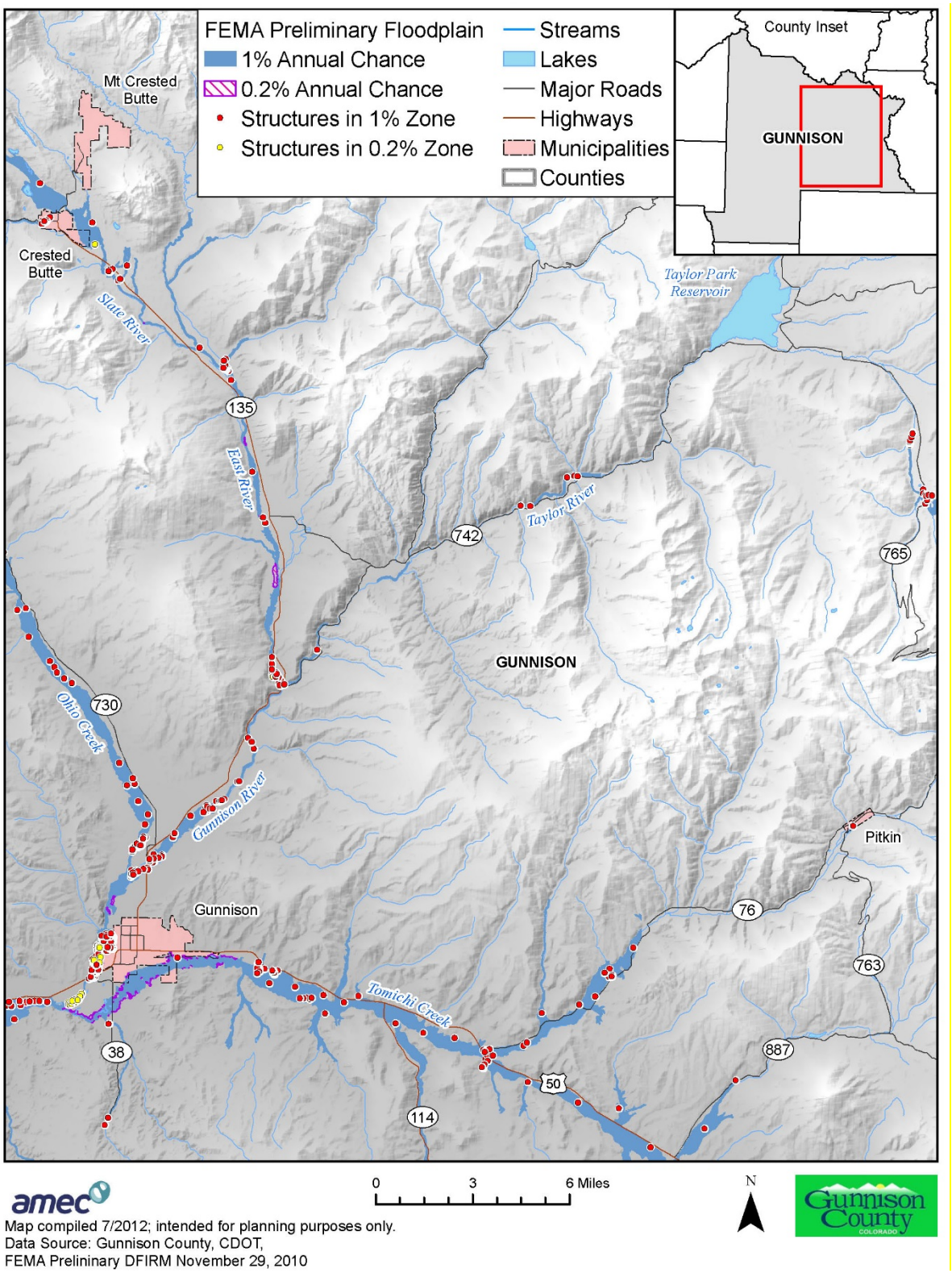
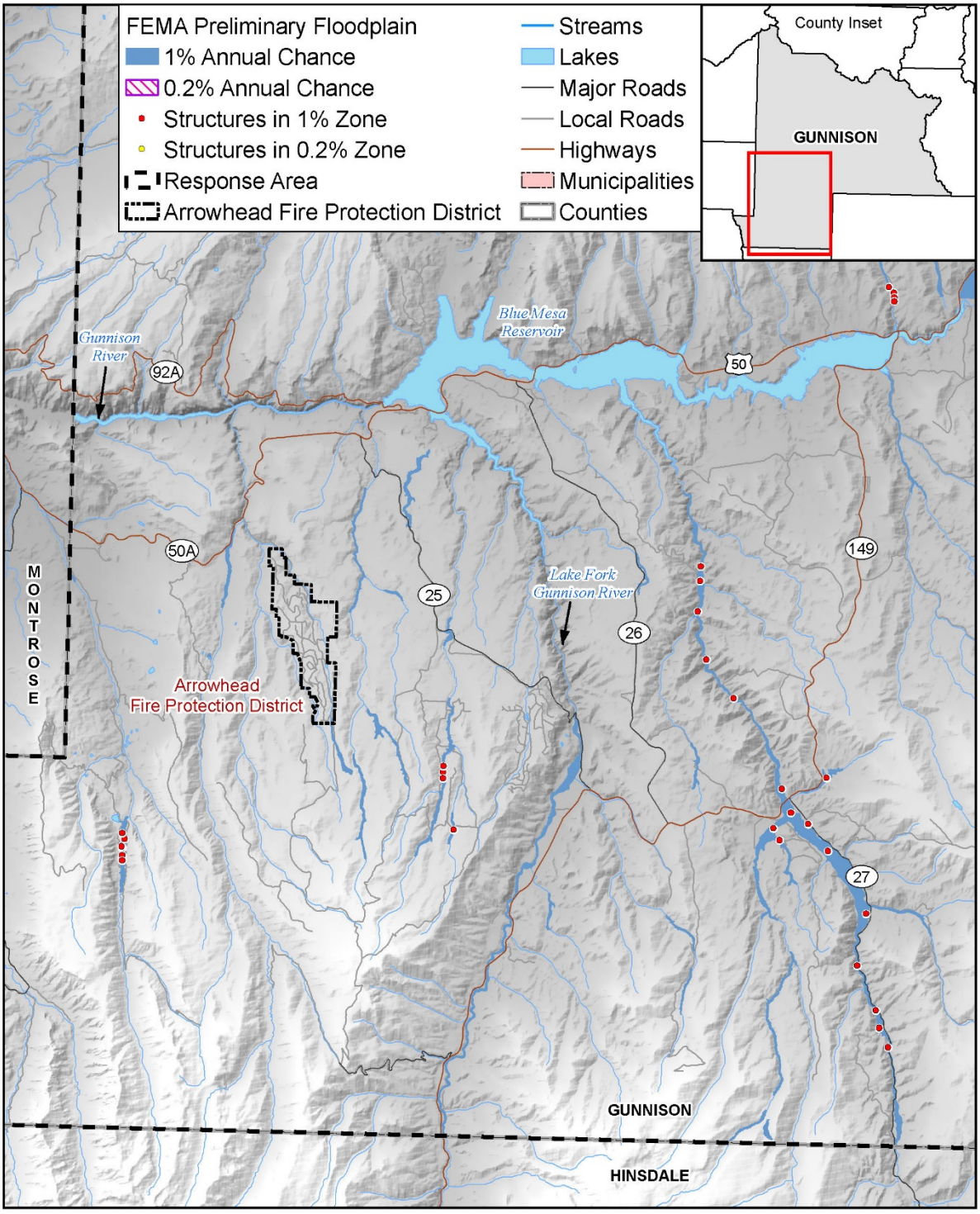
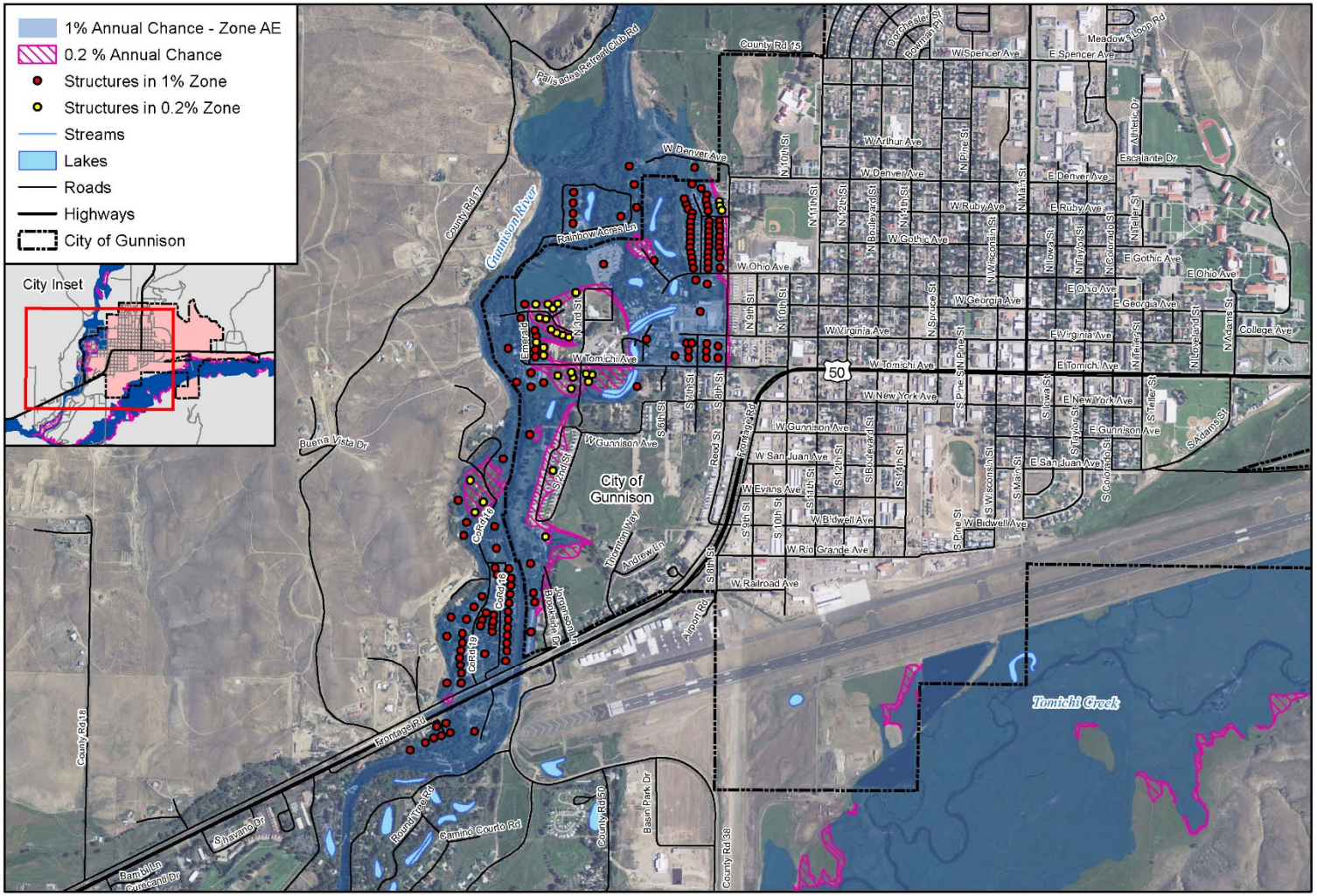


Figure 4.51. Properties in 1% and 0.2% Annual Chance Flood Zones in Southwest Gunnison County



Map compiled 10/2012; intended for planning purposes only.
Data Source: Gunnison County, CDOT,
FEMA Prelininary DFIRM November 29, 2010

Figure 4.52. Properties in 1% and 0.2% Annual Chance Flood Zones in the City of Gunnison



Map compiled 7/2012; intended for planning purposes only.
Data Source: Gunnison County, CDOT, NAIP Imagery 2011,
FEMA Preliminary DFIRM - November 29, 2010

Figure 4.53. Properties in 1% Annual Chance Flood Zones in the Town of Crested Butte

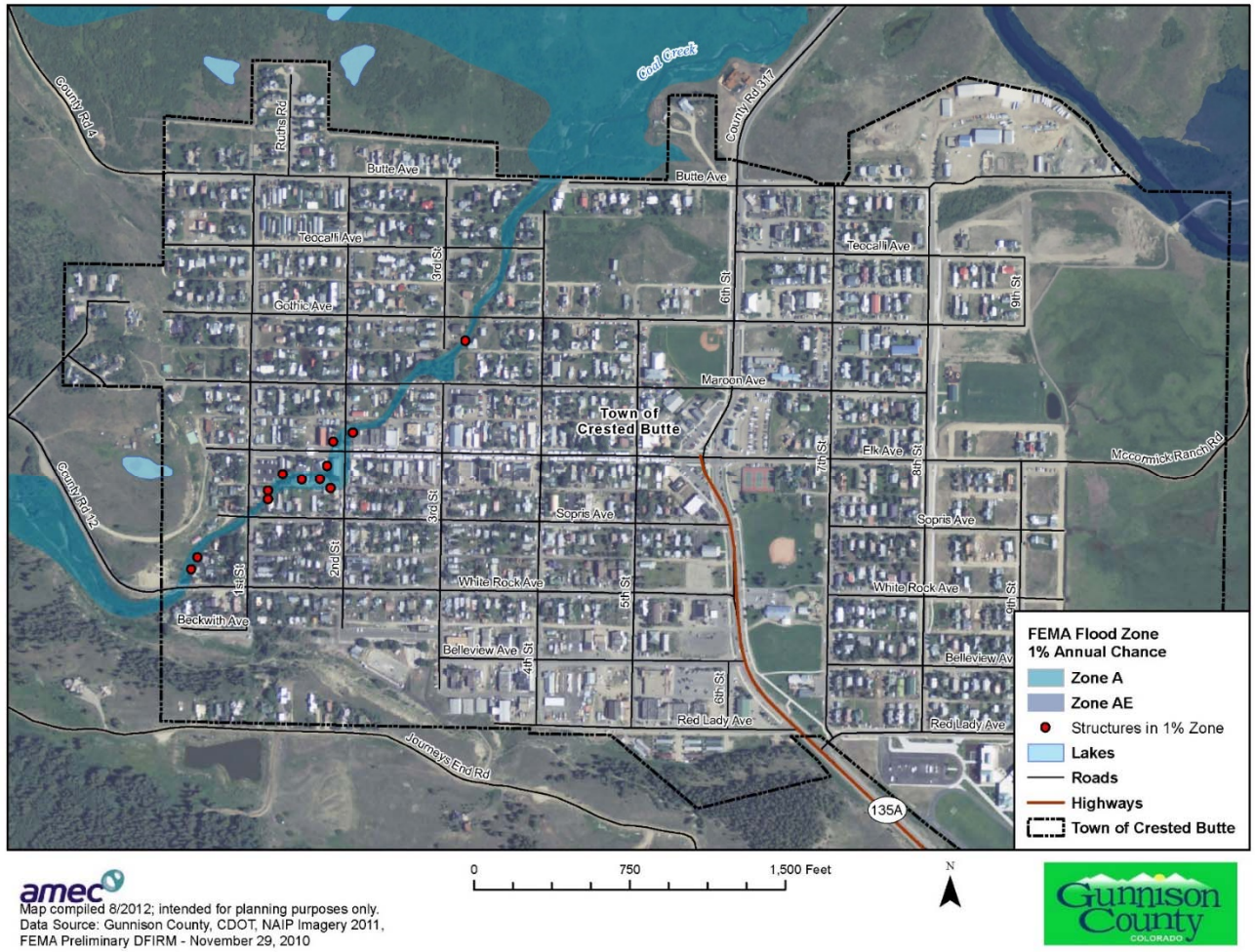
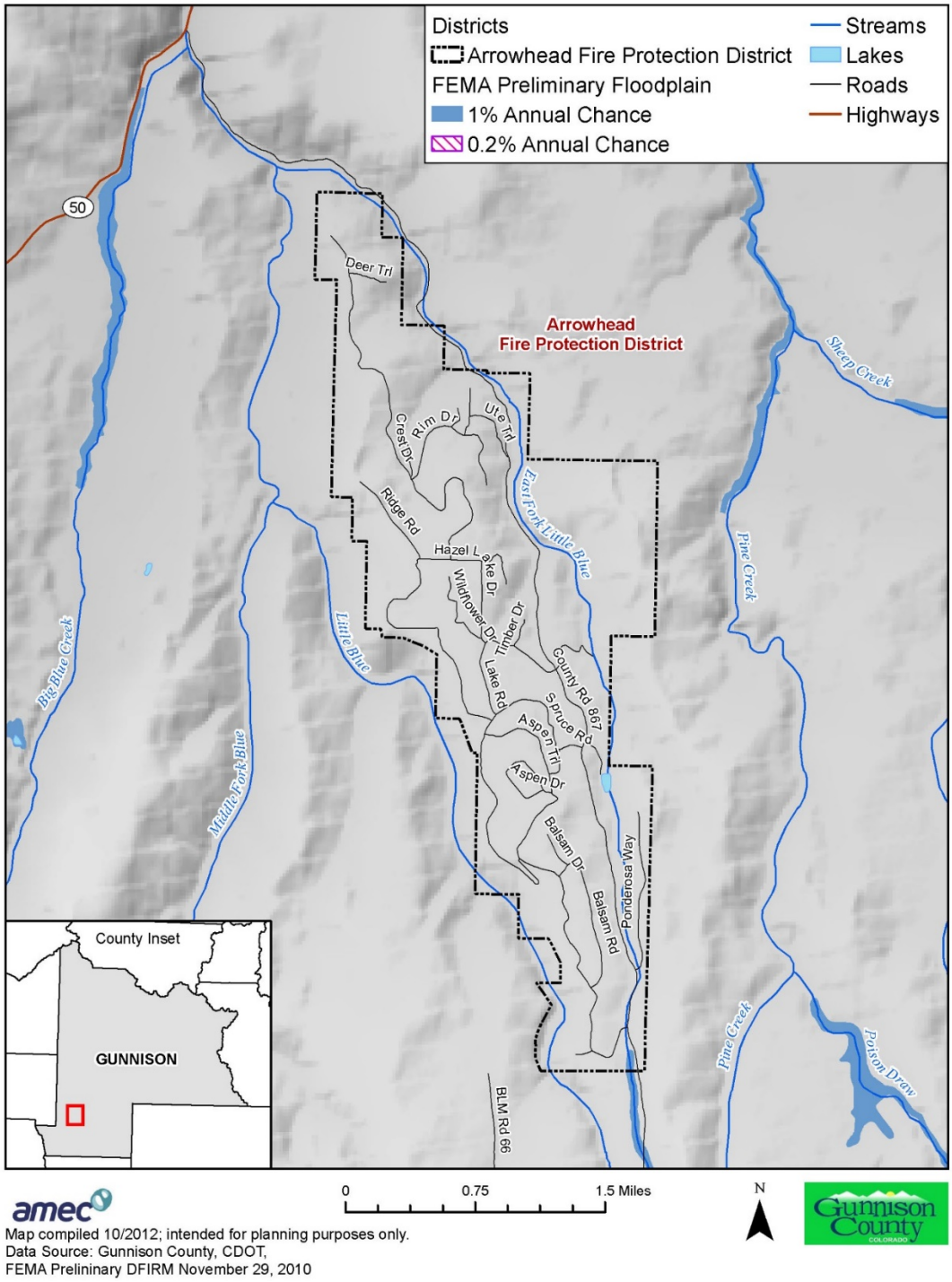


Figure 4.54. Arrowhead FPD 1% and 0.2% Annual Chance Flood Hazards



Map compiled 10/2012; intended for planning purposes only.
Data Source: Gunnison County, CDOT,
FEMA Prelininary DFIRM November 29, 2010

4.153

Figure 4.55. Gunnison County Special Districts 1% and 0.2% Annual Chance Flood Hazards and At-Risk Properties

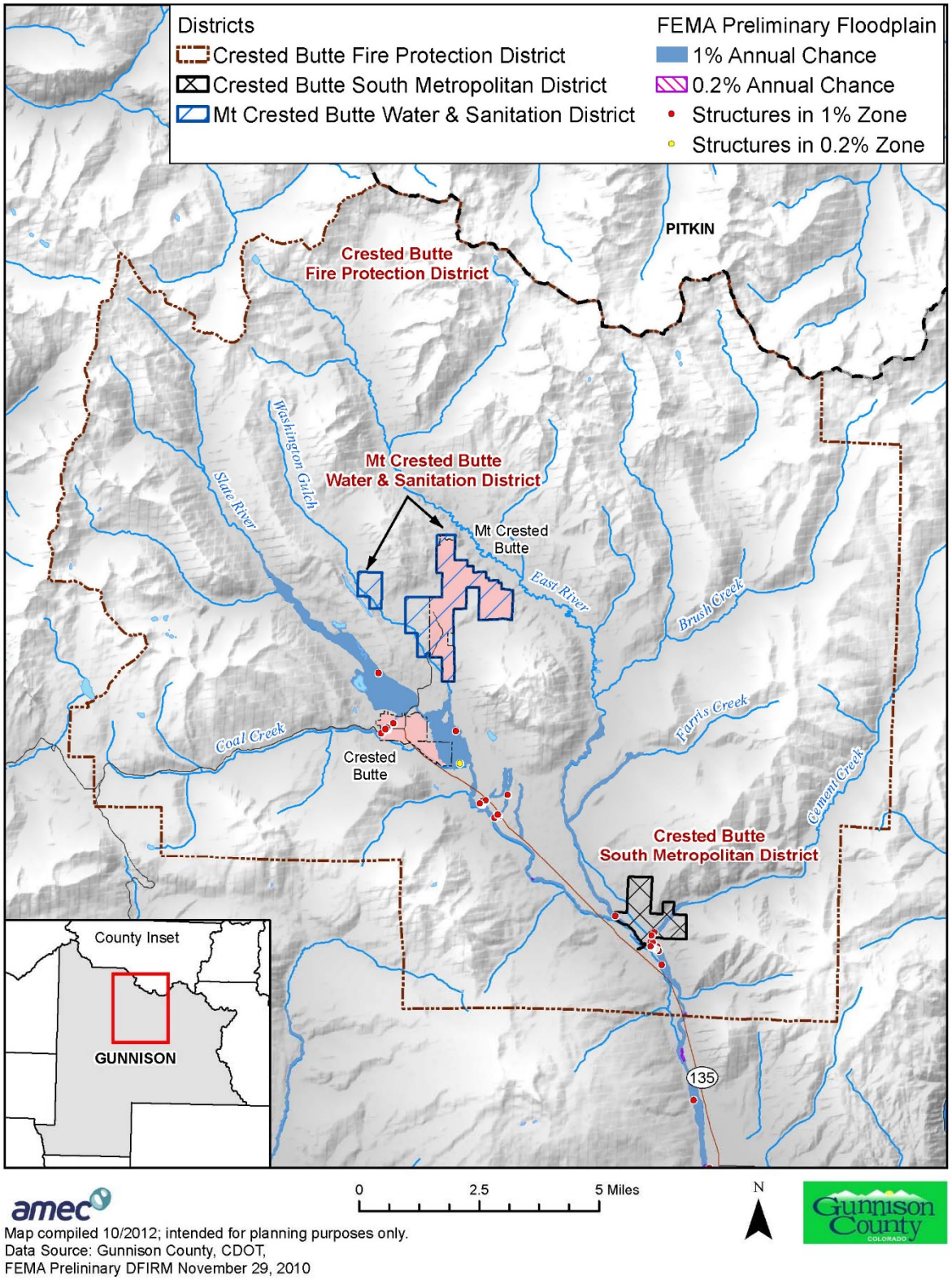
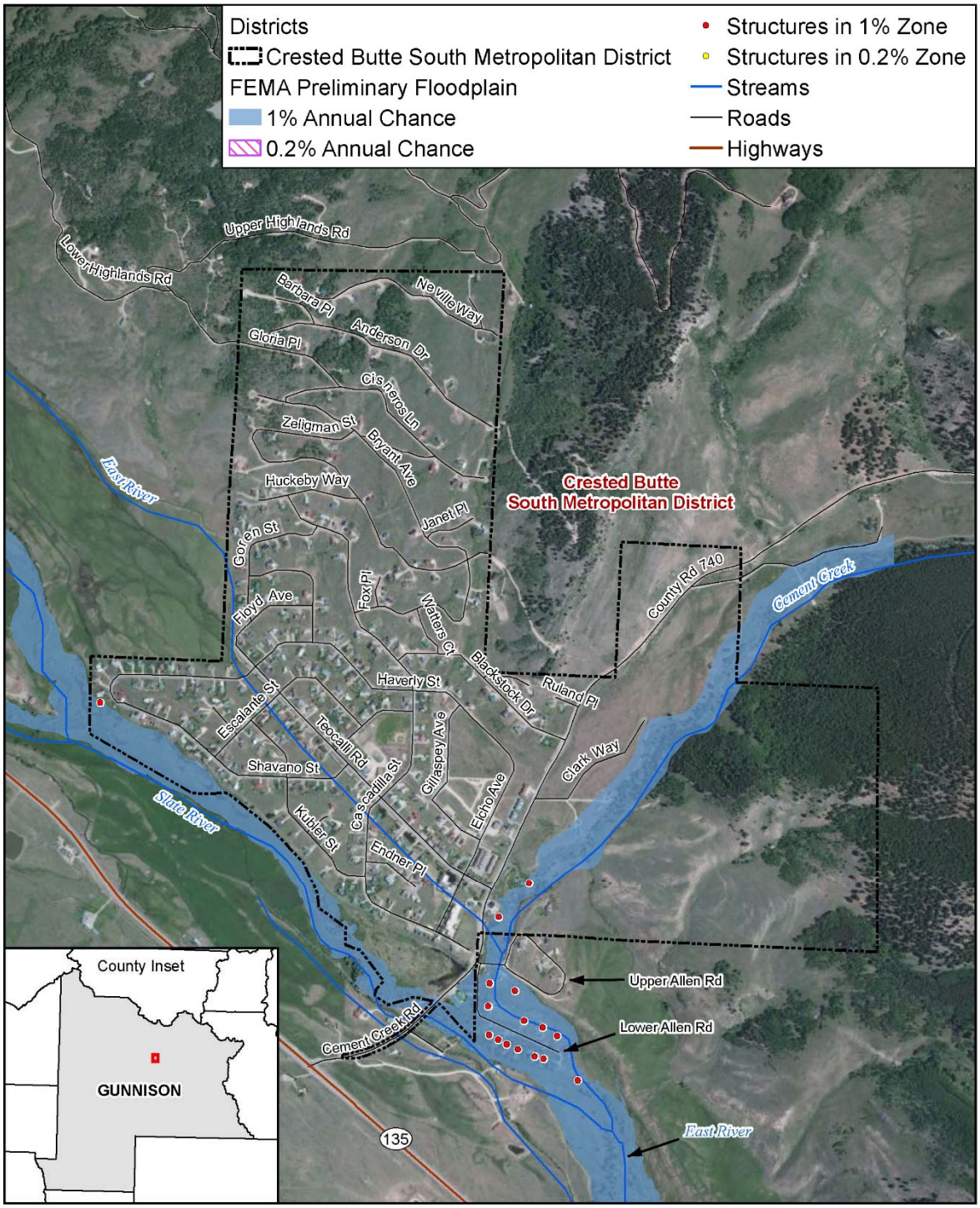


Figure 4.56. Crested Butte South Metropolitan District 1% and 0.2% Annual Chance Flood Hazards and At-Risk Properties



amec

Map compiled 10/2012; intended for planning purposes only.
Data Source: Gunnison County, CDOT, Bing Imagery
FEMA Prelininary DFIRM November 29, 2010

Table 4.37 Critical Facilities in the 100-Year and 500-Year Floodplain

Critical Facility	Type	Jurisdiction	Floodplain
City of Gunnison Shop Buildings	Government Building	City of Gunnison	1%
Electrical Substation	Power Station	City of Gunnison	1%
Dios Rio Water Treatment Plant	Water Treatment Plant	Gunnison County	1%
Roaring Judy Fish Hatchery	Government Building	Gunnison County	0.2%

The City of Gunnison has indicated that the City's electrical substation located at the Public Works Shop facilities is in the floodplain. Earthen berms have been in place since 2003 to mitigate flood impacts. The East River Pump Station was identified by the Mount Crested Butte Water and Sanitation District as a critical facility potentially at risk to flooding. Figure 4.57 through Figure 4.59 depict the location of critical facilities in the City of Gunnison, Town of Crested Butte, and Town of Mt. Crested Butte respectively. The City of Gunnison and Town of Crested Butte both have critical facilities potentially at risk to flooding, although the Town of Mt. Crested Butte does not.

Figure 4.57. City of Gunnison Flood Hazards and Critical Facilities

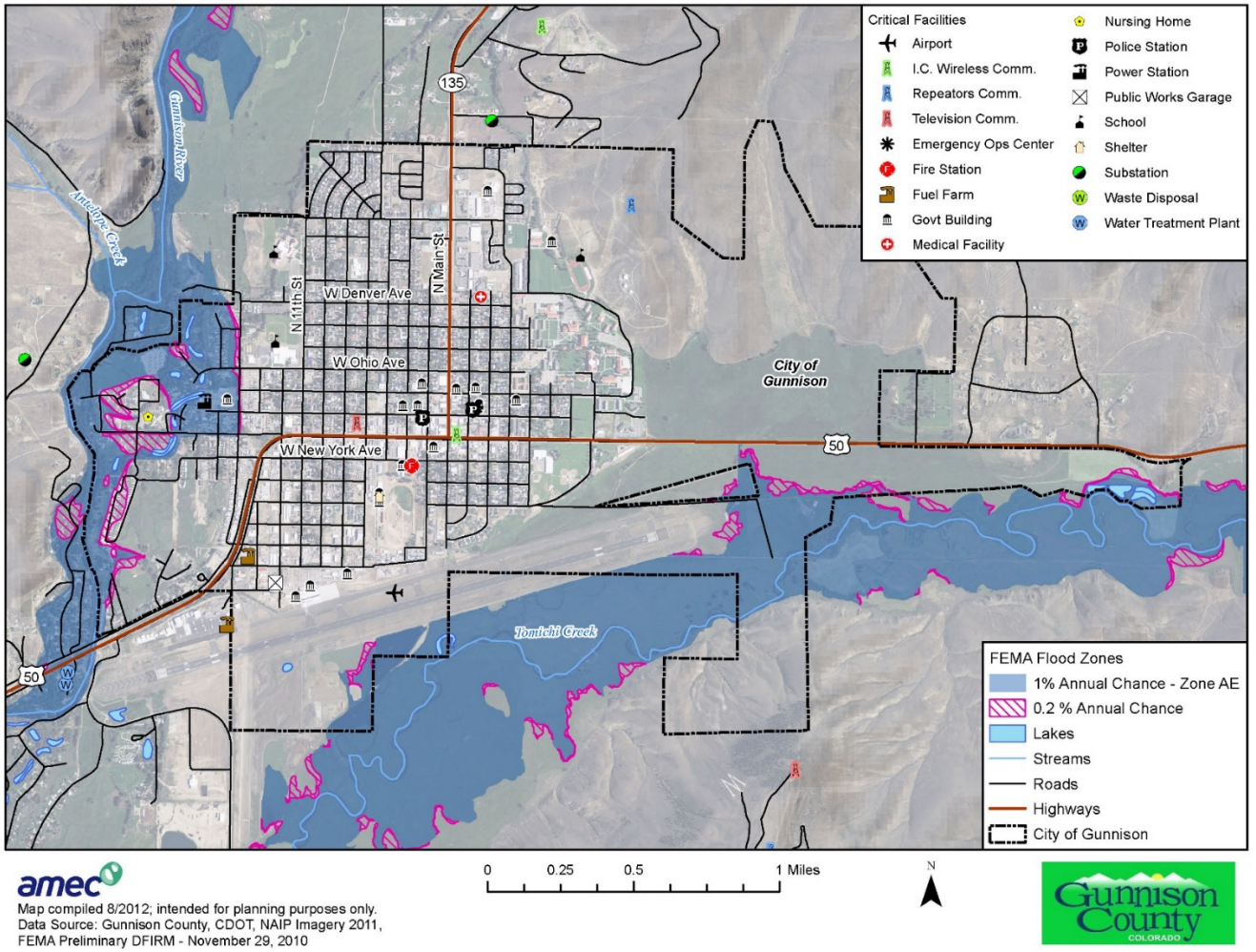


Figure 4.58. Town of Crested Butte Flood Hazards and Critical Facilities

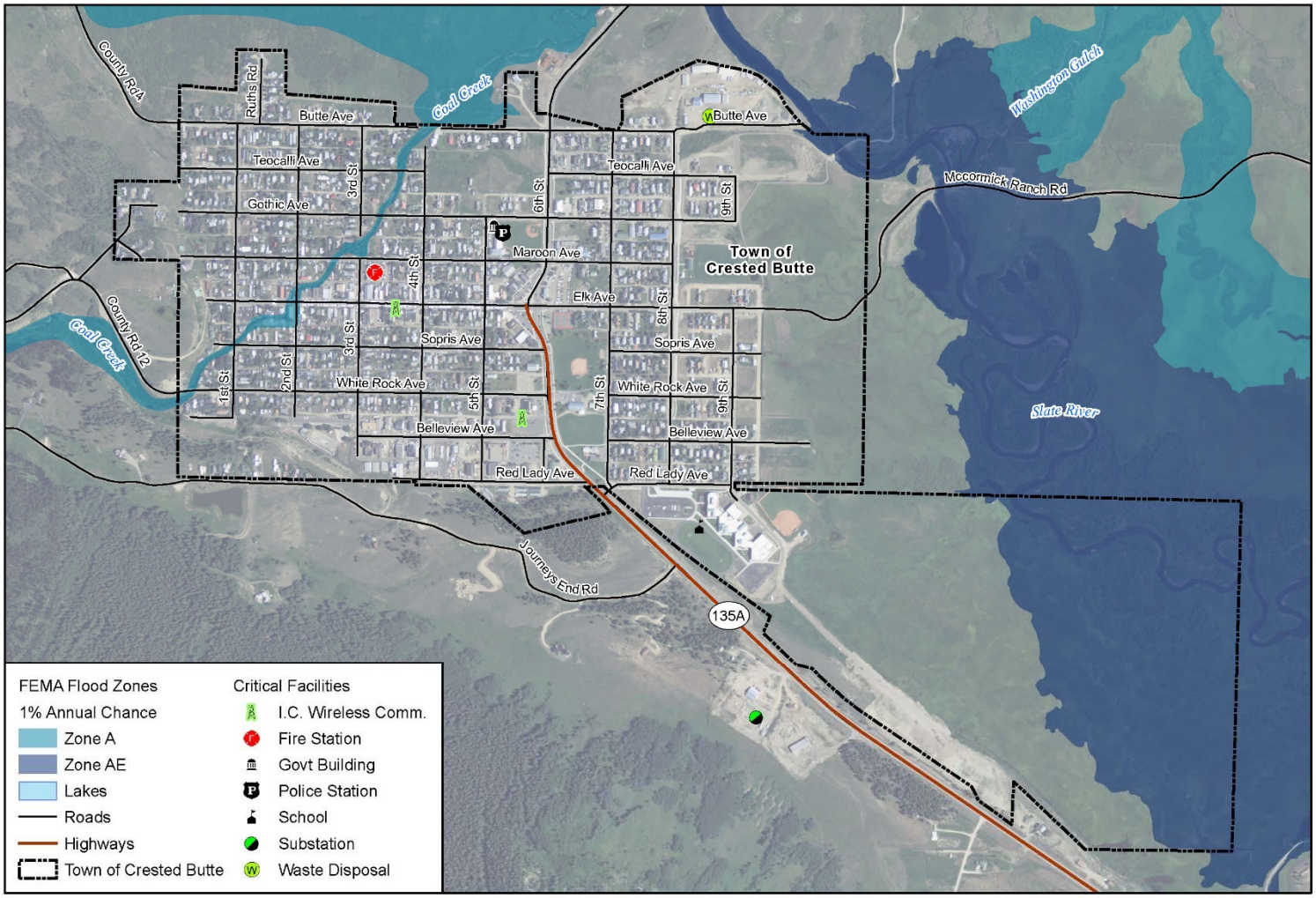
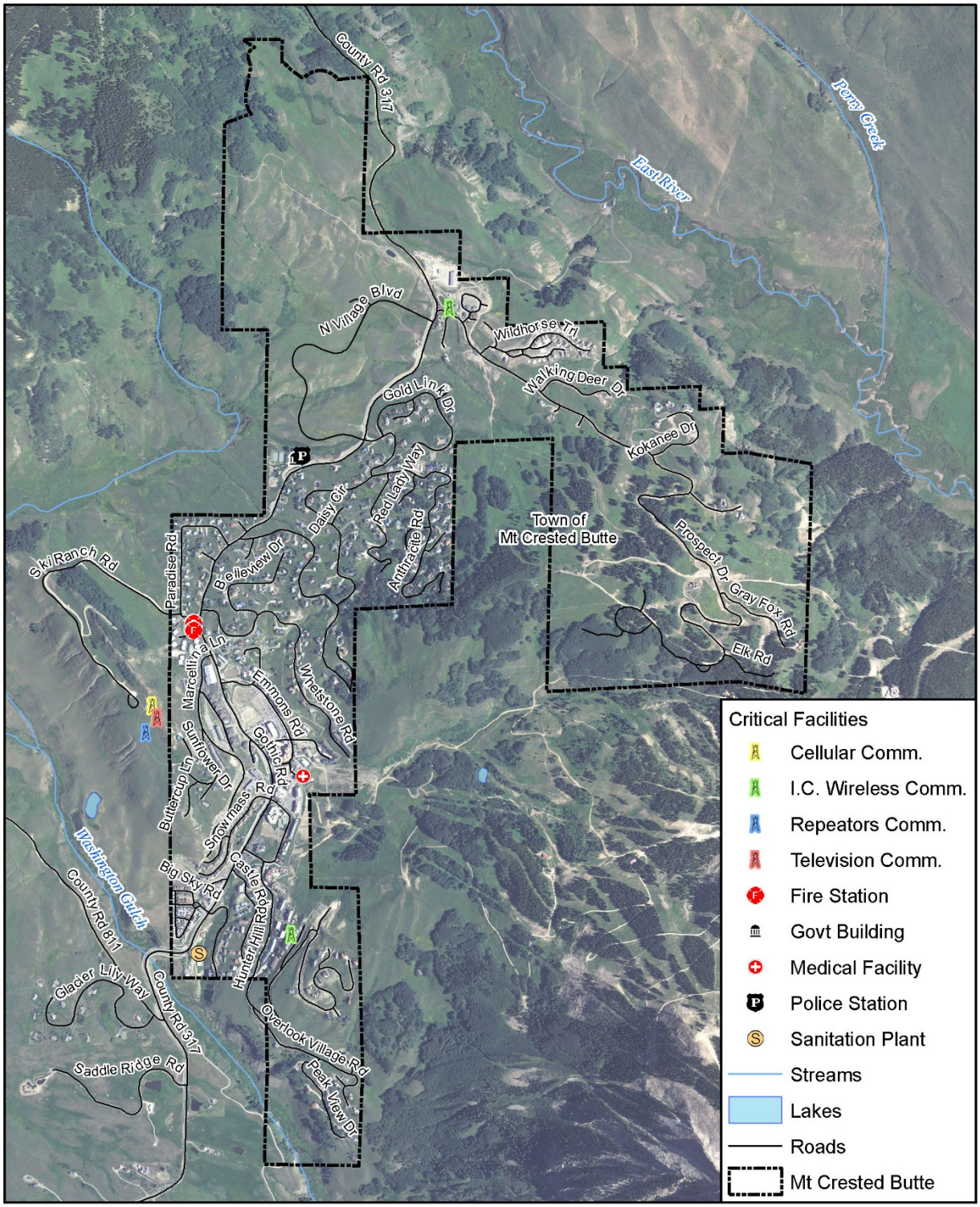


Figure 4.59. Mt. Crested Butte Critical Facilities



amec

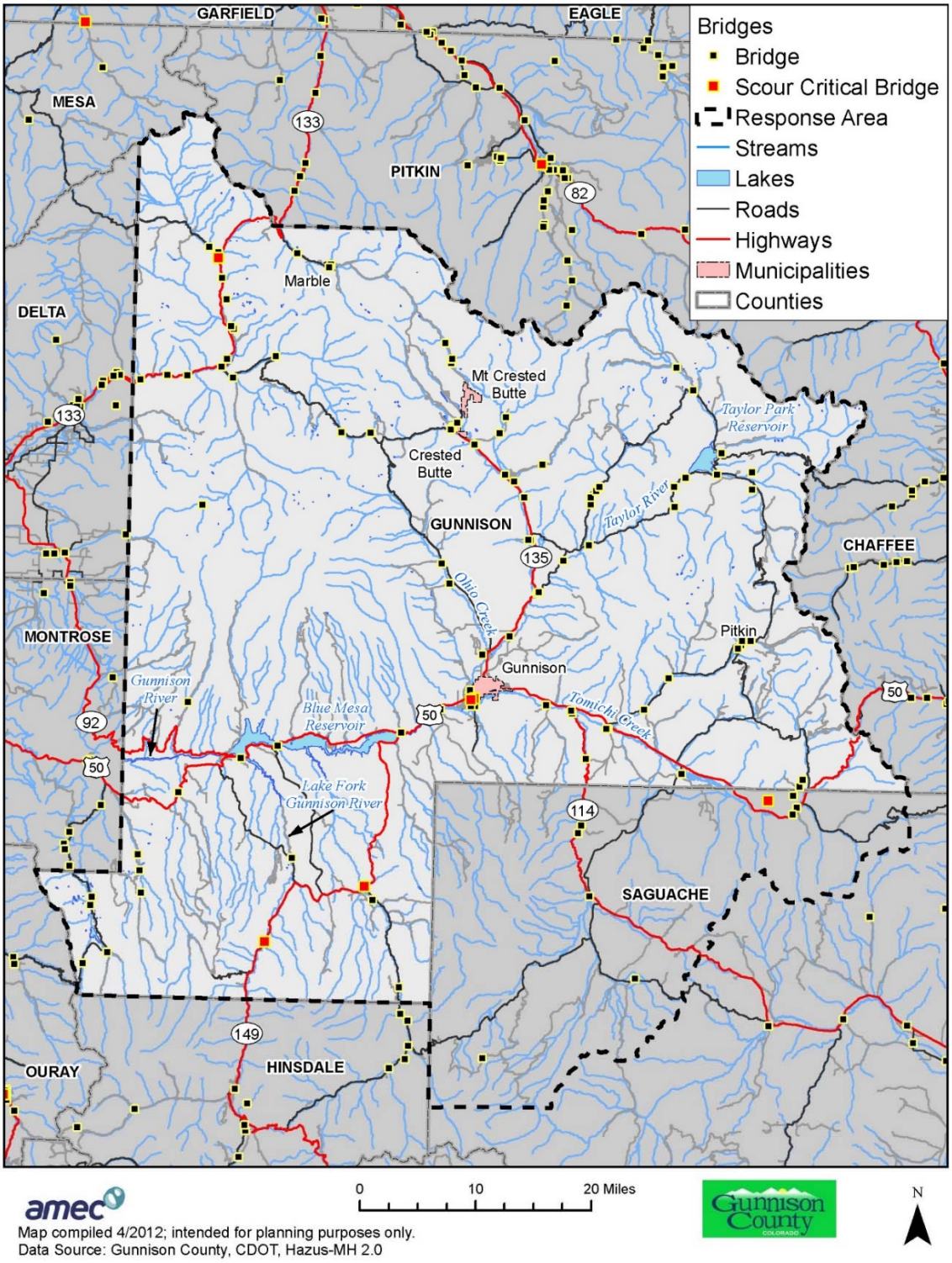
Map compiled 8/2012; intended for planning purposes only.
Data Source: Gunnison County, CDOT, NAIP Imagery 2011

Bridges in the following map are from the National Inventory of Bridges database that comes with HAZUS-MH. 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 location of these bridges are displayed in Figure 4.60, represented by the red squares, and summarized in Table 4.38.

Table 4.38 Gunnison County Bridges Rated Scour Critical

Highway Bridge Code	Location	Community	Year Built
CO005614	SH 149 ML	Gunnison County	1957
CO005321	SH 149 ML	Powderhorn	1958
CO005327	US 50 ML	Saguache County	1937
CO005197	Service Road	Gunnison County	1926
CO005192	US 50 ML	Gunnison County	1957
CO004703	SH 133 ML	Delta	1978

Figure 4.60. Gunnison County Bridges



Flood Insurance Coverage and Claims Paid

Table 4.39 provides detailed information on NFIP policies and claims in participating jurisdictions in Gunnison County.

Table 4.39 National Flood Insurance Program Polices

Jurisdiction	Policies in Force	Insurance in Force ($)	Number of Paid Claims	Paid Claims Totals ($)
Town of Crested Butte	24	6,681,000	3	1,197
Town of Mt. Crested Butte	1	350,000	0	0
City of Gunnison	53	11,927,200	3	6,331
Unincorporated Gunnison County	156	44,447,900	39	145,002

Source: Colorado Water Conservation Board, data up to date as of April 01, 2020

As of April 01, 2020, there were 24 NFIP policies in force in the Town of Crested Butte, 1 in Mt. Crested Butte, 53 in the City of Gunnison, and 156 in unincorporated Gunnison County. Forty-five of the policies are located in zone A01-30 & AE; and fourteen of the policies are in zone A. Comparing the number of policies in force to the number of residential properties identified at risk in Table 4.35 and Table 4.36 indicates that roughly 36% of the structures are covered by flood insurance in the unincorporated areas, 26% in the City of Gunnison, and 100% in Crested Butte.

There have been two repetitive loss properties in unincorporated Gunnison County as of the development of this plan. Repetitive loss properties refer to NFIP-insured structures that have had at least two paid flood losses of more than $1,000 each in any ten year period since 1978. These properties are a nationwide priority to mitigate due to their repeated impacts on Flood Insurance funds.

Analyzing Development Trends

Future growth is expected to occur in the Gunnison Rising annexation along Tomichi Creek. This area was annexed into the City of Gunnison in 2010. Development on this 650-acre property is prohibited within the 1% annual chance floodplain, so flood risk will not increase as a result.

Hailstorm

Information on vulnerability to hailstorms is limited given the relative lack of historical data on damages. According to national databases, no severely damaging hailstorms were reported in Gunnison County between 1950 and 2010. One event caused minor damage. This event resulted in approximately $455 in damages over a 50-year time span between 1960 and 2010. This averages out to about $9 in damages per year. While the entire Gunnison County response area is exposed to hailstorms, the HMPC considers that hailstorms are more likely to have a **negligible**

potential magnitude. Hail could have devastating impacts on the agricultural economy in the County, depending on the timing of the event. Hail damages are typically covered by insurance and thus generally do not result in disaster declarations.

High Winds

In order to calculate exposure and potential losses, and to assist in assessing the overall impact of the hazard on the response area, information from the event of record is used. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it is a reflection of common occurrence. Based on SHELDUS records, the event of record for damaging winds in Gunnison County occurred on April 18, 2000. This event resulted in $78,947 in damages (in 2000 dollars).

Calculating the average annual damage from damaging winds is another method used in assessing potential magnitude. According to SHELDUS, 37 damaging wind events caused a total of $204,113 in damages over a 50 year span between 1960 and 2010. This averages out to $4,082 in damages per year. Therefore, Gunnison County could expect to sustain roughly $4,000 in damages from severe winds in any given year. Impacts on critical facilities and functions in the response area are possible but not anticipated to be substantial.

Landslide/Rockfall/Debris Flow

As described in the hazard profile, geologic hazard areas have been identified in several parts of the Gunnison County response area. Landslides and other geologic constraints have been recognized and mapped since the mid-1970s and accounted for in the County's land use code. These hazards still pose a significant threat to areas developed prior to that timeframe. Problems with slope movement will be extremely difficult to rectify in previously developed areas. Damages to roads and utility lines located in these areas would result in high maintenance and repair costs. The northern part of Gunnison County in the vicinity of Marble and on the west side of McClure Pass is particularly at risk to active landslide and earthflow events. The community's vulnerability to these hazards is higher in areas with active hazard and high intensity land uses.

A GIS analysis was performed to estimate the potential risk to developed properties in the response area. This is considered an exposure analysis and is an inventory of properties by geologic constraint/hazard area. 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. Nonetheless, there is a substantial amount of property potentially exposed, particularly to high water table areas. The properties in the landslide-earthflow and mudflow-debris fan areas should be considered as the most at-risk. The mudflow-debris fan risk can also be exacerbated by wildfires. During the plan update process the CGS provided GIS mapping of additional landslide hazard data to refine the initial risk assessment performed on the geologic constraints layer. Both of these analyses are discussed further below.

The geologic hazards exposure was assessed for Gunnison County using GIS. The County's parcel layer with associated assessor's building improvement valuation data, and point locations of buildings based on addresses provided by the County were used as the basis for inventory. Data provided to Gunnison County by the CGS identified areas of geologic constraints. The geologic hazards included are debris fan, high water-table area, landslide-earthflow area, mudflow-debris fan, potentially unstable slope, rockfall area, and unstable slope. The extent of the geologic constraints mapping is not comprehensive for the County, but covers most of developed areas in the County including the Crested Butte-Gunnison corridor and Marble areas.

The geologic hazards areas were overlaid in GIS on the building point data to identify structures that would likely be within a given geologic hazard identified by the CGS. Building improvement values for those points were then extracted from the parcel/assessor's data and summed for the entire County. Results of the overlay analysis are shown in Table 4.40. There are 18 buildings that are located in an area where a geologic hazards survey has not been completed and they are identified as "Unknown" in Table 4.40. Results by individual jurisdiction are shown in Table 4.41. Table 4.43 lists the critical facilities within geologic hazard areas. As mentioned previously, the presence of property in these areas does not necessarily indicate risk, as geologic hazards may have been accounted for during development. There are 8,261 buildings located within Gunnison County's geologic hazard zones. Based on the data provided, the total improved market value of these structures is approximately $1.5 billion dollars, and the population exposure is estimated at 17,793 people. The population analysis is estimated by applying an average household size factor (Census Bureau estimate of 2.22 persons) to the number of residential structures identified within the geologic hazard area. Note that this method tends to overestimate population, but is considered a reasonable estimate.

Table 4.40 Exposure to Geologic Hazards in Gunnison County

Geologic Hazard	Building Count	Building Improved Market Value	Population
Debris Fan	71	$17,272,220	145
High Water-Table Area	3,634	$335,540,828	7,878
Landslide-Earthflow Area	475	$143,069,748	1,055
Mudflow-Debris Fan	63	$19,604,845	129
Potentially Unstable Slope	1,446	$305,826,058	3,013
Rockfall Area	98	$13,860,835	212
Unknown	18	$1,848,420	38
Unstable Slope	2,456	$654,363,609	5,322
Total	**8,261**	**$1,491,386,564**	**17,793**

Table 4.41 Summary of Exposure to Geologic Hazards by Jurisdiction*

Jurisdiction	Occupancy Type	Geologic Hazard	Sum of Building Count	Sum of Improved Market Building Value	Sum of Population
City of Gunnison	Agricultural	High Water-Table Area	1	$140,794	
		Potentially Unstable Slope	1	$509,519	
	Agricultural Total		2	$650,312	
	Commercial	High Water-Table Area	25	$869,561	
	Commercial Total		25	$869,561	
	Exempt	High Water-Table Area	3	$3,746,000	
	Exempt Total		3	$3,746,000	
	Residential	High Water-Table Area	1,370	$48,462,677	3,096
	Residential Total		1,370	$48,462,677	3,096
City of Gunnison Total			1,400	$53,728,550	3,096
Crested Butte	Commercial	High Water-Table Area	11	$4,587,528	
	Commercial Total		11	$4,587,528	
	Industrial	High Water-Table Area	1	$140,596	
	Industrial Total		1	$140,596	
	Residential	High Water-Table Area	62	$22,827,383	140
	Residential Total		62	$22,827,383	140
Crested Butte Total			74	$27,555,506	140
Marble	Commercial	Debris Fan	3	$820,614	
		Mudflow-Debris Fan	3	$240,357	
	Commercial Total		6	$1,060,972	
	Exempt	Debris Fan	3	$449,672	
		Mudflow-Debris Fan	2	$766,080	
	Exempt Total		5	$1,215,752	
	Residential	Debris Fan	37	$8,411,894	84
		Landslide-Earthflow Area	4	$1,483,621	9
		Mudflow-Debris Fan	43	$13,848,311	97
		Potentially Unstable Slope	3	$411,761	7
	Residential Total		87	$24,155,588	197
	Vacant	Debris Fan	1	$84,760	
	Vacant Total		1	$84,760	
Marble Total			99	$26,517,071	197
Mt Crested Butte	Commercial	Potentially Unstable Slope	77	$5,684,462	
		Unstable Slope	71	$13,591,744	
	Commercial Total		148	$19,276,206	
	Exempt	Unstable Slope	1	$187,716	
	Exempt Total		1	$187,716	
	Residential	High Water-Table Area	24	$4,059,181	54
		Landslide-Earthflow Area	253	$46,368,603	572
		Potentially Unstable Slope	827	$142,132,408	1,869
		Unstable Slope	1,805	$438,914,450	4,079

Jurisdiction	Occupancy Type	Geologic Hazard	Sum of Building Count	Sum of Improved Market Building Value	Sum of Population
	Residential Total		2,909	$631,474,642	6,574
Mt Crested Butte Total			3,058	$650,938,564	6,574
Unincorporated	Agricultural	High Water-Table Area	69	$27,672,397	
		Landslide-Earthflow Area	5	$3,157,575	
		Mudflow-Debris Fan	1	$185,307	
		Potentially Unstable Slope	28	$15,285,875	
		Rockfall Area	1	$528,253	
		Unknown	1	$225,590	
		Unstable Slope	17	$12,340,526	
	Agricultural Total		122	$59,395,523	
	Commercial	High Water-Table Area	26	$9,223,124	
		Potentially Unstable Slope	3	$168,683	
		Rockfall Area	2	$424,450	
		Unstable Slope	3	$951,290	
	Commercial Total		34	$10,767,547	
	Exempt	High Water-Table Area	9	$3,279,629	
		Potentially Unstable Slope	4	$1,296,508	
		Unstable Slope	4	$1,938,259	
	Exempt Total		17	$6,514,396	
	Industrial	High Water-Table Area	1	$422,334	
	Industrial Total		1	$422,334	
	Natural Resources	Unstable Slope	1	$2,227,949	
	Natural Resources Total		1	$2,227,949	
	Residential	Debris Fan	27	$7,505,280	61
		High Water-Table Area	2,030	$209,881,083	4,588
		Landslide-Earthflow Area	210	$91,253,006	475
		Mudflow-Debris Fan	14	$4,564,790	32
		Potentially Unstable Slope	503	$140,336,842	1,137
		Rockfall Area	94	$12,864,578	212
		Unknown	17	$1,622,830	38
		Unstable Slope	550	$183,211,242	1,243
	Residential Total		3,445	$651,239,651	7,786
	Vacant	High Water-Table Area	2	$228,543	
		Landslide-Earthflow Area	3	$806,942	
		Rockfall Area	1	$43,554	
		Unstable Slope	4	$1,000,434	
	Vacant Total		10	$2,079,473	
Unincorporated Total			3,630	$732,646,872	7,786
Grand Total			**8,261**	**$1,491,386,564**	**17,793**

* Exposure does not necessarily indicate vulnerability. A more detailed investigation for each site would be required to refine vulnerability.

During the plan update process the CGS provided GIS mapping of additional landslide hazard data based on various and more recent 1:24,000 scale hazard mapping studies. Maps of these areas are shown countywide and by jurisdiction in the geologic hazard profile section. A separate landslide hazard analysis was performed using this data. The table below indicates that roughly 498 structures are in these mapped landslide hazard areas. Most of these are in the unincorporated area but some of these structures are in the Town of Mt Crested Butte. Approximately 149 structures are also located in the Crested Butte South Metropolitan District. The Mt Crested Butte Water and Sanitation District numbers are approximately the same as those within Town of Mt Crested Butte areas of landslide exposure.

Table 4.42 Landslide Hazard Exposure by Jurisdiction

Jurisdiction	Occupation Type	Landslide Hazard	Building Count	Building Improved Market Value	Community Vacancy Rate Adjusted Population**
Mt Crested Butte	Commercial	High	2	$3,240,052	
	Residential	High	34	$30,271,630	43
Mt Crested Butte Total			36	$33,511,682	43
Unincorporated	Agricultural	High	23	$8,042,606	
		Moderate	5	$1,629,640	
	Agricultural Total		28	$9,672,247	
	Commercial	High	2	$224,202	
	Commercial Total		2	$224,202	
	Exempt	High	5	$2,147,412	
		Moderate	1	$417,778	
	Exempt Total		6	$2,565,189	
	Residential	High	393	$136,686,043	498
		Moderate	29	$6,289,941	37
	Residential Total		422	$142,975,984	535
	Vacant	High	4	$972,738	
	Vacant Total		4	$972,738	
Unincorporated Total			462	$156,410,360	535
Grand Total			**498**	**$189,922,042**	**578**

**Based on a vacancy rate of 42.9% according to 2010 U.S. Census

Table 4.43 Critical Facilities within Geologic Hazard Areas

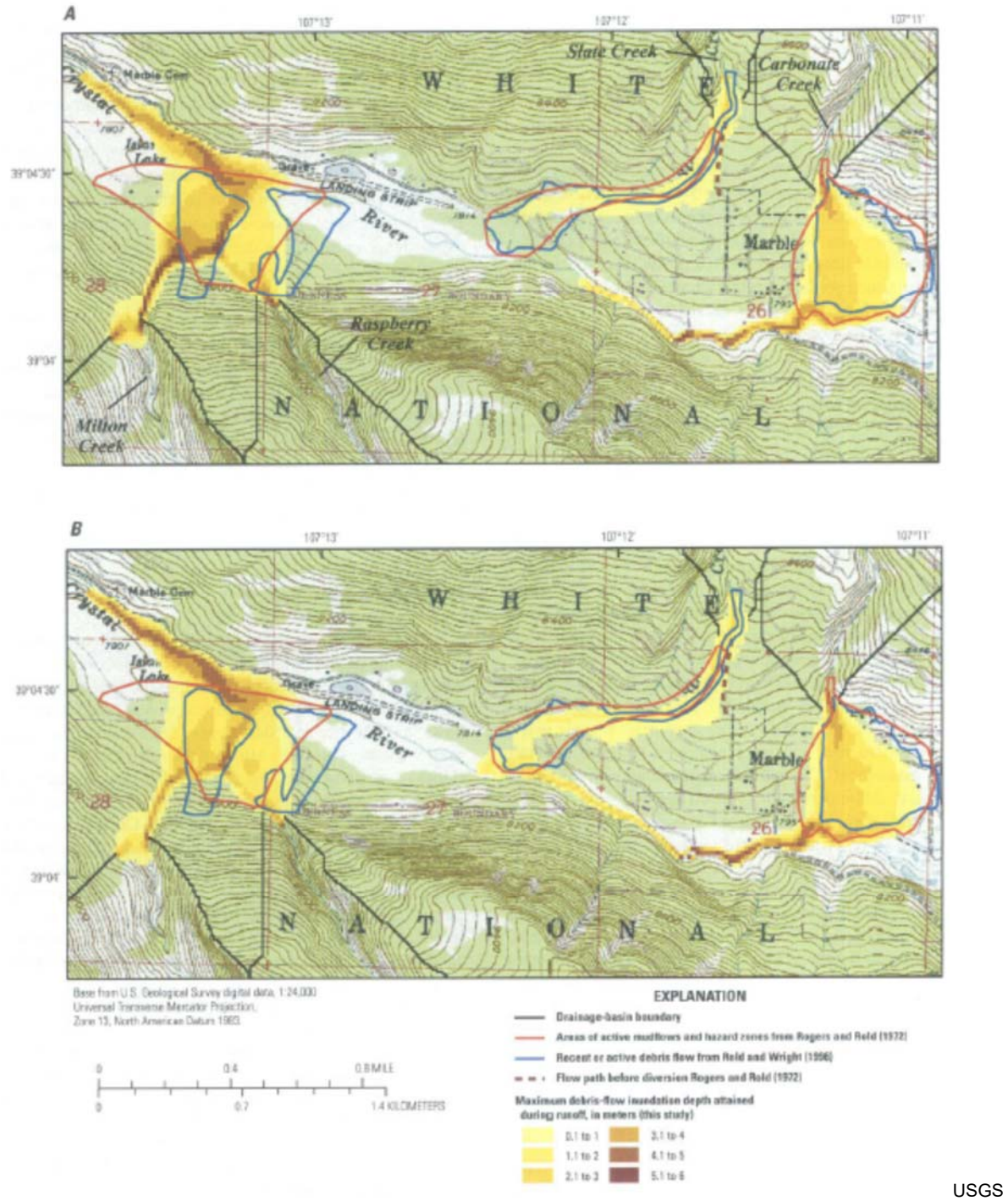
Critical Facility	Type	Jurisdiction	Geologic Hazard
Batchlor	Communications	Mt Crested Butte	Landslide-Earthflow Area
Marble Fire Station	Fire Station	Marble	Mudflow-Debris Fan
Comstock	Communications	Gunnison County	Rockfall Area
Spring Creek	Communications	Gunnison County	Rockfall Area

SHELDUS data indicates that Gunnison County's average annual loss from landslides is $406. The County shouldn't 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 in April 2011. The event resulted in an estimated $60,000 in damages due to the cost of slope stabilization efforts.

There is a potential risk to public safety to travelers due to rockfall. The areas where rockfall is a recurrent problem are identified in Section 0. Specific loss estimates are not available for rockfall hazards in the response area. Elsewhere, rockfalls have caused severe injury or even death. In the Gunnison County response area, this risk is higher for motorists traveling along Highway 133 and the Taylor Canyon area.

A 2011 report by the USGS further explores the potential for post-wildland fire debris flows in the Carbonate, Slate, Raspberry, and Milton creek drainages near Marble. The following map from that report displays debris-flow inundation depths estimated for volumes generated from 5-year recurrence, 1 hour duration rainfall (map A) and 25-year recurrence, 1-hour duration rainfall (map B). Both maps indicate significant impacts to the Town of Marble itself, as well as access to the Town. Further geologic and hydrologic constraints in the Marble/Crystal River area can be referenced in a 1996 report by Wright Water Engineers "Geologic and Hydrologic Factors Governing Impacts of Development on the Crystal River Near Marble, Colorado.

Figure 4.61. Estimated Probabilities, Volumes, and Inundation Depths of Post-wildland Fire Debris Flows Near Marble



USGS

Scientific Investigations Report 2011-5047

Lightning

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

- Electrocution, 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 from electrocution via contact with live power-lines that are 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.

One of the most serious risks associated with lightning is its potential to cause wildland fires. This in particular could result in substantial losses for the Gunnison County response area. For specific details on loss and vulnerability associated with wildland fires, please see the wildland fire vulnerability discussion.

Based on the data from SHELDUS, Gunnison County's average annual loss from lightning is $833.23. The event of record occurred on July 28, 1996. The event resulted in an estimate $35,000 in damages in 1996 dollars. It is not known whether the damages from this event were fire-related.

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 the Gunnison County response area, particularly along remote stretches of road, can become stranded, requiring search and rescue assistance and shelter provisions. The County can experience high winds, extreme cold temperatures, 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 storms also contribute directly to avalanche hazards and extreme temperatures (cold). Limited phone and cell phone service in parts of the County may mean that emergency reporting may be difficult or impossible during severe winter storm events.

The County's grocery stores are largely dependent on truck shipments. These shipments can and have been interrupted for several days due to winter storms, leaving the grocery stores with very little inventory in stock. Citizens need to be prepared for food shortages during these periods. It is recommended that citizens have supplies that will last for periods of one to two weeks.

Structural damage from winter storms in 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).

Based on the data from SHELDUS, Gunnison County's average annual loss from severe winter storms is $19,225. The event of record occurred on December 23, 1982. The event resulted in an estimated $793,651 in damages in 1982 dollars.

Wildland Fire

The Hazard Identification section (0) 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 CWPP identified 32 communities and seven ASIs within the WUI. Each community was designated a vulnerability rating (extreme, very high, high, and medium) during the CWPP development process. During the development 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 parcels (i.e. those that have a structure). 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 4.44. The results were also grouped by extreme, very high, high, and moderate, community wildland fire risk, which is shown in Table 4.45.

Table 4.44 Gunnison County Wildland Fire Vulnerability by CWPP Community

CWPP Community*	Community Hazard Rating	Structure Count	Building Value	Building Contents	Total Value	Community Vacancy Rate Adjusted Population**
Almont	H	123	$30,971,505	$16,594,446	$47,565,951	150
Antelope Hills	H	91	$10,217,594	$5,108,797	$15,326,391	115
Arrowhead	VH	316	$66,107,699	$33,433,911	$99,541,610	341
Blue Mesa Subdivision	H	78	$18,197,386	$9,064,399	$27,261,785	95

CWPP Community*	Community Hazard Rating	Structure Count	Building Value	Building Contents	Total Value	Community Vacancy Rate Adjusted Population**
Cranor Acres	M	19	$5,674,885	$2,837,443	$8,512,328	24
Crested Butte South*	H	572	$196,403,904	$99,766,569	$296,170,473	710
Danni Ranch	H	8	$7,006,005	$3,503,002	$10,509,007	10
Dos Rios	M	389	$83,937,992	$45,037,912	$128,975,905	479
Evergreen	H	29	$10,581,539	$5,290,770	$15,872,309	37
Gold Basin	H	92	$17,911,325	$8,955,662	$26,866,987	117
Gothic*	VH	1	$579,969	$579,969	$1,159,938	0
Gunnison Highlands	VH	32	$3,155,013	$1,820,852	$4,975,865	37
Lake Irwin*	E	3	$178,941	$89,470	$268,411	4
Marble & Upper Crystal River	H	236	$59,158,130	$30,616,492	$89,774,622	279
Mt Crested Butte*	M	2,233	$698,225,676	$361,326,500	$1,059,552,176	457
North Valley Subdivision	M	32	$6,207,802	$3,103,901	$9,311,702	41
Ohio City	H	60	$8,696,514	$4,534,094	$13,230,608	71
Pitkin	H	197	$27,695,106	$14,272,057	$41,967,163	240
Quartz Creek	E	133	$17,142,112	$8,541,278	$25,683,391	162
Rainbow Estates	H	55	$9,351,401	$4,675,701	$14,027,102	70
Red Mountain*	H	23	$19,919,135	$11,030,362	$30,949,497	25
Skyland*	H	416	$201,856,985	$101,332,082	$303,189,067	522
Spring Creek	VH	93	$22,238,038	$11,161,877	$33,399,915	116
Star Mountain Ranch	H	11	$9,609,194	$9,552,105	$19,161,299	1
The Reserve	H	3	$5,569,898	$2,784,949	$8,354,847	4
Tin Cup	H	78	$6,859,479	$3,600,748	$10,460,227	91
Tomichi Heights	M	65	$13,669,796	$7,776,506	$21,446,302	79
Town of Crested Butte*	M	1,036	$369,436,620	$220,407,644	$589,844,264	849
Trappers*	E	40	$46,493,474	$23,119,419	$69,612,893	50
Washington Gulch*	H	134	$68,626,814	$34,254,742	$102,881,556	168
White Pine	VH	47	$2,933,905	$1,466,952	$4,400,857	60
Wilderness Streams	VH	73	$25,232,664	$12,772,417	$38,005,081	91
Totals		**6,678**	**$2,069,846,501**	**$1,098,413,028**	**$3,168,259,529**	**5,495**

* Indicates community within Crested Butte Fire Protection District; **Based on a vacancy rate of 42.9% based on 2010 US Census.

Table 4.45 Gunnison County Wildfire Vulnerability by Hazard Rating

Hazard Rating	Structure Count	Building Value	Building Contents	Total Value	Community Vacancy Rate Adjusted Population*
Extreme	176	$63,814,528	$31,750,168	$95,564,695	377
Very High	522	$120,247,288	$61,235,978	$181,483,266	1,130
High	2,206	$708,631,913	$364,936,977	$1,073,568,891	4,738
Moderate	3,774	$1,177,152,772	$640,489,906	$1,817,642,678	3,379

*Based on a vacancy rate of 42.9% based on 2010 US Census.

The results indicate that approximately $3.2 billion in property value and 6,678 structures are potentially exposed to wildland fire hazards in the county. Note that the incorporated areas of Mount Crested Butte, Crested Butte, Marble, and Pitkin are also considered CWPP communities in their entirety. Subtracting those areas yields $0.9 billion in property value and 2,976 structures are potentially exposed to wildland fire hazards in the unincorporated county. 90% of that value and 2,471 structures are located in communities designated as high, very high, and extreme risk. The number of structures in the Crested Butte FPD, indicated by the communities with an '*' by their name in Table 4.44, equates to 4,458. The number of people in the Crested Butte FPD equates to 2,785 based on the community vacancy rate adjusted population estimates. 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 response area at once.

An analysis of populations at risk was conducted by applying an average household size of 2.22 (Census) to the count of residential parcels with improvements in the communities at risk. The results are displayed below in Table 4.44 and Table 4.45. This analysis yielded an estimated 9,623 people in the communities at risk. This includes 5,337 in the extreme, very high and high risk communities of Gunnison 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 try and compensate this overrepresentation the population estimates were calculated against the 2010 U.S. Census estimate of 42.9% vacancy rate for the County. An adjusted population of 5,495 is a more accurate estimate of population at risk within the CWPP Communities.

The results quantify what Gunnison 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 CWPP's, 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. Some of the largest employers in Gunnison County, such as the Gunnison Watershed RE1J School District and the City of Gunnison, are at risk to wildfire. If employees of these agencies and other businesses were out of work for either the short term or the long term due to wildland fires, Gunnison County's economy

would be impacted. Furthermore, ranching, education, and tourism are important components of Gunnison County's economy. Wildland fires can have a direct impact on agricultural lands and the Gunnison County scenery, adversely affecting the ability of the County's residents to earn a living from these industries. Gunnison 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. A wildfire in the Crested Butte Ski Area could impact winter tourism as well.

Critical infrastructure in Gunnison County includes public safety and government buildings, physical infrastructure, water supply systems, wastewater treatment, power infrastructure, 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), Tri-State, Xcel, and Gunnison Rural Electric. Xcel also has a natural gas pipeline in the county. Power lines can also be sources of wildfire ignitions when knocked down by wind or other means. Table 4.46 lists the critical facilities located in the WUI.

Table 4.46 Critical Facilities Located in the WUI

Critical Facility	Type	Jurisdiction	WUI Community	WUI Rating
Brush Creek Private Airport	Airport	Gunnison County	Skyland	High
Gateview	Communications	Gunnison County	Blue Mesa Subdivision	High
Crested Butte South	Communications	Gunnison County	Crested Butte South	High
Pitkin	Communications	Gunnison County	Quartz Creek	Extreme
Almont Fire Station	Fire Station	Gunnison County	Almont	High
Arrowhead Fire Station	Fire Station	Gunnison County	Arrowhead	Very High
Crested Butte South Fire Station	Fire Station	Gunnison County	Crested Butte South	High
Ohio City Fire Station	Fire Station	Gunnison County	Ohio City	High
Crested Butte South Water & Sanitation Plant	Sanitation Plant	Gunnison County	Crested Butte South	High
Dios Rio Water Treatment Plant	Water Treatment Plant	Gunnison County	Dos Rios	Medium

5 MITIGATION STRATEGY

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 describes the mitigation strategy process and mitigation action plan for the Gunnison County Natural Hazard Mitigation Plan. It explains 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

Up to this point in the planning process, the HMPC has organized resources, assessed natural hazards and risks, and documented mitigation capabilities. A profile of the County response area's vulnerability to natural hazards resulted from this effort, which is documented in the preceding chapter. The resulting goals, objectives, and mitigation actions were developed based on this profile. The HMPC developed this section of the plan based on a series of meetings and worksheets designed to achieve a collaborative mitigation planning effort. This section also builds upon the mitigation strategy developed in the 2013 plan, and provides an update to the actions previously identified in that plan.

"Mitigation," as defined by FEMA, is any sustained action taken to reduce or eliminate long-term risk to human life and property from hazards. FEMA's definition includes actions that protect both existing and future development. An important distinction to note is that many of the County and municipalities' land use planning documents use the term mitigation to refer to protection of existing development only. The broader FEMA definition will be used for the purposes of this hazard mitigation plan.

5.1 Goals

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.

The goals for this plan were updated by the HMPC through a process facilitated by the Gunnison County Emergency Manager during a meeting on the plan's updated risk assessment. This analysis of the risk assessment identified areas where improvements could be made and provided the framework for the HMPC to revisit planning goals and objectives and the mitigation strategy for the Gunnison County response area.

Goals were defined for the purpose of this mitigation plan as broad-based public policy statements that:

- Represent basic desires of the community;
- Encompass all aspects of community, public and private;
- Are nonspecific, in that they refer to the quality (not the quantity) of the outcome;
- Are future-oriented, in that they are achievable in the future; and
- Are time-independent, in that they are not scheduled events.

Goals are stated without regard for implementation, that is, implementation cost, schedule, and means are not considered. Goals are defined before considering how to accomplish them so that the goals are not dependent on the means of achievement. Goal statements form the basis for objectives and actions that will be used as means to achieve the goals. Objectives define strategies to attain the goals and are more specific and measurable.

At the end of the risk assessment meeting team members were given a worksheet for formulating and updating the mitigation strategy. This worksheet included a list of sample goals to consider, and included the 4 Goals from the 2013 Gunnison County Natural Hazard Mitigation Plan, the 2011 Gunnison County CWPP, and the 2018 Colorado NHMP. The HMPC was instructed to revise the existing goals as necessary. That they could use, combine, or revise the statements they were provided or develop new ones on their own, keeping the risk assessment in mind. The results were collected and combined and through this process a slightly revised set of goals and objectives emerged. Goal 4 from the 2013 plan was removed, as it was redundant in the context of the purpose of the plan. The finalized updated goals represented the HMPC's input and consensus and are listed below.

Goal 1: Reduce the potential impacts of hazards on the safety of the County's citizens and guests

- Objective: Protect the population through planning and education
- Objective: Raise awareness and acceptance of hazard mitigation generally
- Objective: Identify appropriate evacuation routes
- Objective: Improve governmental coordination
- Objective: Learn from other areas
- Objective: Improve mapping source data accuracy

Goal 2: Reduce the potential impact of hazards on critical facilities, local government assets, infrastructure, private property, and critical support services

- Objective: Minimize disruption to critical services
- Objective: Improve the County's disaster response and recovery capabilities

- Objective: Reduce impacts to existing and future development

Goal 3: Reduce the potential impact of hazards on the County's economy, natural resources, historic treasures and interests, and other characteristics which add to the quality of life of the citizens and guests of the County

- Objective: Reduce the County's liability with respect to hazards generally

5.2 Identification and Analysis of Mitigation Actions

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.

In order to identify and select mitigation measures to support the mitigation goals, each hazard identified in Section 4.1: Identifying Hazards was evaluated. The HMPC analyzed a comprehensive set of viable mitigation alternatives from the 2013 plan that would support identified goals and objectives for the 2018 plan. In 2013, the action plan was developed by analyzing existing county programs and proposed improvements or changes to those programs. Additional programs were also identified as potential mitigation strategies. The potential mitigation strategies were ranked in five categories according to how they accomplished each item:

- Prevention
- Property Protection
- Structural Protection
- Emergency Services
- Public Information and Involvement

During the 2018 mitigation strategy meeting, each HMPC member was provided with the following list of categories of mitigation measures, which originate from the NFIP Community Rating System. The categories are nearly identical to those used in the 2013 mitigation action development process, with the addition of natural resource protection.

- Prevention
- Property Protection
- Structural Projects
- Natural Resource Protection
- Emergency Services
- Public Information

The HMPC members were also provided with several lists of alternative multi-hazard mitigation actions for each of the above categories. HMPC members were encouraged to develop mitigation alternatives that would protect future, as well as existing, development from hazards per the DMA 2000 regulations. 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. The result was a number of new action ideas, as well as carry-over of some actions from the 2013 plan, with the intent of mitigating the identified hazards.

5.2.1 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, STAPLE/E (which considers social, technical, administrative, political, legal, economic, and environmental constraints and benefits). The STAPLE/E method was also used during the 2013 plan update, so most HMPC members were familiar with the criteria. The STAPLE/E method proposes the following questions to guide prioritization:

1. Social: Does the measure treat people fairly?
2. Technical: Will it work? (Does it solve the problem? Is it feasible?)
3. Administrative: Is there capacity to implement and manage the project?
4. Political: Who are the stakeholders? Did they get to participate? Is there public support? Is political leadership willing to support it?
5. Legal: Does your organization have the authority to implement the measure? Is it legal? Are there liability implications?
6. Economic: Is it cost-beneficial? Is there funding? Does it contribute to the local economy or economic development? Does it reduce direct property losses or indirect economic losses?
7. Environmental: Does it comply with environmental regulations or have adverse environmental impacts?

In 2013, the planning group assigned a quantitative score (good = 3, average = 2, poor = 1) to prioritize each proposed mitigation strategy based on how well it addressed each STAPLE/E criterion. A maximum score of 21 was possible for each action (three points for each of the seven criteria). Of the actions included in the 2013 update, wildland fire prevention (score = 18), the new communications facility (score = 18), establishing mutual aid agreements (score = 19), extreme winter weather preparation (score = 15), and developing an evacuation plan for Gunnison County (score = 18) were given the highest scores. Flood prevention and preparation was ranked relatively lowly with a score of 13.

The HMPC prioritized both new mitigation actions and those that carried over from the 2013 plan during the 2018 update process. 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 STAPLE/E). 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)?

The mitigation action identification and prioritization is summarized in Table 5.2 and detailed in Appendix A. These mitigation actions detail specific tasks for reducing future hazard-related losses within Gunnison County. The actions are organized by identified hazards. Included are the affected jurisdiction(s) and notes about the department and partners necessary to implement the action. Also included are the goal(s) that the actions primarily align with, with an understanding that some actions may help to achieve more than one goal. The mitigation actions are marked with their relative level of priority: H=high, M=medium, and L=low.

5.3 Mitigation Action Plan

Requirement §201.6(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in section (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 benefit 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.

5.3.1 Progress on Previous Mitigation Actions

During the 2018 update process the HMPC reviewed and evaluated the 2013 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 2013 mitigation strategy contained 32 separate mitigation actions benefiting one or more communities within Gunnison County. Of these actions, two have been completed. The completed actions and several of those in progress have increased the response capabilities of the County, and thus will help save lives in future incidents.

Thirty projects from the 2013 plan have been identified for continuation in this plan update. Table 5.1 indicates those actions that have been completed or deleted. Actions from 2013 that are either ongoing or remain to be completed and being carried forward in this plan are integrated into Table 5.2 and marked with a triple asterisk (***) in the hazard column.

Table 5.1. Completed or Deleted Mitigation Actions from 2013 Plan

Hazard(s)	Action Description	Jurisdiction/ Responsible Party	Status	Comments
Multi-hazard	New facility and additional staff for the Communications Center	Gunnison County, City of Gunnison/City Manager, Communications Board	Completed	New Communications Center completed and opened in December 2013. Previously Project #18 in 2013 HMP.
Flood	Continued compliance with NFIP	Town of Mt. Crested Butte	Completed	Town of Mt. Crested Butte passed a flood ordinance in 2012. There are no flood zones in Mt. Crested Butte. Previously Project #6 in 2013 HMP.
Flood	Continue preservation of wetlands around Crested Butte to absorb flood waters. ***	Town of Crested Butte	Completed	Previously Project #10.
Flood	Update floodplain management ordinance/continue to implement sound floodplain management practices through participation in NFIP***	Town of Crested Butte	Completed	Previously project #9
Wildfire	Wildland fire mitigation for Rainbow Acres Estates subdivision plus completion of CWPP***	Rainbow Acre Estates Subdivision and WRWC	Completed	Previously project #28
Drought	Monitor water issues in City of Gunnison area, monitor city's wells for contamination or dropping water tables, continue acquiring water rights in the area. ALTERNATIVE: The City of Gunnison purchases the Van Tuyl Ranch property with the intent of maintaining it as a working agricultural site which provides water recharge for the city well system. Completed 2014	City of Gunnison	Alternative Completed	Previously Project #2 Alternative.

5.3.2 Continued Compliance with NFIP

Given the flood hazard in the planning area and the importance of the NFIP in mitigating flood losses, and the degree of flood risk in the County, an emphasis will be placed on

continued compliance with the NFIP by participating communities (Gunnison County, City of Gunnison, Town of Crested Butte, and Town of Mt. Crested Butte). This includes continuing to comply with the NFIP's standards for updating and adopting floodplain maps and maintaining 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 community capabilities in Section 2 of this plan and the flood vulnerability discussion in Section 4.3.

5.3.3 Updated Mitigation Action Plan

A summary of the action items is captured in Table 5.2 including a description of the action, priority, hazards intended to be mitigated, the parties responsible for implementation, and an action identification number to make actions easier to track and reference in the future. For each identified action a worksheet designed to capture additional details was filled out by the HMPC member or organization taking the lead on action implementation. These details include: action intent, hazard(s) mitigated, other alternatives considered, cost, benefits (losses avoided), responsible entity, priority, and potential funding. These action details are captured in Appendix A. Many 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 a double asterisk '**' in the action title. These actions include those that promote wise development and hazard avoidance, such as building code, mapping and zoning improvements, and continued enforcement of floodplain development regulations. Actions carried forward from the 2013 plan are indicated by a triple asterisk '***.' Progress on those actions can be referenced in the detailed project descriptions in Appendix A.

Table 5.2. Gunnison County Mitigation Action Summary Table

Action ID #	Hazard(s)	Action Description	Jurisdiction/ Responsible Party	Related Goal(s)*	Priority
1	Dam Failure	Review and update all High and Significant dam Emergency Action Plans, annually review flood planning, establish contingency plans and evacuation routes. Perform organized individual dam or regional Emergency Action Plan exercises; drill, tabletop, and/or functional. *** Comment: The 2013 HMP listed only Taylor Dam in this action. It has been changed to include all High and Significant Risk Dams in Gunnison County, as identified by the Colorado Division of Water Resources Dam Safety.	Dam Owners, Gunnison County, City of Gunnison, Gunnison County Emergency Management, Colorado Division of Water Resources Dam Safety; U.S. Bureau of Reclamation	1, 2, 3	M

Action ID #	Hazard(s)	Action Description	Jurisdiction/ Responsible Party	Related Goal(s)*	Priority
2	Drought	Monitor water issues in City of Gunnison area, monitor city's wells for contamination or dropping water tables, continue acquiring water rights in the area*** Comment: The City purchased the Van Tuyl property as one alternative for mitigating the effects of drought. The Van Tuyl property is irrigated ranch land, and recharges several of the City's wells. Though the City completed the land purchase, this will be an on-going action, as maintenance and upkeep on the land and irrigation ditches will be required	City of Gunnison/City of Gunnison Public Works	1, 3,	M
3	Extreme Cold	Acquire alternate sources of heat / power for Crested Butte Town Hall, Fire Department, and Marshal's Office when gas, electricity is terminated or during winter storms / extreme cold***	Crested Butte/Crested Butte Public Works	2,	H
4	Flood	Continued compliance with NFIP**	Gunnison County	1, 2, 3	H
5	Flood	Continued compliance with NFIP**	City of Gunnison	1, 2, 3	H
6	Flood	Become member of COWARN - water and wastewater industry, access to resources***	Crested Butte South Metro District	1, 2	M
7	Flood	Evacuation route work for Arrowhead, improve forest road 867 (primary evacuation route) to protect against flood damage and allow for reliable access and egress during emergency incidents***	Arrowhead/Arrowhead Fire Protection District, Arrowhead HOA, Gunnison County	1, 2	M
8	Flood	Continued preparation and awareness for flooding***	Gunnison County/County Manager, law enforcement, fire departments, EMS, Public Works, County Emergency Management	1, 2, 3	H
9	Multi-hazard	Evacuation Planning for Gunnison County.***	Gunnison County, Crested Butte Fire Protection District	1	M
10	Multi-hazard	Emergency evacuation access for Mt. Crested Butte pending an emergency within city limits or outside limits***	Mt Crested Butte/Mt. Crested Butte Community Development, Police, Fire Department, Gunnison County Emergency Management	1	L
11	Multi-hazard	Improve drainage and road surface along Section 2 of Alpine Plateau Road for emergency access/egress***	Gunnison County/Gunnison County Public Works, USFS, BLM, Arrowhead Improvements Association	1, 2	H
12	Multi-hazard	Back-up power for each critical facility ***	Gunnison County	2	M
13	Multi-hazard	Improve public warning***	Gunnison County	1	H

Action ID #	Hazard(s)	Action Description	Jurisdiction/ Responsible Party	Related Goal(s)*	Priority
14	Multi-hazard	Assess and identify repeater sites to ensure communication during wildland fire, avalanche, severe weather events***	City of Gunnison	1, 2	L
15	Multi-Hazard	Threat Hazard Identification and Risk Assessment for man-caused hazards***	Gunnison County/Gunnison County Emergency Management	1, 2, 3	H
16	Wildland Fire	Implementation of landscape scale fuels reduction projects as well as defensible space projects as identified in the Gunnison County CWPP and other community specific CWPPs.***	Multi-jurisdictional/WRWC, Gunnison FPD, CBFPD, CSFS, Gunnison County EM, GBWC	1, 2, 3	H
17	Wildland Fire	Develop defensible space regulations as a requirement and/or limit new development in high risk areas*** Comment - See project 28	Multi-jurisdictional/Gunnison County Community Development, Fire Districts, Gunnison County Emergency Management	1, 2, 3	H
18	Wildland Fire	Continue to promote wildland fire awareness throughout Gunnison County through public education and outreach programs and materials***	Gunnison County/Gunnison County Emergency Management & Community Development, WRWC, GBWC, State FS	1, 2, 3	H
19	Wildland Fire	Continued wildland fire fuels mitigation***	Arrowhead/Arrowhead Fire Protection District	1, 2, 3	M
20	Wildland Fire	Promote and assist with the development of community specific CWPPs in higher wildland fire risk areas***	Multi-jurisdictional/WRWC, Gunnison County EM, FPDs	1, 2, 3	M
21	Wildland Fire	Evacuation route work for Marble***	Marble/Carbondale Fire & Sheriff	1	M
22	Wildland Fire	Create safer evacuation routes from wildland fire for Spring Creek ***	Spring Creek /Gunnison County Fire Department and Emergency Management	1, 2, 3	M
23	Wildland Fire	Eliminate wildland fire fuels on private lots throughout subdivision***	Crested Butte South Metro District	1, 2, 3	L
24	Wildland Fire***	Continued wildland fire prevention and preparation***	Gunnison County/Gunnison County Emergency Management, law enforcement, EMS, fire departments, County Public Works, Gunnison Basin Wildfire Council, County Community Development, State FS, WRWC	1, 2, 3	H
25	Wildland Fire	Continued wildland fire public education***	Arrowhead/Arrowhead Fire Protection District	1, 2, 3	H
26	All Hazards	Create mutual aid agreements or	Gunnison County, Town	1, 2, 3	H

Action ID #	Hazard(s)	Action Description	Jurisdiction/ Responsible Party	Related Goal(s)*	Priority
		memorandums of understanding for equipment/personnel sharing during all hazard emergencies and disasters***	of Crested Butte/Gunnison County Public Works		
27	Winter Storms	Preparation for extreme winter weather***	Gunnison County/Gunnison County Emergency Management, law enforcement, EMS, fire departments, County Public Works	1, 2, 3	H
28	Wildland Fire	Wildfire Regulatory Changes****	Gunnison County Community Development	1, 2, 3	H
29	Flooding	Flooding Hazard Mitigation for City of Gunnison, West of 8th Street****	City of Gunnison	1, 2	L
30	Avalanche	Avalanche Mitigation and Education****	Mt. Crested Butte	1, 2, 3	M
31	Wildland Fire	Wildfire Mitigation Activities ****	Crested Butte	1, 2, 3	H
32	Wildland Fire	Create safer evacuation routes from wildland fire for White Pine***	White Pine/Gunnison County Fire Department and Emergency Management	1, 2, 3	M

*Goal 1: Reduce the potential impact of hazards on the safety of the County's citizens and guests; Goal 2: Reduce the potential impact of hazards on critical facilities, local government assets, infrastructure, private property and critical support services; Goal 3: Reduce the potential impact of hazards on the County's economy, natural resources, historic treasures and interests, and other characteristics which add to the quality of life of the citizens and guests of the County; Goal; 4: Identify and implement cost effective hazard mitigation and avoidance measures so as to accomplish the County's goals.
**Action related to prevention of losses to future development.
***Action carried over from 2013 Plan.
****New Actions created in 2020 update.

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 Gunnison 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 E Plan Adoption. The plan will need to be re-adopted every five years in accordance with the plan update requirements which are described further in Chapter 7.

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.

7.1 Implementation

Once updated and adopted this plan is intended to be implemented so that the County response area's vulnerability to natural hazards can be reduced over time. While this plan contains many worthwhile mitigation actions, 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 can sometimes most easily demonstrate progress toward successful plan implementation.

Implementation will be accomplished by adhering to the schedules identified for each action (see Appendix A Mitigation Actions) and through constant, pervasive, and energetic efforts to network and highlight the multi-objective, win-win benefits of each project to the Gunnison County response area 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 to prevent problems from becoming worse; and
- COMMUNICATE the hazard information collected and analyzed through this planning process so that local governments and the public 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 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 Gunnison County emergency management. 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;
- 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 Gunnison Board of County Commissioners and participating jurisdictions' governing boards; and
- Inform and solicit input from the public.

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

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.

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. County emergency management is responsible for initiating this review and convening members of the HMPC on a once yearly basis, or more frequently as needed. The annual review is recommended to occur in the month of November.

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 summer 2023. The County will inquire with COEM and FEMA for funds to assist with the update. Funding sources may include the Emergency Management Performance Grants, BRIC, and Hazard Mitigation Grant Program (if a presidential disaster has been declared) funds. Should a BRIC planning grant be sought, the application should be submitted in 2023.

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).

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 and 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, and 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.

Updates to this plan will follow the most current FEMA, COEM, and CRS-FMA planning guidance and consider the following:

- 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, or projected development that could be vulnerable to hazards,
- 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 COEM/FEMA, and
- Include readoption by all participating entities following COEM/FEMA approval.

7.2.3 Incorporation into Existing Planning Mechanisms

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:

- 2012 Draft Gunnison County Emergency Operations Plan
- 2018-2023 Colorado Hazard Mitigation Plan
- 2011 Gunnison County CWPP

- 2018 Saguache County Multi-Hazard Mitigation Plan
- 2008 Western Saguache County CWPP
- Gunnison County Land Use Resolution, reprinted in 2006
- 2005 Crested Butte to Gunnison Corridor Comprehensive Plan
- 2005 Upper Crystal River Valley Comprehensive Plan
- Activities related to CRS participation for the County and City of Gunnison

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. The mitigation plan can be considered a core document that links to other related planning mechanisms that will build from the information and recommendations contained herein. An example would be using the risk assessment information to update the hazard analysis in the Gunnison County EOP. Gunnison County Emergency Management will also be conducting a THIRA for man-made hazards and intends to follow a similar planning process that was used for this natural hazards plan. Another example is using this plan to outline in more detail the project recommendations in the 2011 Countywide CWPP or individual CWPPs and the steps toward implementation of those projects.

7.2.4 Continued Public Involvement

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 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, and press releases to local media. Public awareness of the plan and individual flood mitigation strategies could be developed on an annual basis during public outreach each spring before the runoff begins. This can also occur in coordination with CRS public notification activities.

APPENDIX A MITIGATION ACTIONS

The following appendix provides project specifics and implementation details for mitigation actions identified. They are grouped by the type of hazard(s) they address (see Section 5.3 Mitigation Action Plan for summary).

1. Review and monitor High and Significant (risk) Dam Emergency Action Plans (EAP), annually review flood planning, and establish contingency plans and evacuation routes

Hazards Addressed	Dam Failure
Project Description and Background	Review and update all High and Significant dam Emergency Action Plans, annually review flood planning, establish contingency plans and evacuation routes. Perform organized individual dam or regional Emergency Action Plan exercises; drill, tabletop, and/or functional
Other Alternatives	Annually review flood planning which would not only deal with annual runoff but apply to dam failure. Identify and establish contingency plans for communications and transportation.
Jurisdiction	Gunnison County, City of Gunnison, Dam Owners
Responsible Office	Gunnison County Emergency Management, Colorado Division of Water Resources Dam Safety; Bureau of Reclamation
Priority	Medium
Cost Estimate	Low – staff time
Benefits	Establish local planning to compliment the dam EAPs.
Potential Funding	Not applicable.
Schedule	Ongoing

2. Monitor water issues in City of Gunnison area

Hazards Addressed	Drought
Project Description and Background	Colorado continues to experience reduced annual moisture levels, affecting ranching, recreation, and potentially water supplies. The City of Gunnison will continue to monitor water issues in the area. The City has acquired several water rights in the area and continues to use those rights to maintain their viability. Additionally, the City will monitor City wells for contamination or dropping water tables.
Other Alternatives	The City of Gunnison purchases the Van Tuyl Ranch property with the intent of maintaining it as a working agricultural site which provides water recharge for the city well system. The City of Gunnison participates in the Colorado Source Water Assessment and Protection Program as part of our mitigation efforts.
Jurisdiction	City of Gunnison
Responsible Office	City of Gunnison Public Works
Priority	Medium
Cost Estimate	TBD
Benefits	Use existing water rights to maintain well recharge area. Use water rights as a source of potable water as allowable. Monitor to be able to take additional mediation steps as needed early.
Potential Funding	Establish budget – City of Gunnison
Schedule	Ongoing

3. Acquire alternate sources of heat/power for Crested Butte Town Hall, Fire Department, and Marshal's Office

Hazards Addressed	Extreme Cold, Severe Winter Storm, Windstorm
Project Description and Background	When gas lines fail or electric lines fail in the winter, buildings and people can become cold. The Crested Butte Town Hall is a central large space where people can go for shelter. Alternate sources of heat may be needed to keep the building warm for people staying there in the event of a power outage. The Town needs to acquire portable alternate energy sources like diesel generators, but preferably generators that do not use fossil fuels.
Other Alternatives	Install solar panels on Town Hall to generate hot water or electricity to warm the building. Also need to heat critical facilities such as marshal's office, community radio station, fire hall
Jurisdiction	Town of Crested Butte
Responsible Office	Crested Butte Public Works
Priority	High
Cost Estimate	$200K
Benefits	Protect life safety and reduce property damages related to extreme cold
Potential Funding	Local funds, disaster recovery funding, HMGP, FEMA Hazard Mitigation Assistance, EMPG, Colorado Governor's Energy Office
Schedule	By 2014

4. Continue to implement sound floodplain management practices in Gunnison County through participation in the National Flood Insurance Program and updated statewide floodplain rules

Hazards Addressed

Flood

Project Description and Background

Gunnison County participates in the National Flood Insurance Program (NFIP). This project restates the commitment of Gunnison County to implement sound floodplain management practices, as stated in the 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 above the base flood elevation. Floodplain managers will remain current on NFIP policies, and are encouraged to attend appropriate training and consider achieving Certified Floodplain Manager (CFM) status.

This project also includes periodic reviews of the floodplain ordinance to ensure that it is clear, up to date, and adequately addresses the level of flood risk identified within the Hazard Mitigation Plan. Because of the adoption of updated statewide floodplain rules and regulations (effective January 14, 2011) the CWCB will require local governments to revise their floodplain ordinance to comply with the new rules by January 2014.

Other activities that could be included in this effort are:

- Ensure that stop work orders and other means of compliance are being used as authorized by each ordinance;
- Suggest changes to improve enforcement of and compliance with regulations and programs;
- Participate in Flood Insurance Rate Map updates by adopting new maps or amendments to maps;
- Utilize recently completed Digital Flood Insurance Rate Maps (DFIRMs) in conjunction with GIS to improve floodplain management, such as improved risk assessment and tracking of floodplain permits;
- Promote and disperse information on the benefits of flood insurance, with assistance from partners such as the City of Gunnison, Town of Mt. Crested Butte, the Town of Crested

Butte, and the Colorado Water Conservation Board; and
- Evaluate improving the County's rating with the Community Rating System to further lower the cost of flood insurance for residents.

Other Alternatives	None identified
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Community Development Department
Priority	High
Cost Estimate	Low
Benefits	Reduced property loss from floods, continued availability of flood insurance for residents, reduced vulnerability of new development to flooding
Potential Funding	County budget
Schedule	Some activities are complete, while some are ongoing: • Ongoing - We are required to submit an annual report to participate in the NFIP/CRS Program, with a five-year on-site review. We are currently in good standing. • Ongoing - We review all building, OWTS, and land use permit applications for compliance with our floodplain regulations. • Completed - We updated the LUR Floodplain regulations in 2013, Resolution #2013-06, May 7, 2013, in compliance with the CWCB mandate. • Completed – The floodplain mapping project on the Gunnison, East and Slate Rivers, with FEMA adoption of the new NFIP - FIRM floodplain maps on May 16, 2013.

5. Continue to implement sound floodplain management practices in the City of Gunnison through participation in the National Flood Insurance Program and updated statewide floodplain rules

Hazards Addressed

Flood

Project Description and Background

The City of Gunnison participates in the National Flood Insurance Program (NFIP). This project restates the commitment of the City of Gunnison to implement sound floodplain management practices, as stated in the 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 above the base flood elevation. Floodplain managers will remain current on NFIP policies, and are encouraged to attend appropriate training and consider achieving Certified Floodplain Manager (CFM) status.

This project also includes periodic reviews of the floodplain ordinance to ensure that it is clear, up to date, and adequately addresses the level of flood risk identified within the Hazard Mitigation Plan. Because of the adoption of updated statewide floodplain rules and regulations (effective January 14, 2011) the CWCB will require local governments to revise their floodplain ordinance to comply with the new rules by January 2014.

Other activities that could be included in this effort are:

- Ensure that stop work orders and other means of compliance are being used as authorized by each ordinance;
- Suggest changes to improve enforcement of and compliance with regulations and programs;
- Participate in Flood Insurance Rate Map updates by adopting new maps or amendments to maps;
- Utilize recently completed Digital Flood Insurance Rate Maps (DFIRMs) in conjunction with GIS to improve floodplain management, such as improved risk assessment and tracking of floodplain permits;
- Promote and disperse information on the benefits of flood insurance, with assistance from partners such as Gunnison County, the Town of Mt. Crested Butte, the Town of Crested

	Butte, and the Colorado Water Conservation Board; and • Evaluate improving the City's rating with the Community Rating System to further lower the cost of flood insurance for residents.
Other Alternatives	None identified
Jurisdiction	City of Gunnison
Responsible Office	City of Gunnison Community Development Department
Priority	High
Cost Estimate	Low
Benefits	Reduced property loss from floods, continued availability of flood insurance for residents, reduced vulnerability of new development to flooding
Potential Funding	City budget
Schedule	Ongoing

6. Become a member of CoWARN –

Hazards Addressed	Multiple
Project Description and Background	Crested Butte South Metropolitan District should become a member of Colorado's Water/Wastewater Agency Response Network (CoWARN). Natural disasters or emergencies can compromise water and wastewater infrastructure. CoWARN provides a statewide resource for water and wastewater utility companies to aid one another during disasters and emergencies. Membership in CoWARN would grant participating municipalities access to other members' resources, including equipment, repair parts, and years of expertise from Colorado's top water/wastewater professionals.
Other Alternatives	Local intergovernmental agreements (IGAs)
Jurisdiction	Crested Butte South Metropolitan District
Responsible Office	Crested Butte South Metropolitan District
Priority	Medium
Cost Estimate	Minimal, just occasional transportation costs to attend meetings on the front range.
Benefits	In the event of a natural disaster where infrastructure, treatment plants, or water producing capabilities were compromised, Crested Butte South Metro District would have resources from equipment, parts, etc., to get vital portions of the community back online.
Potential Funding	General fund
Schedule	5 years

7. Evacuation Route Work for Arrowhead/Improving Forest Road 867

Hazards Addressed	Flood
Project Description and Background	Forest Road 867 serves as the primary evacuation route for the Arrowhead community. This road needs to be improved to protect against flood damage and allow for reliable access/egress during emergency incidents.
Other Alternatives	None identified
Jurisdiction	Arrowhead community
Responsible Office	Arrowhead FPD, Arrowhead HOA, Gunnison County
Priority	Medium
Cost Estimate	TBD
Benefits	Protect life safety related to wildland fire and flood events that impact the Arrowhead community; Reduced damages from flooding; maintain access/egress for first responders
Potential Funding	Local, state, and federal funds
Schedule	TBD

8. Continued preparation and awareness for flooding

Hazards Addressed	Flood
Project Description and Background	Gunnison County should continue flood preparation and awareness efforts. Floods, especially flash floods, can occur very quickly and offer little warning for people to get to a safe location. Through flood preparation and awareness, citizens can protect their lives and homes. This effort will help provide citizens with the necessary knowledge to stay safe during a flood or to develop family emergency plans before a flooding event occurs. Preparation and awareness activities can also improve emergency response capabilities by teaching first responders how to monitor environmental and climate conditions for flooding potential. This is an ongoing activity in the Gunnison County Office of Emergency Management (OEM) and other agencies.
Other Alternatives	None identified
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Manager, law enforcement, fire departments, EMS, Gunnison County Public Works, Gunnison County Emergency Management
Priority	High
Cost Estimate	TBD
Benefits	Protect life and property and reduce losses
Potential Funding	Local and state sources
Schedule	Ongoing

9. Evacuation Planning for Gunnison County

Hazards Addressed	Multiple
Project Description and Background	There is no county-wide evacuation plan for Gunnison County. Some evacuation routes have been established, and some evacuation plans have been developed for high risk wildland fire areas, but no county-wide plan exists. Evacuation plans should be developed or improved at the jurisdictional level, the municipal level, and the county level with MOUs in place among all parties.
Other Alternatives	None identified
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Emergency Management, law enforcement, fire districts, Gunnison County Public Works, Crested Butte FPD
Priority	Medium
Cost Estimate	TBD
Benefits	Protecting life safety and enhancing relationships with partners at the local, regional, state, etc. level.
Potential Funding	Local sources
Schedule	Ongoing

10. Emergency evacuation access for Mt. Crested Butte

Hazards Addressed	Multiple
Project Description and Background	Currently County Road 317 is the only available evacuation route from Mt. Crested Butte. The Town needs an alternative route in case CR 317 access is blocked north of the Town of Crested Butte.
Other Alternatives	Work with Gunnison County to improve bridge flood flows to higher levels. Determine alternative evacuation route.
Jurisdiction	Town of Mt. Crested Butte
Responsible Office	Town of Mt. Crested Butte Planning; Police and Fire; Support from Gunnison County Emergency Management
Priority	Low
Cost Estimate	TBD
Benefits	Be able to properly evacuate and provide emergency services to Mt. Crested Butte citizens and guests in case of an emergency.
Potential Funding	TBD
Schedule	TBD

11. Improve drainage and road surface along Section 2 of Alpine Plateau Road for emergency access/egress

Hazards Addressed	Multiple
Project Description and Background	Section 2 of the Alpine Plateau Road needs to be improved for emergency access/egress purposes. This would entail improving the surface and drainage of the road. The Alpine Plateau Road is the single, year round route in and out of the Arrowhead Ranch Subdivision, other private residential or ranching sites, and large forest and other wild lands. In the event of wild land fires, floods, extreme winter weather, or other events the ability of emergency response agencies to move people and equipment into areas served by the road may be severely impacted. Similarly it may become impossible to evacuate residents and visitors resulting in significant threat to the lives of the affected people. While significant improvements to portions of the road have been accomplished by the USFS, Gunnison County Public Works, and the Arrowhead Improvements Association several high risk hazards remain as documented in Attachment A – Issues and Risks.
Other Alternatives	There is an unmaintained road from Hazel Lake Drive that passes through private ranch lands to reach US 50 near the CDOT facility in the Big Blue Creek valley. That is not a public road and use of federal, state, or county funds to improve that road as an alternative to the Alpine Plateau Road is not appropriate. This road is also not open to wheeled vehicle traffic during many months due to snowfall. Changing that would require significant recurring costs. Using the southern approach to the Arrowhead Ranch Subdivision from highway 149 is possible for limited purposes. However, the terrain along long portions of that road is very steep resulting in narrow roads and switchbacks. Making that portion of the Alpine Plateau Road suitable either for rapid evacuation or for insertion of emergency vehicles would be nearly impossible and very expensive. In addition the environmental impact due to construction would be extreme. This portion of the Alpine Plateau Road is also not open to wheeled vehicle traffic during many months due to snowfall. Changing that would require major recurring costs and would add danger to the snow handling team. There are trails that lead east from the area surrounding the

	Arrowhead Ranch subdivision that have a potential for use as either an ingress or egress path. However the cost of converting them to usable roads would be prohibitive and would introduce an additional party in the form of the Mountain Ute tribe.
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Department of Public Works with support from USFS, BLM, and Arrowhead Improvements Association
Priority	High
Cost Estimate	Widening the road - $49.6K, repairing roadbed erosion - $17.5K, fixing line of sight limitations - $49.6K, trafficability - $99.8K
Benefits	Losses could include both loss of life ranging from few to hundreds as well as property losses ranging from a single dwelling ($300,000 average) to the entire subdivision estimated at $100M or more.
Potential Funding	Existing maintenance funds are inadequate. FEMA or similar grant funding may be the only effective source.
Schedule	Significant work could be accomplished in a single season but at least two full seasons are needed to complete all sub-projects.

12. Backup power for each critical facility

Hazards Addressed	Multiple
Project Description and Background	Critical facilities in Gunnison County and other jurisdictions should obtain backup power. Power outages and energy supply disruptions can compromise the ability of critical facilities to perform their mission essential functions. Having backup power during an emergency is especially important for critical facilities with a role in life safety, communications, or emergency response. Backup power is also important for public shelters, especially during extreme temperature events. The Crested Butte water treatment plant and wastewater treatment plant are currently equipped with backup generators.
Other Alternatives	None identified
Jurisdiction	Gunnison County and City of Gunnison
Responsible Office	All agencies
Priority	Medium
Cost Estimate	TBD
Benefits	Backup power will enable critical facilities to continue to perform mission essential functions during a disaster or emergencies. This can potentially save both lives and property.
Potential Funding	Local funds, disaster recovery funding, HMGP, FEMA Hazard Mitigation Assistance, EMPG, Colorado Governor's Energy Office
Schedule	Next 5 years

13. Improve public warning

Hazards Addressed	Multiple
Project Description and Background	Gunnison County and other jurisdictions should improve their public warning systems. Many natural hazards occur rapidly, potentially placing people and property at great risk. Advanced public warning can give people time to seek shelter or safety, and give emergency responders a chance to prepare for deployment. Public warning needs to be able to alert citizens to shelter in place, evacuate, or take other safety measures depending on the nature of the specific hazard. Citizens must be able to receive and understand the warning message(s) being given. As technology and lifestyles change, public warning systems need to adapt and diversify to reach the greatest number of people. Both permanent and seasonal residents need access to public warning systems.
Other Alternatives	None identified
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Emergency Management, law enforcement, fire departments
Priority	High
Cost Estimate	TBD
Benefits	Increase life safety for both citizens and emergency responders
Potential Funding	Local funds, State of Colorado, Ready Colorado
Schedule	TBD

14. Assess and identify repeater sites to ensure communication during emergencies or disasters

Hazards Addressed	Multiple
Project Description and Background	The City of Gunnison should identify and assess repeater sites to ensure that communications can be maintained during emergencies or disasters. City of Gunnison operates the Regional Emergency Radio system for Gunnison and Hinsdale County. It is the primary contact for local law enforcement, ambulance, and fire services as well as communications with state and federal agencies in the region. Communications is accomplished by a series of repeaters located at several locations around the two counties. Repeaters are housed in County owned facilities, federal facilities, and private facilities. Repeater locations are potentially located in areas with limited access or susceptible to power outages caused by avalanches, heavy snows, wildland fires, or severe weather.
Other Alternatives	Repeater locations should be clearly identified. Each repeater site should have available routes identified and methods of travel identified depending on time of year and local travel restrictions. Routine maintenance schedule should be established to include winterization. Alternate communications options should be established if a repeater fails. Power needs and concerns should be established to deal with issues that may arise.
Jurisdiction	City of Gunnison
Responsible Office	City of Gunnison Police Department
Priority	Low
Cost Estimate	TBD
Benefits	Maintain equipment on good working order preventing outages. Identify the threats and resources needed now to shorten the response and repair time in the event of an outage. If an outage is unavoidable, limit the impact by having alternate communications options determined.
Potential Funding	Established City Budget Process and Regional 911 Board

Schedule	Ongoing – Addition of Comstock Communications site has been completed since the 2013 HMP.

15. Threat Hazard Identification and Risk Assessment for Man-Caused Hazards

Hazards Addressed	Multiple
Project Description and Background	The Gunnison County Hazard Mitigation Planning Committee recognizes that man-caused hazards should be planned for, in addition to natural hazards. The County will be developing a Human Caused/Technical Hazard Identification and Risk Assessment, or THIRA, following recently released federal guidelines. The THIRA will supplement the Natural Hazard Mitigation Plan update by analyzing man-made hazards in Gunnison County. The THIRA will set capability targets for dealing with threats and hazards in the community. The THIRA process will be modeled after the process used to update the HMP. Many of the stakeholders involved in the Natural Hazard Mitigation Planning process will also be involved in the Human Caused/Technical Hazard Planning process.
Other Alternatives	None identified
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Emergency Management
Priority	High
Cost Estimate	TBD
Benefits	Identify risks associated with man-made hazards to supplement Gunnison County Natural Hazard Mitigation Plan Update, improve emergency management capabilities, reduce losses to life and property
Potential Funding	State - EMPG
Schedule	TBD

16. Implementation of landscape-scale fuels reduction projects and defensible space projects identified in the County and local level CWPPs

Hazards Addressed	Wildland Fire
Project Description and Background	Obtain funding to support the implementation of the Gunnison County CWPP fuels reduction and defensible space recommendations to reduce the wildland fire risk to identified communities within the county.
Other Alternatives	Encourage HOAs and individual homeowners to complete defensible space without funding assistance.
Jurisdiction	County and all jurisdictions
Responsible Office	WRWC, Gunnison FPD, CBFPD, CSFS, EM, GBWC
Priority	High
Cost Estimate	$2,500-$3,000 per acre treated (approximate)
Benefits	Mitigation work in high risk wildland fire areas increases chances of structural survivability as well as changes fire behavior therefore reducing the risk for first responders / suppression efforts. Mitigation also reduces risk for life safety and increases evacuation success.
Potential Funding	FEMA, local counties. BLM/USFS
Schedule	On-going

17. Develop defensible space regulations as a requirement and/or limit new development in high risk areas

Hazards Addressed	Wildland Fire
Project Description and Background	Gunnison County should implement defensible space recommendations, and/or limit development in high wildland fire risk areas. Defensible space is recommended but not required in much of Gunnison County, although the Crested Butte Fire Protection District does require implementation of defensible space. Development continues to occur in high wildland fire hazard areas without sufficient egress and access. In the Crested Butte area, development occurs on 35-acre lots over which the County has no subdivision approval control. This presents a significant public safety and property protection issue as first responders may not be able to reach threatened people or property during a wildland fire.
Other Alternatives	Continue as recommendation only
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Community Development, fire districts, Gunnison County Emergency Management
Priority	High
Cost Estimate	Staff time
Benefits	Avoid loss of life and structures
Potential Funding	County general fund, grants
Schedule	2013-2014

18. Continue to promote wildland fire awareness throughout Gunnison County through public education and outreach programs/materials

Hazards Addressed	Wildland Fire
Project Description and Background	Participate in the development of a regional wildland fire education and outreach program. Materials to include the development of wildland fire education publication. Support events, meetings and other outreach opportunities to deliver concise and clear messages to the public about wildland fire risk, mitigation actions, and evacuation information.
Other Alternatives	N/A
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Emergency Management, WRWC, GBWC, CSFS, Gunnison County Community Development
Priority	High
Cost Estimate	5K
Benefits	Increasing public awareness about wildland fire risk, and how to prepare and mitigate against those risks reduces property and life losses in actual events.
Potential Funding	Counties, FEMA, WRWC
Schedule	Completed by January 1, 2013

19. Continued Wildland Fire Fuels Mitigation for Arrowhead Fire Protection District

Hazards Addressed	Wildland Fire
Project Description and Background	Arrowhead Fire Protection district has been engaged in various wildland fuels mitigation projects. Continued efforts need to be made to develop defensible space, fuel breaks, and other projects as recommended in the Gunnison County CWPP.
Other Alternatives	None identified
Jurisdiction	Arrowhead community
Responsible Office	Arrowhead FPD
Priority	Medium
Cost Estimate	TBD
Benefits	Protect life and property, reduce losses related to wildland fire
Potential Funding	FEMA, BLM/USFS, CSFS, WRWC, local sources
Schedule	Ongoing

20. Promote and assist with the development of community specific CWPPs in higher wildland fire risk areas

Hazards Addressed	Wildland Fire
Project Description and Background	Obtain funding assistance for communities and/or FPD interested in developing a community specific CWPP. These plans would further the already developed County CWPP by providing detailed wildland fire risk and mitigation actions specific to the community.
Other Alternatives	County wide CWPP
Jurisdiction	Any communities in Gunnison County
Responsible Office	WRWC, County EM, FPDs
Priority	Medium
Cost Estimate	Plan scale dependant
Benefits	Planning for wildland fire events, identifying potential risk reduction projects and identifying at risk areas helps homeowners, HOAs, first responders and emergency managers mitigate against life and property loss.
Potential Funding	FEMA, BLM, Counties, FPDs
Schedule	On-going

21. Evacuation Route Work for Marble

Hazards Addressed	Wildland Fire
Project Description and Background	Evacuation route thinning is a recommended mitigation activity in the Gunnison County CWPP due to the one way access and egress to the Town of Marble.
Other Alternatives	None identified
Jurisdiction	Marble
Responsible Office	Carbondale Fire and Sheriff
Priority	Medium
Cost Estimate	TBD
Benefits	Protect life safety for Marble residents
Potential Funding	Local funding sources
Schedule	Next five years

22. Create safer evacuation routes from wildland fire for Spring Creek

Hazards Addressed	Wildland Fire
Project Description and Background	Safer evacuation routes need to be developed for Spring Creek. There currently are no requirements for evacuation to avoid fire events. Uncontrolled combustible growth is allowed along evacuation routes. This makes evacuation routes unnecessarily dangerous and could impede emergency personnel from responding to threatened people or property along these evacuation routes.
Other Alternatives	Develop safer evacuation through hiring a contractor
Jurisdiction	Spring Creek
Responsible Office	Gunnison County Fire Department and Gunnison County Emergency Management, USFS, WRWC CSFS
Priority	Medium
Cost Estimate	Unknown at this time
Benefits	Avoid potential loss of life as a result of poor and unsafe egress during a wildland fire event
Potential Funding	Possible grants
Schedule	ASAP

23. Eliminate wildland fire fuels on private lots throughout the Crested Butte South Metropolitan District subdivision

Hazards Addressed	Wildland Fire
Project Description and Background	Several lots in CB South have experienced Aspen die off as has a lot of Western Colorado. The plan would be to contact private owners of the lots and build a strategy to remove fire fuel off their lots and reduce fire risk throughout the subdivision. The main challenge is that it is private property. CB South Metro has a good relationship with its owners and therefore can make this a feasible project.
Other Alternatives	Pass a resolution requiring property owners to remove fire fuels on their own.
Jurisdiction	Crested Butte South Metropolitan District
Responsible Office	Crested Butte South Metropolitan District
Priority	Low
Cost Estimate	$50,000
Benefits	Several structures are built in areas surrounded by these dead aspen trees. There are also neighboring subdivisions that would receive the benefits of fire fuel removal.
Potential Funding	General fund, Grants
Schedule	5 years

24. Continued wildland fire prevention and preparation

Hazards Addressed	Wildland Fire
Project Description and Background	Nearly all of Gunnison County lies within the WUI. Wildland fires are expected to occur each year, so the County needs to be prepared to deal with these events and mitigate them wherever possible. Prevention and preparation activities can reduce losses to life and property in the County. Prevention and preparation activities may include implementing defensible space, educating the public, taking inventory of capabilities and positioning resources, establishing mutual aid agreements with other jurisdictions and agencies, implementing burning restrictions, etc.
Other Alternatives	None identified
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Emergency Management, law enforcement, fire districts, EMS, Gunnison County Public Works, Gunnison Basin Wildfire Council, Gunnison County Community Development, CSFS, WRWC
Priority	High
Cost Estimate	TBD
Benefits	Protection of life safety and property in Gunnison County, reduced emergency response times for wildland fire events
Potential Funding	Local and state sources
Schedule	Ongoing

25. Continued wildland fire public education

Hazards Addressed	Wildland Fire
Project Description and Background	A strong public education program helps the public prepare for wildland fires. Several different methods can be used to educate the public, including Town Hall style meetings, brochures, media articles, interviews, websites, etc. The public should know about how and when to shelter in place or evacuate, preparing a family emergency plan/kit, preparing a pet safety plan/kit, protecting important documents, etc. Creating defensible space around the home is an especially important part of wildland fire public education. The public can take several measures to protect their home from fire and make it easier for fire crews to defend the home when it is threatened. This is part of an ongoing effort within Gunnison County OEM and other agencies.
Other Alternatives	None identified
Jurisdiction	Arrowhead community
Responsible Office	Arrowhead FPD
Priority	High
Cost Estimate	TBD
Benefits	Protect life and property, reduce losses
Potential Funding	FEMA, BLM/USFS, WRWC, local sources, State of Colorado, Ready Colorado
Schedule	Ongoing

26. Create mutual aid agreements or memorandums of understanding for equipment/personnel sharing during severe winter storms

Hazards Addressed	Severe Winter Storms
Project Description and Background	Gunnison County is prone to severe winter storms, which can potentially create life safety issues. A memorandum of understanding (MOU) should be established among Gunnison County, the City of Gunnison, Crested Butte South Metropolitan District, the Town of Crested Butte, and the Town of Mt. Crested Butte to ensure that emergency routes are maintained and accessible during periods of severe winter storms.
Other Alternatives	If all jurisdictions named do not want to participate, establish a MOU among the parties that do wish to participate.
Jurisdiction	Gunnison County, Town of Crested Butte, City of Gunnison, Town of Mt CB
Responsible Office	Gunnison County Public Works
Priority	High to Medium
Cost Estimate	TBD
Benefits	Avoid unnecessary delays to emergency response or evacuation.
Potential Funding	Local sources; staff time
Schedule	As soon as possible.

27. Preparation for Extreme Winter Weather

Hazards Addressed	Severe Winter Storms
Project Description and Background	Severe winter storms are not unusual in Gunnison County given the local climate and elevation. These storms have the potential to isolate an area by making roads impassible. Deliveries of supplies, such as food and fuel, can be delayed by severe storms. Power outages can occur, and critical facilities may not be able to perform important functions unless they are equipped with backup power. Preparation activities can help mitigate these effects and ensure that citizens have enough supplies and resources to last through a severe winter storm. This is an ongoing activity within Gunnison OEM and other agencies.
Other Alternatives	Update snow plowing equipment impact fees for new development. This is currently underway in the Town of Crested Butte. Snow plowing impact fees for all jurisdictions can help with preparation for extreme winter weather in new developments.
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Emergency Management, law enforcement, EMS, fire districts, Gunnison County Public Works, City of Gunnison, Town of CB, Town of Mt CB
Priority	High
Cost Estimate	TBD
Benefits	Protect life and property, reduce losses
Potential Funding	FEMA, State and local grants
Schedule	Ongoing

28. Wildfire Regulatory Changes

Hazards Addressed	Wildland Fire
Project Description and Background	Provide defensible space and wildfire mitigation, as a required review element of building permit review and issuance. Possible adoption of 2015 IWUIC code.
Other Alternatives	Regulatory changes associated with amendments to the Gunnison County Land Use Resolution – Section 11-105: Development in Areas Subject to Wildfire.
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Community Development
Priority	High
Cost Estimate	Low- staff time
Benefits	Protect life and property, reduce losses
Potential Funding	Staff Time
Schedule	Winter 2019

29. Flooding Hazard Mitigation for City of Gunnison, West of 8th Street

Hazards Addressed	Flooding
Project Description and Background	A system of head gates, ditches and ponds extends from the Gunnison River north of the City Limits and runs south through the West edge of City of Gunnison (West of 8th street) and reenters the river through the Lazy K Property, owned by the City of Gunnison. The waterway runs through several private and city owned properties and is a private ditch right of way. During flooding 1985 the waterway contributed to channeling flood waters from the river into the low laying areas within the City of Gunnison, West of 8th Street. Due to restricted water flow roads in the area were impacted threatening access to several residences and the nursing home. Public and private property West of 8th street was damaged from flood waters. The area affected in 1985 has continued to develop and consists of: single family residence, apartments, mobile homes, Senior RV Park, nursing home, City of Gunnison electrical substation and City of Gunnison Public Works buildings. The Lazy K Property was purchased by the City of Gunnison in 2013 and future development is pending as a park, public space and possible private development. Project proposed would be to evaluate and make improvements to the water drainage to increase the capacity to handle flood waters. Improve critical road sections crossing the waterway to accommodate higher water flows to insure access to at risk populations.
Other Alternatives	If feasible, an alternative would be to restrict flow to the existing ditch via series of berms or structures.
Jurisdiction	City of Gunnison
Responsible Office	City of Gunnison Community Development and Public Works
Priority	Low

Cost Estimate TBD depending on the selected methodology.

Benefits Increasing flood capacity of the existing waterway would reduce the extent and damage caused by flood waters. Reducing the flood extent would allow for more residents to shelter in place during the flood events. Additionally, improved stability of roads would further reduce the risk to residents living in the affected areas by strengthening the routes needed during any evacuations.

Potential Funding FEMA, DOLA, Colorado Outdoors

30. Avalanche Mitigation and Education for Mt. Crested Butte

Hazards Addressed	Avalanche
Project Description and Background	Avalanche mitigation and education for Mt. Crested Butte. There are specific avalanche zones in various areas throughout the Town of Mt Crested Butte (see attached avalanche zones map). Each avalanche zone poses a significant threat to human life and safety. The Town has a plan in place to improve existing signage as well as placing new signage in our avalanche zone areas. We will be changing the language on our existing signs. Our current signs deliver the message that is specific to the avalanche hazard zone as classified on the avalanche zone map. The existing signs are also color coded to signify the magnitude of the avalanche hazard. Since all the avalanche zones can result in loss of life, it is our goal to incorporate a singular and stronger message into our existing signage. "Avalanche Area Keep Out." All existing signs will be changed to show this message and all additional new signs will show this message as well. All signs will also be the color orange to signify the magnitude of the avalanche zone. Implementation is expected within the next year. Though this does not mitigate the hazard itself, it will help mitigate human exposure to the hazard.
Other Alternatives	
Jurisdiction	Town of Mt. Crested Butte
Responsible Office	Mt. Crested Butte Community Development
Priority	Medium
Cost Estimate	Low
Benefits	Increase awareness and reduce threat to life safety.
Schedule	2019

31. Wildland Fire Mitigation for the Town of Crested Butte

Hazards Addressed	Wildland Fire
Project Description and Background	The Town of Crested Butte is a former mining town, and is considered a Wildland Urban Interface (WUI) community. As such, it has a hazard rating of Moderate (2011 Gunnison County CWPP). Given the Town's proximity to the forest, building construction (mostly wood siding), and tightly packed building density, a wildland fire could cause considerable damage. Collaborating with the West Region Wildfire Council, United States Forest Service, Colorado State Forest Service, Crested Butte Fire Protection District and Gunnison County Emergency Management, develop a fuels mitigation plan for public lands surrounding the town, and private properties adjoining the public land, creating a "buffer" for the town. The plan would identify specific cross-boundary mitigation projects, possibly utilizing funding through the WRWC and the USFS Good Neighbor Authority.
Other Alternatives	Increase public awareness of the wildland fire threat in the Town of Crested Butte, and provide information to property owners on mitigation and preparedness actions. This would include offering grants for defensible space through the West Region Wildfire Council.
Jurisdiction	Town of Crested Butte
Responsible Office	Town of Crested Butte
Priority	High
Cost Estimate	An average per acre cost is ~$4,500. But this figure needs to be taken with a fairly large grain of salt because WRWC is seeing a lot of variability on per acre costs. Some of the primary drivers of cost variability include (but are not limited to): • Accessibility for equipment and sawyers, terrain/slope considerations • Wood utilization and merchantability - are there any forest products, of any value, that can come off of the site? • Forest/fuel type and fuel loads and distributions (current vs. future

objectives)

- Forest management/ silvicultural prescriptions - thinning, pruning, patch cuts, even-aged management, uneven-aged management, etc.
- Slash management options and requirements: pile burning vs. chipping vs. mastication vs. lop and scatter vs. Rx burning
- Contractor availability - timelines, contracting, etc.
- Fixed costs - mobilization, equipment, labor
- Scale - how many acres makes a difference in per acre cost

Benefits

Schedule 2019

32. Create safer evacuation routes from wildland fire for White Pine

Hazards Addressed	Wildland Fire
Project Description and Background	Safer evacuation routes need to be developed for White Pine. There currently are no requirements for evacuation to avoid fire events. Uncontrolled combustible growth is allowed along evacuation routes. This makes evacuation routes unnecessarily dangerous and could impede emergency personnel from responding to threatened people or property along these evacuation routes.
Other Alternatives	Develop safer evacuation through hiring a contractor
Jurisdiction	White Pine
Responsible Office	Gunnison County Fire Department and Gunnison County Emergency Management, USFS, WRWC CSFS
Priority	Medium
Cost Estimate	Unknown at this time
Benefits	Avoid potential loss of life as a result of poor and unsafe egress during a wildland fire event
Potential Funding	Possible grants
Schedule	ASAP

Appendix B Planning Process Documentation

Gunnison County Hazard Mitigation Plan Update

1st meeting, 10:00 am, Jan 19 2018 Gunnison County EOC

1. Introductions, facility info, safety info etc.
2. Purpose of the HMP and the update
   - ✓ Should we add Human Caused Hazards (HCH's)?
3. Schedule and process
   a. Updated plan to FEMA by Sept 1 2018. (Current plan expires Mar 4 2019, and must be approved by FEMA by that date)
   b. First meeting Jan 19. Review Section 2 Community Profiles and Section 4 Risk Assessment and Hazard Profile. Homework: meet with jurisdictional staff and continue to refine Sections 2 and 4.
   c. Updates for Section 2 Community Profile and 4 Risk Assessment to Emergency Management by Mar 14.
4. Set future meetings (below dates are tentative)
   a. **Meeting 09:00 am – 12:00 pm Wed Mar 21**. (Open to the public). Discuss and finalize Sections 2 and 4, incorporating appropriate public input. Begin review of Section 5 Mitigation Strategies. Homework: Meet with jurisdictional staff and continue review of Section 5 Mitigation Strategies, with special attention to table 5.2, which lists proposed mitigation projects for participating jurisdictions. For projects assigned to your jurisdiction, provide a status update – completed, in-progress, move to 2018 plan or removed.
   b. Updates for Section 5 Mitigation Strategies to Emergency Management by Wed Apr 25.
   c. **Meeting 09:00 am – 12:00 pm Wed May 2.** (Open to the public). Finalize Section 5 Mitigation Strategies. Each jurisdiction briefly present one project. *Begin discussion on Human Caused Hazards (deliberate and accidental). Identify threats/hazards and vulnerability. Homework: meet with jurisdictional staff to refine Human Caused Hazards (threats, vulnerability and potential mitigation).*

d. ***Meeting 09:00 am – 12:00 pm Wed June 20.*** (Open to the public). *Finalize HCH section, present projects. Discuss readiness of entire plan for public review. Public review schedule.*
e. **Public Meeting 6:00 pm Wed July 18**. (Plan will be available 2 weeks prior to meeting for public review, electronically and at several public locations).
f. **Completed Hazard Mitigation Plan to State on Fri Aug 17**.

Meeting: HAZARD MITIGATION PLAN

Date: 01/19/18

NAME (Please print)	REPRESENTING	PHONE & E-MAIL
BOBBIE LUCERO	GUN OEM	970.640.2443 blucero@gunnisoncounty.org
Mark Thompson	DHSEM	720-630-0770 mark.w.thompson@state.co.us
JIM PRINGLE	NATIONAL WEATHER SERVICE	970-243-7007x726 james.pringle@noaa.gov
JASON WARD	CO DIV. WATER RES.	970-209-1624 jason.ward@state.co.us
CHRIS DAVIS	CBFPD	970 349 5333 cdavis@cbfpd.org
RIC EMS	CBFPD	" " rems@cbfpd.org
Carlos Velado	Twn MTCB	970-349-6652 cvelado@mtcrestedbuttecolorado.us
SCOTT MORRILL	GUNNISON OEM	
Keith Robinson	Gunnison PD	970 641 8250 krobinson@gunnisonco.gov
FRANCIE KUGEL	UGRWCD	970 641 6065 FKUGEL@UGRWCD.ORG
Mike Tarantino	WRWC	970 615 7300 wrwc.mike@gmail.org
Ric Ems	CBFPD	" 209-0561 REMS@CBFPD.ORG
CHRIS PRATER	CPW	970 275 2409 chris.prater@state.co.us
CJ Malcolm	GVH EMS	619 987 8334 cmalcolm@gvh-colorado.org

Meeting: HAZARD MITIGATION PLAN

Date: 01/19/18

NAME (Please print)	REPRESENTING	PHONE & E-MAIL
MARK MYKOL	GCSO	970 641 1113 MMYKOL @ GUNNISON COUNTY.ORG
Dennis Spitzer	Gunnison Fire	970 641 2153 dennis@cityofgunnison-co.gov
MICHAEL REILY	CBFMO	970-209-1101 mpreily@crestedbutte-co.gov
Nathan Kubes	Western	970 209 8798
Mike Billingsley	SMD ERFSD	349-7411 mike@skylandco.com
NEAL STARKEBAUM	GC COM. DEV.	641-0360
Michael Yerman	Town of CB	myerman@crestedbutte-co.gov
Steve Westbay	City of Gunny	Swestbay@gunnisonco.gov

Local Hazard Mitigation Planning

Presented by:

Patricia Gavelda and Mark Thompson

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Hazard Mitigation

❖ Mitigation: "Sustained action taken to reduce or eliminate long-term risk to people and property from hazards."

❖ Local Hazard Mitigation Plans (HMPs) form a foundation for communities (Counties, Cities/Towns, Tribes, Special Districts) who seek to reduce risks from natural hazards to people, property and infrastructure:

- A vision for a safer community developed by and tailored to the community.
- An effort to make the community as independent and self-reliant as possible.
- An opportunity to comprehensively assess your risks and develop a strategy to address risks through preparedness, mitigation, and should something happen, recovery. Mitigation reduces demand for response.
- Opportunity to integrate hazard planning into other planning projects.

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What Are the Benefits?

❖ The planning process enables a community's comprehensive assessment of its hazards, how it would like to mitigate them, and opportunities to integrate mitigation planning with other community plans.

❖ An approved Local HMP creates eligibility for FEMA's Hazard Mitigation Assistance grant programs:

- Pre-Disaster Mitigation (PDM- Annual Cycle)
- Flood Mitigation Assistance (FMA- Annual Cycle)
- Hazard Mitigation Grant Program (HMGP – Post-Disaster)
  - HMGP from DR-4145 (2013 Floods) ~ $67.4 Million Federal Funds
  - HMGP from DR-4229 (2015 Floods and Storms) ~ $3.3 Million Federal Funds
- If enrolled in the National Flood Insurance Program Community Rating System (CRS), local mitigation plans can receive credit of 100 or more points.

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What the Plan is Not

- A regulatory document- It does not create new regulations.

- A set-in-stone commitment of resources:
  - FEMA and the State encourage communities to be both ambitious and practical.
  - Both FEMA and the State understand that actions are dependent on the availability of resources.
  - If actions included in the plan are unable to be completed, the community will not be punished.

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Projects in Colorado to 2016

Colorado Project Awards through FEMA Hazard Mitigation Assistance Program					
	Wildfire Mitigation/Fuels Reduction	**Flood Reduction/ Drainage Improvements/ Property Acquisition**	**Landslide/ Slope Stabilization/ Property Acquisition**	**Planning Grants**	**Other Projects including Generators, 5% Projects, Appraisals, Preparedness, Warning**
Number of Obligated Projects	21	27	5	21	32
FEMA Grant Fund	HMGP, PDM	HMGP, PDM, FMA	HMGP, PDM	HMGP, PDM	HMGP
Project Costs	$9,569,391.66	$79,803,141.61	$11,717,794.00	$1,454,680.03	$4,265,228.01
Total FEMA Funding and Local Match (2011-Present) = $106,810,235.31 (Total Projects: 106)					

Every dollar spent on mitigation saves four dollars in disaster response and recovery costs!

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Types of Wildfire Projects Eligible and Funded

- Defensible Space

- Hazardous Fuels Reduction Activities
  - Community level vegetation management;
  - Vegetation removal;
  - Vegetation clearing and/or thinning;
  - Slash removal; and
  - Vertical clearance of tree branches.

- Structural Protection Through Ignition-Resistant Construction Activities; i.e. smoke resistant windows

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Types of Flood Projects Eligible and Funded

- Acquisition
- Dry and Wet Flood-proofing
- Elevation
- "Minor Localized Flood Reduction Projects"
  - Detention ponds
  - Channel stabilization
- Infrastructure Retrofit
  - Culverts, bridges, etc.

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Other Types of Eligible Projects

- ❖ Landslides/ Geologic Hazards
  - Channel (soil) stabilization/ protection of critical facility
  - Property Acquisition

- ❖ Utility Protection
  - Winter Weather
  - Wildfire
  - High Winds
- ❖ Safe Rooms
- ❖ Generators
- ❖ Seismic Building/Infrastructure Retrofit

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PDM & FMA 2017 Timeline

- NOFO Posted to Grants.gov: 7/10/2017
- Preliminary Application Due to DHSEM in EM Grants: 7/28/2017
- Application Start Date: 8/14/2017
- Projected Period of Performance Start: 8/14/2017
- Draft Benefit-Cost Analysis Due to DHSEM: 8/18/2017
- Draft Applications Due to DHSEM in eGrants: 10/18/2017
- State Application Complete in eGrants and Submitted to FEMA: 11/10/2017
- Application Deadline: 11/14/2017
- Anticipated Funding Selection: 1/30/2018
- Anticipated Award Date: 12/30/2018
- Projected Period of Performance End: 1/30/2021 (42 Months)
  - FEMA Milestones
  - DHSEM Milestones

Sources: FY 2017 PDM & FMA NOFOs and 2017 PDM & FMA DHSEM Program Grant Priorities

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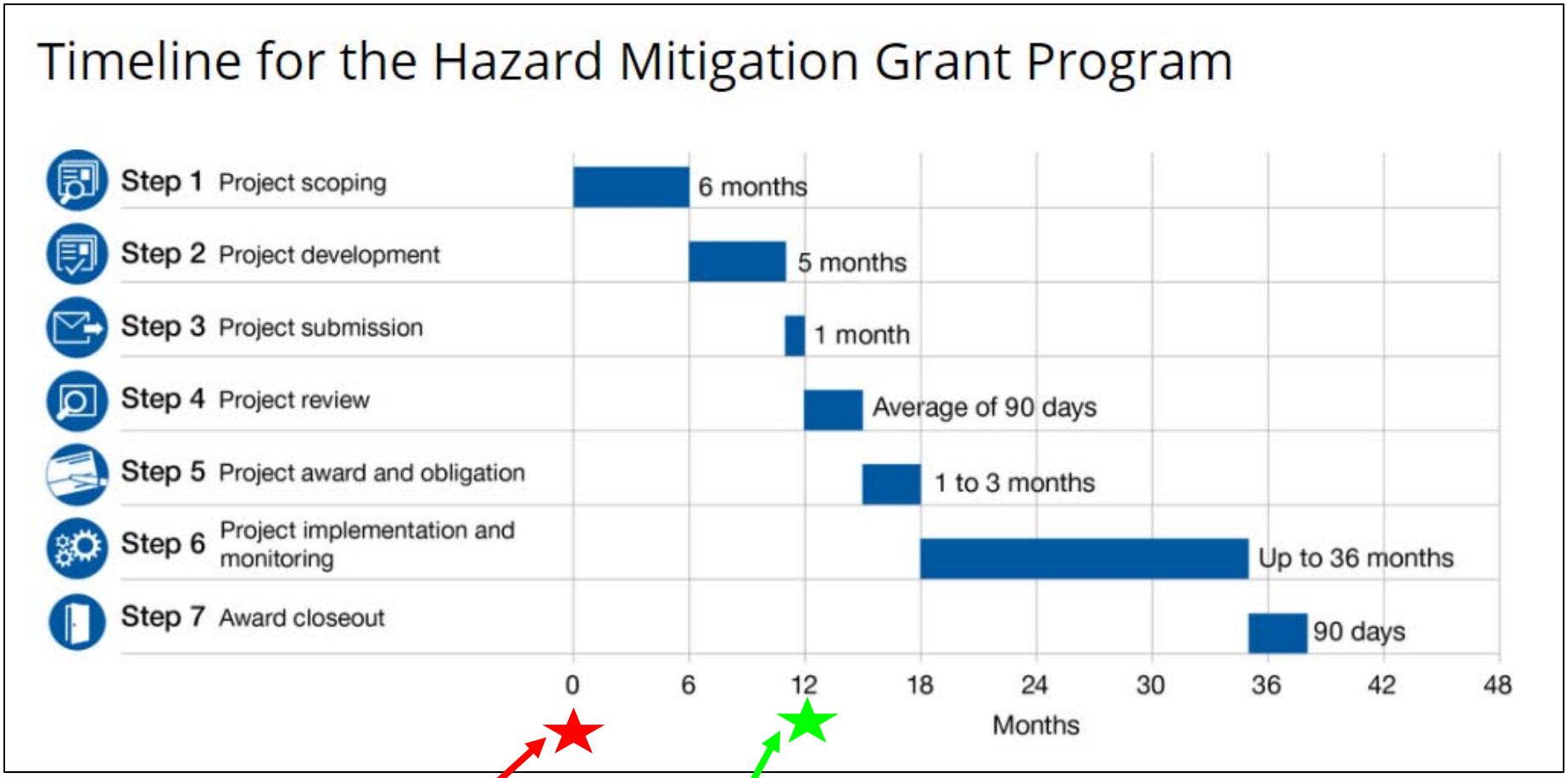
Typical HMGP Timeline



Source: https://www.fema.gov/media-library/assets/images/130705

Disaster Declaration Date

Application Period Ends

Questions?

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Multi-Hazard Mitigation Plans: The Planning Process
Tips and Best Practices

I. Identify Participating Jurisdictions

Plans may represent multiple jurisdictions. Jurisdictions seeking status as an eligible applicant for mitigation grant programs must meet the requirements under 44 CFR §201.6 for multi-jurisdictional plans. While certain elements are common to all participating jurisdictions (e.g., planning process, hazards, goals, and maintenance), there are some elements that are unique to each participating jurisdiction. For each participating jurisdiction, the plan must address the following:

- Risks, where they differ from the general planning area
- Mitigation actions (at least one new action must be identified for each jurisdiction; if only one new action is created it cannot be an Education and Awareness Program action)
- Participation in the planning process (examples of participation include attending meetings, contributing data or other information, commenting on drafts of the plan, etc.)
- Adoption (each jurisdiction must formally adopt the plan).

A county's participation covers unincorporated areas. Incorporated towns and cities as well as special districts should also formally participate in plans to obtain eligible applicant status.

Consider requiring a resolution or something in writing from each jurisdiction that documents their commitment to participate in the plan. This prevents wasting time and funding on jurisdictions that may not follow through on the process. (Required if requesting a FEMA grant to fund the plan.)

Make sure to clearly document the active participation of each jurisdiction seeking plan approval status. Example table:

Table X: Jurisdictional Participation at Planning Team Meetings

Meetings	Date	Brown County	City of Blue	City of Red
Meeting 1	xx/xx/xxxx	X	X	X
Meeting 2	xx/xx/xxxx	X		X
Meeting 3	xx/xx/xxxx	X	X	X

II. Develop a Planning Team

The plan organizer should form a core planning team to guide the process and make decisions. The planning team should be made up of those key players in the community that can provide data and expertise and that will be responsible for the plan's implementation.

Local government agencies that are important participants on the planning team are the following:

- City/county management
- Planning and community development
- Public works
- Building/engineer
- Floodplain administrator
- Road and bridge
- Emergency management
- GIS
- Fire district or department
- Cultural and historic resource representatives (museums, libraries, etc.)

The information needed and strategies developed for a mitigation plan more often come from city/county management, planning, and public works departments more than emergency response and law enforcement.

Each participation jurisdiction must have representation on the planning team. List the participants of the planning team by name and organization in the plan document. Work with the planning team to define responsibilities and document these responsibilities in the plan.

III. Create Opportunities for Public Involvement

The plan must have an open public involvement process that provides an opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.

The opportunity **during the drafting stage** allows public input and priorities to be incorporated into the plan. Consider what types of public involvement techniques have been successful in your community in the past and do something similar. Try to go to the public instead of having them to come to you. Ideas include piggy-backing on a popular community event or festival, a presentation to an open, regularly scheduled meeting of the Planning Commission or other governing body, or developing a questionnaire or survey to collect input and ideas. Document in the plan the type of comments received and how they were incorporated.

The opportunity for comment **prior to plan approval** should occur when the plan is ready to be submitted to the State and FEMA. Allow the public and stakeholders a final opportunity to comment on the final draft. Communities can follow their normal public review and approval procedures. Often communities put the plan on their website and in hard copy at community locations, such as libraries, for a two-week period to allow for review and comment. Make sure to publicize the availability of the document and how to provide input in newspapers and other sources.

IV. Invite Neighboring Communities and Other Stakeholders

Identify other stakeholders in the plan, such as local and regional agencies involved in hazard mitigation activities; agencies that have the authority to regulate development; and businesses, academia, and other private and non-profit interests. Reach out to these entities in particular to provide input on the plan. Consider phone interviews, a specific stakeholder meeting, and/or specifically inviting them by mail or email to participate in the planned public involvement opportunities. These commonly include the Colorado State and US Forest Services, US Bureau of Land Management, Colorado Avalanche Information Center, and the Colorado Division of Fire Prevention and Control.

Neighboring communities, such as surrounding counties, must be made aware of the plan and given an opportunity to comment. Consider inviting the elected bodies of surrounding towns and counties to review and comment on the plan draft when it is available prior to plan approval.

V. Review and Integrate Reports, Plans, Policies

The plan requires the review and incorporation (if appropriate) of any existing plans, studies, reports, and technical information.

Ask the planning team to provide relevant plans, studies, and reports at the beginning of the process. A questionnaire or form is often helpful for getting this information.

Make sure to incorporate information from the most recent FEMA Flood Insurance Rate Maps and Flood Insurance Studies for your planning area.

Most communities are already doing many types of mitigation activities. This process helps document existing activities and identifies gaps that new mitigation strategies can address.

Describe in the plan which and how existing plans and reports were reviewed and incorporated.

VI. Document the Planning Process

The plan must include a narrative description of the planning process. Consider breaking this section down into tasks or steps to help organize in the plan document, such as Step 1: Organize a Planning Team, Step 2: Assess Risk and Vulnerability, Step 3: Identify Mitigation Alternatives, Step 4: Involve the Public, etc.

Use tables to present information clearly. Example table:

Table Y: Planning Team Meetings

Meetings	Date	Agenda
Meeting 1	xx/xx/xxxx	Presented mitigation planning requirements Developed project timeline Identified public involvement strategy Identified best available data and subject matter experts by hazard
Meeting 2	xx/xx/xxxx	Presented hazard profiles Discussed community assets and vulnerabilities Developed goals
Meeting 3	xx/xx/xxxx	Identified mitigation actions by hazard and by jurisdiction Developed prioritization criteria
Meeting 4	xx/xx/xxxx	Prioritized mitigation actions by jurisdiction Developed implementation plans for prioritized actions Decided upon plan maintenance process

Develop a planning process appendix that includes the documentation materials, such as the following:

- Meeting sign-in sheets
- Meeting agendas or minutes
- Copies of press releases, newspaper articles, or any other publication materials
- Lists of stakeholders invited to participate

Natural Hazard Mitigation Plans

The Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended by the Disaster Mitigation Act of 2000 (DMA 2000), provides the legal basis for State, local, and Indian Tribal governments to undertake a risk-based approach to reducing risks from natural hazards through mitigation planning.

It places emphasis on State, Tribal, and local mitigation planning by requiring these entities to develop and submit mitigation plans as a condition of receiving various types of federal assistance.

What Are the Benefits?

Eligibility for FEMA grant programs, including:

- Pre-Disaster Mitigation (PDM)
- Flood Mitigation Assistance (FMA)
- Hazard Mitigation Grant Program (HMGP – Post-Disaster)
  (Colorado has received more than $20 Million in Mitigation grants since 2005)
- An opportunity to comprehensively assess your risks and develop a strategy to reduce those risks
- Additional opportunity to integrate hazards planning into your other planning projects (i.e. comprehensive plans, land use plans, floodplain management plans emergency operations plans, etc)
- If enrolled in the NFIP Community Rating System, local mitigation plans can receive credit of 100 or more points.

Types of Eligible Projects

- Wildfire Mitigation: defensible space; fuels reduction; structural protection
- Flood Projects: Property Acquisition; Dry and Wet Flood-proofing; Elevation; “Minor Localized Flood Reduction Projects”; Detention ponds; Channel stabilization; Infrastructure Retrofit; Culverts, bridges, etc
- Utility Protection
  - Winter Weather
  - Wildfire
  - High Winds
- Safe Rooms
- Seismic Building/Infrastructure Retrofit
- Landslides/ Geologic Hazards: Channel (soil) stabilization/ protection of critical facility; Property Acquisition

Who Should Participate?

Establishing stakeholders and the Planning Team - Should include (but not be limited to):

Jurisdiction political/ administrative leadership; Emergency Management; Planning Departments; Public Works/Engineering; State and Federal Partners; Floodplain Management; Fire; Law Enforcement; Parks; Members from Each Participating Jurisdiction (for multi-jurisdictional plans); Academia; Local Non-profits and businesses; Citizens

Local Hazard Mitigation Planning Process

Hazard Mitigation Planning

Engages the whole community in a process to:

Multi-Jurisdiction Requirements

Each jurisdiction seeking plan approval must:

- **Participate in the planning process**
- **Assess unique risks**
- **Identify specific mitigation activities**
- **Adopt the plan**

Opportunity for Involvement

Planning Team

- Agencies involved in hazard mitigation activities
- Agencies with authority to regulate development

Stakeholders

- Neighboring jurisdictions
- Businesses
- Academia
- Other private and nonprofit interests

Public

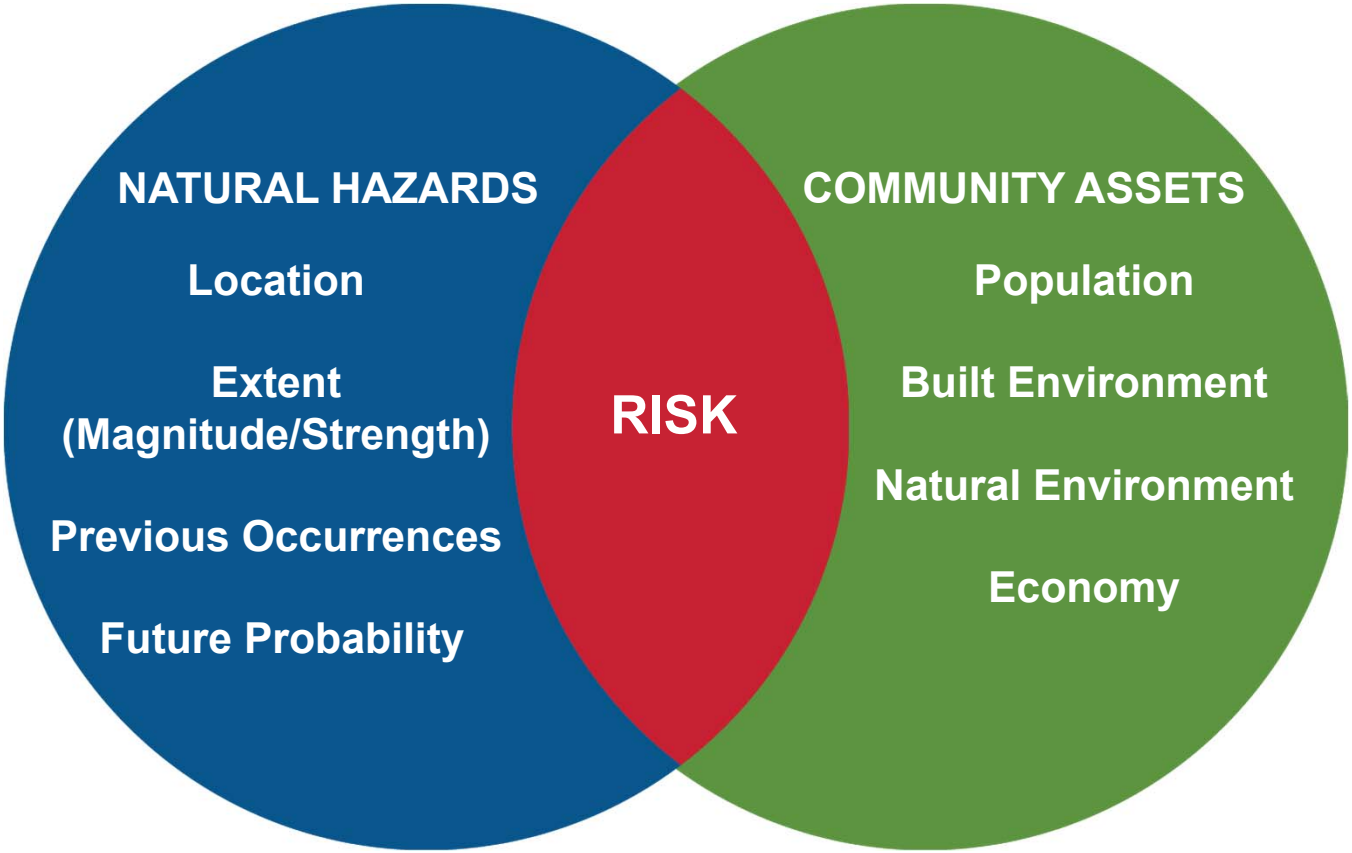
- Residents
- Business owners
- Local workers

Document Who, What, and When

- Who was involved?
- How was the plan prepared?
  - Schedule
  - Activities
- How was the public involved?
- What future public involvement opportunities are scheduled?

Plan updates must document the current planning process

Hazard Identification and Risk Assessment (HIRA)



Note: Modified from U.S. Geological Survey and Oregon Partnership for Disaster Resilience Models.

Steps to Assess Risks

Hazard Descriptions

- Location
- Extent
- Previous Occurrences
- Probability of Future Events

Community Assets

People

Economy

Structures

Critical Facilities and Infrastructure

Natural Environment

Assess Impacts and Vulnerability

For each hazard

- **Evaluate vulnerable assets**
- **Assess potential impacts**
- **Estimate future losses**

Develop Problem Statements

To communicate vulnerabilities, develop problem statements

- **Clear, concise**
- **Identify key issues or problems**
- **Based on results of risk assessment**
- **Pertain to individual jurisdictions or to entire planning area**

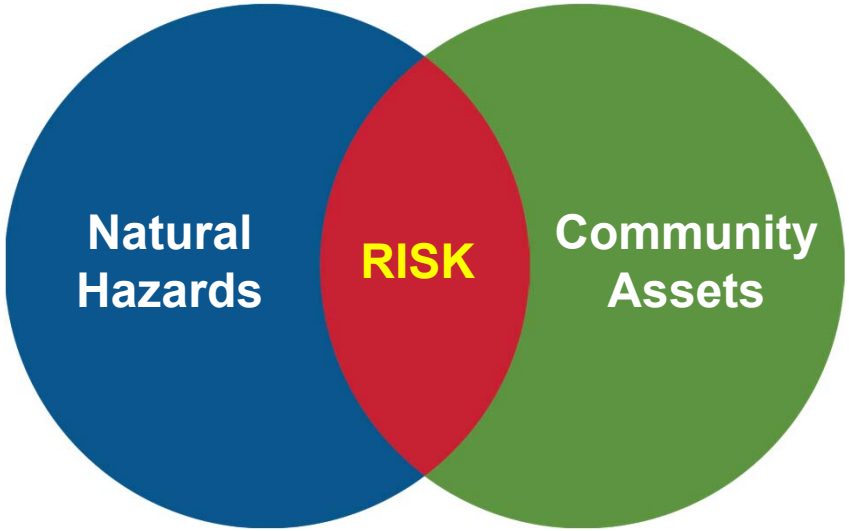
Example Problem Statements

- **Newberg City recently annexed the South Woods area located in the wildland-urban interface. The City's land use and building codes do not address wildfire hazard areas. Future development in South Woods will increase vulnerability to wildfires.**
- **The North Creek Sewage Treatment Plant is located in the 100-year floodplain and has been damaged in past flood events.**

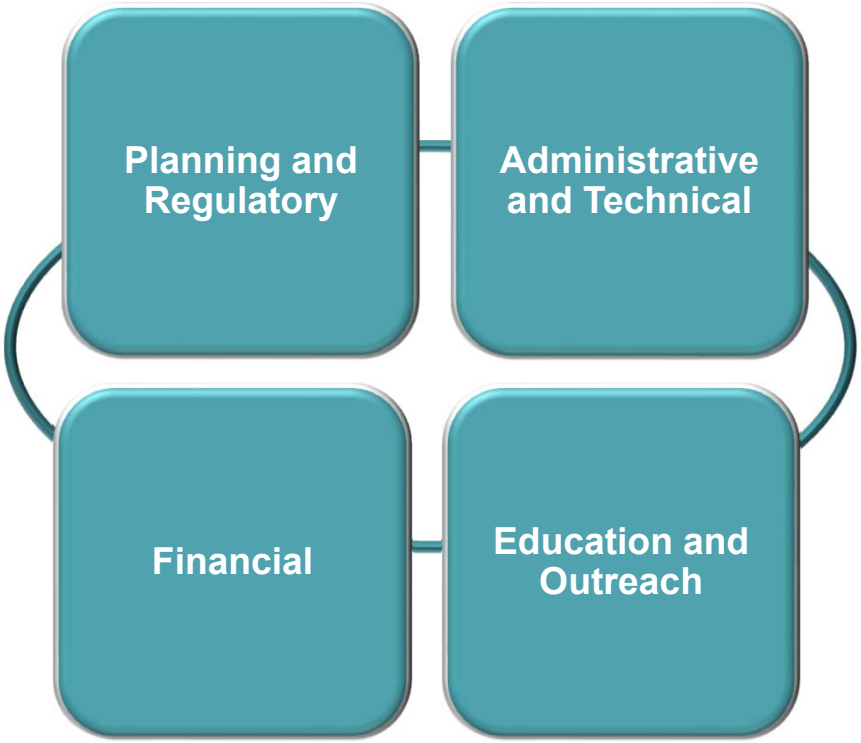
Mitigation Strategy

How to Identify Mitigation Actions

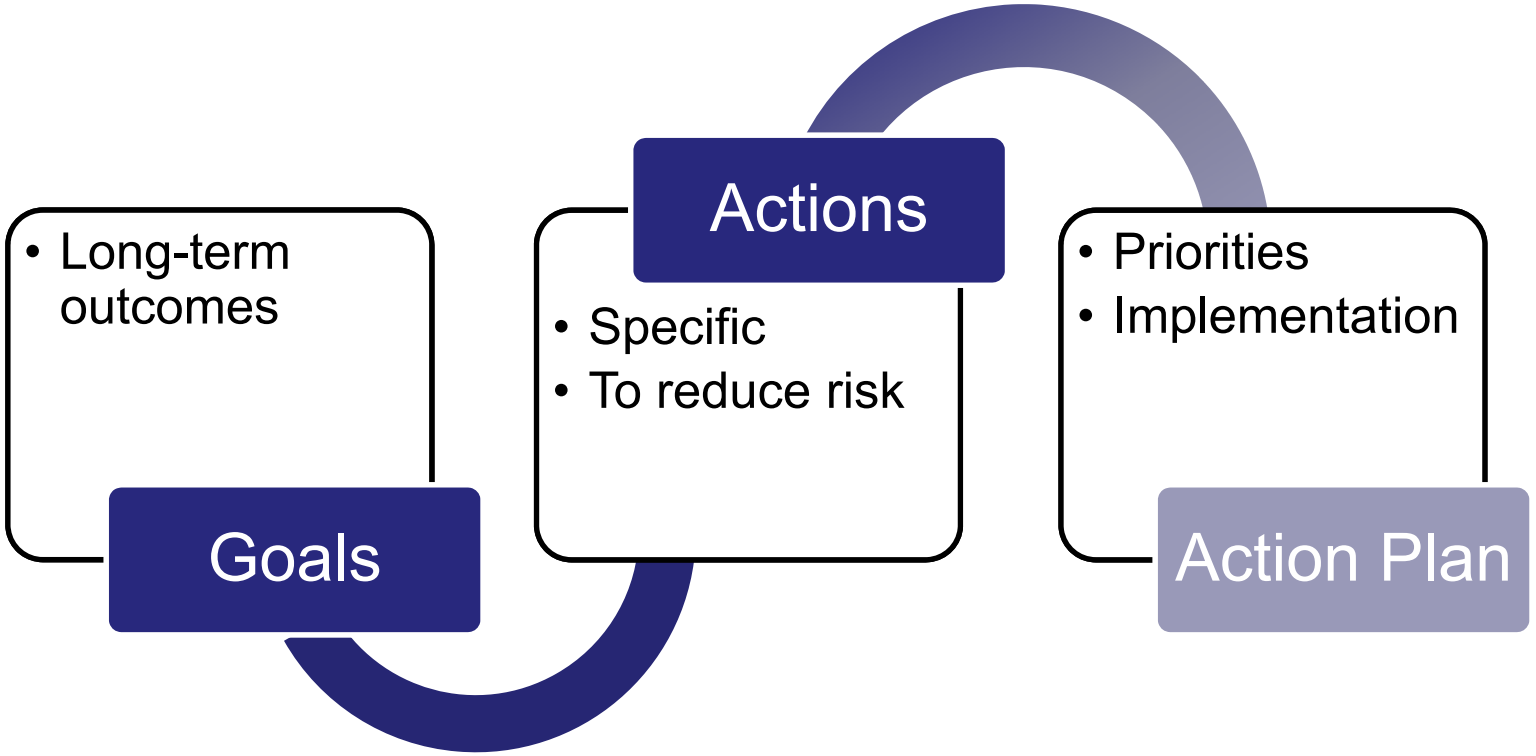
Review Risk Assessment



Assess Capabilities



Mitigation Strategy



Types of Mitigation Actions

Local Plans and Regulations

Structure and Infrastructure Projects

Natural Systems Protection

Education and Awareness Programs

Example Problem Statement

In wildland-urban interface areas, two critical facilities (school and county maintenance shop) and $500 million in property value are at risk, and there is increasing development pressure.

Comprehensive Range of Actions

Adopt a wildfire mitigation code

Retrofit school and maintenance shop with fire-resistant materials

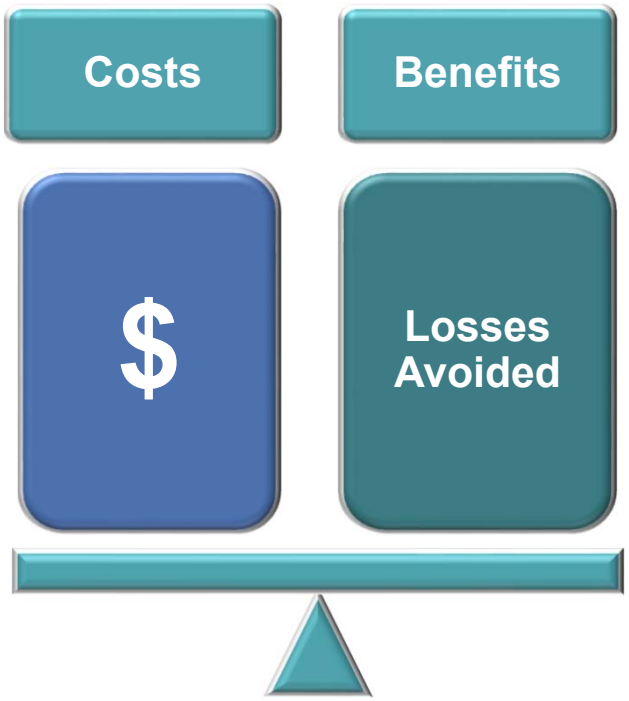
Identify land for acquisition by Parks Department for trails and open space

Implement Firewise programs to educate property owners

3. Evaluate and Prioritize Actions

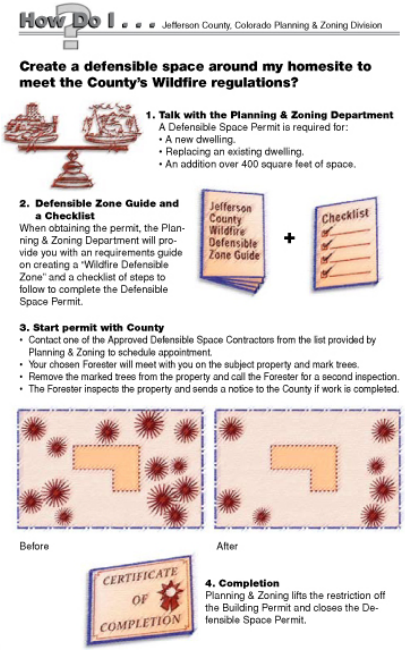
Describe how actions will be prioritized, including emphasis on benefit-cost review

- Benefit-Cost Review
  - Are costs reasonable compared to problem and probable benefits?
  - Estimate costs using planning level assessment
  - Consider quantitative ($) and qualitative

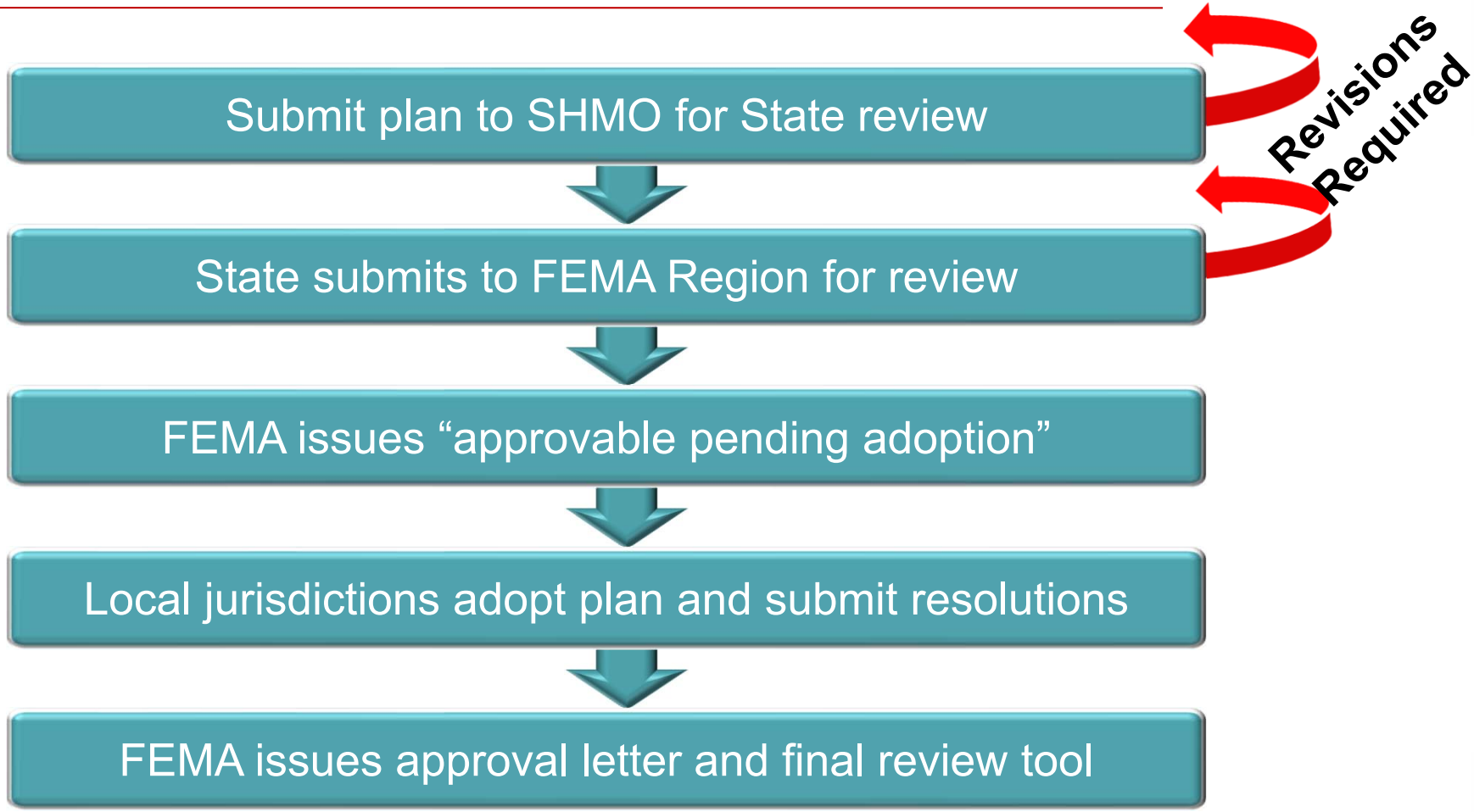


Action Prioritization

- Considers plan goals and hazards addressed
- Weighs the pros and cons
- Is appropriate for community capabilities



State and FEMA Plan Approval



Gunnison County Hazard Mitigation Plan

2018 Update

Wed Jan 23, 2019 10:00 – 12:00

Gunnison County EOC, 510 W. Bidwell, Gunnison CO 81230

Agenda

- ✓ Introductions
- ✓ Review Table 5.1 completed / deleted actions
- ✓ Review Table 5.2 continuing or new actions (discuss Action 15)
- ✓ Compare table 5.2 to Appendix A
- ✓ Section 4 discussion
- ✓ Jan 31 public meeting in Crested Butte, CB Town Hall 6 – 8 pm
- ✓ Feb 4 public meeting in Gunnison, Gunnison County Multipurpose Building 6 – 8 pm

Meeting: HAZARD MITIGATION PLAN UPDATE

Date: 01/23/19

NAME (Please print)	REPRESENTING	PHONE & E-MAIL
SHEA EARLEY	TOWN OF C.B.	970-349-5338 searley@crestedbutte-co.gov
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Jake Schmalz	WRWC	970-250-4945 wrwc.jake@gmail.com
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NEAL STARKEBAUM	GC - COMDEV	970 . 641 . 7930 nstarkebaum@gunnisoncounty.org

5 MITIGATION STRATEGY

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 describes the mitigation strategy process and mitigation action plan for the Gunnison County Natural Hazard Mitigation Plan. It explains 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

Up to this point in the planning process, the HMPC has organized resources, assessed natural hazards and risks, and documented mitigation capabilities. A profile of the County response area's vulnerability to natural hazards resulted from this effort, which is documented in the preceding chapter. The resulting goals, objectives, and mitigation actions were developed based on this profile. The HMPC developed this section of the plan based on a series of meetings and worksheets designed to achieve a collaborative mitigation planning effort. This section also builds upon the mitigation strategy developed in the 2013 plan, and provides an update to the actions previously identified in that plan.

"Mitigation," as defined by FEMA, is any sustained action taken to reduce or eliminate long-term risk to human life and property from hazards. FEMA's definition includes actions that protect both existing and future development. An important distinction to note is that many of the County and municipalities' land use planning documents use the term mitigation to refer to protection of existing development only. The broader FEMA definition will be used for the purposes of this hazard mitigation plan.

5.1 Goals

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.

The goals for this plan were updated by the HMPC through a process facilitated by the Gunnison County Emergency Manager during a meeting on the plan's updated risk assessment. This analysis of the risk assessment identified areas where improvements could be made and provided the framework for the HMPC to revisit planning goals and objectives and the mitigation strategy for the Gunnison County response area.

Goals were defined for the purpose of this mitigation plan as broad-based public policy statements that:

- Represent basic desires of the community;
- Encompass all aspects of community, public and private;
- Are nonspecific, in that they refer to the quality (not the quantity) of the outcome;
- Are future-oriented, in that they are achievable in the future; and
- Are time-independent, in that they are not scheduled events.

Goals are stated without regard for implementation, that is, implementation cost, schedule, and means are not considered. Goals are defined before considering how to accomplish them so that the goals are not dependent on the means of achievement. Goal statements form the basis for objectives and actions that will be used as means to achieve the goals. Objectives define strategies to attain the goals and are more specific and measurable.

At the end of the risk assessment meeting team members were given a worksheet for formulating and updating the mitigation strategy. This worksheet included a list of sample goals to consider, and included the 4 Goals from the 2013 Gunnison County Natural Hazard Mitigation Plan, the 2011 Gunnison County CWPP, and the 2016 Colorado NHMP. The HMPC was instructed to revise the existing goals as necessary. That they could use, combine, or revise the statements they were provided or develop new ones on their own, keeping the risk assessment in mind. The results were collected and combined and through this process a slightly revised set of goals and objectives emerged. Goal 4 from the 2013 plan was removed, as it was redundant in the context of the purpose of the plan. The finalized updated goals represented the HMPC's input and consensus and are listed below.

Goal 1: Reduce the potential impacts of hazards on the safety of the County's citizens and guests

- Objective: Protect the population through planning and education
- Objective: Raise awareness and acceptance of hazard mitigation generally
- Objective: Identify appropriate evacuation routes
- Objective: Improve governmental coordination
- Objective: Learn from other areas
- Objective: Improve mapping source data accuracy

Goal 2: Reduce the potential impact of hazards on critical facilities, local government assets, infrastructure, private property, and critical support services

- Objective: Minimize disruption to critical services
- Objective: Improve the County's disaster response and recovery capabilities
- Objective: Reduce impacts to existing and future development

Goal 3: Reduce the potential impact of hazards on the County's economy, natural resources, historic treasures and interests, and other characteristics which add to the quality of life of the citizens and guests of the County

- Objective: Reduce the County's liability with respect to hazards generally

5.2 Identification and Analysis of Mitigation Actions

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.

In order to identify and select mitigation measures to support the mitigation goals, each hazard identified in Section 4.1: Identifying Hazards was evaluated. The HMPC analyzed a comprehensive set of viable mitigation alternatives from the 2013 plan that would support identified goals and objectives for the 2018 plan. In 2013, the action plan was developed by analyzing existing county programs and proposed improvements or changes to those programs. Additional programs were also identified as potential mitigation strategies. The potential mitigation strategies were ranked in five categories according to how they accomplished each item:

- Prevention
- Property Protection
- Structural Protection
- Emergency Services
- Public Information and Involvement

During the 2018 mitigation strategy meeting, each HMPC member was provided with the following list of categories of mitigation measures, which originate from the NFIP Community Rating System. The categories are nearly identical to those used in the 2013 mitigation action development process, with the addition of natural resource protection.

- Prevention
- Property Protection
- Structural Projects
- Natural Resource Protection
- Emergency Services
- Public Information

The HMPC members were also provided with several lists of alternative multi-hazard mitigation actions for each of the above categories. HMPC members were encouraged to develop mitigation alternatives that would protect future, as well as existing, development from hazards per the DMA 2000 regulations. 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. The result was a number of new

action ideas, as well as carry-over of some actions from the 2013 plan, with the intent of mitigating the identified hazards.

5.2.1 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, STAPLE/E (which considers social, technical, administrative, political, legal, economic, and environmental constraints and benefits). The STAPLE/E method was also used during the 2013 plan update, so most HMPC members were familiar with the criteria. The STAPLE/E method proposes the following questions to guide prioritization:

1. Social: Does the measure treat people fairly?
2. Technical: Will it work? (Does it solve the problem? Is it feasible?)
3. Administrative: Is there capacity to implement and manage the project?
4. Political: Who are the stakeholders? Did they get to participate? Is there public support? Is political leadership willing to support it?
5. Legal: Does your organization have the authority to implement the measure? Is it legal? Are there liability implications?
6. Economic: Is it cost-beneficial? Is there funding? Does it contribute to the local economy or economic development? Does it reduce direct property losses or indirect economic losses?
7. Environmental: Does it comply with environmental regulations or have adverse environmental impacts?

In 2013, the planning group assigned a quantitative score (good = 3, average = 2, poor = 1) to prioritize each proposed mitigation strategy based on how well it addressed each STAPLE/E criterion. A maximum score of 21 was possible for each action (three points for each of the seven criteria). Of the actions included in the 2013 update, wildland fire prevention (score = 18), the new communications facility (score = 18), establishing mutual aid agreements (score = 19), extreme winter weather preparation (score = 15), and developing an evacuation plan for Gunnison County (score = 18) were given the highest scores. Flood prevention and preparation was ranked relatively lowly with a score of 13.

The HMPC prioritized both new mitigation actions and those that carried over from the 2013 plan during the 2018 update process. 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 STAPLE/E). 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)?

The mitigation action identification and prioritization is summarized in Table 5.2 and detailed in Appendix A. These mitigation actions detail specific tasks for reducing future hazard-related losses within Gunnison County. The actions are organized by identified hazards. Included are the affected jurisdiction(s) and notes about the department and partners necessary to implement the action. Also included are the goal(s) that the actions primarily align with, with an understanding that some actions may help to achieve more than one goal. The mitigation actions are marked with their relative level of priority: H=high, M=medium, and L=low.

5.3 Mitigation Action Plan

Requirement §201.6(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in section (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 benefit 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.

5.3.1 Progress on Previous Mitigation Actions

During the 2018 update process the HMPC reviewed and evaluated the 2013 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 2013 mitigation strategy contained 32 separate mitigation actions benefiting one or more communities within Gunnison County. Of these actions, two have been completed. The completed actions and several of those in progress have increased the response capabilities of the County, and thus will help save lives in future incidents. Thirty projects from the 2013 plan have been identified for continuation in this plan update. Table 5.1 indicates those actions that have been completed or deleted. Actions from 2013 that are either ongoing or remain to be completed and being carried forward in this plan are integrated into Table 5.2 and marked with a triple asterisk (***) in the hazard column.

Table 5.1. Completed or Deleted Mitigation Actions from 2013 Plan

Hazard(s)	Action Description	Jurisdiction/ Responsible Party	Status	Comments
Multi-hazard	New facility and additional staff for the	Gunnison County,	Completed	New Communications

Hazard(s)	Action Description	Jurisdiction/ Responsible Party	Status	Comments
	Communications Center	City of Gunnison/City Manager, Communications Board		Center completed and opened in December 2013. Previously Project #18 in 2013 HMP.
Flood	Continued compliance with NFIP	Town of Mt. Crested Butte	Completed	Town of Mt. Crested Butte passed a flood ordinance in 2012. There are no flood zones in Mt. Crested Butte. Previously Project #6 in 2013 HMP.
Flood	Continue preservation of wetlands around Crested Butte to absorb flood waters. ***	Town of Crested Butte	Completed	Previously Project #10.
Flood	Update floodplain management ordinance/continue to implement sound floodplain management practices through participation in NFIP***	Town of Crested Butte	Completed	Previously project #9
Wildfire	Wildland fire mitigation for Rainbow Acres Estates subdivision plus completion of CWPP***	Rainbow Acre Estates Subdivision and WRWC	Completed	Previously project #28
Drought	Monitor water issues in City of Gunnison area, monitor city's wells for contamination or dropping water tables, continue acquiring water rights in the area. ALTERNATIVE: The City of Gunnison purchases the Van Tuyl Ranch property with the intent of maintaining it as a working agricultural site which provides water recharge for the city well system. Completed 2014	City of Gunnison	Alternative Completed	Previously Project #1 Alternative.

5.3.2 Continued Compliance with NFIP

Given the flood hazard in the planning area and the importance of the NFIP in mitigating flood losses, and the degree of flood risk in the County, an emphasis will be placed on continued compliance with the NFIP by participating communities (Gunnison County, City of Gunnison, Town of Crested Butte, and Town of Mt. Crested Butte). As NFIP participants the county and municipalities 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 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 community capabilities in Section 2 of this plan and the flood vulnerability discussion in Section 4.3.

5.3.3 Updated Mitigation Action Plan

A summary of the action items is captured in Table 5.2 including a description of the action, priority, hazards intended to be mitigated, the parties responsible for implementation, and an action identification number to make actions easier to track and reference in the future. For each identified action a worksheet designed to capture additional details was filled out by the HMPC member or organization taking the lead on action implementation. These details include: action intent, hazard(s) mitigated, other alternatives considered, cost, benefits (losses avoided), responsible entity, priority, and potential funding. These action details are captured in Appendix A. Many 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 a double asterisk '**' in the action title. These actions include those that promote wise development and hazard avoidance, such as building code, mapping and zoning improvements, and continued enforcement of floodplain development regulations. Actions carried forward from the 2013 plan are indicated by a triple asterisk '***.' Progress on those actions can be referenced in the detailed project descriptions in Appendix A.

Table 5.2. Gunnison County Mitigation Action Summary Table

Action ID #	Hazard(s)	Action Description	Jurisdiction/ Responsible Party	Related Goal(s)*	Priority
1	Dam Failure	Review and update all High and Significant dam Emergency Action Plans, annually review flood planning, establish contingency plans and evacuation routes. Perform organized individual dam or regional Emergency Action Plan exercises; drill, tabletop, and/or functional. *** Comment: This was changed from just Taylor Dam, to include all High and Significant Risk Dams in Gunnison County.	Dam Owners, Gunnison County, City of Gunnison, Gunnison County Emergency Management, Colorado Division of Water Resources Dam Safety; U.S. Bureau of Reclamation	1, 2, 3	M
2	Drought	Monitor water issues in City of Gunnison area, monitor city's wells for contamination or dropping water tables, continue acquiring water rights in the area*** Comment: The 2013 HMP listed purchase of the Van Tuyl property as an alternative to recharge some city wells. This was completed in 2014.	City of Gunnison/City of Gunnison Public Works	1, 3,	M
3	Extreme Cold	Acquire alternate sources of heat / power for Crested Butte Town Hall, Fire Department, and Marshal's Office when gas, electricity is terminated or during winter storms / extreme cold***	Crested Butte/Crested Butte Public Works	2,	H
4	Flood	Continued compliance with NFIP**	Gunnison County	1, 2, 3	H

Action ID #	Hazard(s)	Action Description	Jurisdiction/ Responsible Party	Related Goal(s)*	Priority
5	Flood	Continued compliance with NFIP**	City of Gunnison	1, 2, 3	H
6	Flood	Become member of COWARN - water and wastewater industry, access to resources***	Crested Butte South Metro District	1, 2	M
7	Flood	Evacuation route work for Arrowhead, improve forest road 867 (primary evacuation route) to protect against flood damage and allow for reliable access and egress during emergency incidents***	Arrowhead/Arrowhead Fire Protection District, Arrowhead HOA, Gunnison County	1, 2	M
8	Flood	Continued preparation and awareness for flooding***	Gunnison County/County Manager, law enforcement, fire departments, EMS, Public Works, County Emergency Management	1, 2, 3	H
9	Multi-hazard	Evacuation Planning for Gunnison County.***	Gunnison County, Crested Butte Fire Protection District	1	M
10	Multi-hazard	Emergency evacuation access for Mt. Crested Butte pending an emergency within city limits or outside limits***	Mt Crested Butte/Mt. Crested Butte Community Development, Police, Fire Department, Gunnison County Emergency Management	1	L
11	Multi-hazard	Improve drainage and road surface along Section 2 of Alpine Plateau Road for emergency access/egress***	Gunnison County/Gunnison County Public Works, USFS, BLM, Arrowhead Improvements Association	1, 2	H
12	Multi-hazard	Back-up power for each critical facility ***	Gunnison County	2	M
13	Multi-hazard	Improve public warning***	Gunnison County	1	H
14	Multi-hazard	Assess and identify repeater sites to ensure communication during wildland fire, avalanche, severe weather events***	City of Gunnison	1, 2	L
15	Multi-Hazard	Threat Hazard Identification and Risk Assessment for man-caused hazards***	Gunnison County/Gunnison County Emergency Management	1, 2, 3	H
16	Wildland Fire	Implementation of landscape scale fuels reduction projects as well as defensible space projects as identified in the Gunnison County CWPP and other community specific CWPPs.***	Multi-jurisdictional/WRWC, Gunnison FPD, CBFPD, CSFS, Gunnison County EM, GBWC	1, 2, 3	H
17	Wildland Fire	Develop defensible space regulations as a requirement and/or limit new development in high risk areas*** Comment - See project 28	Multi-jurisdictional/Gunnison County Community Development, Fire Districts, Gunnison County Emergency Management	1, 2, 3	H
18	Wildland	Continue to promote wildland fire	Gunnison	1, 2, 3	H

Action ID #	Hazard(s)	Action Description	Jurisdiction/ Responsible Party	Related Goal(s)*	Priority
	Fire	awareness throughout Gunnison County through public education and outreach programs and materials***	County/Gunnison County Emergency Management, WRWC, GBWC		
19	Wildland Fire	Continued wildland fire fuels mitigation***	Arrowhead/Arrowhead Fire Protection District	1, 2, 3	M
20	Wildland Fire	Promote and assist with the development of community specific CWPPs in higher wildland fire risk areas***	Multi-jurisdictional/WRWC, Gunnison County EM, FPDs	1, 2, 3	M
21	Wildland Fire	Evacuation route work for Marble***	Marble/Carbondale Fire & Sheriff	1	M
22	Wildland Fire	Create safer evacuation routes from wildland fire for Spring Creek and White Pine***Comment – separate plans	Spring Creek, White Pine/Gunnison County Fire Department and Emergency Management	1, 2, 3	M
23	Wildland Fire	Eliminate wildland fire fuels on private lots throughout subdivision***	Crested Butte South Metro District	1, 2, 3	L
24	Wildland Fire***	Continued wildland fire prevention and preparation***	Gunnison County/Gunnison County Emergency Management, law enforcement, EMS, fire departments, County Public Works, Gunnison Basin Wildfire Council, County Community Development	1, 2, 3	H
25	Wildland Fire	Continued wildland fire public education***	Arrowhead/Arrowhead Fire Protection District	1, 2, 3	H
26	Winter Storms	Create mutual aid agreements or memorandums of understanding for equipment/personnel sharing during severe winter storms*** Comment – we should make this for all hazards, not just winter storms	Gunnison County, Town of Crested Butte/Gunnison County Public Works	1, 2, 3	H
27	Winter Storms	Preparation for extreme winter weather***	Gunnison County/Gunnison County Emergency Management, law enforcement, EMS, fire departments, County Public Works	1, 2, 3	H
28	Wildland Fire	Wildfire Regulatory Changes	Gunnison County Community Development	1, 2, 3	H
29	Flooding	Flooding Hazard Mitigation for City of Gunnison, West of 8th Street	City of Gunnison	1, 2	L
30	Avalanche	Avalanche Mitigation and Education	Mt. Crested Butte	1, 2, 3	M
31	Wildland Fire	Wildfire Mitigation Activities	Crested Butte	1, 2, 3	H

*Goal 1: Reduce the potential impact of hazards on the safety of the County's citizens and guests; Goal 2: Reduce the potential impact of hazards on critical facilities, local government assets, infrastructure, private property and critical support services; Goal 3: Reduce the potential impact of hazards on the County's economy, natural resources, historic treasures and interests, and other characteristics which add to the quality of life of the citizens and guests of the County; Goal; 4: Identify and implement cost effective hazard mitigation and avoidance measures so as to accomplish the County's goals.
**Action related to prevention of losses to future development.
***Action carried over from 2013 Plan.

APPENDIX A MITIGATION ACTIONS

The following appendix provides project specifics and implementation details for mitigation actions identified. They are grouped by the type of hazard(s) they address (see Section 5.3 Mitigation Action Plan for summary).

1. Review and monitor High and Significant (risk) Dam Emergency Action Plans (EAP), annually review flood planning, and establish contingency plans and evacuation routes

Hazards Addressed	Dam Failure
Project Description and Background	Review and update all High and Significant dam Emergency Action Plans, annually review flood planning, establish contingency plans and evacuation routes. Perform organized individual dam or regional Emergency Action Plan exercises; drill, tabletop, and/or functional
Other Alternatives	Annually review flood planning which would not only deal with annual runoff but apply to dam failure. Identify and establish contingency plans for communications and transportation.
Jurisdiction	Gunnison County, City of Gunnison, Dam Owners
Responsible Office	Gunnison County Emergency Management, Colorado Division of Water Resources Dam Safety; Bureau of Reclamation
Priority	Medium
Cost Estimate	TBD
Benefits	Establish local planning to compliment the dam EAPs.
Potential Funding	Not applicable.
Schedule	Ongoing

2. Monitor water issues in City of Gunnison area

Hazards Addressed	Drought
Project Description and Background	Colorado continues to experience reduced annual moisture levels, affecting ranching, recreation, and potentially water supplies. The City of Gunnison will continue to monitor water issues in the area. The City has acquired several water rights in the area and continues to use those rights to maintain their viability. Additionally, the City will monitor City wells for contamination or dropping water tables.
Other Alternatives	The City of Gunnison purchases the Van Tuyl Ranch property with the intent of maintaining it as a working agricultural site which provides water recharge for the city well system. COMPLETED
Jurisdiction	City of Gunnison
Responsible Office	City of Gunnison Public Works
Priority	Medium
Cost Estimate	TBD
Benefits	Use existing water rights to maintain well recharge area. Use water rights as a source of potable water as allowable. Monitor to be able to take additional mediation steps as needed early.
Potential Funding	Establish budget – City of Gunnison
Schedule	Ongoing

3. Acquire alternate sources of heat/power for Crested Butte Town Hall, Fire Department, and Marshal's Office

Hazards Addressed	Extreme Cold, Severe Winter Storm, Windstorm
Project Description and Background	When gas lines fail or electric lines fail in the winter, buildings and people can become cold. The Crested Butte Town Hall is a central large space where people can go for shelter. Alternate sources of heat may be needed to keep the building warm for people staying there in the event of a power outage. The Town needs to acquire portable alternate energy sources like diesel generators, but preferably generators that do not use fossil fuels.
Other Alternatives	Install solar panels on Town Hall to generate hot water or electricity to warm the building. Also need to heat critical facilities such as marshal's office, community radio station, fire hall
Jurisdiction	Town of Crested Butte
Responsible Office	Crested Butte Public Works
Priority	High
Cost Estimate	$200K
Benefits	Protect life safety and reduce property damages related to extreme cold
Potential Funding	Local funds, disaster recovery funding, HMGP, FEMA Hazard Mitigation Assistance, EMPG, Colorado Governor's Energy Office
Schedule	By 2014

4. Continue to implement sound floodplain management practices in Gunnison County through participation in the National Flood Insurance Program and updated statewide floodplain rules

Hazards Addressed Flood

Project Description and Background

Gunnison County participates in the National Flood Insurance Program (NFIP). This project restates the commitment of Gunnison County to implement sound floodplain management practices, as stated in the 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 above the base flood elevation. Floodplain managers will remain current on NFIP policies, and are encouraged to attend appropriate training and consider achieving Certified Floodplain Manager (CFM) status.

This project also includes periodic reviews of the floodplain ordinance to ensure that it is clear, up to date, and adequately addresses the level of flood risk identified within the Hazard Mitigation Plan. Because of the adoption of updated statewide floodplain rules and regulations (effective January 14, 2011) the CWCB will require local governments to revise their floodplain ordinance to comply with the new rules by January 2014.

Other activities that could be included in this effort are:

- Ensure that stop work orders and other means of compliance are being used as authorized by each ordinance;
- Suggest changes to improve enforcement of and compliance with regulations and programs;
- Participate in Flood Insurance Rate Map updates by adopting new maps or amendments to maps;
- Utilize recently completed Digital Flood Insurance Rate Maps (DFIRMs) in conjunction with GIS to improve floodplain management, such as improved risk assessment and tracking of floodplain permits;
- Promote and disperse information on the benefits of flood insurance, with assistance from partners such as the City of Gunnison, Town of Mt. Crested Butte, the Town of Crested Butte, and the Colorado Water Conservation Board; and
- Evaluate improving the County's rating with the Community Rating System to further lower the cost of flood insurance for residents.

Other Alternatives	None identified
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Community Development Department
Priority	High
Cost Estimate	Low
Benefits	Reduced property loss from floods, continued availability of flood insurance for residents, reduced vulnerability of new development to flooding
Potential Funding	County budget
Schedule	Ongoing

5. Continue to implement sound floodplain management practices in the City of Gunnison through participation in the National Flood Insurance Program and updated statewide floodplain rules

Hazards Addressed Flood

Project Description and Background

The City of Gunnison participates in the National Flood Insurance Program (NFIP). This project restates the commitment of the City of Gunnison to implement sound floodplain management practices, as stated in the 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 above the base flood elevation. Floodplain managers will remain current on NFIP policies, and are encouraged to attend appropriate training and consider achieving Certified Floodplain Manager (CFM) status.

This project also includes periodic reviews of the floodplain ordinance to ensure that it is clear, up to date, and adequately addresses the level of flood risk identified within the Hazard Mitigation Plan. Because of the adoption of updated statewide floodplain rules and regulations (effective January 14, 2011) the CWCB will require local governments to revise their floodplain ordinance to comply with the new rules by January 2014.

Other activities that could be included in this effort are:

- Ensure that stop work orders and other means of compliance are being used as authorized by each ordinance;
- Suggest changes to improve enforcement of and compliance with regulations and programs;
- Participate in Flood Insurance Rate Map updates by adopting new maps or amendments to maps;
- Utilize recently completed Digital Flood Insurance Rate Maps (DFIRMs) in conjunction with GIS to improve floodplain management, such as improved risk assessment and tracking of floodplain permits;
- Promote and disperse information on the benefits of flood insurance, with assistance from partners such as Gunnison County, the Town of Mt. Crested Butte, the Town of Crested Butte, and the Colorado Water Conservation Board; and
- Evaluate improving the City's rating with the Community Rating System to further lower the cost of flood insurance for residents.

Other Alternatives	None identified
Jurisdiction	City of Gunnison
Responsible Office	City of Gunnison Community Development Department
Priority	High
Cost Estimate	Low
Benefits	Reduced property loss from floods, continued availability of flood insurance for residents, reduced vulnerability of new development to flooding
Potential Funding	City budget
Schedule	Ongoing

6. Become a member of CoWARN –

Hazards Addressed	Multiple
Project Description and Background	Crested Butte South Metropolitan District should become a member of Colorado's Water/Wastewater Agency Response Network (CoWARN). Natural disasters or emergencies can compromise water and wastewater infrastructure. CoWARN provides a statewide resource for water and wastewater utility companies to aid one another during disasters and emergencies. Membership in CoWARN would grant participating municipalities access to other members' resources, including equipment, repair parts, and years of expertise from Colorado's top water/wastewater professionals.
Other Alternatives	Local intergovernmental agreements (IGAs)
Jurisdiction	Crested Butte South Metropolitan District
Responsible Office	Crested Butte South Metropolitan District
Priority	Medium
Cost Estimate	Minimal, just occasional transportation costs to attend meetings on the front range.
Benefits	In the event of a natural disaster where infrastructure, treatment plants, or water producing capabilities were compromised, Crested Butte South Metro District would have resources from equipment, parts, etc., to get vital portions of the community back online.
Potential Funding	General fund
Schedule	5 years

7. Evacuation Route Work for Arrowhead/Improving Forest Road 867

Hazards Addressed	Flood
Project Description and Background	Forest Road 867 serves as the primary evacuation route for the Arrowhead community. This road needs to be improved to protect against flood damage and allow for reliable access/egress during emergency incidents.
Other Alternatives	None identified
Jurisdiction	Arrowhead community
Responsible Office	Arrowhead FPD, Arrowhead HOA, Gunnison County
Priority	Medium
Cost Estimate	TBD
Benefits	Protect life safety related to wildland fire and flood events that impact the Arrowhead community; Reduced damages from flooding; maintain access/egress for first responders
Potential Funding	Local, state, and federal funds
Schedule	TBD

8. Continued preparation and awareness for flooding

Hazards Addressed	Flood
Project Description and Background	Gunnison County should continue flood preparation and awareness efforts. Floods, especially flash floods, can occur very quickly and offer little warning for people to get to a safe location. Through flood preparation and awareness, citizens can protect their lives and homes. This effort will help provide citizens with the necessary knowledge to stay safe during a flood or to develop family emergency plans before a flooding event occurs. Preparation and awareness activities can also improve emergency response capabilities by teaching first responders how to monitor environmental and climate conditions for flooding potential. This is an ongoing activity in the Gunnison County Office of Emergency Management (OEM) and other agencies.
Other Alternatives	None identified
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Manager, law enforcement, fire departments, EMS, Gunnison County Public Works, Gunnison County Emergency Management
Priority	High
Cost Estimate	TBD
Benefits	Protect life and property and reduce losses
Potential Funding	Local and state sources
Schedule	Ongoing

9. Evacuation Planning for Gunnison County

Hazards Addressed	Multiple
Project Description and Background	There is no county-wide evacuation plan for Gunnison County. Some evacuation routes have been established, and some evacuation plans have been developed for high risk wildland fire areas, but no county-wide plan exists. Evacuation plans should be developed or improved at the jurisdictional level, the municipal level, and the county level with MOUs in place among all parties.
Other Alternatives	None identified
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Emergency Management, law enforcement, fire districts, Gunnison County Public Works, Crested Butte FPD
Priority	Medium
Cost Estimate	TBD
Benefits	Protecting life safety and enhancing relationships with partners at the local, regional, state, etc. level.
Potential Funding	Local sources
Schedule	Ongoing

10. Emergency evacuation access for Mt. Crested Butte

Hazards Addressed	Multiple
Project Description and Background	Currently County Road 317 is the only available evacuation route from Mt. Crested Butte. The Town needs an alternative route in case CR 317 access is blocked north of the Town of Crested Butte.
Other Alternatives	Work with Gunnison County to improve bridge flood flows to higher levels. Determine alternative evacuation route.
Jurisdiction	Town of Mt. Crested Butte
Responsible Office	Town of Mt. Crested Butte Planning; Police and Fire; Support from Gunnison County Emergency Management
Priority	Low
Cost Estimate	TBD
Benefits	Be able to properly evacuate and provide emergency services to Mt. Crested Butte citizens and guests in case of an emergency.
Potential Funding	TBD
Schedule	TBD

11. Improve drainage and road surface along Section 2 of Alpine Plateau Road for emergency access/egress

Hazards Addressed Multiple

Project Description and Background Section 2 of the Alpine Plateau Road needs to be improved for emergency access/egress purposes. This would entail improving the surface and drainage of the road. The Alpine Plateau Road is the single, year round route in and out of the Arrowhead Ranch Subdivision, other private residential or ranching sites, and large forest and other wild lands. In the event of wild land fires, floods, extreme winter weather, or other events the ability of emergency response agencies to move people and equipment into areas served by the road may be severely impacted. Similarly it may become impossible to evacuate residents and visitors resulting in significant threat to the lives of the affected people. While significant improvements to portions of the road have been accomplished by the USFS, Gunnison County Public Works, and the Arrowhead Improvements Association several high risk hazards remain as documented in Attachment A – Issues and Risks.

Other Alternatives There is an unmaintained road from Hazel Lake Drive that passes through private ranch lands to reach US 50 near the CDOT facility in the Big Blue Creek valley. That is not a public road and use of federal, state, or county funds to improve that road as an alternative to the Alpine Plateau Road is not appropriate. This road is also not open to wheeled vehicle traffic during many months due to snowfall. Changing that would require significant recurring costs.

Using the southern approach to the Arrowhead Ranch Subdivision from highway 149 is possible for limited purposes. However, the terrain along long portions of that road is very steep resulting in narrow roads and switchbacks. Making that portion of the Alpine Plateau Road suitable either for rapid evacuation or for insertion of emergency vehicles would be nearly impossible and very expensive. In addition the environmental impact due to construction would be extreme. This portion of the Alpine Plateau Road is also not open to wheeled vehicle traffic during many months due to snowfall. Changing that would require major recurring costs and would add danger to the snow handling team.

There are trails that lead east from the area surrounding the Arrowhead Ranch subdivision that have a potential for use as either an ingress or egress path. However the cost of converting them to usable roads would be prohibitive and would introduce an additional party in the form of the

	Mountain Ute tribe.
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Department of Public Works with support from USFS, BLM, and Arrowhead Improvements Association
Priority	High
Cost Estimate	Widening the road - $49.6K, repairing roadbed erosion - $17.5K, fixing line of sight limitations - $49.6K, trafficability - $99.8K
Benefits	Losses could include both loss of life ranging from few to hundreds as well as property losses ranging from a single dwelling ($300,000 average) to the entire subdivision estimated at $100M or more.
Potential Funding	Existing maintenance funds are inadequate. FEMA or similar grant funding may be the only effective source.
Schedule	Significant work could be accomplished in a single season but at least two full seasons are needed to complete all sub-projects.

12. Backup power for each critical facility

Hazards Addressed	Multiple
Project Description and Background	Critical facilities in Gunnison County and other jurisdictions should obtain backup power. Power outages and energy supply disruptions can compromise the ability of critical facilities to perform their mission essential functions. Having backup power during an emergency is especially important for critical facilities with a role in life safety, communications, or emergency response. Backup power is also important for public shelters, especially during extreme temperature events. The Crested Butte water treatment plant and wastewater treatment plant are currently equipped with backup generators.
Other Alternatives	None identified
Jurisdiction	Gunnison County
Responsible Office	All agencies
Priority	Medium
Cost Estimate	TBD
Benefits	Backup power will enable critical facilities to continue to perform mission essential functions during a disaster or emergencies. This can potentially save both lives and property.
Potential Funding	Local funds, disaster recovery funding, HMGP, FEMA Hazard Mitigation Assistance, EMPG, Colorado Governor's Energy Office
Schedule	Next 5 years

13. Improve public warning

Hazards Addressed	Multiple
Project Description and Background	Gunnison County and other jurisdictions should improve their public warning systems. Many natural hazards occur rapidly, potentially placing people and property at great risk. Advanced public warning can give people time to seek shelter or safety, and give emergency responders a chance to prepare for deployment. Public warning needs to be able to alert citizens to shelter in place, evacuate, or take other safety measures depending on the nature of the specific hazard. Citizens must be able to receive and understand the warning message(s) being given. As technology and lifestyles change, public warning systems need to adapt and diversify to reach the greatest number of people. Both permanent and seasonal residents need access to public warning systems.
Other Alternatives	None identified
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Emergency Management, law enforcement, fire departments
Priority	High
Cost Estimate	TBD
Benefits	Increase life safety for both citizens and emergency responders
Potential Funding	Local funds, State of Colorado, Ready Colorado
Schedule	TBD

14. Assess and identify repeater sites to ensure communication during emergencies or disasters

Hazards Addressed	Multiple
Project Description and Background	The City of Gunnison should identify and assess repeater sites to ensure that communications can be maintained during emergencies or disasters. City of Gunnison operates the Regional Emergency Radio system for Gunnison and Hinsdale County. It is the primary contact for local law enforcement, ambulance, and fire services as well as communications with state and federal agencies in the region. Communications is accomplished by a series of repeaters located at several locations around the two counties. Repeaters are housed in County owned facilities, federal facilities, and private facilities. Repeater locations are potentially located in areas with limited access or susceptible to power outages caused by avalanches, heavy snows, wildland fires, or severe weather.
Other Alternatives	Repeater locations should be clearly identified. Each repeater site should have available routes identified and methods of travel identified depending on time of year and local travel restrictions. Routine maintenance schedule should be established to include winterization. Alternate communications options should be established if a repeater fails. Power needs and concerns should be established to deal with issues that may arise.
Jurisdiction	City of Gunnison
Responsible Office	City of Gunnison Police Department
Priority	Low
Cost Estimate	TBD
Benefits	Maintain equipment on good working order preventing outages. Identify the threats and resources needed now to shorten the response and repair time in the event of an outage. If an outage is unavoidable, limit the impact by having alternate communications options determined.
Potential Funding	Established City Budget Process and Regional 911 Board
Schedule	Ongoing – Addition of Comstock Communications site has been completed since the 2013 HMP.

15. Threat Hazard Identification and Risk Assessment for Man-Caused Hazards

Hazards Addressed	Multiple
Project Description and Background	The Gunnison County Hazard Mitigation Planning Committee recognizes that man-caused hazards should be planned for, in addition to natural hazards. The County will be developing a Human Caused/Technical Hazard Identification and Risk Assessment, or THIRA, following recently released federal guidelines. The THIRA will supplement the Natural Hazard Mitigation Plan update by analyzing man-made hazards in Gunnison County. The THIRA will set capability targets for dealing with threats and hazards in the community. The THIRA process will be modeled after the process used to update the HMP. Many of the stakeholders involved in the Natural Hazard Mitigation Planning process will also be involved in the Human Caused/Technical Hazard Planning process.
Other Alternatives	None identified
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Emergency Management
Priority	High
Cost Estimate	TBD
Benefits	Identify risks associated with man-made hazards to supplement Gunnison County Natural Hazard Mitigation Plan Update, improve emergency management capabilities, reduce losses to life and property
Potential Funding	State - EMPG
Schedule	TBD

16. Implementation of landscape-scale fuels reduction projects and defensible space projects identified in the County and local level CWPPs

Hazards Addressed	Wildland Fire
Project Description and Background	Obtain funding to support the implementation of the Gunnison County CWPP fuels reduction and defensible space recommendations to reduce the wildland fire risk to identified communities within the county.
Other Alternatives	Encourage HOAs and individual homeowners to complete defensible space without funding assistance.
Jurisdiction	County and all jurisdictions
Responsible Office	WRWC, Gunnison FPD, CBFPD, CSFS, EM, GBWC
Priority	High
Cost Estimate	$2,500-$3,000 per acre treated (approximate)
Benefits	Mitigation work in high risk wildland fire areas increases chances of structural survivability as well as changes fire behavior therefore reducing the risk for first responders / suppression efforts. Mitigation also reduces risk for life safety and increases evacuation success.
Potential Funding	FEMA, local counties. BLM/USFS
Schedule	On-going

17. Develop defensible space regulations as a requirement and/or limit new development in high risk areas

Hazards Addressed	Wildland Fire
Project Description and Background	Gunnison County should implement defensible space recommendations, and/or limit development in high wildland fire risk areas. Defensible space is recommended but not required in much of Gunnison County, although the Crested Butte Fire Protection District does require implementation of defensible space. Development continues to occur in high wildland fire hazard areas without sufficient egress and access. In the Crested Butte area, development occurs on 35-acre lots over which the County has no subdivision approval control. This presents a significant public safety and property protection issue as first responders may not be able to reach threatened people or property during a wildland fire.
Other Alternatives	Continue as recommendation only
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Community Development, fire districts, Gunnison County Emergency Management
Priority	High
Cost Estimate	Staff time
Benefits	Avoid loss of life and structures
Potential Funding	County general fund, grants
Schedule	2013-2014

18. Continue to promote wildland fire awareness throughout Gunnison County through public education and outreach programs/materials

Hazards Addressed	Wildland Fire
Project Description and Background	Participate in the development of a regional wildland fire education and outreach program. Materials to include the development of wildland fire education publication. Support events, meetings and other outreach opportunities to deliver concise and clear messages to the public about wildland fire risk, mitigation actions, and evacuation information.
Other Alternatives	N/A
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Emergency Management, WRWC, GBWC
Priority	High
Cost Estimate	5K
Benefits	Increasing public awareness about wildland fire risk, and how to prepare and mitigate against those risks reduces property and life losses in actual events.
Potential Funding	Counties, FEMA, WRWC
Schedule	Completed by January 1, 2013

19. Continued Wildland Fire Fuels Mitigation for Arrowhead Fire Protection District

Hazards Addressed	Wildland Fire
Project Description and Background	Arrowhead Fire Protection district has been engaged in various wildland fuels mitigation projects. Continued efforts need to be made to develop defensible space, fuel breaks, and other projects as recommended in the Gunnison County CWPP.
Other Alternatives	None identified
Jurisdiction	Arrowhead community
Responsible Office	Arrowhead FPD
Priority	Medium
Cost Estimate	TBD
Benefits	Protect life and property, reduce losses related to wildland fire
Potential Funding	FEMA, BLM/USFS, CSFS, WRWC, local sources
Schedule	Ongoing

20. Promote and assist with the development of community specific CWPPs in higher wildland fire risk areas

Hazards Addressed	Wildland Fire
Project Description and Background	Obtain funding assistance for communities and/or FPD interested in developing a community specific CWPP. These plans would further the already developed County CWPP by providing detailed wildland fire risk and mitigation actions specific to the community.
Other Alternatives	County wide CWPP
Jurisdiction	Any communities in Gunnison County
Responsible Office	WRWC, County EM, FPDs
Priority	Medium
Cost Estimate	Plan scale dependant
Benefits	Planning for wildland fire events, identifying potential risk reduction projects and identifying at risk areas helps homeowners, HOAs, first responders and emergency managers mitigate against life and property loss.
Potential Funding	FEMA, BLM, Counties, FPDs
Schedule	On-going

21. Evacuation Route Work for Marble

Hazards Addressed	Wildland Fire
Project Description and Background	Evacuation route thinning is a recommended mitigation activity in the Gunnison County CWPP due to the one way access and egress to the Town of Marble.
Other Alternatives	None identified
Jurisdiction	Marble
Responsible Office	Carbondale Fire and Sheriff
Priority	Medium
Cost Estimate	TBD
Benefits	Protect life safety for Marble residents
Potential Funding	Local funding sources
Schedule	Next five years

22. Create safer evacuation routes from wildland fire for Spring Creek and White Pine

Hazards Addressed	Wildland Fire
Project Description and Background	Safer evacuation routes need to be developed for Spring Creek and White Pine. There currently are no requirements for evacuation to avoid fire events. Uncontrolled combustible growth is allowed along evacuation routes. This makes evacuation routes unnecessarily dangerous and could impede emergency personnel from responding to threatened people or property along these evacuation routes.
Other Alternatives	Develop safer evacuation through hiring a contractor
Jurisdiction	Spring Creek, White Pine
Responsible Office	Gunnison County Fire Department and Gunnison County Emergency Management
Priority	Medium
Cost Estimate	Unknown at this time
Benefits	Avoid potential loss of life as a result of poor and unsafe egress during a wildland fire event
Potential Funding	Possible grants
Schedule	ASAP

23. Eliminate wildland fire fuels on private lots throughout the Crested Butte South Metropolitan District subdivision

Hazards Addressed	Wildland Fire
Project Description and Background	Several lots in CB South have experienced Aspen die off as has a lot of Western Colorado. The plan would be to contact private owners of the lots and build a strategy to remove fire fuel off their lots and reduce fire risk throughout the subdivision. The main challenge is that it is private property. CB South Metro has a good relationship with its owners and therefore can make this a feasible project.
Other Alternatives	Pass a resolution requiring property owners to remove fire fuels on their own.
Jurisdiction	Crested Butte South Metropolitan District
Responsible Office	Crested Butte South Metropolitan District
Priority	Low
Cost Estimate	$50,000
Benefits	Several structures are built in areas surrounded by these dead aspen trees. There are also neighboring subdivisions that would receive the benefits of fire fuel removal.
Potential Funding	General fund, Grants
Schedule	5 years

24. Continued wildland fire prevention and preparation

Hazards Addressed	Wildland Fire
Project Description and Background	Nearly all of Gunnison County lies within the WUI. Wildland fires are expected to occur each year, so the County needs to be prepared to deal with these events and mitigate them wherever possible. Prevention and preparation activities can reduce losses to life and property in the County. Prevention and preparation activities may include implementing defensible space, educating the public, taking inventory of capabilities and positioning resources, establishing mutual aid agreements with other jurisdictions and agencies, implementing burning restrictions, etc.
Other Alternatives	None identified
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Emergency Management, law enforcement, fire districts, EMS, Gunnison County Public Works, Gunnison Basin Wildfire Council, Gunnison County Community Development
Priority	High
Cost Estimate	TBD
Benefits	Protection of life safety and property in Gunnison County, reduced emergency response times for wildland fire events
Potential Funding	Local and state sources
Schedule	Ongoing

25. Continued wildland fire public education

Hazards Addressed	Wildland Fire
Project Description and Background	A strong public education program helps the public prepare for wildland fires. Several different methods can be used to educate the public, including Town Hall style meetings, brochures, media articles, interviews, websites, etc. The public should know about how and when to shelter in place or evacuate, preparing a family emergency plan/kit, preparing a pet safety plan/kit, protecting important documents, etc. Creating defensible space around the home is an especially important part of wildland fire public education. The public can take several measures to protect their home from fire and make it easier for fire crews to defend the home when it is threatened. This is part of an ongoing effort within Gunnison County OEM and other agencies.
Other Alternatives	None identified
Jurisdiction	Arrowhead community
Responsible Office	Arrowhead FPD
Priority	High
Cost Estimate	TBD
Benefits	Protect life and property, reduce losses
Potential Funding	FEMA, BLM/USFS, WRWC, local sources, State of Colorado, Ready Colorado
Schedule	Ongoing

26. Create mutual aid agreements or memorandums of understanding for equipment/personnel sharing during severe winter storms

Hazards Addressed	Severe Winter Storms
Project Description and Background	Gunnison County is prone to severe winter storms, which can potentially create life safety issues. A memorandum of understanding (MOU) should be established among Gunnison County, the City of Gunnison, Crested Butte South Metropolitan District, the Town of Crested Butte, and the Town of Mt. Crested Butte to ensure that emergency routes are maintained and accessible during periods of severe winter storms.
Other Alternatives	If all jurisdictions named do not want to participate, establish a MOU among the parties that do wish to participate.
Jurisdiction	Gunnison County, Town of Crested Butte
Responsible Office	Gunnison County Public Works
Priority	High to Medium
Cost Estimate	TBD
Benefits	Avoid unnecessary delays to emergency response or evacuation.
Potential Funding	Local sources; staff time
Schedule	As soon as possible.

27. Preparation for Extreme Winter Weather

Hazards Addressed	Severe Winter Storms
Project Description and Background	Severe winter storms are not unusual in Gunnison County given the local climate and elevation. These storms have the potential to isolate an area by making roads impassible. Deliveries of supplies, such as food and fuel, can be delayed by severe storms. Power outages can occur, and critical facilities may not be able to perform important functions unless they are equipped with backup power. Preparation activities can help mitigate these effects and ensure that citizens have enough supplies and resources to last through a severe winter storm. This is an ongoing activity within Gunnison OEM and other agencies.
Other Alternatives	Update snow plowing equipment impact fees for new development. This is currently underway in the Town of Crested Butte. Snow plowing impact fees for all jurisdictions can help with preparation for extreme winter weather in new developments.
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Emergency Management, law enforcement, EMS, fire districts, Gunnison County Public Works
Priority	High
Cost Estimate	TBD
Benefits	Protect life and property, reduce losses
Potential Funding	FEMA, State and local grants
Schedule	Ongoing

28. Wildfire Regulatory Changes

Hazards Addressed	Wildland Fire
Project Description and Background	Provide defensible space and wildfire mitigation, as a required review element of building permit review and issuance. Possible adoption of 2015 IWUIC code.
Other Alternatives	Regulatory changes associated with amendments to the Gunnison County Land Use Resolution – Section 11-105: Development in Areas Subject to Wildfire.
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Community Development
Priority	High
Cost Estimate	TBD- unknown
Benefits	Protect life and property, reduce losses
Potential Funding	Unknown
Schedule	Spring 2019

29. Flooding Hazard Mitigation for City of Gunnison, West of 8th Street

Hazards Addressed Flooding

Project Description and Background A system of head gates, ditches and ponds extends from the Gunnison River north of the City Limits and runs south through the West edge of City of Gunnison (West of 8th street) and reenters the river through the Lazy K Property, owned by the City of Gunnison. The waterway runs through several private and city owned properties and is a private ditch right of way. During flooding 1985 the waterway contributed to channeling flood waters from the river into the low laying areas within the City of Gunnison, West of 8th Street. Due to restricted water flow roads in the area were impacted threatening access to several residences and the nursing home. Public and private property West of 8th street was damaged from flood waters.

The area affected in 1985 has continued to develop and consists of: single family residence, apartments, mobile homes, Senior RV Park, nursing home, City of Gunnison electrical substation and City of Gunnison Public Works buildings. The Lazy K Property was purchased by the City of Gunnison in 2013 and future development is pending as a park, public space and possible private development.

Project proposed would be to evaluate and make improvements to the water drainage to increase the capacity to handle flood waters. Improve critical road sections crossing the waterway to accommodate higher water flows to insure access to at risk populations.

Other Alternatives If feasible, an alternative would be to restrict flow to the existing ditch via series of berms or structures.

Jurisdiction City of Gunnison

Responsible Office City of Gunnison Community Development and Public Works

Priority Low

Cost Estimate TBD

Benefits Increasing flood capacity of the existing waterway would reduce the extent and damage caused by flood waters. Reducing the flood extent would allow for more residents to shelter in place during the flood events. Additionally, improved stability of roads would further reduce the risk to

residents living in the affected areas by strengthening the routes needed during any evacuations.

Potential Funding FEMA, DOLA, Colorado Outdoors

30. Avalanche Mitigation and Education for Mt. Crested Butte

Hazards Addressed Avalanche

Project Description and Background Avalanche mitigation and education for Mt. Crested Butte.

There are specific avalanche zones in various areas throughout the Town of Mt Crested Butte (see attached avalanche zones map). Each avalanche zone poses a significant threat to human life and safety. The Town has a plan in place to improve existing signage as well as placing new signage in our avalanche zone areas. We will be changing the language on our existing signs. Our current signs deliver the message that is specific to the avalanche hazard zone as classified on the avalanche zone map. The existing signs are also color coded to signify the magnitude of the avalanche hazard. Since all the avalanche zones can result in loss of life, it is our goal to incorporate a singular and stronger message into our existing signage. "Avalanche Area Keep Out." All existing signs will be changed to show this message and all additional new signs will show this message as well. All signs will also be the color orange to signify the magnitude of the avalanche zone. Implementation is expected within the next year. Though this does not mitigate the hazard itself, it will help mitigate human exposure to the hazard.

Other Alternatives

Jurisdiction Town of Mt. Crested Butte

Responsible Office Mt. Crested Butte Community Development

Priority Medium

Cost Estimate TBD

Benefits Increase awareness and reduce threat to life safety.

Schedule 2019

31. Wildland Fire Mitigation for the Town of Crested Butte

Hazards Addressed Wildland Fire

Project Description and Background The Town of Crested Butte is a former mining town, and is considered a Wildland Urban Interface (WUI) community. As such, it has a hazard rating of Moderate (2011 Gunnison County CWPP). Given the Town's proximity to the forest, building construction (mostly wood siding), and tightly packed building density, a wildland fire could cause considerable damage.

Collaborating with the West Region Wildfire Council, United States Forest Service, Colorado State Forest Service, Crested Butte Fire Protection District and Gunnison County Emergency Management develop a fuels mitigation plan for public lands surrounding the town, and private properties adjoining the public land, creating a "buffer" for the town. The plan would identify specific cross-boundary mitigation projects, possibly utilizing funding through the WRWC and the USFS Good Neighbor Authority.

Other Alternatives Increase public awareness of the wildland fire threat in the Town of Crested Butte, and provide information to property owners on mitigation and preparedness actions. This would include offering grants for defensible space through the West Region Wildfire Council.

Jurisdiction Town of Crested Butte

Responsible Office Town of Crested Butte

Priority High

Cost Estimate TBD

Benefits

Schedule 2019

Gunnison County Hazard Mitigation Plan

2018 Update

Wed Mar 21, 2018, 09:00 – 12:00

Crested Butte Fire Station #2, 751 Gothic Av, Mt Crested Butte CO 81225

Agenda

- Introductions
  (Note: For time management, we'll allot about one hour for review of input for Sections 2 and 4. The balance of the meeting will be focused on discussion of Section 5)
- Section 2 Community Profile Input Review
  - Each Jurisdiction will briefly discuss their changes from the 2013 plan
  - Overall discussion on this section – corrections / additions
  - Capability Assessment
- Section 4 Risk Assessment and Hazard Profile Input Review
  - Each Jurisdiction will briefly discuss their changes from the 2013 plan
    - ✓ Risks and Hazards
    - ✓ Vulnerability vs. Capability relative to Risks and Hazards
  - Overall discussion on this section – corrections / additions
- Section 5 Mitigation Strategy
  - Establish Mitigation Goals and Objectives
    - ✓ Goals- General guidelines that explain what the community wants to achieve with the plan. Usually broad policy-type statements that are long-term. They represent visions for reducing or avoiding losses from identified hazards. They are mandatory for an HMP.
    - ✓ Objectives- Optional for HMPs. Broader than specific actions, but are measurable, unlike goals. Objectives connect goals to actions.
  - Identify at least one mitigation action for each jurisdiction that could eliminate or reduce a hazard's impact. (Reminder: listing a mitigation action in the HMP does not obligate the jurisdiction to complete that action, and listing an action makes the jurisdiction eligible for possible Federal assistance with that or other actions identified in the future.)
    - ✓ Each action must be linked to a goal.
    - ✓ Must be a Mitigation Action and not a Preparedness or Response Action.
  - Categorize and prioritize mitigation actions

- Public Involvement Activities
- Next meeting and assignments: May 2, 09:00 – 12:00

GUNNISON COUNTY

Meeting: HAZARD MITIGATON

Date: 03/21/18

NAME (Please print)	REPRESENTING	PHONE & E-MAIL
Katherine Haase	Gunnison County	
CJ Malcolm	GVH EMS	
MARK MYKOL	SHERIFF'S OFFICE	
NEAL STARKEBAUM	GUNNISON COUNTY	
Michael Yerman	Town of CB	
Dennis Spritzes	Gunn Fire	
Ric Ems	CAFPA	
MICHAEL REILLY	CBMO	
Mark Thompson	DHSEM	
JASON WARD	STATE ENGINEER'S OFFICE	
Julie Malingowski	National Weather Service	
Jim Pringle	" "	
Keith Robinson	Gunnison PD	
Mike Tarantino	West Region Wildfire Council	

Gunnison County Hazard Mitigation Plan Update

Mar 21, 2018

Section 5 Mitigation Strategy

(Identifying and Prioritizing Mitigation Actions)

Goals of mitigation actions should be identified with-out considering cost, schedule, and means of accomplishment. Goal statements form the basis for determining objectives and actions to achieve the goals.

1. Over-arching goals of the 2013 HMP as relating to Mitigation Actions:
    - Represent basic desires of the community;
    - Encompass all aspects of community, public and private;
    - Are nonspecific, in that they refer to the quality (not the quantity) of the outcome;
    - Are future-oriented, in that they are achievable in the future; and
    - Are time-independent, in that they are not scheduled events.

2. 2013 HMP Goals Specific to Mitigation Actions

    Goal 1: Reduce the potential impacts of hazards on the safety of the County's citizens and guests

    - Minimize impacts to the population through planning, regulation, and education
    - Raise awareness and acceptance of hazard mitigation generally
    - Identify appropriate evacuation routes
    - Improve governmental coordination
    - Learn from other community best practices
    - Improve mapping source data accuracy

    Goal 2: Reduce the potential impact of hazards on critical facilities, local government assets, infrastructure, private property, and critical support services

    - Minimize disruption to critical services
    - Improve the County's disaster response and recovery capabilities
    - Reduce impacts to existing and future development

    Goal 3: Reduce the potential impact of hazards on the County's economy, natural resources, historic treasures and interests, and other characteristics which add to the quality of life of the citizens and guests of the County

    - Reduce the County's liability with respect to hazards generally

    Goal 4: Identify and implement cost effective hazard mitigation and avoidance measures so as to accomplish the County's goals.

3. 2018 Mitigation Action Types (These are mitigation alternatives and support mitigation goals)
    - Local Plans and Regulations (LPR)
    - Structure and Infrastructure Projects (SIP)
    - Natural Systems Protection (NSP)
    - Education and Awareness Programs (EAP)

4. Mitigation Action Prioritization Process – Use the below questions to prioritize identified Mitigation Actions.
    - Social: Does the measure treat people fairly?
    - Technical: Will it work? (Does it solve the problem? Is it feasible?)
    - Administrative: Is there capacity to implement and manage the project?
    - Political: Who are the stakeholders? Did they get to participate? Is there public support? Is political leadership willing to support it?
    - Legal: Does your organization have the authority to implement the measure? Is it legal? Are there liability implications?
    - Economic: Is it cost-beneficial? Is there funding? Does it contribute to the local economy or economic development? Does it reduce direct property losses or indirect economic losses?
    - Environmental: Does it comply with environmental regulations or have adverse environmental impacts?
    - Scored against hazard ranking

Table 4.1 Hazards Ranking for Each Participating Jurisdiction or Special District

Hazard	Gunnison County (Including Federal and State Lands)	City of Gunnison	Crested Butte	Mt. Crested Butte	Arrowhead FPD	Crested Butte FPD	Crested Butte South Metro Dist.	Mt. Crested Butte Water and Sanitation Dist.
Avalanche								
Dam Failure								
Drought								
Earthquake								
Extreme Cold								
Flooding and Ice Jam								
Hail								
High Wind								
Landslide/ Rockfall/ Debris Flow								
Lightning								
Severe Winter Weather								
Wildland Fire								

Table 4.1 Hazards Ranking for Each Participating Jurisdiction or Special District

Hazard	Gunnison County (Including Federal and State Lands)	City of Gunnison	Crested Butte	Mt. Crested Butte	Arrowhead FPD	Crested Butte FPD	Crested Butte South Metro Dist.	Mt. Crested Butte Water and Sanitation Dist.
Avalanche	✓			✓		✓		✓
Dam Failure	✓	✓	✓	✓	✓	✓	✓	✓
Drought	✓	✓	✓	✓	✓	✓	✓	✓
Earthquake	✓	✓	✓	✓	✓	✓	✓	✓
Extreme Cold	✓	✓	✓	✓	✓	✓	✓	✓
Flooding and Ice Jam	✓	✓	✓		✓	✓	✓	
Hail	✓	✓	✓	✓	✓	✓	✓	✓
High Wind	✓	✓	✓	✓	✓	✓	✓	✓
Landslide/ Rockfall/ Debris Flow	✓	✓	✓	✓	X	✓	✓	✓
Lightning	✓	✓	✓	✓	✓	✓	✓	✓
Severe Winter Weather	✓	✓	✓	✓	✓	✓	✓	✓
Wildland Fire	✓	✓	✓	✓	✓	✓	✓	✓

1. Risk Identification and Assessment for Human-Caused and Technical Hazards

Hazards Addressed	Multiple
Project Description and Background	The Gunnison County Hazard Mitigation Planning Committee recognizes that human caused/technical hazards should be planned for, in addition to natural hazards. The HMPC agreed at the 2018 HMP Update kick-off meeting to include human-caused and technical hazards in the 2018 update, following recently released federal guidelines. The Human-Caused and Technical Hazards process will be modeled after the process used to update the HMP. Many of the stakeholders involved in the Natural Hazard Mitigation Planning process will also be involved in the Human Caused/Technical Hazard Planning process.
Other Alternatives	None identified
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Emergency Management
Priority	High
Cost Estimate	TBD
Benefits	Identify risks associated with man-made hazards to supplement Gunnison County Natural Hazard Mitigation Plan Update, improve emergency management capabilities, reduce losses to life and property
Potential Funding	State - EMPG
Schedule	Completed by end of 2018

From the 2013 HMP

Table 4.1 Gunnison County Natural Hazards Identification Worksheet

Hazard	Likelihood of Event/Frequency	Hazard Extent	Potential Magnitude	Significance
Avalanche	Highly Likely	Limited	Limited	Low
Dam Failure	Occasional	Significant	Critical	Medium
Drought	Likely	Extensive	Limited	Medium
Earthquake	Occasional	Extensive	Limited	Low
Extreme Cold	Highly Likely	Extensive	Negligible	Low
Flooding (including ice jams)	Highly Likely	Significant	Critical	High
Hailstorm	Occasional	Limited	Negligible	Low
High Winds	Likely	Extensive	Negligible	Medium
Landslide, Rockfall, and Debris Flow	Likely	Limited	Limited	Medium
Lightning	Likely	Limited	Negligible	Low
Severe Winter Storms	Likely	Extensive	Limited	High
Wildland fires	Highly Likely	Significant	Critical	High

Likelihood of Event/Frequency
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.

Potential Magnitude
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 Gunnison County Human Caused and Technological Hazards Identification Worksheet

Hazard	Likelihood of Event/Frequency	Hazard Extent	Potential Magnitude	Significance
Power Failure				
Communications Failure (Phone, Cell, Internet)				
Cyber attack				
Waste Water System Failure				
Water System Failure				
Large Planned Events				
Hazardous Materials Accident				
Civil Unrest				
Terrorism				

Likelihood of Event/Frequency
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.
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Potential Magnitude
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

Goals for the 2018 Gunnison County Multi-Hazard Mitigation Plan

Reduce the potential impact of hazards on the safety of the county's citizens and guests.

- Objective: Protect the population through planning and education
- Objective: Raise awareness and acceptance of hazard mitigation generally
- Objective: Identify appropriate evacuation routes
- Objective: Improve governmental coordination
- Objective: Learn from other areas
- Objective: Improve mapping source data accuracy

Reduce the potential impact of hazards on critical facilities, local government assets, infrastructure, private property and critical support services.

- Objective: Minimize disruption to critical services
- Objective: Improve the county's disaster response and recovery capabilities.
- Objective: Reduce impacts to existing and future development

Reduce the potential impact of hazards on the county's economy, natural resources, historic treasures and interests, and other characteristics which add to the quality of life of the citizens and guests of the county.

- Objective: Reduce the county's liability with respect to hazards generally.

Gunnison County Hazard Mitigation Plan

2018 Update

Wed May 2, 2018, 09:00 – 12:00

Gunnison County EOC, 510 W. Bidwell Av Gunnison CO 81230

Agenda

- Introductions
- Review and complete the worksheets: Natural Hazards Risk Assessment Profile and Human Caused and Technological Risk Assessment Profile. (Reminder that we chose to complete these for **each** participating jurisdiction, instead of a single "averaged" worksheet for the whole county. This ensures the risks/hazards for each participating jurisdiction are more accurately reflected).
- Present a Natural Hazard Mitigation Project from your jurisdictional worksheet. Depending on time, if anyone is interested in presenting a project on Human Caused and Technological Hazards, we'll try to fit it in.

Gunnison County Hazard Mitigation Plan

2018 Update

Wed May 2, 2018, 09:00 – 12:00

Gunnison County EOC, 510 W. Bidwell Av Gunnison CO 81230

Agenda

- 9-9:15 Introductions
- 9:15-10:30 Finalize the worksheet: Natural Hazards Risk Assessment Profile (Reminder that we chose to complete these for **each** participating jurisdiction, instead of a single "averaged" worksheet for the whole county. This ensures the risks/hazards for each participating jurisdiction are more accurately reflected).
    - Create a problem statement for each High & Medium natural hazard. Examples could include: critical facilities/infrastructure in hazard areas, parts of the community that have had hazard damage in the past, or hazard areas zoned for future development. These provide discrete risks to create mitigation strategies against. Sample statements:
        - **Newberg City recently annexed the South Woods area located in the wildland-urban interface. The City's land use and building codes do not address wildfire hazard areas. Future development in South Woods will increase vulnerability to wildfires.**
        - **The North Creek Sewage Treatment Plant is located in the 100-year floodplain and has been damaged in past flood events.**
- 10:30-10:40 Break
- 10:40-11:40 Present a Natural Hazard Mitigation Action from your jurisdictional worksheet.
- 11:40-12:00 Create an Implementation and Maintenance Schedule. What will be the schedule for the team to reassemble and: monitor implementation of the plan (update status of actions); evaluate effectiveness of the plan at achieving goals and objectives (may need to create metrics); update (*modify*) HIRA, goals, objectives, mitigation strategy; and create an ongoing public outreach strategy.

Meeting: HAZARD MITIGATION PLANNING

Date: 05/02/18

NAME (Please print)	REPRESENTING	PHONE & E-MAIL
Mark Thompson	DHSEM	720-630-0770; mark.a.thompson@state.co.us
Deanna Butterbaugh	DHSEM	720-512-0275; deanna.butterbaugh@state.co.us
Bobbi Lucero	GUN OEM	9706402443 blucero@gunnisoncounty.org
Drew Peterson	DHSEM	970-633-0201 drew.peterson@state.co.us
Scott Morrill	GUNN OEM	970-275-1370 smorrill@gunnisoncounty.org
Keith Robinson	GPD	920 275 6783 krobinson@gunnisonco.gov
~~Dennis~~ Spetzer	GunnFire	970 641-8153 dspetzer@gunnisonco.gov
Marilyn Gally	CRRO DOLA	303489 2291 marilyn.gally@state.co.us
Iain Hyde	DOLA CRRO	iain.hyde@state.co.us
Ric Ems	CBFPD	349-5333 REMS at CBFPD.ORG.
Michael Reily	CBMO	349-5231 mpreily@crestedbutte-co.gov
Mike Tarantino	WRWC	615-7300 wrwc.mike@gmail.com
~~Iain Hyde~~	~~DOLA~~	~~720.237.9190 iain.hyde@state.co.us~~
Jim Pringle	NATL WX SVC	970-243-7007 x726 james.pringle@noaa.gov
Carlos Velado	Town of Mt CB	970-349-6632 cvelado@mtcrestedbutte.colorado.us
Katherine Haase	Gunnison County	970-275-5208 khaase@gunnisoncounty.org

Gunnison County Hazard Mitigation Plan
Mitigation Action Prioritization Process
Jurisdiction:_____

Use the below questions to begin prioritizing identified Mitigation Actions. 1=Poor, 2=Average, 3=Good. Enter answers in the table below next to appropriate criteria.

- Social: Does the measure treat people fairly?
- Technical: Will it work? (Does it solve the problem? Is it feasible?)
- Administrative: Is there capacity to implement and manage the project?
- Political: Who are the stakeholders? Did they get to participate? Is there public support? Is political leadership willing to support it?
- Legal: Does your organization have the authority to implement the measure? Is it legal? Are there liability implications?
- Economic: Is it cost-beneficial? Is there funding? Does it contribute to the local economy or economic development? Does it reduce direct property losses or indirect economic losses?
- Environmental: Does it comply with environmental regulations or have adverse environmental impacts?

	Hazard:_____ _____ Mit. Action:_____ _____ Significance:_____ (From Hazard Worksheet)	Hazard:_____ _____ Mit. Action:_____ _____ Significance:_____ (From Hazard Worksheet)	Hazard:_____ _____ Mit. Action:_____ _____ Significance:_____ (From Hazard Worksheet)
Social			
Technical			
Administrative			
Political			
Legal			
Economic			
Environmental			
Subtotal			
Multiply by Significance			
Prioritization Score			

Multiply Subtotal X Significance (where H=3, M=2, L=1) to determine Prioritization Score for each Mitigation Action

Gunnison County Hazard Mitigation Plan Update

May 2, 2018

Section 5 Mitigation Strategy

(Identifying and Prioritizing Mitigation Actions)

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Natural Hazard Mitigation Plans

The Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended by the Disaster Mitigation Act of 2000 (DMA 2000), provides the legal basis for State, local, and Indian Tribal governments to undertake a risk-based approach to reducing risks from natural hazards through mitigation planning.
It places emphasis on State, Tribal, and local mitigation planning by requiring these entities to develop and submit mitigation plans as a condition of receiving various types of federal assistance.

What Are the Benefits?

Eligibility for FEMA grant programs, including:

- Pre-Disaster Mitigation (PDM): Identification of mitigation projects before the disaster, regardless of whether the project was in the HMP; Flood Mitigation Assistance (FMA) Pre and post flooding disaster projects; Hazard Mitigation Grant Program (HMGP – Post-Disaster).
- An opportunity to comprehensively identify and assess your jurisdictions risks and develop a strategy to reduce those risks.
    - Wildfire
    - Flood / Ice Jams
- Opportunity to collaborate with other jurisdictions in identifying, planning for and mitigating against common risks (natural and human / technological caused).
- Additional opportunity to integrate hazards planning into jurisdictional planning projects (i.e. comprehensive plans, land use plans, floodplain management plans emergency operations plans, etc)
- If enrolled in the NFIP Community Rating System, local mitigation plans can receive credit of 100 or more points.

Types of Eligible Projects

- Wildfire Mitigation: defensible space; fuels reduction; structural protection (WRWC)
- Flood Projects: Property Acquisition; Dry and Wet Flood-proofing; Elevation; “Minor Localized Flood Reduction Projects”; Detention ponds; Channel stabilization; Infrastructure Retrofit; Culverts, bridges, etc
- Utility Protection
    - Winter Weather
    - Wildfire
    - High Winds
- Safe Rooms
- Seismic Building/Infrastructure Retrofit
- Landslides/ Geologic Hazards: Channel (soil) stabilization/ protection of critical facility; Property Acquisition

What’s Different – 2013 vs. 2018

- The 2018 update is being done “in-house” without a contractor. This saves us all money, reduces FEMA requirements, and will result in a better, more reflective plan
- Human Caused and Technological Hazards are being included in this update. These are not required or scored by FEMA, nor are PDM funds available to mitigate these risks. However, the group felt it important to capture these risks, and identify potential means of mitigation.
- We will be including each jurisdictions Hazard and Risk Worksheets in the plan this time. In 2013, these worksheets were averaged together, and the resulting table was not reflective of each jurisdictions specific hazards.

Gunnison County
COLORADO

Fred R. Field Western Heritage Center
Melody Roper, Manager
275 South Spruce Street
Gunnison, CO 81230
970-641-8561
Fax: 970-641-4687

Name of Organization Requesting Facility Use: Emergency Management

Contact Person: Scott Morrill Phone: _____

Mailing Address: 510 W. Bidwell

Date Facility Will be Used: 5/2/18 Time: 9A-12pm

Number of People Expected to Attend: 10-20 Serving Alcohol: ____Yes X No

Indicate Which Part(s) of the Building you want to Use:

- ____ Downstairs Conference Room (24' x 24'), seats 35 (McDonough Room)
- ____ Upstairs Conference Room (34' x 57'), seats 50 (Hartman Room)
- ____ Small Multi-Purpose Room (50' x 80'), seats 220 (Van Tuyl Room)
- X Large Multi-Purpose Room (125' x 80'), sets 400 (Esty Room)
- ____ Kitchen
- ____ Outdoor Arena
- ____ Stalls
- ____ Lights
- ____ Other Facilities

Please describe the event for which you are requesting use of the Multi-Purpose Building (i.e. Wedding Reception, Animal Show, Fair, Dance, etc.):

Meeting for Hazard Mitigation Plan

10 Rectangular Tables

_____ Round Tables

30 Folding Metal Chairs

_____ Padded Conference Chairs

_____ Portable Stage (4' x 8')

_____ Podium

_____ Sound System

_____ Table Top Podium

Please list any other special needs you will have:

_____

_____

_____

Please read and initial that you agree to comply with the following rules:

- I have received, read, understand and agree to the conditions General Policies for Fred R. Field Western Heritage Center. _____
- I understand that I am responsible for any damage done to facility and equipment resulting from my use of the facility. _____
- I have read and understand the policy regarding the use of Alcoholic beverages and agree to any and all conditions set forth by the County regarding such use. _____
- To indemnify, defend and hold harmless the Gunnison County Board of Commissioners, officials, employees and agents of Gunnison County regarding any and all claims for damages resulting from my use of the facility and/or equipment pursuant to this application. _____

_____ _____

Signature Date

For Official Use Only

_____ Fee Paid

_____ Alcohol Permit Approved

_____ Proof of Insurance

_____ Use Approved _____

Gunnison County

Table 4.1 Hazards Ranking for Each Participating Jurisdiction or Special District

Hazard	Gunnison County (Including Federal and State Lands)	City of Gunnison	Crested Butte	Mt. Crested Butte	Arrowhead FPD	Crested Butte FPD	Crested Butte South Metro Dist.	Mt. Crested Butte Water and Sanitation Dist.
Avalanche	✓			✓		✓		✓
Dam Failure	✓	✓	✓	✓	✓	✓	✓	✓
Drought	✓	✓	✓	✓	✓	✓	✓	✓
Earthquake	✓	✓	✓	✓	✓	✓	✓	✓
Extreme Cold	✓	✓	✓	✓	✓	✓	✓	✓
Flooding and Ice Jam	✓	✓	✓		✓	✓	✓	
Hail	✓	✓	✓	✓	✓	✓	✓	✓
High Wind	✓	✓	✓	✓	✓	✓	✓	✓
Landslide/ Rockfall/ Debris Flow	✓	✓	✓	✓	X	✓	✓	✓
Lightning	✓	✓	✓	✓	✓	✓	✓	✓
Severe Winter Weather	✓	✓	✓	✓	✓	✓	✓	✓
Wildland Fire	✓	✓	✓	✓	✓	✓	✓	✓

Table 4.1 Hazards Ranking for Each Participating Jurisdiction or Special District

Hazard	Gunnison County (Including Federal and State Lands)	City of Gunnison	Crested Butte	Mt. Crested Butte	Arrowhead FPD	Crested Butte FPD	Crested Butte South Metro Dist.	Mt. Crested Butte Water and Sanitation Dist.
Avalanche								
Dam Failure								
Drought								
Earthquake								
Extreme Cold								
Flooding and Ice Jam								
Hail								
High Wind								
Landslide/ Rockfall/ Debris Flow								
Lightning								
Severe Winter Weather								
Wildland Fire								

Gunnison County Hazard Mitigation Plan

Risk Assessment and Hazard Profile – Crested Butte Fire Protection District

Natural Hazards Identification Worksheet

Hazard	Likelihood of Event/Frequency	Potential Impacts	Significance
Avalanche	Likely	Critical/Limited	M
Dam Failure	Unlikely	Limited/Neg	L
Drought	Occasional	Limited/Neg	L
Earthquake	Unlikely	Limited/Neg	L
Extreme Cold	Highly Likely	Negligible	L
Flooding (including ice jams)	Likely	Limited	M
Hailstorm	Occasional	Limited/Neg	L
High Winds	Likely	Limited	M
Landslide, Rockfall, and Debris Flow	Occasional	Limited/Neg	L
Lightning	Occasional	Negligible	L
Severe Winter Storms	Highly Likely	Limited/Neg	M
Wildland fires	Highly Likely	Critical	H

Likelihood of Event/Frequency
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.

Potential Impacts
Catastrophic—More than 50% of property severely damaged, and/or facilities are inoperable or closed for more than 30 days. More than 50% agricultural losses. Multiple fatalities and injuries. Critical indirect impacts.
Critical—25 to 50% of property severely damaged, and/or facilities are inoperable or closed for at least 2 weeks. 10-50% agricultural losses. Injuries and/or illnesses result in permanent disability and some fatalities. Moderate indirect impacts.
Limited—10 to 25% of area affected. Some injuries, complete shutdown of critical facilities for more than one week, more than 10% of property is severely damaged.
Negligible—Less than 10% of area affected. Minor injuries, minimal quality-of-life impact, shutdown of critical facilities and services for 24 hours or less, less than 10% of property is severely damaged.

Significance
(Intersection of Likelihood and Impacts)
Low
Medium
High

Gunnison County Hazard Mitigation Plan

Risk Assessment and Hazard Profile – Crested Butte Fire Protection District

Human Caused and Technological Hazards Identification Worksheet

Hazard	Likelihood of Event/Frequency	Potential Magnitude	Significance
Power Failure	Likely		
Communications Failure (Phone, Cell, Internet)	Likely		
Cyber attack	Unlikely		
Waste Water System Failure	Unlikely		
Water System Failure	Likely		
Large Planned Events	Likely		
Hazardous Materials Accident	Highly Likely		
Civil Unrest	Occasional		
Terrorism	Unlikely		

Likelihood of Event/Frequency
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Significance
(Intersection of Likelihood and Impacts)
Low
Medium
High

Gunnison County Hazard Mitigation Plan

Risk Assessment and Hazard Profile – CITY OF GUNNISON

Natural Hazards Identification Worksheet

Hazard	Likelihood of Event/Frequency	Potential Impacts	Significance
Avalanche	Unlikely	Negligible	L
Dam Failure	Likely	Catastrophic	H
Drought	Likely	Negligible	L
Earthquake	Occasional	Negligible	L
Extreme Cold	Likely	Limited	M
Flooding (including ice jams)	Highly Likely	Catastrophic	H
Hailstorm	Occasional	Negligible	L
High Winds	Occasional	Negligible	L
Landslide, Rockfall, and Debris Flow	Unlikely	Negligible	L
Lightning	Occasional	Negligible	L
Severe Winter Storms	Likely	Limited	M
Wildland fires	Likely	Limited	M

Likelihood of Event/Frequency
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
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Critical—25 to 50% of property severely damaged, and/or facilities are inoperable or closed for at least 2 weeks. 10-50% agricultural losses. Injuries and/or illnesses result in permanent disability and some fatalities. Moderate indirect impacts.
Limited—10 to 25% of area affected. Some injuries, complete shutdown of critical facilities for more than one week, more than 10% of property is severely damaged.
Negligible—Less than 10% of area affected. Minor injuries, minimal quality-of-life impact, shutdown of critical facilities and services for 24 hours or less, less than 10% of property is severely damaged.

Significance
(Intersection of Likelihood and Impacts)
Low
Medium
High

Gunnison County Hazard Mitigation Plan

Risk Assessment and Hazard Profile – City of Gunnison

Human Caused and Technological Hazards Identification Worksheet

Hazard	Likelihood of Event/Frequency	Potential Magnitude	Significance
Power Failure	Likely		
Communications Failure (Phone, Cell, Internet)	Highly Likely		
Cyber attack	Highly Likely		
Waste Water System Failure	Occasional		
Water System Failure	Occasional		
Large Planned Events	Likely		
Hazardous Materials Accident	Highly Likely		
Civil Unrest	Occasional		
Terrorism	Unlikely		

Likelihood of Event/Frequency
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.

Potential Impacts
Catastrophic—More than 50% of property severely damaged, and/or facilities are inoperable or closed for more than 30 days. More than 50% agricultural losses. Multiple fatalities and injuries. Critical indirect impacts.
Critical—25 to 50% of property severely damaged, and/or facilities are inoperable or closed for at least 2 weeks. 10-50% agricultural losses. Injuries and/or illnesses result in permanent disability and some fatalities. Moderate indirect impacts.
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Negligible—Less than 10% of area affected. Minor injuries, minimal quality-of-life impact, shutdown of critical facilities and services for 24 hours or less, less than 10% of property is severely damaged.

Significance
(Intersection of Likelihood and Impacts)
Low
Medium
High

Gunnison County Hazard Mitigation Plan

Risk Assessment and Hazard Profile – GFPD

Natural Hazards Identification Worksheet

Hazard	Likelihood of Event/Frequency	Potential Impacts	Significance
Avalanche	Occasional	Limited	M
Dam Failure	Likely	Critical	H
Drought	Likely	Critical	H
Earthquake	Occasional	Negligible	L
Extreme Cold	Likely	Limited	M
Flooding (including ice jams)	Likely	Critical	H
Hailstorm	Occasional	Limited	M
High Winds	Likely	Critical	H
Landslide, Rockfall, and Debris Flow	Occasional	Limited	M
Lightning	Likely	Critical	H
Severe Winter Storms	Likely	Limited	M
Wildland fires	Highly Likely	Critical	H

Likelihood of Event/Frequency
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.

Potential Impacts
Catastrophic—More than 50% of property severely damaged, and/or facilities are inoperable or closed for more than 30 days. More than 50% agricultural losses. Multiple fatalities and injuries. Critical indirect impacts.
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Significance
(Intersection of Likelihood and Impacts)
Low
Medium
High

Gunnison County Hazard Mitigation Plan

Risk Assessment and Hazard Profile – GFPD

Human Caused and Technological Hazards Identification Worksheet

Hazard	Likelihood of Event/Frequency	Potential Magnitude	Significance
Power Failure	Occasional		
Communications Failure (Phone, Cell, Internet)	Likely		
Cyber attack	Likely		
Waste Water System Failure	Unlikely		
Water System Failure	Likely		
Large Planned Events	Likely		
Hazardous Materials Accident	Highly Likely		
Civil Unrest	Occasional		
Terrorism	Occasional		

Likelihood of Event/Frequency
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.
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Potential Impacts
Catastrophic—More than 50% of property severely damaged, and/or facilities are inoperable or closed for more than 30 days. More than 50% agricultural losses. Multiple fatalities and injuries. Critical indirect impacts.
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Significance
(Intersection of Likelihood and Impacts)
Low
Medium
High

Gunnison County Hazard Mitigation Plan

Risk Assessment and Hazard Profile –GUNNISON COUNTY

Natural Hazards Identification Worksheet

Hazard	Likelihood of Event/Frequency	Potential Impacts	Significance
Avalanche	Occasional	Limited	H
Dam Failure	Unlikely	Cat/Critical	L
Drought	Likely	Crit/Limited	M
Earthquake	Unlikely	Critical	L
Extreme Cold	Highly Likely	Negligible	L
Flooding (including ice jams)	Highly Likely	Limited	M
Hailstorm	Occasional	Limited/Negligible	M
High Winds	Occasional	Limited	M
Landslide, Rockfall, and Debris Flow	Likely	Limited	M
Lightning	Highly Likely	Negligible	L
Severe Winter Storms	Likely	Negligible	L
Wildland fires	Highly Likely	Critical	H

Likelihood of Event/Frequency
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.
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Potential Impacts
Catastrophic—More than 50% of property severely damaged, and/or facilities are inoperable or closed for more than 30 days. More than 50% agricultural losses. Multiple fatalities and injuries. Critical indirect impacts.
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Significance
(Intersection of Likelihood and Impacts)
Low
Medium
High

Gunnison County Hazard Mitigation Plan

Risk Assessment and Hazard Profile –GUNNISON COUNTY

Human Caused and Technological Hazards Identification Worksheet

Hazard	Likelihood of Event/Frequency	Potential Magnitude	Significance
Power Failure	Likely		
Communications Failure (Phone, Cell, Internet)	Likely		
Cyber attack	Occasional		
Waste Water System Failure	Occasional		
Water System Failure	Occasional		
Large Planned Events	Likely		
Hazardous Materials Accident	Occasional		
Civil Unrest	Unlikely		
Terrorism	Unlikely		

Likelihood of Event/Frequency
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.
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Potential Impacts
Catastrophic—More than 50% of property severely damaged, and/or facilities are inoperable or closed for more than 30 days. More than 50% agricultural losses. Multiple fatalities and injuries. Critical indirect impacts.
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Negligible—Less than 10% of area affected. Minor injuries, minimal quality-of-life impact, shutdown of critical facilities and services for 24 hours or less, less than 10% of property is severely damaged.

Significance
(Intersection of Likelihood and Impacts)
Low
Medium
High

Gunnison County Hazard Mitigation Plan

Risk Assessment and Hazard Profile – Mt. Crested Butte

Natural Hazards Identification Worksheet

Hazard	Likelihood of Event/Frequency	Potential Impacts	Significance
Avalanche	Highly Likely	Negligible	M
Dam Failure	Unlikely	Negligible	M
Drought	Likely	Catastrophic	M
Earthquake	Unlikely	Catastrophic	L
Extreme Cold	Highly Likely	Catastrophic	L
Flooding (including ice jams)	Occasional	Negligible	L
Hailstorm	Highly Likely	Catastrophic	L
High Winds	Highly Likely	Catastrophic	L
Landslide, Rockfall, and Debris Flow	Likely	Limited	L
Lightning	Highly Likely	Limited	M
Severe Winter Storms	Highly Likely	Catastrophic	L
Wildland fires	Likely	Critical	M

Likelihood of Event/Frequency
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.

Potential Impacts
Catastrophic—More than 50% of property severely damaged, and/or facilities are inoperable or closed for more than 30 days. More than 50% agricultural losses. Multiple fatalities and injuries. Critical indirect impacts.
Critical—25 to 50% of property severely damaged, and/or facilities are inoperable or closed for at least 2 weeks. 10-50% agricultural losses. Injuries and/or illnesses result in permanent disability and some fatalities. Moderate indirect impacts.
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Significance
(Intersection of Likelihood and Impacts)
Low
Medium
High

Gunnison County Hazard Mitigation Plan

Risk Assessment and Hazard Profile – Mt. Crested Butte

Human Caused and Technological Hazards Identification Worksheet

Hazard	Likelihood of Event/Frequency	Potential Magnitude	Significance
Power Failure	Likely	Catastrophic	M
Communications Failure (Phone, Cell, Internet)	Likely	Catastrophic	M
Cyber attack	Occasional	Limited	M
Waste Water System Failure	Occasional	Catastrophic	M
Water System Failure	Occasional	Catastrophic	M
Large Planned Events	Occasional	Catastrophic	L
Hazardous Materials Accident	Occasional	Limited	L
Civil Unrest	Occasional	Negligible	L
Terrorism	Occasional	Limited	M

Likelihood of Event/Frequency

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.

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Potential Impacts

Catastrophic—More than 50% of property severely damaged, and/or facilities are inoperable or closed for more than 30 days. More than 50% agricultural losses. Multiple fatalities and injuries. Critical indirect impacts.

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Negligible—Less than 10% of area affected. Minor injuries, minimal quality-of-life impact, shutdown of critical facilities and services for 24 hours or less, less than 10% of property is severely damaged.

Significance

(Intersection of Likelihood and Impacts)

Low

Medium

High

Gunnison County Hazard Mitigation Plan

Risk Assessment and Hazard Profile – TOWN OF CRESTED BUTTE

Natural Hazards Identification Worksheet

Hazard	Likelihood of Event/Frequency	Potential Impacts	Significance
Avalanche	Likely	Limited	M
Dam Failure	Unlikely	Negligible	L
Drought	Occasional	Limited	M
Earthquake	Unlikely	Limited	L
Extreme Cold	Likely	Negligible	L
Flooding (including ice jams)	Likely	Limited	M
Hailstorm	Occasional	Limited/Neg	L
High Winds	Likely	Limited	M
Landslide, Rockfall, and Debris Flow	Occasional	Limited/Neg	L
Lightning	Unlikely	Negligible	L
Severe Winter Storms	Likely	Negligible	L
Wildland fires	Highly Likely	Critical/ Limited	H

Likelihood of Event/Frequency
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.

Potential Impacts
Catastrophic—More than 50% of property severely damaged, and/or facilities are inoperable or closed for more than 30 days. More than 50% agricultural losses. Multiple fatalities and injuries. Critical indirect impacts.
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Negligible—Less than 10% of area affected. Minor injuries, minimal quality-of-life impact, shutdown of critical facilities and services for 24 hours or less, less than 10% of property is severely damaged.

Significance
(Intersection of Likelihood and Impacts)
Low
Medium
High

Gunnison County Hazard Mitigation Plan

Risk Assessment and Hazard Profile – TOWN OF CRESTED BUTTE

Human Caused and Technological Hazards Identification Worksheet

Hazard	Likelihood of Event/Frequency	Potential Magnitude	Significance
Power Failure	Highly Likely		
Communications Failure (Phone, Cell, Internet)	Occasional		
Cyber attack	Unlikely		
Waste Water System Failure	Occasional		
Water System Failure	Occasional		
Large Planned Events	Likely		
Hazardous Materials Accident	Highly Likely		
Civil Unrest	Unlikely		
Terrorism	Unlikely		

Likelihood of Event/Frequency
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.

Potential Impacts
Catastrophic—More than 50% of property severely damaged, and/or facilities are inoperable or closed for more than 30 days. More than 50% agricultural losses. Multiple fatalities and injuries. Critical indirect impacts.
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Significance
(Intersection of Likelihood and Impacts)
Low
Medium
High

Hazard Mitigation
Problem Statements

Examples:

Gunnison Fire

- Wildfire:
    - White Pine - located in dense old growth forest with limited restricted ingress and egress.
    - Quartz Creek - located in dense old growth forest with limited restricted ingress and egress, plus steep slopes.

Town of Crested Butte

- Flood:
    - Four Coal Creek Bridges – Bridges are susceptible to debris damage and continually cause localized flooding.

15. Backup power for each critical facility

Hazards Addressed	Multiple
Project Description and Background	Critical facilities in Gunnison County and other jurisdictions should obtain backup power. Power outages and energy supply disruptions can compromise the ability of critical facilities to perform their mission essential functions. Having backup power during an emergency is especially important for critical facilities with a role in life safety, communications, or emergency response. Backup power is also important for public shelters, especially during extreme temperature events. The Crested Butte water treatment plant and wastewater treatment plant are currently equipped with backup generators.
Other Alternatives	None identified
Jurisdiction	Gunnison County
Responsible Office	All agencies
Priority	Medium
Cost Estimate	TBD
Benefits	Backup power will enable critical facilities to continue to perform mission essential functions during a disaster or emergencies. This can potentially save both lives and property.
Potential Funding	Local funds, disaster recovery funding, HMGP, FEMA Hazard Mitigation Assistance, EMPG, Colorado Governor's Energy Office
Schedule	Next 5 years

21. Develop defensible space regulations as a requirement and/or limit new development in high risk areas

Hazards Addressed	Wildland Fire
Project Description and Background	Gunnison County should implement defensible space recommendations, and/or limit development in high wildland fire risk areas. Defensible space is recommended but not required in much of Gunnison County, although the Crested Butte Fire Protection District does require implementation of defensible space. Development continues to occur in high wildland fire hazard areas without sufficient egress and access. In the Crested Butte area, development occurs on 35-acre lots over which the County has no subdivision approval control. This presents a significant public safety and property protection issue as first responders may not be able to reach threatened people or property during a wildland fire.
Other Alternatives	Continue as recommendation only
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Community Development, fire districts, Gunnison County Emergency Management
Priority	High
Cost Estimate	Staff time
Benefits	Avoid loss of life and structures
Potential Funding	County general fund, grants
Schedule	2013-2014

4. *Continue to implement sound floodplain management practices in Gunnison County through participation in the National Flood Insurance Program and updated statewide floodplain rules*

Hazards Addressed Flood

Project Description and Background

Gunnison County participates in the National Flood Insurance Program (NFIP). This project restates the commitment of Gunnison County to implement sound floodplain management practices, as stated in the 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 above the base flood elevation. Floodplain managers will remain current on NFIP policies, and are encouraged to attend appropriate training and consider achieving Certified Floodplain Manager (CFM) status.

This project also includes periodic reviews of the floodplain ordinance to ensure that it is clear, up to date, and adequately addresses the level of flood risk identified within the Hazard Mitigation Plan. Because of the adoption of updated statewide floodplain rules and regulations (effective January 14, 2011) the CWCB will require local governments to revise their floodplain ordinance to comply with the new rules by January 2014.

Other activities that could be included in this effort are:

- Ensure that stop work orders and other means of compliance are being used as authorized by each ordinance;
- Suggest changes to improve enforcement of and compliance with regulations and programs;
- Participate in Flood Insurance Rate Map updates by adopting new maps or amendments to maps;
- Utilize recently completed Digital Flood Insurance Rate Maps (DFIRMs) in conjunction with GIS to improve floodplain management, such as improved risk assessment and tracking of floodplain permits;
- Promote and disperse information on the benefits of flood insurance, with assistance from partners such as the City of Gunnison, Town of Mt. Crested Butte, the Town of Crested Butte, and the Colorado Water Conservation Board; and
- Evaluate improving the County's rating with the Community Rating System to further lower the cost of flood insurance for residents.

Other Alternatives	None identified
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Community Development Department
Priority	High
Cost Estimate	Low
Benefits	Reduced property loss from floods, continued availability of flood insurance for residents, reduced vulnerability of new development to flooding
Potential Funding	County budget
Schedule	Ongoing

12. Evacuation Planning for Gunnison County

Hazards Addressed	Multiple
Project Description and Background	There is no county-wide evacuation plan for Gunnison County. Some evacuation routes have been established, and some evacuation plans have been developed for high risk wildland fire areas, but no county-wide plan exists. Evacuation plans should be developed or improved at the jurisdictional level, the municipal level, and the county level with MOUs in place among all parties.
Other Alternatives	None identified
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Emergency Management, law enforcement, fire districts, Gunnison County Public Works, Crested Butte FPD
Priority	Medium
Cost Estimate	TBD
Benefits	Protecting life safety and enhancing relationships with partners at the local, regional, state, etc. level.
Potential Funding	Local sources
Schedule	Ongoing

19. Threat Hazard Identification and Risk Assessment for Man-Caused Hazards

Hazards Addressed	Multiple
Project Description and Background	The Gunnison County Hazard Mitigation Planning Committee recognizes that man-caused hazards should be planned for, in addition to natural hazards. The County will be developing a Human Caused/Technical Hazard Identification and Risk Assessment, or THIRA, following recently released federal guidelines. The THIRA will supplement the Natural Hazard Mitigation Plan update by analyzing man-made hazards in Gunnison County. The THIRA will set capability targets for dealing with threats and hazards in the community. The THIRA process will be modeled after the process used to update the HMP. Many of the stakeholders involved in the Natural Hazard Mitigation Planning process will also be involved in the Human Caused/Technical Hazard Planning process.
Other Alternatives	None identified
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Emergency Management
Priority	High
Cost Estimate	TBD
Benefits	Identify risks associated with man-made hazards to supplement Gunnison County Natural Hazard Mitigation Plan Update, improve emergency management capabilities, reduce losses to life and property
Potential Funding	State - EMPG
Schedule	Completed by end of 2013

16. *Improve public warning*

Hazards Addressed	Multiple
Project Description and Background	Gunnison County and other jurisdictions should improve their public warning systems. Many natural hazards occur rapidly, potentially placing people and property at great risk. Advanced public warning can give people time to seek shelter or safety, and give emergency responders a chance to prepare for deployment. Public warning needs to be able to alert citizens to shelter in place, evacuate, or take other safety measures depending on the nature of the specific hazard. Citizens must be able to receive and understand the warning message(s) being given. As technology and lifestyles change, public warning systems need to adapt and diversify to reach the greatest number of people. Both permanent and seasonal residents need access to public warning systems.
Other Alternatives	None identified
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Emergency Management, law enforcement, fire departments
Priority	High
Cost Estimate	TBD
Benefits	Increase life safety for both citizens and emergency responders
Potential Funding	Local funds, State of Colorado, Ready Colorado
Schedule	TBD

14. Improve drainage and road surface along Section 2 of Alpine Plateau Road for emergency access/egress

Hazards Addressed Multiple

Project Description and Background Section 2 of the Alpine Plateau Road needs to be improved for emergency access/egress purposes. This would entail improving the surface and drainage of the road. The Alpine Plateau Road is the single, year round route in and out of the Arrowhead Ranch Subdivision, other private residential or ranching sites, and large forest and other wild lands. In the event of wild land fires, floods, extreme winter weather, or other events the ability of emergency response agencies to move people and equipment into areas served by the road may be severely impacted. Similarly it may become impossible to evacuate residents and visitors resulting in significant threat to the lives of the affected people. While significant improvements to portions of the road have been accomplished by the USFS, Gunnison County Public Works, and the Arrowhead Improvements Association several high risk hazards remain as documented in Attachment A – Issues and Risks.

Other Alternatives There is an unmaintained road from Hazel Lake Drive that passes through private ranch lands to reach US 50 near the CDOT facility in the Big Blue Creek valley. That is not a public road and use of federal, state, or county funds to improve that road as an alternative to the Alpine Plateau Road is not appropriate. This road is also not open to wheeled vehicle traffic during many months due to snowfall. Changing that would require significant recurring costs.

Using the southern approach to the Arrowhead Ranch Subdivision from highway 149 is possible for limited purposes. However, the terrain along long portions of that road is very steep resulting in narrow roads and switchbacks. Making that portion of the Alpine Plateau Road suitable either for rapid evacuation or for insertion of emergency vehicles would be nearly impossible and very expensive. In addition the environmental impact due to construction would be extreme. This portion of the Alpine Plateau Road is also not open to wheeled vehicle traffic during many months due to snowfall. Changing that would require major recurring costs and would add danger to the snow handling team.

There are trails that lead east from the area surrounding the Arrowhead Ranch subdivision that have a potential for use as either an ingress or egress path. However the cost of converting them to usable roads would be prohibitive and would introduce an additional party in the form of the

	Mountain Ute tribe.
Jurisdiction	Gunnison County
Responsible Office	Gunnison County Department of Public Works with support from USFS, BLM, and Arrowhead Improvements Association
Priority	High
Cost Estimate	Widening the road - $49.6K, repairing roadbed erosion - $17.5K, fixing line of sight limitations - $49.6K, trafficability - $99.8K
Benefits	Losses could include both loss of life ranging from few to hundreds as well as property losses ranging from a single dwelling ($300,000 average) to the entire subdivision estimated at $100M or more.
Potential Funding	Existing maintenance funds are inadequate. FEMA or similar grant funding may be the only effective source.
Schedule	Significant work could be accomplished in a single season but at least two full seasons are needed to complete all sub-projects.

31. Create mutual aid agreements or memorandums of understanding for equipment/personnel sharing during severe winter storms

Hazards Addressed	Severe Winter Storms
Project Description and Background	Gunnison County is prone to severe winter storms, which can potentially create life safety issues. A memorandum of understanding (MOU) should be established among Gunnison County, the City of Gunnison, Crested Butte South Metropolitan District, the Town of Crested Butte, and the Town of Mt. Crested Butte to ensure that emergency routes are maintained and accessible during periods of severe winter storms.
Other Alternatives	If all jurisdictions named do not want to participate, establish a MOU among the parties that do wish to participate.
Jurisdiction	Gunnison County, Town of Crested Butte
Responsible Office	Gunnison County Public Works
Priority	High to Medium
Cost Estimate	TBD
Benefits	Avoid unnecessary delays to emergency response or evacuation.
Potential Funding	Local sources; staff time
Schedule	As soon as possible.

BRIEFS

Cottonwood opening may be delayed until mid-June

Another delay may be forthcoming for the opening of Cottonwood Pass. Gunnison County Public Works Director Marlene Crosby told Gunnison County Commissioners Tuesday that United Companies has asked county leaders to support an opening of the pass between Buena Vista and Taylor Park on June 17.

The project was expected to have been completed last November but was delayed until this coming spring, with final reclamation and paving occurring while single-lane traffic is permitted. The contractor is now requesting that the Federal Highway Administration leave the road closed until the mid-June date.

The $30 million project was approved in 2016, when Gunnison County signed on to participate with $1.5 million in local funding. "Once it's open, it's a popular route," Commission Jonathan Houck noted.

Hazard Plan meetings announced

Gunnison County Emergency Management and partner agencies are updating the county's Hazard Mitigation Plan. Public Meetings have been scheduled for the following times and locations: Jan. 31 at 6 p.m. at the Crested Butte Council Chambers; and Feb. 4 at 6 p.m. at the Fred Field Multi-purpose Building in Gunnison.

For more information, call Gunnison County Emergency Management at 970.641.2481 or e-mail smorrill@gunnisoncounty.org or blucero@gunnisoncounty.org.

County named in Green Lake Road suit

Gunnison County and the U.S. Forest Service have been named as defendants along with landowners lining Green Lake Road near Irwin, west of Crested Butte, in a long-simmering dispute over public access. The action comes following the filing of a lawsuit by John Biro and Lake Irwin Coalition seeking for the road to be declared public.

As part of the lawsuit, in a court order filed by District Court Judge J. Steven Patrick late last year, the plaintiffs had 35 days to declare Gunnison County, the Forest Service and the landowners as either plaintiffs or defendants. That deadline passed in late December.

In an amended complaint filed in District Court Jan. 10, the those parties were named defendants alongside landowner J.W. Smith, whose blockade of the road in recent years spurred the plaintiffs to file the lawsuit.

Gunnison County Commissioners met in executive session this past Tuesday to consider what action to take, but no direction was given to staff afterward. The matter is expected to be discussed in an open meeting in coming weeks.

Gunnison Country Times | INSIGHT

Editor's note: This page is a new addition to the *Times*, offering insight about the articles we've written as well as highlights from this week's edition.

WORKERS FEELING SHUTDOWN'S SQUEEZE

Will Shoemaker
Times Editor

REPORTER'S NOTEBOOK

> The impact of a situation like the partial shutdown of the federal government is frequently talked about, but what it actually means for members of the Gunnison Valley community can be lost upon an outside observer. What steps are these workers taking to make ends meet? What sort of sacrifices are being made?

> I sought out federal employees who are struggling not only to make ends meet, but to come to terms with the uncertainty of wanting to return to work but being barred from doing so. What are they doing while politicians bicker?

> Additionally, questions about the status of public lands deserved to be answered. Who's doing the most basic work of emptying the trash and cleaning up restrooms? While it would be impossible to look at every facility managed by federal agencies, frequently visited National Park Service spots west of Gunnison along Hwy. 50 seemed like a logical starting point.

> A look into the question uncovered community members taking it upon themselves to help keep those public lands pristine.

> Unexpectedly but not surprisingly, a look into the issue also uncovered groups and individuals who have stepped up to help federal employees acquire basic needs such as food. Asking about avenues available to furloughed employees to meet these needs also uncovered that federal food assistance funding — benefits that support more than 500 families in Gunnison County — for all residents of the valley, Colorado and the nation may soon run dry.

> Through the course of research and interviews, it became clear that many impacts from the shutdown won't be known until it ends. Work that typically takes place this time of year in preparation for warmer months is not currently occurring.

> This story sought to provide a snapshot of conditions on the ground. However, many real and potential repercussions noted by sources are only beginning to be understood. Look for future coverage of the issue in these pages.

PAGE A1

SPOTLIGHT

Noteworthy facts from today's paper.

> In 2018, 13,000 acres in Gunnison County previously uninfested by spruce beetles were newly affected, the most of any county in Colorado. Fremont County was second on the list with 6,000 newly infested acres. **PAGE A11**

> During the Day of Service in honor of Martin Luther King, Jr. Day on Monday, 122 volunteers from Western Colorado University aided more than 20 nonprofits in the Gunnison Valley. **PAGE B2**

> Identified "trigger points" recommend the addition of modular classrooms at Crested Butte Community School when enrollment reaches 775 students. Enrollment is currently at 746. **PAGE A1**

VALLEY VOICES

"I honestly think I didn't play a good game, but it felt great to help the team get the win." **Jakub Kozanyi,** *after scoring three goals in a single game for Crested Butte High School.* **PAGE B11**

"Some of the issues that we were working on are now sort of going unchecked. I'm thinking about bathrooms that are still open and not being maintained." **Joe Laughlin,** *in reference to impacts on public lands during the partial government shutdown.* **PAGE A1**

"We are trying to make this available for everyone. We don't want equipment to be a limiting factor in participation." **Brian Smith,** *about an inaugural winter triathlon slated to occur following this year's Kenny Mac ski races.* **PAGE B1**

"This may be the best route of all 14 times I've done it." **Steve Mills,** *on the 2019 Ride the Rockies route which starts and ends in the Gunnison Valley.* **PAGE A1**

ARDEN SAUNDERS: "EVERY ANGLE" - Arden's sculptural process consists of manipulating plywood to create unique forms that carry a sense of movement, physicality and mass. She investigates structures that are at once organic and intuitive. Skeletal forms serve as inspiration - bones and unseen parts of the body referenced in each unique sculpture. After assembling the pieces, the shape alters from the body references. She embraces the change of form that comes out of process and labor, a progression that allows her to just "go with it." Show runs January 28 February 25. Opening Reception: Wednesday, February 13. 6 - 8 p.m. At the Piper Gallery. (1/30).

LITERARY SALON SERIES Brian Calvert: Tuesday, January 29. 6 8 p.m. Free! Attention writers, readers and anyone with a professional interest in literature! Make contacts, discuss your work, and discover new friends at this monthly networking event. With invited speakers, a friendly atmosphere (and drinks!) it's the perfect meeting place for writers, journalists, ferocious readers, publishers, illustrators, booksellers and spoken-word artists. Tuesday, January 29 features Brian Calvert, Managing Editor of High Country News, the nation's leading source of reporting on the American west. A fourth-generation Wyoming native, Brian grew up in Pinedale and graduated from the University of Northern Colorado in 1994 with a BA in English liberal arts and minors in writing and media studies. He has worked as a foreign correspondent, writer, audio journalist, and most recently, a Ted Scripps Fellow in Environmental Journalism at the University of Colorado. After extensive time in Cambodia, China and Afghanistan, Brian has a new appreciation for the West. He is also earning an MFA in Poetry at Western. Literary Salons held the last Tuesday of every month. Future sessions February 26 and March 26. At the Eldo. (1/23).

AMERICAN LEGION POST 54 in Gunnison invites all Veterans to our Monthly Meeting tomorrow, Wednesday, January 16th at the Legion Building, 501 E. Virginia Av. Sons of the American Legion and American Legion Auxiliary are also welcome! Dinner is provided at 1730, meeting starts at 1800. Contact Adjutant John Nelson, 970-596-2841 for information. (1/23).

SIX POINTS THRIFT STORE donation hours: Monday, Wednesday and Friday from 9-5 and Saturday from 10-4. Furniture items are accepted by appointment Monday-Saturday from 9-5. Call 970-641-3081 or come to 1160 N. Main St. in Gunnison. (1/23).

KIDS COOK! WINTER SESSION - Baker's Delight is now offered through Mountain Roots. Wednesdays, 4 - 6 p.m. from Jan 30 - March 13. With different recipes each week, you'll bake scrumptious main courses, desserts and sides. Ages 10 + Register through Gunnison Rec Center. Scholarships and Choice Pass discounts available by emailing: sasha@mountainrootsfoodproject.org (1/23).

DUANE VANDENBUSCHE WILL TEACH a Colorado History class at Crested Butte Community School Thursday evenings from 7:00 - 8:30 PM beginning on January 31 and ending after 12 sessions on April 18. The exciting history of Colorado will include the following topics: Mesa Verde, Mountain Men and the Fur Trade, Explorers, Gold Rush, Silver Camps, Narrow Gauge Railroads, Ranching, Sustainability, Polka Music and Dancing with Pete Dunda, Water & Recreation. Slide shows also on Early Day Skiing, Narrow Gauge Railroads and Ranching. Register online at: western.edu/es or call Extended Studies 970-943-2885 (1/30).

PUBLIC NOTICE: GUNNISON County Emergency Management and partner agencies are updating the Gunnison County Hazard Mitigation Plan. Public Meetings have been scheduled for the following times and locations: Jan 31st at 6:00 p.m. at the Crested Butte Council Chambers; and on Feb. 4th at 6:00 p.m. at the Fred Field Multipurpose Building. For more information, call Gunnison County Emergency Management 970-641-2481 or email smorrill@gunnisoncounty.org or blucero@gunnisoncounty.org (2/6).

AN EVENING WITH CHRIS ROBINSON BROTHERHOOD: Thursday, January 31 & Friday, February 1. 8:00 p.m. The prolific new standard-bearers of the psychedelic roots torch, Chris Robinson Brotherhood bring their shimmering acid-Americana once again to the Center stage. Chris Robinson Brotherhood is Neal Casal (guitar), Tony Leone (drums), Adam MacDougall (keyboards), and Jeff Hill (bass). Two tiers of VIP packages are available with a pre-show Meet & Greet, personal photograph with Chris Robinson, specialized CRB memorabilia, and much more. Please find VIP ticket details and pricing on the Center's website. (1/30).

GUNNISON COUNTY HEALTH & Human Services offers application assistance for adults with disabilities and seniors. Need help with dental work, vision improvement, transportation, billing and mail management? We can help during at 220 N. Spruce St. on Monday, February 4 from 10 - 11:30 a.m. (1/30).

PMC PRECIOUS METAL CLAY Jewelry Making: Monday, February 4 & Tuesday, February 5. 5:30. 8 p.m. Those new to PMC and those who've taken a class before are invitedto join this two-day workshop. Precious Metal Clay (PMC) is a crafting medium with the consistency of polymer clay, comprised of very small particles of silver. Be guided through molding and shaping the PMC into beautiful pendants, earrings or bracelets. Intermediate students can choose to create a ring or hinged bracelet. The jewelry is then fired in a tabletop kiln, where the binder in the PMC burns away, incredibly leaving 99% pure silver pieces of jewelry. Finish your piece by creating a patina, burnishing, polishing and finally assembling the silver into a wearable piece of jewelry. At the Art Studio. Instructor: Mary Tuck. (1/30).

RECYCLERS PLEASE TAKE NOTE AND PASS ALONG that the Gunnison County Recycle Center takes primarily CORRUGATED CARDBOARD. Please DO NOT bring waxed cardboard, toilet paper or paper towel tubes or Pringles cans. We thank you for your continued diligence in dropping off quality products. If you have any further questions please do not hesitate to contact Gunnison County Public Work Department at 970-641-0044. (1/23).

MUD WRESTLING: Thursday, February 7. 5:30 - 7:30 p.m. Grab a partner or friend and get your hands dirty with clay at the Art Studio's monthly "Mud Wrestling" evenings. We hand you and your "date" a hunk of mud (er, clay that is) and literally see what you can make of it. Mix in a cocktail and you have a surefire way of getting hands on experience with this wonderful medium. Sculp this 'n hers sake cups, sushi bowls, jewelry dishes,and more. Your pieces are fired in our kiln, with the first firing included, then take your piece home as raw bisque, orreturn to the Art Studio during a Paint-Your-Own Pottery event to glaze and re-fire your creations for an additional $10 fee. Other session date: Thursday, March 7. Cocktails and supplies are included in the price, and we mix up something yummy to eat every month! No experience necessary. At the Art Studio. Instructor:Laura Elm. (2/6).

JOIN US FOR THE 4TH ANNUAL Mountain Roots Benefit Concert on Thursday, February 7th at 8:00 p.m. at the Public House! We will be dancing the night away to Atomga, an acrobat, jazz, and hiphop band. Visit Mountain Roots website for information. (2/6).

COUPLES CLASS - A TRIP TO BOLOGNA: Thursday, February 7. 5:30 - 8 p.m. Learn the secrets of regional cuisine from Italy's hottest foodie destination in a romantic date night with your special someone. Nicknamed "La Grassa" (the fat one) for its substantial culinary tradition, Bologna is home to balsamic vinegar, Parma ham, Parmesan cheese, tagliatelle, tortellini and delicious ragu bolognese. Feel like you're in Italy as you make an authentic Bolognese meal in this hands-on class, including making your own pasta! Instructor: Chef Michael Busse. (2/6).

ART STUDIO GALLERY FEATURED ARTISTS - The Art Studio Gallery currently features the work of five of our outstanding workshop instructors with Audrey Anderson in watercolor; Peggy Stenmark: watercolors and acrylics; Laura Elm: ceramics, drawings, paintings; Suzanne Pierson: watercolors; and Mary Tuck: acrylics, watercolor, fabric art and Precious Metal Clay; and Christina Stillwagon: stained glass. Downtown shoppers will fall in love with the variety of giftable, one-of-a-kind items handcrafted by this talented group. Show runs through April 15. Artist Reception: Saturday, February 16. 5 - 8 p.m. during ArtWalk. At the Art Studio Gallery. (1/30).

CALLING ALL BRIDGE PLAYERS - Thursday afternoons available for new players! Call Jeff @ 970-209-1977 to sign up. Membership in Boomers & Beyond will be requested ($25 annually for space and furniture upkeep). (1/30).

TIPS FOR DRIVING AT NIGHT...Use your bright lights when driving in rural areas and on open highways away from urban and metropolitan areas. If you are driving with your high beam lights on or your low beam lights with fog lights on, you must dim them before coming within 500 feet of any oncoming vehicle so the oncoming driver is not blinded by the glare. When following another vehicle, you must use your low beam lights, with your fog lights off, if you are within 200 feet of the vehicle ahead of you. (1/23).

SIX POINTS THRIFT STORE is always happy to receive your donations of clean, gently used furniture! PLEASE CALL us to arrange a time to drop off your items. Your donations support programming for people with intellectual/developmental disabilities. Call 970-641-3081. (1/23).

SIX POINTS IS A VENDOR for the Division of Vocational Rehabilitation (DVR). Through DVR, we can provide employment support to individuals with documented physical or mental health disabilities. These services are not restricted to those with intellectual disabilities. Call Kate 970-641-3081. (1/23).

LOOKING FOR A WAY TO GIVE BACK to your community? Colorado State Health Insurance Assistance Program (SHIP) is looking for volunteers to assist Medicare patients with navigating their health insurance. If interested, call Eva at Region 10: 970-765-3127. (1/23).

GUNNISON COUNTY SENIOR RESOURCE OFFICE has Options Counselors to assist older adults and people with disabilities in creating a plan to meet their basic needs. Call 970-642-7300 to schedule an appointment. (1/23).

DO YOU HAVE AN UPCOMING EVENT FOR THE GUNNISON COMMUNITY? Fundraiser? Kids event? Multicultural gathering? Artistic endeavor? All-around good time? Let us know. We'll print your community notice for free. Call 970-641-3148. Email nicki@gunnisonshopper.com. Let all of Gunnison county and the surrounding areas know what you're planning for them. (1/23).

ARE YOU OVER 55 and like to have fun, eat good food, enjoy cultural and outdoor events and activities, learn new things? Join Boomers & Beyond today! $25 annually, good for 2 family members. Contact: gunnyseniors@gmail.com or 970-641-8272. (1/30).

PLEASE WEAR REFLECTIVE CLOTHING while running, biking or walking on Gunnison County Roads after dark. Thank you! (1/23).

DID YOU KNOW?... If you buy a #6 plastic cup you can bring it to WCU to "TERRACYCLE" into other useful products? Drop-off locations at: Library Parking Lot, Pinnacles, North Mears, Between Ute and Robidoux Hall Look for the recycling bin with the "TERRACYCLE" logo on it! (1/23/pd/47).

SIX POINTS HOURS are Mon. - Fri., 9 a.m. - 6 p.m., Sat 10 a.m. - 5 p.m., Closed Sundays. DROP OFF HOURS Mon., Wed., Fri., 9 a.m - 5 p.m., Sat 10 a.m. - 4 p.m. We are located North of Walmart behind Time Warner Cable. (1/23).

¿EMBARAZADA? ¿Necesitas ayuda? Pruebas de embarazo gratuitas y consulta. Referencias y asistencia. ¡Estamos aquí para ayudar! Lighthouse 970-596-1706 (1/23).

THE GUNNISON VALLEY CALENDAR: Keep it Short, Keep it Sweet.... submit your Who, What, When, Where, Why, and How to nicki@gunnisonshopper.com. (1/23).

GUNNISON CONSERVATION DISTRICT sells custom native wild flower and grass seed. For a custom mix call 970-642-4461 (1/23).

¿NECESITA AYUDA ALIMENTARIA? La Despensa de Alimentos (Gunnison Country Food Pantry) está abierta lunes de 1 a 4 y miércoles de 1 a 7 de la tarde. Para personas mayores de 65 años: jueves 10 de la mañana a 2 de la tarde. Visítenos en 321-C N. Main Street en la esquina suroeste de Main y Ohio. Más información en GunnisonCountryFoodPantry.org. (1/23).

DON'T FORGET! Gunnison Valley PTA is collecting **BOX TOPS 4 EDUCATION** This is an easy way for anyone to support your local community school/PTA. You can send your Box Tops to your child's classroom or put them in collection containers at the public library or the community center. Thank you for your support! (1/23).

PLEASE REMEMBER that Six Points cannot accept televisions or computer equipment. The city offers recycling for these items. Call us for more information. 970-641-3081. (1/23).

NEED FOOD ASSISTANCE? Gunnison Country Food Pantry is open Mondays 1 p.m. - 4 p.m. and Wednesdays 1 p.m. - 7 p.m. Seniors 65+ are served Thursdays 10 a.m. - 2 p.m. Visit the Pantry at 321-C N. Main Street in Gunnison on the SW corner of Main and Ohio. Info at GunnisonCountryFoodPantry.org. (1/23).

GOT PRESCHOOL?- Colorado Preschool Scholarships are still available and can be used at Lake Preschool, Tenderfoot, Little Red, or Stepping Stones. Contact Jennifer Kennedy or Annie Romero for more information. 970-641-7770 or: jkennedy@gunnisonschools.net (1/23).

GUNNISON BOXING CLUB meets M-F at 4PM. Beginners Welcome (Ages 9 & Up). Gain fitness and learn self defense skills. Meets on WCU Campus in Mears Hall basement. Club Fee charged per semester. Call Coach Tom at 303-881-7778 for more information. (1/23).

50% OF LGBT ELDERS REPORT feeling isolated. The SAGE LGBT Elder Hotline provides gay, lesbian, bisexual, and transgender seniors the ability to talk to trained peer-counselor volunteers about issues including isolation, relationships, bullying, and more. Call 1-888-234-SAGE (1-888-234-7243) for support. (1/23).

THE SENIOR RESOURCE OFFICE has Options Counselors to assist older adults and people with disabilities in creating a plan to meet their basic needs. Call 970-642-7300 to schedule and appointment. (1/23).

KBUT IS LOCATED AT 88.7 FM IN GUNNISON. Our signal strength has increased from 40 watts to 6500 watts this past year. Tune us in loud and clear. (1/23).

SENIORS, NEED FOOD ASSISTANCE? Gunnison Country Food Pantry is open to Seniors 65+ on Thursdays 10 a.m. - 2 p.m. Come for coffee, see what the community wants to share with you. Visit the Pantry at 321-C N. Main Street in Gunnison on the SW corner of Main and Ohio. Info at GunnisonCountryFoodPantry.org (1/23).

Appendix C. HAZARD MITIGATION PLANNING COMMITTEE

Table C.1 HMPC Contact List

Name	Department	Position	Phone	Email
Gunnison County				
Scott Morrill	Gunnison County Emergency Management	Emergency Manager	970-641-2481	smorrill@gunnisoncounty.org
Matthew Birnie	Gunnison County	County Manager	970-641-0248	mbirnie@gunnisoncounty.org
Marlene Crosby	Gunnison County Public Works	Director and Asst. County Manager	970-641-0044	mcrosby@gunnisoncounty.org
Cathie Pagano	Gunnison County Community Development	Director	970-641-0360	cpagano@gunnisoncounty.org
Joni Reynolds	Gunnison County Department of Health & Human Services	Director	970-641-3244	jreynolds@gunnisoncounty.org
Mike Pelletier	Gunnison County GIS	Director	970-641-7620	mpelletier@gunnisoncounty.org
City of Gunnison				
Hugo Ferchau	City of Gunnison Community Development/ Gunnison Volunteer Fire Department	Fire Marshal	970-641-8090	hferchau@cityofgunnison-co.gov
Keith Robinson	Gunnison Police Department	Police Chief	970-641-8200	keith@cityofgunnison-co.gov
Town of Crested Butte				
Mike Reily	Crested Butte Marshals Office	Chief Marshal	970-349-5231	Mreily@crestedbutte-co.gov
Town of Mt. Crested Butte				
Carlos Velado	Mt. Crested Butte Community Development	Coordinator	970-349-6632	carlosv@mtcrestedbutte-co.gov
Special Districts				
Ric Ems	Crested Butte Fire Protection District	Chief	970-349-5333	rems@crestedbutte.net
Sean Caffrey	Crested Butte Fire Protection District	Manager	970-349-5333	scaffrey@cbfpd.org
Jim Gelsomini	Arrowhead Fire Protection District	Chief		jgelsomini@yahoo.com.
Ronnie Benson	Crested Butte South Metropolitan District	Manager	970-349-5480	ronnie@cbsouthmetro.net
State/Local /Regional/Private Stakeholders				

Name	Department	Position	Phone	Email
Sam Pankratz	Colorado State Forest Service	Forester	970-641-6852	sam.pankratz@colostate.edu
J. Wenum	Colorado Department of Parks and Wildlife	District Manager	970-641-7060	j.wenum@state.co.us
John Ehmsen	Colorado State Patrol	Sergeant	970-249-4392	John.Ehmsen@cdps.state.co.us
John David	Colorado Dept of Transportation	District Supervisor	970-249-5285	john.david@dot.state.co.us
Drew Petersen	Colorado Division of Emergency Management	West Region Field Manager	970-633-0201	Drew.petersen@state.co.us
Marilyn Gally	Colorado Division of Emergency Management	DOLA	720-852-6694	marilyn.gally@state.co.us
Kevin Houck	Colorado Water Conservation Board	Senior Engineer	303-866-3441 Ext 3219	kevin.houck@state.co.us
Jason Ward	Colorado Division of Water Resources	Engineer	970-249-6622	jason.ward@state.co.us
Brian Stevens	US Bureau of Land Management	Fire Management Officer	970-642-4940	brian_stevens@blm.gov
Chris Mengel	Curecanti NRA/Black Canyon NP	Chief Ranger	(702) 419-3369	Chris_mengel@nps.gov
Melissa Post	Curecanti NRA/Black Canyon NP	Park Ranger	970-641-2337 x246	Melissa_Post@nps.gov
Jim Pringle	National Weather Service	Meteorologist	970-243-7007 ext 726	james.pringle@noaa.gov
Ron Leach	Carbondale Fire Protection District	Chief	970-963-2491	leach@carbondalefire.org
Frank Kugel	Upper Gunnison River Water Conservancy District	General Manager	970-641-6065	fkugel@ugrwcd.org
Lilia Colter	West Region Wildfire Council	Coordinator	970-249-9051 x125	wrwc.lilia@gmail.com

Appendix D REFERENCES

Bureau of Land Management.
http://www.blm.gov/wo/st/en.html

City of Gunnison.
www.cityofgunnison-co.gov

Climate, Global Warming, and Daylight Charts and Data for Gunnison 3 SW, Colorado
http://www.climate-charts.com/USA-Stations/CO/CO053662.php

Colorado Avalanche Information Center.
http://avalanche.state.co.us

Colorado Climate Center.
http://climate.colostate.edu/climateofcolorado.php

Colorado Department of Local Affairs.
www.dola.colorado.gov

Colorado Department of Public Health and Environment.
http://www.cdphe.state.co.us/

Colorado Department of Transportation.
http://www.coloradodot.info/

Colorado Division of Water Resources Dam Safety Branch.
http://water.state.co.us/damsafety/dams.asp

Colorado Geological Survey.
http://geosurvey.state.co.us

Colorado State Demography Office
http://www.colorado.gov/cs/Satellite/DOLA-Main/CBON/1251590805419

Colorado State Register of Historic Properties.
http://www.historycolorado.org/archaeologists/colorado-state-register-historic-properties

Colorado State Natural Hazard Mitigation Plan (2008).
www.dola.state.co.us/dem/mitigation/plan_2007/2008_plan.htm

Colorado State Natural Hazard Mitigation Plan (2011).
http://www.colorado.gov/cs/Satellite/DOLA-Main/CBON/1251595686517

Appendix D REFERENCES

Colorado Water Conservation Board.
http://cwcb.state.co.us

Denver Post.
www.denverpost.com

Enhanced Fujita Scale. National Oceanic and Atmospheric Administration Storm Prediction Center, www.spc.noaa.gov/faq/tornado/ef-scale.html

Federal Emergency Management Agency.
www.fema.gov

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

FEMA Understanding Your Risks: Indentifying Hazards and Estimating Losses (2001).
http://www.fema.gov/library/viewRecord.do?id=1880

Fujita Scale. National Oceanic and Atmospheric Administration Storm Prediction Center, www.spc.noaa.gov/faq/tornado/f-scale.html

"Geologic and Hydrologic Factors Governing Impacts of Development on the Crystal River Near Marble, Gunnison County, Colorado." Wright Water Engineers, Inc. May 1996.
http://www.gunnisoncounty.org/planning_pdf/Marble_Report.pdf

Gunnison County.
www.gunnisoncounty.org

Gunnison County Historic Preservation Commission.
http://www.gunnisonhistoricpreservation.org/

Modified Mercalli Intensity and peak ground acceleration (PGA) (Wald, et al 1999).

National Climatic Data Center (NCDC).
www.ncdc.noaa.gov

National Drought Mitigation Center.
http://drought.unl.edu/

National Flood Insurance Program.
www.fema.gov/business/nfip

Appendix D REFERENCES

National Institute of Building Science Multi-Hazard Mitigation Council.
http://www.nibs.org/index.php/mmc/

National Inventory of Dams.
http://geo.usace.army.mil/pgis/f?p=397:12:

National Lightning Safety Institute.
www.lightningsafety.com

National Oceanic and Atmospheric Agency.
www.noaa.gov

National Register of Historic Places.
www.nps.gov/history/nr

National Response Center.
www.nrc.uscg.mil

National Weather Service.
www.nws.noaa.gov

Public Entity Risk Institute (PERI) Presidential Disaster Declaration Site.
www.peripresdecusa.org/mainframe.htm

Small Business Administration.
www.sba.gov

Spatial Hazard Events and Losses Database for the United States (SHELDUS).
http://webra.cas.sc.edu/hvri/products/sheldus.aspx

Town of Crested Butte.
www.crestedbutte-co.gov

Town of Mt. Crested Butte.
www.mtcrestedbuttecolorado.us

United States Army Corps of Engineers.
www.usace.army.mil

United States Army Corps of Engineers Ice Jam Database.
http://icejams.crrel.usace.army.mil/

United States Census Bureau.
www.census.gov

Appendix D REFERENCES

United States Department of Agriculture.
www.usda.gov

United States Drought Monitor.
http://droughtmonitor.unl.edu/

United States Fish and Wildlife Service.
www.fws.gov

United States Forest Service.
www.usfs.gov

United States Geological Survey.
www.usgs.gov

Vaisala Group.
http://www.vaisala.com/en/Pages/default.aspx

Western Regional Climate Center.
http://www.wrcc.dri.edu/

World Bank Data.
http://data.worldbank.org/

Appendix E PLAN ADOPTION

Note: The records of adoption will be incorporated as an electronic appendix. When the plan is adopted in 2020, the jurisdictions and adoption date will be noted here, but scanned versions of all adoption resolutions will be kept on file with Gunnison County Emergency Management. A sample adoption resolution is provided here.

Natural Hazard Mitigation Plan Adoption Sample Resolution

Resolution # _____

Adopting the 2020 Gunnison County
Natural Hazard Mitigation

Whereas, *(name of county or community) 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 Natural 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, *(name of county or community) resides within the Planning Area, and fully participated in the mitigation planning process to prepare this Natural Hazard Mitigation Plan; and*

Whereas, *the Colorado Office of Emergency Management and Federal Emergency Management Agency, Region VIII officials have reviewed the Gunnison County Natural Hazard Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and*

Now, therefore, be it resolved, *that the (name of board or council), hereby adopts the Gunnison County Natural Hazard Mitigation Plan, as an official plan; and*

Be it further resolved, *Gunnison County Emergency Management will submit this Adoption Resolution to the Colorado Office of Emergency Management and Federal Emergency Management Agency, Region VIII officials to enable the Plan's final approval.*

Passed: (date)

_____

Certifying Official

APPENDIX F FEMA APPROVAL

GLOSSARY OF ACRONYMS

ADS: Advanced Drainage System

AIA: Arrowhead Improvement Association

ALS: Active Landslides

ASI: Area of Special Interest

BLM: United States Bureau of Land Management

CAIC: Colorado Avalanche Information Center

CB: Crested Butte

CBFPD: Crested Butte Fire Protection District

CDOT: Colorado Department of Transportation

CDPHE: Colorado Department of Public Health and Environment

CFM: Certified Floodplain Manager

CGS: Colorado Geological Survey

COEM: Colorado Office of Emergency Management

CoWARN: Colorado's Water/Wastewater Agency Response Network

CR: County Road

CRFPD: Carbondale and Rural Fire Protection District

CRHRS: Colorado Rockfall Hazard Rating System

CRS: Community Rating System

CSFS: Colorado State Forest Service

CWCB: Colorado Water Conservation Board

CWPP: Community Wildfire Protection Plan

DFIRM: Digital Flood Insurance Rate Map

DMA: Disaster Mitigation Act

EAP: Emergency Action Plan

EM: Emergency Management

EMS: Emergency Medical Services

EMPG: Emergency Management Performance Grant

EOC: Emergency Operations Center

EOP: Emergency Operations Plan

FBFM: Fire Behavior Fuel Models

FEMA: Federal Emergency Management Agency

FIS: Flood Insurance Study

FPD: Fire Protection District

FTP: File Transfer Protocol

GBWC: Gunnison Basin Wildfire Council

GIS: Geographic Information Systems

HMGP: Hazard Mitigation Grant Program

HMP: Hazard Mitigation Plan

HMPC: Hazard Mitigation Planning Committee

HOA: Homeowners Association

IGA: Intergovernmental Agreement

MCBWS: Mt. Crested Butte Water and Sanitation

MOU: Memorandum of Understanding

NCDC: National Climatic Data Center

NEPA: National Environmental Policy Act

NFIP: National Flood Insurance Program

NHMP: Natural Hazard Mitigation Plan

NID: National Inventory of Dams

NOAA: National Oceanic and Atmospheric Administration

NWCG: National Wildfire Coordinating Group

NWS: National Weather Service

OEM: Office of Emergency Management

PERI: Public Entity Risk Institute

PSAP: Public Safety Access Point

RMBL: Rocky Mountain Biological Laboratory

RNA: Rapid Needs Assessment

SBA: Small Business Administration

SFHA: Special Flood Hazard Area

SH: State Highway

SHELDUS: Spatial Hazard Events and Losses Database for the United States

SMF: Small Mudflows

STAPLE/E: Social, Technical, Administrative, Political, Legal, Economic/Environmental

THIRA: Threat Hazard Identification and Risk Assessment

USACE: United States Army Corps of Engineers

USDA: United States Department of Agriculture

USFS: United States Forest Service

USGS: United States Geological Survey

WAPA: Western Area Power Administration

WRCC: Western Regional Climate Center

WRWC: West Region Wildfire Council

WUI: Wildland Urban Interface