

# Grand County Multi-Hazard Mitigation Plan

2020



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

2020

Updated by Grand County Office of Emergency Management.  
Previous planning assistance provided by  
AMEC Environment & Infrastructure, Boulder, CO.

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# EXECUTIVE SUMMARY

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The purpose of natural hazards mitigation is to reduce or eliminate long-term risk to people and property from natural hazards. Grand County and participating jurisdictions first developed this multi-hazard mitigation plan in 2008 to reduce future losses to the County and its communities resulting from natural hazards. The plan was updated in 2013 (submitted 2015) in accordance with the requirements of the Disaster Mitigation Act of 2000 and to maintain eligibility for the Federal Emergency Management Agency (FEMA) Flood Mitigation Assistance, Pre-Disaster Mitigation, Hazard Mitigation Grant Programs. Since the original development of this plan, FEMA guidance for local hazard mitigation plans has been refined and updated. This plan was updated in 2020 to be consistent with the new FEMA guidance and with Grand County's current hazard mitigation priorities and risks.

The Grand County Multi-Hazard Mitigation Plan update is a multi-jurisdictional plan that covers the following local governments and special districts:

- Grand County
- Town of Fraser
- Town of Granby
- Town of Grand Lake
- Town of Hot Sulphur Springs
- Town of Kremmling
- Town of Winter Park
- Fire Protection Districts
- Denver Water
- Northern Water
- Three Lakes Watershed Association

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

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

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## **Goal 1: Reduce the loss of life and personal injuries from hazardous events**

Enhance life safety for residents and responders

Improve public education and awareness of all hazards

Improve emergency response and early notification capabilities for all hazards within the County

- Reduce the potential impact to the County and participating jurisdictions from transported hazardous materials
- Identify and characterize facilities and companies that regularly receive or transport hazardous materials
  - Reduce disease outbreak occurrences and severity
  - Minimize the impact of winter storms on Grand County and participating jurisdictions within the County
  - Enhance community policies and procedures to reduce wildfire impact
  - Reduce rockslide occurrences and impact potential on human life

## **Goal 2: Reduce the impacts of hazards on property and the environment**

Enhance community policies and regulations as measures to reduce property impacts

Continue to support development and implementation of Community Wildfire Protection Planning

Develop and implement fuel-reduction projects

Mitigate undesirable fire outcomes to residential and commercial property

Mitigate undesirable fire outcomes to the environment, watersheds, and quality of life

Improve identification and characterization of landslide hazards

## **Goal 3: Protect critical facilities and infrastructure from the impacts of hazards**

Minimize disruption to critical services from hazard events

Identify and reduce the wildfire threat to critical infrastructure

Improve physical mitigation actions for high-risk landslide hazard areas

## **Goal 4: Minimize economic losses**

- Reduce financial exposure and disaster expenditures of county/municipal governments and special districts
  - Strengthen disaster resistance and resiliency of businesses and employers
  - Speed recovery and redevelopment following future disaster events
  - Support future grant requests for pre- and post-disaster initiatives

Climate change and pressure from population growth will challenge Grand County's economy. Changes in global climate patterns show Colorado faces more frequent and intense hazards. These drivers warn of increased vulnerabilities, economic disruption, and loss of life and



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ecosystem services.

To take an in-depth look at potential future economic impacts of flood, drought, and wildfire on specific sectors of Grand County's economy, Future Avoided Cost Explorer\* was used. Through the F.A.C.E. dashboard, Grand County OEM was able to explore how drought, flood, and wildfire may cause economic damages under a low- or high-impact future, using a variety of climate and population scenarios.

To meet identified goals and objectives, the plan recommends the mitigation actions summarized in Chapter 4 of this plan and in the jurisdictional annexes. The list of action items from 2015 was reviewed by the HMPC. Committee members noted which actions were completed, deleted, or ongoing and provided reasons why these decisions were made. County entities also developed new actions which are included in Chapter 4 and the jurisdictional annexes. Each action item describes a plan, priority level, background information, ideas for implementation, responsible agency, timeline, cost estimate, and potential funding sources.

This hazard mitigation plan will be formally adopted by the Grand County Board of County Commissioners and the governing bodies of each participating municipality.

The next Plan update will be in 2025

# 1 INTRODUCTION AND PLANNING AREA PROFILE

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## 1.1 Purpose

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Grand County and several participating jurisdictions prepared this local hazard mitigation plan to guide hazard mitigation planning to better protect the people and property of the County from the effects of hazard events. This plan demonstrates the communities' commitment to reducing risks from hazards and serves as a tool to help decision makers direct mitigation activities and resources. The plan is intended to be a living document through ongoing implementation and regular updates every five years. The original plan was developed in 2008 and underwent a comprehensive update in 2013.

The four goals of the Grand County Multi-Hazard Mitigation Plan are the following:

- Goal 1: Reduce the loss of life and personal injuries from hazard events
- Goal 2: Reduce the impacts of hazards on property and the environment
- Goal 3: Protect critical facilities and infrastructure from the impacts of hazards
- Goal 4: Minimize economic losses

This plan was also developed to make Grand County and participating jurisdictions eligible for certain federal disaster assistance, specifically FEMA's pre- and post- disaster mitigation grants, as well as to make the County more disaster resistant.

## 1.2 Background and Scope

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Each year in the United States, natural 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 non-governmental organizations are not reimbursed by tax dollars. Many natural disasters are predictable, and much of the damage caused by these events can be alleviated or even eliminated.

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

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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 Grand County's hazard mitigation planning process and identifies relevant hazards and vulnerabilities and strategies the County and participating jurisdictions will use to decrease vulnerability and increase resiliency and sustainability in Grand County.

The Grand County Multi-Hazard Mitigation Plan is a multi-jurisdictional plan that geographically covers everything within Grand County's jurisdictional boundaries (hereinafter referred to as the planning area). Unincorporated Grand County and the following communities and special districts participated in the 2020 planning process:

- Grand County
- Town of Fraser
- Town of Granby
- Town of Grand Lake
- Town of Kremmling
- Town of Hot Sulphur Springs
- Town of Winter Park
- Fire Protection Districts
- Northern Water
- Denver Water
- Three Lakes Watershed Association\*

\* New participating jurisdiction in 2020

This plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule published in the *Federal Register* on February 26, 2002, (44 CFR §201.6) and finalized on October 31, 2007. The 2007 amendments also incorporate mitigation planning requirements of the Flood Mitigation Assistance (FMA) program authorized by the National Flood Insurance Act of 1968. While the Disaster Mitigation 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).

Information in this plan will be used to help guide and coordinate mitigation activities and decisions for local land use policy in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to communities and their residents by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruptions.

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The Grand County planning area has been affected by hazards in the past and is thus committed to reducing future impacts from hazard events and becoming eligible for mitigation-related federal funding.

This plan addresses natural hazards and one manmade hazard—hazardous materials release. Although the members of the Grand County Hazard Mitigation Planning Committee (HMPC) recognize that FEMA encourages communities to integrate manmade hazards into the mitigation planning process, the scope of this effort did not address other manmade hazards for several reasons. First, many of the planning activities for the mitigation of these hazards are either underway or complete and are addressed in the emergency operations plan for Grand County. Second, the Disaster Mitigation Act of 2000 requires extensive public information and input, and this is in direct conflict with the confidentiality necessary in planning for chemical, biological, and radiological terrorism. Thus the HMPC determined it was not in the planning area’s best interests to publicly share specific information about its vulnerability to manmade hazards.

### **1.3 Jurisdictional Annexes**

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Each jurisdiction participating in this plan developed its own annex, which provides a more detailed assessment of the jurisdiction’s unique risks as well as their mitigation strategy to reduce long-term losses. Each jurisdictional annex contains the following:

- Community profile summarizing geography and climate, history, economy, and population
- Hazard information on location, previous occurrences, probability of future occurrences, and magnitude/severity for geographically specific hazards
- Hazard map(s) at an appropriate scale for the jurisdiction, if available
- Number and value of buildings, critical facilities, and other community assets located in hazard areas, if available
- Vulnerability information in terms of future growth and development in hazard areas
- A capability assessment describing existing regulatory, administrative, technical, and fiscal resources and tools as well as outreach efforts and partnerships and past mitigation projects

- Mitigation actions specific to the jurisdiction

### **1.4 Plan Organization**

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The Grand County Multi-Hazard Mitigation Plan is organized as follows:

- Executive Summary
- Chapter 1: Introduction and Planning Area Profile
- Chapter 2: Planning Process
- Chapter 3: Risk Assessment
- Chapter 4: Mitigation Strategy
- Chapter 5: Plan Implementation and Maintenance

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Jurisdictional Annexes

Appendix A References

Appendix B Planning Process Materials

Appendix C Mitigation Action Alternatives and Priorities

Appendix D Hazard Mitigation Planning Committee

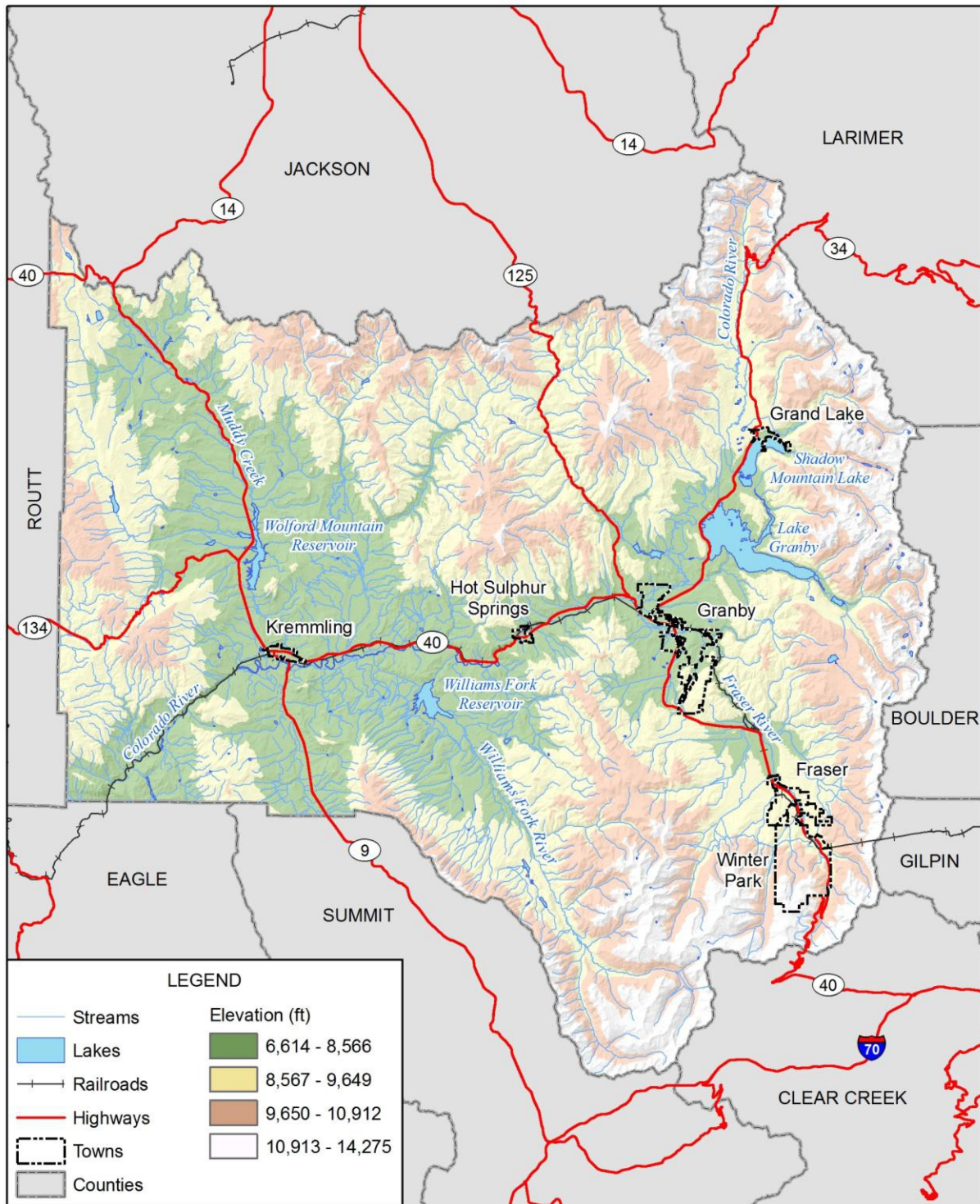
Appendix E Plan Adoption

## **1.5 Planning Area Profile**

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Figure 1.1 shows a map of the Grand County planning area.

**Figure 1.1. Grand County**



0 7.5 15 Miles



Map compiled 4/2013; intended for planning purposes only.  
Data Source: Grand County, CDOT

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## 1.5.1 Geography and Climate

Grand County is located high in the Colorado Rockies along the west side of the Continental Divide. Its land area encompasses approximately 1,846 square miles and is located northwest of the geographic center of Colorado. Major transportation corridors include Highways 40, 9, 14, 34, 125, and 134. The County is bounded by Jackson (north), Larimer (northeast), Boulder and Gilpin (east), Clear Creek (southeast), Summit (south), Eagle (southwest), and Routt counties (west). The County is known for its scenery and outdoor recreation opportunities. The western section of Rocky Mountain National Park is located in Grand County. Other important natural resources in the County include Arapaho National Recreation Area, national forests (Arapaho and Routt), national wilderness areas (Byers Peak, Indian Peaks, Never Summer, Ptarmigan Peak, Sarvis Creek, and Vasquez Peak), the Continental Divide National Scenic Trail, and national scenic byways (Colorado River Headwaters and Trail Ridge Road/Beaver Meadow).

The County's topography includes broad mountain valleys flanked by high peaks. Several mountain ranges converge in the County, including portions of the Gore Range, Williams Fork Mountains, Rabbit Ears Range, Front Range, and the entirety of the Never Summer Range. Elevations range from 7,300 feet along the Colorado River in the Gore Canyon to 13,553 feet at the summit of Pettingell Peak on the Continental Divide (Grand County CWPP, 2006).

Vegetation varies based on elevation. The lowest elevation areas are composed primarily of sagebrush shrub land. At around 9,000 feet and above, coniferous forest predominates. Timberline is located at approximately 11,500 feet, with areas above that elevation comprised of snow, rock, and alpine tundra.

The County has one major drainage basin, that of the Upper Colorado River Basin. The specific portion that lies in Grand County is the Middle Park Basin. The Colorado River flows south from its headwaters in the northeast County and traverses to the southwest corner of the County. There are several reservoirs in the County, including Shadow Mountain Lake, Lake Granby, Wolford Mountain Reservoir, and Williams Fork Reservoir. These reservoirs impound the Colorado River, Muddy Creek, and Williams Fork River.

Mean summer temperatures typically range from the mid- to high-50s, with summer high temperatures reaching the 70s. Individual days with temperatures in the 80s and 90s have occurred during hotter summers. Winter lows have dropped below -45°F, though average winter temperatures are typically in the teens and low winter temperatures are in the single digits (Western Regional Climate Center, 2013). Grand County is known for its extreme cold temperatures, and the relative humidity is quite low throughout the year. Much of the annual precipitation comes in the form of winter snow, but afternoon summer thunderstorms are common. Snow is possible at any time of year in the highest elevations. The average rainfall and snowfall is approximately 12 inches and 128 inches a year respectively. In addition, Winter Park Resort boasts an average 365 inches of precipitation a year, mostly in snowfall (Grand County CWPP, 2006).

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## 1.5.2 Climate Change

The earth is warming and climate change is affecting Colorado. Temperatures have increased by almost 2°F in the last century, with the 2001-2010 decade being the warmest since records began 110 years ago. The Colorado Climate Center examined temperature and precipitation records for the 2017-2018 water year, discovering that Colorado had its warmest and second driest year ever. The closest rivals to that were 2002 and a year in the 1930s.

Drought conditions are already common and drought periods are expected to become more frequent, intense, and longer. Drought will affect important water sources, and with expected population growth, climate change will exacerbate existing stresses

In the coming decades, the changing climate is likely to decrease water availability and agricultural yields in Colorado, and further increase the severity, frequency, and extent of wildfires in Colorado, which could harm property, livelihoods, and human health. The size and number of forest fires have increased substantially since 1985.

### Impacts on Water Resources

A reliable water supply is crucial for sustaining the people, agriculture, energy production, and ecosystems. Increased water demand and reduced water supplies will add new stresses to already strained water resources.

Colorado and surrounding states rely on the slow melt of mountain snowpack throughout the spring and summer, when water demands are highest. Snowpack helps keep the ground and soil moist by covering it longer into the spring and summer, which delays the onset of the fire season and influences the prevalence and severity of wildfires. Over the last 50 years, there has been less snow precipitation falling in late winter, snow is melting earlier in spring, and less water flows through the Colorado River. Since the 1950's, the amount of snowpack measured in April has declined by 20 to 60 percent at most monitoring sites in Colorado.

### Impacts on Forests and Ecosystems

Diminishing snowpack enables subalpine fir and other high-altitude trees to grow at higher elevations. The upward movement of the tree line will shrink the extent of alpine tundra and fragment these ecosystems, possibly causing the loss of some species. More severe drought and warming temperatures are threatening forests in the region and making them more vulnerable to other stresses, including pests (see below).

Warmer, drier conditions, combined with the accumulation of dead trees and other fuels have contributed to an increase in the size of wildfires in recent decades, resulting in extensive and costly damage. Fire is a natural occurrence in the Southwest, but excessive wildfire destroys homes, transforms ecosystems, threatens public health, and damages the economy.



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## **Impacts on Lodge Pole Beetles**

In 2012, ScienceMagazine.Org reported that climate change could be throwing mountain pine beetles into a reproductive frenzy. It was suggested that some beetles living in Colorado, which normally reproduce just once annually, now churn out an extra generation of new bugs each year, in turn further devastating the region's forests.

In what used to be late summer in the Colorado Rocky Mountains, pine beetles single out individual lodge pole pines. Females dig burrows inside the pines' trunks and drop their eggs. While hiking in mid-June to survey pines east of Boulder, researchers saw adult beetles out and flying close to 2 months too early that year. The cue for this early flight seemed to be unseasonably hot weather. The researchers also found that June-emerging bugs attacked nearby pines almost immediately, laying their own eggs. Those offspring developed speedily, becoming adults, by August or September, just in time to infest another round of pine trees—the second that season. This reproductive explosion could be one reason why the insects have been cutting a deadly swath through North America, causing enormous losses both to mountain habitats and to the logging industry.

## **Impacts on Agriculture**

Rising temperatures increase the rate at which water evaporates into the air from soils and plants. Unless rainfall increases to the same extent as evaporation, soils become drier. As a result, the soil retains more water when it rains, and less water runs off into rivers, streams, and reservoirs. During the last few decades, soils have become drier in most of the state, especially during summer.

Warmer temperatures could also result in more heat waves, a longer frost-free season, and fewer cold snaps. These changes are likely to cause crops to ripen and mature early, reducing some crop yields. Reduced water availability will force some farms to switch from irrigation to dry land farming, which typically cuts yields in half.

Livestock production is also expected to be affected by changes in water availability and temperatures. Pasture lands are not irrigated, potentially reducing grazing lands to drought while warming temperatures impose additional stresses on livestock.

In the decades to come, rainfall during summer is more likely to decrease than increase in Colorado, and periods without rain are likely to become longer. All of these factors would tend to make droughts more severe in the future.

<https://archive.epa.gov/epa/climate-impacts/climate-impacts-southwest.html>  
<https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-co.pdf>  
<https://www.sciencemag.org/news/2012/03/climate-change-sends-beetles-overdrive#:~:text=Climate%20change%20could%20be%20throwing,of%20new%20bugs%20each%20year.>

### 1.5.3 Population

Grand County had the 32<sup>nd</sup> largest population of the 64 counties in Colorado as of the 2010 U.S. Census. Grand County grew by 19.3 percent between 2000 and 2010. The estimated County population in 2010 was 14,843, up from 12,442 as of the 2000 U.S. Census. 2012 estimates place the population at 14,195. The majority of the County’s population is in unincorporated areas. 2020 census data is not yet available for the towns as of the writing of this plan update.

**Table 1.1. Grand County Population**

Jurisdiction	2000	2010	2019*
Town of Fraser	910	1,224	1,326
Town of Granby	1,525	1,864	2,139
Town of Grand Lake	447	471	506
Town of Hot Sulphur Springs	521	663	733
Town of Kremmling	1,578	1,444	1,524
Town of Winter Park	662	999	1,090
Unincorporated Grand County	6,799	8,178	8,416
<b>Total Grand County</b>	<b>12,442</b>	<b>14,843</b>	<b>15,734</b>

Source: United States Census

\*Estimate

2019 U.S. Census demographic and social characteristics estimates for **Grand County** are shown in Table 1.2. Characteristic percentages for the towns are from 2015 due to the U.S. Census website not being able to offer statistics for municipalities under 5,000 in population.

**Table 1.2. Grand County Demographic and Social Characteristics**

Characteristic	Grand County	Fraser	Granby	Grand Lake	Hot Sulphur Springs	Kremmling	Winter Park
<b>Gender/Age</b>							
Male (%)	53.5	56.5	51.3	53.3	50.8	51.2	58.7
Female (%)	46.5	43.5	48.7	46.7	49.2	48.8	41.3
Under 5 Years (%)	3.8	7.2	6.7	3.2	8.1	7.5	4.7
65 Years and Over (%)	18.5	3.7	7.4	14.6	6	8.4	8.6
<b>Race/Ethnicity (one race)</b>							
White (%)	86.7	90.8	91.2	93.2	96.8	92.6	93.8
Black (%)	1.0	1.1	0.9	0.2	0.0	0.3	0.4
American Indian and Alaska Native (%)	0.9	0.6	0.5	0.8	0.9	0.3	0.3
Asian (%)	0.9	1.3	0.9	0.4	0.3	0.3	1.7
Native Hawaiian and Other Pacific Islander (%)	0.2	0.0	0.1	0.0	0.0	0.3	0.1
Other (%)	1.9	7.8	5.0	2.1	1.2	4.3	2.1
Hispanic/Latino (Any)	9.6	13.6	9.8	7.4	7.7	11.9	5.9
High School Grad or Higher (%)	95.5	97.8	96.0	99.2	96.3	81.1	100

Source: U.S. Census Bureau, 2010, [factfinder2.census.gov/](http://factfinder2.census.gov/)

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## 1.5.4 History

Grand County was created on February 2, 1874 from a portion of Summit County. It contained land to the western and northern borders of the State, which is now in present day Moffat County and Routt County. On January 29, 1877, Routt County was created and Grand County was reduced to its current western boundary. When valuable minerals were found in North Park, Grand County claimed the area as part of its county, a claim Larimer County also held. It took a decision by the Colorado Supreme Court in 1886 to declare North Park a part of Larimer County, and thus Grand County's northern boundary was set.

## 1.5.5 Economy

The largest industry in Grand County is tourism and accompanying services provided. It is estimated that two million visitors come to Grand County each year to enjoy a diverse recreational experience. Tourism activities include but are not limited to: skiing, snowmobiling, hunting, fishing, boating, hiking, golf, camping, mountain biking, sightseeing, dining, lodging, and shopping. These tourism activities depend on a healthy forest, beautiful scenery, water quality, air quality, and public safety.

Property development and construction of commercial, recreational, and residential sites has seen a dramatic rise in the last decade. The logging and timber industries have an increased presence due to the mountain pine beetle epidemic that impacted Grand County. The Climax Molybdenum Company, and Henderson Mine continue to be important contributors to the County's economy. Remaining production and agriculture entities, found mostly in the western portion of Grand County, continue to be a vital component of the County's heritage and economy. However, production agriculture is in decline due to land values, commodity market prices, rising operational costs, and development pressures (Grand County CWPP, 2006).

According to the 2010 U.S. Census, the industries that employed the highest percentages of Grand County's labor force were construction (19.0%); arts, entertainment, recreation, accommodation, and food services (17.2%); retail trade (12.9%); finance, insurance, real estate, and rental and leasing (9.3%); and educational services, and health care and social assistance (8.0%). Select economic characteristics for Grand County from the 2010 Census are shown in Table 1.3. Characteristics for Grand County are for the entire County.

# 2 PLANNING PROCESS

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**44 CFR Requirement 201.6(c)(1): [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.**

## 2.1 Background on Mitigation Planning in Grand County

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The Grand County Office of Emergency Management recognized the need and importance of this plan and was responsible for initiating the plan's original development in 2008 and the 2013 update process, which included securing funding. The first version of this plan was approved by FEMA in 2008. Since the original development of the plan, the County contracted with AMEC Environment and Infrastructure (AMEC) in 2013 to facilitate the update of a multi-jurisdictional, multi-hazard mitigation plan. AMEC's role was to:

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

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

## 2.2 Plan Section Review and Analysis – 2013 Update

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During the 2013 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 and AMEC analyzed each section using FEMA's local plan update guidance (July 2008 and 2011 Local Mitigation Plan Review Tool) to ensure that the plan met

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the latest requirements. Upon review, the HMPC and AMEC determined that nearly every section of the plan would need revision or reorganization to align with the latest FEMA planning guidance and requirements. Thus, the 2013 plan has been significantly revised from the 2008 version with relevant information carried over to the updated document.

Revisions included combining several chapters of the 2008 plan and reorganizing the document in a format that more closely follows the FEMA local mitigation plan review crosswalk. The 2013 update revised the list of profiled hazards, eliminating several that fell outside of the scope of hazard mitigation planning. Other hazards were profiled in greater detail and overall vulnerability was analyzed more thoroughly. New GIS maps and methods were used to substantially improve the plan and quantify the loss potential to various hazards where feasible. The 2013 plan update analyzed how risk varied across the participating jurisdictions, including the fire protection districts and other special districts.

The planning process section of the 2013 plan update enhanced the original planning process discussion in the 2008 plan. The step-by-step process used in the 2013 plan update is similar to that of the 2008 plan, though the 2013 process is organized to be more closely aligned with FEMA guidance. Notes of how various sections of the 2008 plan were improved or altered during the update are noted where appropriate in the narrative of the planning process that follows.

## 2.3 Multi-Jurisdictional Participation

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

Grand County invited every incorporated town and special district in the County to participate in the multi-jurisdictional Grand County Multi-Hazard Mitigation Plan Update. Outreach expanded to include the fire protection districts and other special districts during the 2013 update. Two water districts recognized the linkage between watershed health and hazard mitigation and participated in the effort. The Disaster Mitigation Act requires that each jurisdiction participate in the planning process and officially adopt the multi-jurisdictional hazard mitigation plan. Each jurisdiction that chose to participate in the planning process and development of the plan or its update was required to meet strict plan participation requirements defined at the beginning of the process, which included the following:

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

An effort was made during the 2020 update to keep up the multi-jurisdictional participation. In the table below, representatives for each jurisdiction attended meetings, helped collect data, identified mitigation actions and implementation strategies, and reviewed annex drafts. Table 2.1 shows the attendance of representatives at the 2020 HMPC meetings; sign-in sheets are included in Appendix B: Planning Process Documentation. Jurisdictions that could not attend meetings communicated with the planning team via email and/or phone during the update process to submit materials needed for the update.

**Table 2.1. Jurisdictional Participation in 2020 HMPC Meetings**

Jurisdiction	Kickoff Meeting	HMPC Mtg
Grand County	✓	☒
Town of Fraser	✓	
Town of Granby	✓	
Town of Grand Lake		
Town of Hot Sulphur Springs	✓	
Town of Kremmling		☒
Town of Winter Park	✓	
East Grand FPD	✓	☒
Grand FPD	✓	x
Grand Lake FPD	✓	
Hot Sulphur Springs/Parshall FPD		x
Kremmling FPD		
Northern Water	✓	
Denver Water	✓	
3 Lakes Watershed Association*	✓	

\*New participating jurisdiction in 2020

## 2.4 The 10-Step Planning Process

For this 2020 update, Grand County OEM established the framework and process for this planning effort using FEMA’s *Local Multi-Hazard Mitigation Planning Guidance* (2008) and the State and Local Mitigation Planning How-To Guides (2001), which includes *Multi-Jurisdictional Mitigation Planning* (2006). The 2020 update follows the guidance and this plan which are structured around a four-phase process:

- 1) Organize resources
- 2) Assess risks
- 3) Develop the mitigation plan
- 4) Implement the plan and monitor progress

In 2013, AMEC integrated a detailed 10-step planning process used for FEMA’s Community Rating System (CRS) and Flood Mitigation Assistance programs, which was followed in 2020. Thus, the modified 10-step process used for this plan meets the funding eligibility requirements of the Hazard Mitigation Assistance grants (including Hazard Mitigation Grant Program, Pre-Disaster Mitigation program, Flood Mitigation Assistance, Repetitive Loss and Severe Repetitive Loss grants), Community Rating System, , and the flood control projects authorized by the U.S. Army Corps of Engineers (USACE). Table 2.2 shows how the modified 10-step process fits into FEMA’s four-phase process.

**Table 2.2. Mitigation Planning Process Used to Develop the Plan**

<b>DMA Process</b>	<b>Modified CRS Process</b>
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

## **Phase I Organize Resources**

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

Grand County Office of Emergency Management established the framework and organization for the development of this 2020 update. In January 2020, key county, municipal, and other local government and initial stakeholder representatives were identified. Email invitations, with flyers, were sent out 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:

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## ***Grand County***

- Grand County Office of Emergency Management
- Grand County Public Health
- Grand County Department of Natural Resources
- Grand County Road and Bridge
- Grand County Sheriff's Office

## ***Participating Jurisdictions***

- Town of Fraser
- Town of Granby
- Town of Hot Sulphur Springs
- Town of Winter Park
- East Grand Fire Protection District
- Grand Fire Protection District
- Grand Lake Fire Protection District
- Hot Sulphur Springs/Parshall Fire Protection District
- 3 Lakes Watershed Association
- Northern Water
- Denver Water

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

- Colorado Division of Fire Prevention & Control
- Colorado Geological Survey
- Colorado State Forest Service
- U.S. Forest Service
- U.S. Bureau of Reclamation
- U.S. Bureau of Land Management
- Senator Bennet's Office
- FEMA Region VIII
- Winter Park Resort



The plan update process officially began with a kickoff meeting in Fraser, Colorado, on January 23, 2020. The Grand County Office of Emergency Management emailed invitations to the kickoff meeting to county, municipal, district, state, and other stakeholder representatives. The invite letter is included in Appendix B.

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

The HMPC contributed to this planning process by:

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

The HMPC communicated during the planning process with a combination of face-to-face meetings, virtual meetings, and email correspondence. The HMPC met twice during the planning period (January 23, 2020 to June 25, 2020). The sign-in sheets and agendas for each of the meetings are included in Appendix B. The plan was also discussed at other ongoing meetings, including an LEPC meeting held on January 16, 2020, in Granby. **Note:** due to the Coronavirus Pandemic, HMPC meeting #2 was held in several locations, with participants joining in virtually by WebEx.

**Table 2.3. Schedule of HMPC Meetings**

Meeting	Topic	Date
Kickoff Meeting	Introduction to DMA and the planning process; Identification of hazards impacting Grand County	January 23, 2020
HMPC #2	Review of updated risk assessment; Review of goals and objectives	June 4, 2020

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During the kickoff meeting, Grand County OEM presented information on the scope and purpose of the plan update, participation requirements of HMPC members, and the proposed project work plan and schedule. **Note:** the original schedule of meetings was altered due to the Coronavirus Pandemic. Plans for public involvement (Step 2) and coordination with other agencies and departments (Step 3) were discussed. Hazard identification requirements and data were discussed, as well as past events, impacts, and future probability for each of the hazards required by FEMA for consideration in a local hazard mitigation plan. Participants were given a Data Collection Guide to facilitate the collection of information needed to support the plan update, such as data on historic hazard events, values at risk, and current capabilities. Action Item worksheets were also passed out. New and former participants completed and returned the worksheets and data collection guides to Grand County OEM, or provided information to incorporate.

## **Step 2: Involve the Public**

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

At the kickoff meeting, the HMPC discussed options for soliciting public input on the mitigation plan and developed an outreach strategy by consensus.

During the plan update's drafting stage, the HMPC provided a link to the updated plan, as an opportunity for public input during the planning process, prior to finalization of the plan update. The public was given the opportunity to answer questions and offer their input through a County webpage. The webpage results were sent to the County Emergency Manager for collection.

**[Public Comments will be placed at the end of this Plan]**

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

**44 CFR Requirement 201.6(b): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process. (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.**

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

As part of the coordination with other agencies, the HMPC collected and reviewed existing technical data, reports, and plans. State and federal agency data sources, including National Weather Service web pages and FEMA Flood Insurance Studies, were used to collect information. Grand County and its communities use a variety of comprehensive planning mechanisms, such as land use and general plans, emergency operations plans, and municipal ordinances and building codes, to manage community growth and development. This information was used in the development and update of the hazard identification, vulnerability assessment, and capability assessment and in the formation of goals, objectives, and mitigation actions. These sources are documented throughout the plan, in the capability assessment sections of each jurisdictional annex, and in Appendix A References. Other planning mechanisms that were used in the development of the Multi-Hazard Mitigation Plan Update include (but are not limited to):

- Community Wildfire Protection Plans for each of the fire protection districts
- Fraser Comprehensive Plan
- Grand County Master Plan
- Grand County Emergency Operations Plan
- Grand Lake Comprehensive Land Use Plan
- Kremmling Comprehensive Plan
- Upper Colorado Headwaters Wildfire/Watershed Assessment

Sources are named throughout the plan update wherever these and other documents were used.

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## Phase 2 Assess Risk

### Step 4: Identify the Hazards

During the 2008 planning process, the HMPC identified the natural hazards that have impacted or could impact communities in Grand County. The HMPC discussed past events and impacts and future probability for each of the hazards required by FEMA for consideration in a local hazard mitigation plan. The current HMPC refined the list of hazards to make it relevant to Grand County in 2020. Web resources, existing reports and plans, and existing GIS layers were used to compile information about past hazard events and determine the location, previous occurrences, probability of future occurrences, and magnitude/severity of each hazard. The Grand County Data Collection Guide distributed at the kickoff meeting helped identify hazards and vulnerabilities specific to the participating jurisdictions. Information on the methodology and resources used to identify and profile hazards is provided in Sections 3.1-3.2.

### Step 5: Assess the Risks

After profiling the hazards that could affect Grand County, the HMPC collected information to describe the likely impacts of future hazard events on the participating jurisdictions. This step included two parts: a vulnerability assessment and a capability assessment.

**Vulnerability Assessment**—Participating jurisdictions inventoried their assets at risk to natural hazards—overall and in identified hazard areas. These assets included total number and value of structures; critical facilities and infrastructure; natural, historic, and cultural assets; and economic assets. The HMPC also analyzed development trends in hazard areas. The DFIRM was used to refine the estimate flood losses during the update, where available for the NFIP participating communities.

**Capability Assessment**—This assessment consisted of identifying the existing mitigation capabilities of participating jurisdictions. This involved collecting information about existing government programs, policies, regulations, ordinances, and plans that mitigate or could be used to mitigate risk to disasters. Participating jurisdictions collected information on their regulatory, personnel, fiscal, and technical capabilities, as well as ongoing initiatives related to interagency coordination and public outreach. This information is included in the jurisdictional annexes.

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

### **Step 6: Set Goals**

During the second HMPC meeting, goals and objectives for the overall multi-jurisdictional mitigation plan update were discussed. Past actions were considered; whether they were still viable or completed. The final goals and objectives are further discussed in Chapter 4.

### **Step 7: Review Possible Activities**

The HMPC identified and prioritized mitigation actions at the second meeting (virtual due to COVID-19). Several action items (county, municipality or special district) were found to be duplicates of other action items. Other action items were found to be outdated and should have been pulled during the last update. For relevant action items identified in the last plan, each jurisdiction provided input on any progress made.

### **Step 8: Draft the Plan**

When the first complete draft of the plan update was done, the draft was made available online and in hard copy for review and comment by the public and other agencies and interested stakeholders. This review period was from August 3-August 14, 2020. Methods for inviting interested parties and the public to review and comment on the plan were discussed in Steps 2 and 3, and materials are provided in Appendix B. Comments were integrated into a final draft for submittal to the Colorado Office of Emergency Management, Colorado Water Conservation Board, and FEMA Region VIII.

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

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

To secure buy-in and officially implement the plan, the governing bodies of each participating jurisdiction adopted the plan and their jurisdictional annex. Scanned copies of resolutions of adoption are included in the Appendix E – Plan Adoption.

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

The HMPC developed and agreed upon an overall strategy for plan implementation and for monitoring and maintaining the plan over time during Meeting #2. This strategy is described in Chapter 5 and was updated in 2013.

# 3 RISK ASSESSMENT

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**Requirement §201.6(c)(2): [The plan shall include] A risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.**

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.” This chapter will examine hazards and vulnerability. Jurisdictional annexes to the plan discuss the capabilities for each of the participating jurisdictions as well as the hazards and vulnerability particular to their area.

The risk assessment process identifies and profiles relevant hazards and assesses the exposure of lives, property, and infrastructure to these hazards. The goal of the risk assessment is to estimate the potential loss in Grand County, including loss of life, personal injury, property damage, and economic loss, from a hazard event. The risk assessment process allows communities in Grand County to better understand their potential risk to natural hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

The risk assessment for Grand County and its jurisdictions followed the methodology described in the FEMA publication 386-2, *Understanding Your Risks: Identifying Hazards and Estimating Losses* (2002), which includes a four-step process:

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

This chapter is divided into three parts: hazard identification, hazard profiles, and vulnerability assessment:

- **Section 3.1 Hazard Identification** identifies the hazards that threaten the planning area and describes why some hazards have been omitted from further consideration.
- **Section 3.2 Hazard Profiles** discusses the geographic location, past events, future probability, magnitude/severity, and overall vulnerability of the planning area to each hazard.
- **Section 3.3 Vulnerability Assessment** assesses the County’s total exposure to natural hazards and considers assets at risk, including critical facilities and infrastructure; natural, historic, and cultural resources; and economic assets. This section also describes vulnerability and estimates potential losses to structures in identified hazard areas and addresses development and land use trends.

## 3.1 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.**

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 Grand County planning area. The hazards evaluated in this plan include those that have occurred historically or have the potential to cause significant human and/or monetary losses in the future.

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

Avalanche	Hazardous Materials	Severe Winter Storm
Dam/Levee Failure	Landslide, debris flows, mudflow, rockfall	Wildfire
Disease Outbreak	Lightning	Wildlife-Vehicle Collisions
Drought	Mountain Pine Beetle Infestation	Windstorm
Earthquake		
Flood		

The HMPC eliminated some hazards from further profiling because they do not occur in the planning area, their impacts were not considered significant in relation to other hazards, or they are not within the scope of this plan. Table 3.1 lists these hazards and provides a brief explanation for their elimination.

**Table 3.1. Hazards Not Profiled in the Plan**

Hazard	Explanation for Omission
Coastal Storm	Planning area is not near coastal areas.
Expansive Soils	Expansive soils are not a common soil type in the planning area.
Extreme Temperatures	Extreme heat has not created problems in the past. Due to the high altitude and alpine environment of Grand County temperatures are rarely hot enough to affect human health. Extreme cold is a common occurrence in Grand County, but the residents deal with it in stride. However, the impacts of extreme cold temperatures are mentioned in the winter storm profile.
Hailstorm	Hailstorms occur, but large-sized damaging hail similar to that occurring on the Front Range of Colorado is very rare. Past damage has been negligible.
Hurricane	Planning area is not near coastal areas.
Land Subsidence	Hazard is primarily related to coal mining in Colorado. The HMPC did not identify this as an area of concern.
Tsunami	Planning area is not near coastal areas.
Volcano	Dotsero, near Glenwood Canyon, is the only volcano of concern in Colorado. It has not erupted in 4,000 years.

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The HMPC identified 14 hazards that significantly affect the planning area and organized these hazards to be consistent with the State of Colorado Natural Hazards Mitigation Plan (2011). Several hazards were deleted from the 2008 hazard mitigation plan, including volcanic eruption, asteroid/comet impact, terrorism (international and domestic), airplane crashes, jail/prison escape, civil disturbance, military accident, arson, urban fire, extreme acts of violence, vehicle crashes (not related to wildlife). Most of these hazards were judged to be outside the scope of or not appropriate for the hazard mitigation plan update, or were addressed in other planning mechanisms such as the County Emergency Operations Plan.

Two new hazards were added in 2013: beetle infestation and wildlife-vehicle collisions. Mountain pine beetle kill affects the lodge pole pine tree population in the County and exacerbates wildfire risk. Prolonged power outages are also discussed as a consequence of several hazards profiled in the plan update. The 14 hazards identified for this plan update are profiled in further detail in the next section and are listed in Table 3.2 along with a checkmark indicating the jurisdictions impacted by the hazard.

Although not required by the Disaster Mitigation Act, the HMPC decided to address one manmade hazard—hazardous materials release. The risk from this hazard is related primarily to the transportation of hazardous materials through the County, and the 2020 HMPC believed this was still an important issue to incorporate into this hazard planning process.



**Table 3.2. Hazards Identified for Each Participating Jurisdiction**

Hazard	Grand County	Fraser	Granby	Grand Lake	Hot Sulphur Springs	Kremmling	Winter Park	Denver Water	Northern Water	FPDs
Avalanche	✓						✓	✓	✓	
Dam Failure	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Disease Outbreak	✓	✓	✓	✓	✓	✓	✓	✓		✓
Drought	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Earthquake	✓	✓	✓	✓	✓	✓	✓			
Flood	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Hazardous Materials Release (Transportation)	✓	✓	✓	✓	✓	✓	✓	✓		✓
Landslide, Mudflow/Debris Flow, Rock Fall	✓	✓	✓	✓	✓	✓	✓	✓		✓
Lightning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Beetle Infestation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Severe Winter Weather	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wildfire	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wildlife Hazards	✓	✓	✓	✓	✓	✓	✓	✓		✓
Windstorm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Source: Grand County Hazard Mitigation Planning Committee, 2013  
 \*FPD=Fire Protection District

Data on the past impacts and future probability of these hazards was collected from the following sources:

- Grand County HMPC
- FEMA Region VIII
- Colorado Geological Survey
- State of Colorado Natural Hazards Mitigation Plan (2011)
- Grand County Master Plan (2011)
- Grand County Community Wildfire Protection Plan (2006)
- Colorado Flood Decision Support System
- Geographic Information Systems (GIS) data from Grand County
- Data collection guides filled out by each participating jurisdiction
- Personal communications with HMPC members and other stakeholders
- Information on past hazard events from the Spatial Hazard Event and Loss Database (SHELDUS), a component of the University of South Carolina Hazards Research Lab, that compiles county-level hazard data for 18 different natural hazard event types
- Information on past extreme weather and climate events from the National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center
- Disaster declaration history from FEMA, the Public Entity Risk Institute, and the U.S. Department of Agriculture (USDA) Farm Service Agency

### **3.1.1 Disaster Declaration History**

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

The federal government may issue a disaster declaration through FEMA, the 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 disaster declaration certifies that the affected county has suffered at least a 30 percent loss in one or more crop or livestock areas and provides affected producers with access to low-interest loans and other programs to help mitigate the impact of the disaster. In accordance with the Consolidated Farm and Rural Development Act, all counties neighboring those receiving disaster declarations are named as contiguous disaster counties and, as such, are eligible for the same assistance.

Table 3.3 lists state and federal disaster declarations received by Grand County. Many of the disaster events were regional or statewide; therefore, reported costs are not accurate reflections of losses to Grand County.

**Table 3.3. Disaster Declaration History in Grand County, 1953-Present**

Date Declared	Disaster Name	Declaration Type	Disaster Number	Cost (\$)
3/13/2020	Covid-19 Pandemic	Presidential	9994	Unk at this time
7/3/2012	Drought, high winds, excessive heat	USDA (contiguous)	S3260	
9/5/2005	Hurricane Katrina Evacuation	Presidential	3224	15,279,405
4/9/2003	Snow	Presidential	3185	9,786,362 <sup>1</sup>
6/19/2002	Wildfires	Presidential	1421	7,589,180 <sup>1</sup>
2002	Drought	USDA		
2000	Drought	USDA		
1995	Flooding	State		
1/29/1977	Drought	Presidential	3025	4,873,838 <sup>1</sup>

Source: State of Colorado Natural Hazards Mitigation Plan 2011; Public Entity Risk Institute Presidential Disaster Declaration Site, [www.peripresdecusa.org/mainframe.htm](http://www.peripresdecusa.org/mainframe.htm); USDA Farm Service Agency, <http://www.fsa.usda.gov/FSA/webapp?area=home&subject=diap&topic=landing>

<sup>1</sup>Costs are in 2009 dollars and are statewide

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

Half of the declarations were for, or included, drought. These declarations, which were USDA declarations with the exception of one, were in 1977, 2000, 2002, and 2012. Grand County was included in the Presidential Major Disaster Declaration for wildfire in 2002; however, major fires or losses were not sustained in the County itself. The County provided aid to affected areas but no reimbursement was involved.

It is important to be aware that hazard events that happen outside of the County boundaries also can have direct and indirect impacts to Grand County. For instance, transportation routes or power supply could be interrupted by severe winter storms, flooding, rockslides, or wildfire hazards outside of the County.

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## 3.2 Hazard Profiles

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

**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.**

The hazards identified in Section 3.1 Hazard Identification are profiled individually in this section. The section will conclude by summarizing the probability of future occurrence and potential magnitude of each hazard for each jurisdiction, as well as assigning an overall vulnerability, or planning significance, rating of high, moderate, or low for each hazard.

The sources used to collect information for these profiles include the following:

- Disaster declaration history from FEMA, the Public Entity Risk Institute, and the USDA Farm Service Agency
- State of Colorado Natural Hazards Mitigation Plan (2011)
- Grand County Community Wildfire Protection Plan (2006)
- Grand County Master Plan (2011)
- Internet resources on past hazard events, such as the SHELDUS database created by the University of South Carolina Hazards Research Lab and the National Climatic Data Center Storm Events Database
- Geographic information systems (GIS) data from the Grand County GIS Department
- Statewide GIS datasets compiled by state and federal agencies
- Other existing plans and reports
- Personal interviews with HMPC members and other stakeholders
- Grand County Data Collection Guide completed by each participating jurisdiction

Detailed profiles for each of the identified hazards include information on the following characteristics of the hazard:

### **Hazard Description**

This section consists of a general description of the hazard and the general impacts it may have on a community.

### **Geographic Location**

This section describes the geographic extent or location of the hazard in the planning area and assesses the affected areas as isolated, small, medium, or large.

- 
- **Large**—More than 50 percent of the planning area affected
  - **Medium**—25-50 percent of the planning area affected
  - **Small**—10-25 percent of the planning area affected
  - **Isolated**—Less than 10 percent of the planning area affected

### **Previous Occurrences**

This section includes information on historic incidents, including impacts and costs, if known. A historic incident worksheet was used to capture information from participating jurisdictions on past occurrences. Information from the HMPC was combined with other data sources, including those previously mentioned.

### **Probability of Future Occurrence**

The frequency of past events is used to gauge the likelihood of future occurrences. Based on historical data, the Probability of Future Occurrence is categorized as follows:

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

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

### **Magnitude/Severity**

This section summarizes the magnitude/severity or extent of a hazard event in terms of deaths, injuries, property damage, and interruption of essential facilities and services. Magnitude and severity is classified in the following manner:

- **Catastrophic**—Multiple deaths; property destroyed and severely damaged; and/or interruption of essential facilities and service for more than 72 hours
- **Critical**—Isolated deaths and/or multiple injuries and illnesses; major or long-term property damage that threatens structural stability; and/or interruption of essential facilities and services for 24-72 hours

- 
- **Limited**—Minor injuries and illnesses; minimal property damage that does not threaten structural stability; and/or interruption of essential facilities and services for less than 24 hours
  - **Negligible**—No or few injuries or illnesses; minor quality of life loss; little or no property damage; and/or brief interruption of essential facilities and services

### 3.2.1 Avalanche

#### Hazard Description

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. Avalanches occur when loading of new snow increases stress at a rate faster than strength develops, and the slope fails. Critical stresses develop more quickly on steeper slopes and where deposition of wind-transported snow is common. While most avalanches are caused simply by the weight of accumulated snow, other triggers can be a human (e.g., skier, snowshoer, snowmobiler), animal, or a sonic boom.

The combination of steep slopes, abundant snow, weather, snowpack, and an impetus to cause movement create an avalanching episode. According to the Colorado Avalanche Information Center (CAIC), about 90 percent of all avalanches start on slopes of 30-45 degrees; about 98 percent of all avalanches occur on slopes of 25–50 degrees. Avalanches release most often on slopes above timberline that face away from prevailing winds (leeward slopes collect snow blowing from the windward sides of ridges). Avalanches can run, however, on small slopes well below timberline, such as gullies, road cuts, and small openings in the trees. Very dense trees can anchor the snow to steep slopes and prevent avalanches from starting; however, avalanches can release and travel through a moderately dense forest. An average-sized avalanche travels around 80 miles mph; the typical range of impact pressure from an avalanche is from 0.5 to 5.0 tons per foot.

Historically in Colorado, avalanches have occurred during the winter and spring months between November and April. The avalanche danger increases with major snowstorms and periods of thaw. About 2,300 avalanches are reported to the CAIC in an average winter. More than 80 percent of these fall during or just after large snowstorms. The most avalanche-prone months are, in order, February, March, and January. Avalanches caused by thaw occur most often in April.

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. Grand County is known for its outdoor recreation opportunities, such as skiing at Winter Park and abundant backcountry skiing, snowboarding, and snowmobiling options. Thus avalanches pose a risk to people in the Grand County planning 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. 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.

### Geographic Location

The geographic extent of this hazard in Grand County is **isolated**—less than 10 percent of the planning area affected.

Many areas of Grand County are considered especially susceptible to avalanche activity. The Colorado Avalanche Information Center primarily forecasts avalanche danger in the eastern part of the County, which falls under the Front Range avalanche forecast zone. Granby, Winter Park, and Berthoud Pass are within the Front Range forecast zone. The HMPC named Chicken Hill and Gravel Mountain as particular areas of concerns for avalanche events.

The most severe avalanche terrain in Grand County is on federally owned lands in the vicinity of Berthoud Pass. Some of these avalanche runout zones affect US Highway 40, with the most hazardous areas on the Clear Creek County side of the pass. Unincorporated Grand County is the jurisdiction with the most avalanche risk. However, highway closures due to an event can affect all participating jurisdictions.

### Previous Occurrences

According to SHELDUS, seven avalanches caused injuries and two caused fatalities between 2005 and 2010. Note that SHELDUS damage and casualty estimates are based on averages of events that occurred over multiple counties. This is why some injury and fatality records are shown as decimal points. Grand County avalanche events from the SHELDUS database are shown below.

Note: due to the 2020 Pandemic, updated avalanche information was not received from CAIC.

**Table 3.4. Grand County Avalanche History: 2005 – 2010\***

Date	Injuries	Fatalities	Property Damage (\$)**
3/27/2005	0.29	0	0
11/6/2005	0	1	0
1/6/2007	0.14	0	0
12/31/2007	1	0	0
12/5/2008	0.14	0	0
12/26/2008	0	0.5	0
12/5/2010	0.14	0	0
12/12/2010	0.14	0	0

Date	Injuries	Fatalities	Property Damage (\$)**
11/16/2010	0.14	0	0
<b>TOTAL</b>	<b>1.99</b>	<b>1.5</b>	<b>0</b>

Sources: SHELDUS

\*Extent of Record

\*\*Dollar value based on year of event

According to information from a *History of Colorado Avalanche Accidents, 1859–2006*, there were 20 avalanche-related deaths in Grand County between 1859 and 2006. The National Climatic Data Center Storm Events Database and the CAIC have information on 12 notable avalanches (e.g., avalanches that involved people) that occurred in Grand County between 2008 and 2013. Details of these and other events from the 2008 Grand County Hazard Mitigation Plan are summarized below.

- **February 7, 2013**—2 skiers were caught, with 1 partially buried near Current Creek/Postage Stamp near Berthoud Pass. The avalanche was triggered after both skiers had crossed the path and were ascending along the south flank about mid-track. Neither skier was seriously injured. Both individuals were able to ski out to Highway 40 and back to their car without further incident.
- **February 3, 2013**—A party of 8 students and instructors in an Introduction to Avalanches class left the Pumphouse trailhead to inspect two avalanches from the day prior on the southeast face of Russell Peak. Several group members were able to reach shelter when the avalanche triggered, but 2 skiers were caught with one becoming partially buried and another being fully buried. Both skiers were extracted with help from the other group members. No one sustained serious injuries.
- **January 22, 2012**—This was a small avalanche but resulted in a fatality. A backcountry skier was caught and fully buried. Rescuers were not able to reach him in time.
- **January 1, 2012**—Two experienced backcountry skiers left the Current Creek trailhead north of Berthoud Pass. While descending from a ridge, one skier was caught in an avalanche and partially buried. The skier sustained a broken arm. The second skier was able to extract the first, and the two began to walk back to the main trailhead together. Witnesses had called 911 which dispatched Flight for Life. Flight for Life completed the medical evacuation.
- **January 17, 2011**—A pair of snowboarders and one dog left Berthoud Pass and headed northeast. The group triggered an avalanche near the northeast edge of the High Trail Cliffs. The first snowboarder was able to outrun the avalanche, but unfortunately the second snowboarder and his dog were caught and fully buried. Rescuers were not able to reach them in time.
- **November 16, 2010**—Two snowboarders and a dog were near the Nitro Chute near Berthoud Pass. One snowboarder was caught by an avalanche and transported over a cliff band. He sustained a back injury and was taken by ambulance to Denver for medical care.



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- **March 3, 2010**—Two Alpine Search and Rescue members were on Berthoud Pass looking for a lost hiker. The two were caught in an avalanche and were able to self-rescue. Neither one sustained serious injuries.
  - **March 2, 2010**—Two snowboarders were riding in the Floral Park area of Berthoud Pass. After the avalanche triggered, one snowboarder was caught and partially buried. The second snowboarder was able to locate the first with avalanche beacons. The first rider sustained four fractured ribs and a bruised lung.
  - **February 14, 2010**—Two skiers were in the Zero Creek area north of Berthoud Pass. One skier was caught and partially buried. The second skier was able to locate him using his avalanche beacon. The second skier dug the first out in roughly 10 minutes. Neither sustained any serious injuries.
  - **January 11, 2010**—Three skiers were in the No Name Peak area of Berthoud Pass. One was caught but not buried. He did not sustain any serious injuries.
  - **December 27, 2008**—4 snowmobilers were riding in the bowl between Gravel Mountain and Little Gravel Mountain. An avalanche triggered, partially burying one snowmobiler and fully burying and killing two others.
  - **December 31, 2007**—In Grand County, a snowmobiler on Gravel Mountain was injured when he triggered an avalanche. He was knocked unconscious and buried under 3 feet of snow. Fortunately, he suffered only a separated shoulder.
  - **January 6, 2006**—The Stanley slide path near Berthoud Pass avalanched, putting debris on Highway 40. The Stanley slide path crosses two switchbacks of Highway 40. The avalanche debris pushed two vehicles off the upper section of the roadway and partially buried them between the two switchbacks. Five people were riding in one vehicle and three in the other. Witnesses initiated a rescue of the vehicle occupants. CAIC and CDOT staff members initiated an organized rescue effort. All of the vehicle occupants sustained at least minor injuries, with one sustaining broken ribs.
  - **November 6, 2005**—A backcountry snowboarder, a Denver man and a long-time rider in the Berthoud Pass area, and his dog were buried and killed in a sizable hard slab avalanche on the north side of Mines Peak, just northeast of the summit of Berthoud Pass. This was the first Colorado and U.S. avalanche fatality of the season.
  - **April 19, 1998**—Two snowshoers were injured, one critically, on Berthoud Pass. It is unclear at this time if the critically injured woman was actually caught in the slide or fell down the steep slope trying to get to her partner who had an injured shoulder. Also, one rescuer triggered a small slide trying to get to them. Two skiers triggered a slide on the Stanley avalanche path that stopped just short of Highway 40 on the east side of Berthoud Pass. Later that day, a skier triggered an avalanche near the Loveland Ski Area. A few natural events were also spotted along the I-70 corridor. These slides ranged from 6 inches to 3 to 6 feet deep and were on east-southeast aspects near and above timberline. Avalanche control on the east side of the 10-Mile Range near Breckenridge also produced shallow slabs from recent drifting above treeline. The recent new snow and windloading were the main reasons for these slides. A thin, weak layer of dry snow that

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was overlaid with a shallow wind slab appeared to be the main ingredient for the instability.

- **March 1, 1998**—A day of outdoor recreation turned to tragedy when a 20 year old backcountry snowboarder was buried and killed in a sizable slab avalanche on the south and east side of Berthoud Pass in Colorado. The victim and a skier friend triggered the avalanche as they skied down a steep backcountry area above treeline known as the Russell Face. The two men used snowshoes to hike westward from the summit of Berthoud Pass toward the Continental Divide. They were only 3 to 4 turns down the slope when it fractured. The victim was swept down and buried under about two feet of snow. His partner had his skis knocked off his feet which likely allowed him to stay on the surface. When the avalanche stopped, he briefly searched for his buried friend. But since they carried no avalanche rescue gear, he started hiking out to the highway where he flagged down a motorist. The Berthoud Pass Ski Patrol responded with support from the Alpine Rescue Team and the Loveland Ski Areas ski patrol. The victim was quickly found and CPR was started, but the almost 2 hour burial was too long for him to survive.

### **Probability of Future Occurrence**

**Highly Likely**—Near 100 percent chance of occurrence next year or happens every year

Between 2008 and 2013, there were 12 notable avalanches in Grand County (e.g., avalanches that involved people). This suggests that at least one notable avalanche occurs each year in Grand County.

### **Magnitude/Severity**

**Critical**—Isolated deaths and/or multiple injuries and illnesses; major or long-term property damage that threatens structural stability; and/or interruption of essential facilities and services for 24-72 hours

Avalanches in Grand County can injure and kill multiple people, damage property and infrastructure, and cause road closures. Seven people died in avalanches in Grand County between 2005 and 2010. The County also noted that several individuals were caught by avalanches on Berthoud Pass in April 2009. The Town of Winter Park' economy is impacted whenever Highway 40 is closed due to avalanche, losing roughly \$100,000 for each 24 hour period the road is closed. Road closures due to avalanches on Berthoud Pass and Highway 40 occur an estimated 4 times a year according to the Town of Winter Park.

## **3.2.2 Dam Failure**

### **Hazard Description**

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

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or mine tailings. 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 development and infrastructure located downstream.

Dam failures can result from any one or a combination of the following causes:

- Prolonged periods of rainfall and flooding, which result in overtopping (overtopping is the primary cause of earthen dam failure)
- Earthquake
- Inadequate spillway capacity resulting in excess overtopping flows
- Internal erosion caused by embankment or foundation leakage or piping or rodent activity
- Improper design
- Improper maintenance
- Negligent operation
- Failure of upstream dams on the same waterway

### **Geographic Location**

The geographic extent of this hazard in Grand County is **large**— more than 50 percent of the planning area affected.

HAZUS-MH contains a database of dams based on the National Inventory of Dams. This database lists nine dams in the County and classifies dams based on the potential hazard to the downstream area resulting from failure or misoperation of the dam or facilities:

- **High Hazard Potential**—Probable loss of life (one or more)
- **Significant Hazard Potential**—No probable loss of human life but can cause economic loss, environment damage, disruption of lifeline facilities, or impact other concerns; often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure
- **Low Hazard Potential**—No probable loss of human life and low economic and/or environmental losses; losses are principally limited to the owner's property

Based on these classifications, there are (12) high hazard dams and (14) significant hazard dams in Grand County. These dams are listed in Table 3.5 and illustrated in Figure 3.1. The high and significant hazard dams all have emergency action plans in place with the exception of Granby Dike 1-4, Griggs, Scholl, and Sinkovits & Linke.

**Table 3.5 Grand County Dams**

Source: Colorado Division of Water Resources, Dam Safety Branch

Dam ID	Name	Stream	Town Downstream	Norm Storage	Hazard Class	EAP
370221	#1 TAILINGS POND				2	
500124	BINCO	ALBERT CREEK	KREMMLING	312	2	Y
510104	DALE	SOUTH BATTLE CR	PARSHALL	48	2	Y
510212	DISCOVERY PARK	Fraser River	Winter Park	40	2	
510105	EAST BRANCH	UTE CREEK	PARSHALL	2000	2	Y
510108	GRANBY	N. FORK CO RIVER	HS SPRINGS	539800	1	Y
520107	JONES	HENRY CREEK	State Bridge	75	2	Y
530115	JONES #1	SHEEP CREEK	KREMMLING	241	2	Y
510114	LITTLE KING RANCH	BUFFALO CREEK	HS SPRINGS	1090	2	Y
500113	MATHESON	TROUBLESOME CREEK	KREMMLING	1074	2	Y
500115	MCMAHON #2	RED DIRT CREEK	KREMMLING	3460	1	Y
510118	MEADOW CREEK	MEADOW CREEK	TABERNASH	5370	1	Y
510121	MUSGRAVE	ROCK CREEK	Kremmling	199	2	Y
500133	RITSCHARD	MUDDY CREEK	KREMMLING	65985	1	Y
510124	SCHOLL	CORRAL CREEK	KREMMLING	353	2	Y
510123	SHADOW MTN	N. FORK CO RIVER	HS SPRINGS	18400	1	Y
510125	SYLVAN	LITTLE MUDDY CRK	PARSHALL	835	1	Y
500121	WHITELEY PEAK	DIAMOND CR	KREMMLING	773	1	Y
510127	WILLIAMS FORK	WILLIAMS FORK RIVER	PARSHALL	90640	1	Y
510128	WILLOW CREEK	WILLOW CREEK	HS SPRINGS	10600	1	Y
510132	WINDY GAP	COLORADO RIVER	HS SPRINGS	445	2	Y

**Hazard Class:** 1= high hazard  
2= significant hazard

Risk to dam failure is greatest to the Town of Granby downstream of the Granby dam and Granby dikes 1-4. The Ritschard dam (a.k.a Wolford Mountain Reservoir) upstream of Kremmling and the Williams Fork dam upstream of Parshall have the next highest storage capacities at 84,639 cubic feet and 101,600 cubic feet respectively.

**Note:** at the time of this Plan update, Dam Safety Engineers for the State of Colorado were increasing McMahon #2 and Whiteley Peak Dams from a significant hazard class to a high hazard class. Changes were made in Table 3.5

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**Figure 3.1 Grand County Dams**

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**REDACTED**

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## Previous Occurrences

There was no information available indicating that dam failures had occurred in Grand County in the past.

## Probability of Future Occurrence

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

Using the methodology adopted for natural hazards in this plan, no past events represent an unlikely probability of future occurrence. However, because dam failure is a manmade hazard, the methodology for calculating probability based on past occurrences does not necessarily reflect the actual risk of future occurrence. Further information on this risk is unknown.

## Magnitude/Severity

**Catastrophic**—Multiple deaths; property destroyed and severely damaged; and/or interruption of essential facilities and service for more than 72 hours

Water released by a failed dam generates tremendous energy and can cause a flood that is catastrophic to life and property located in the inundation area. A failure of the Dillon Dam or Green Mountain dam in Summit County would have catastrophic, cascading impacts that could reach Grand County. Failure of the Dillon Dam could cause other dams downstream, such as Green Mountain, to fail, essentially creating a domino effect.

In 2013, Grand County's HMP stated 'there is potential for future issues with Ritschard Dam (a.k.a. Wolford Mountain Reservoir), an earthen dam that is settling twice as fast as the expected rate. In the summer of 2012 water levels in the dam were low due to the drought and water demands along the Western Slope. This afforded the Colorado River District, who owns and operates Wolford Reservoir, to study why the dam was settling so much faster than expected. The chief engineer for the River District stated, "There is no reason for concern over dam failure. There are no leaks; the dam is solid."

The Colorado River District produced the following in 2015:  
Renovation solutions for Ritschard Dam at Wolford Mountain Reservoir.

KREMMLING, Colo. January 2015 --

Engineering consultants engaged by the Colorado River District to study the problem since 2009, as well as the Dam Safety Branch of the Colorado Division of Water Resources, agree that the dam is safe and poses no danger. To maintain that standard, after an aggressive five-year investigation that continues to include installation and monitoring of sophisticated instruments to measure the movement, the Colorado River District will review renovation scenarios this year.

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AECOM engineers told the Board in January that the settlement is likely occurring because the rock-fill shell that surrounds the clay core on the upstream and downstream sides was inadequately compacted. In such a dam, the clay core material is the impervious element in the dam. The rock-fill shell supports the core. At Ritschard Dam, filters meant to collect seepage are in excellent shape and are doing their job. Normal seepage does not show any effects from the settlement. Since the dam was constructed in 1995, it has settled near its center by about two feet, one foot more than anticipated. Along with this settlement, the crest of the dam has shifted downstream about nine inches.

Although the chief of dam safety for the state of Colorado has not placed an operational restriction on the dam, the River District will continue with the cautionary policy it began in 2014 of keeping the spring runoff fill level of the reservoir 10 feet below full. The lower water level has been shown by instrumentation to slow down settlement trends.

<https://www.coloradoriverdistrict.org/wp-content/uploads/2015/10/Ritschard-Dam-update-2-18-2015.pdf>

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### 3.2.3 Disease Outbreak

#### Hazard Description

Grand County has a higher susceptibility to disease outbreaks due to the number of national and international guests that visit the County every year. In the past, Grand County Public Health investigated seven outbreaks ranging from hepatitis A to H1N1 (Swine Flu) in 2009. The County's healthcare system doesn't have the depth of staff and services as the larger counties and cities in the State. As a result, an outbreak with several sick or dying people would quickly overwhelm

the County's healthcare facilities as well as EMS. Pertussis and pandemic influenza were identified as diseases of particular concern to the County in the 2008 hazard mitigation plan.

#### Geographic Location

The geographic extent of this hazard in Grand County is **large**—more than 50 percent of the planning area affected. All persons who reside in the area, or are temporarily present, are theoretically at some risk of developing a disease in the event that an outbreak occurs.

#### Previous Occurrences

In 2010 a Hepatitis A outbreak occurred across Colorado, including Grand County. County Public Health held a mass immunization clinic for 1,000 people. The source of the outbreak was traced to two highly frequented restaurants in Grand Lake. The County was impacted by the H1N1 flu strain April 2009 - February 2010, including a few hospitalizations. School administrators discussed closing schools, but ultimately the schools were kept open. The incidence of pertussis (whooping cough) in the County fluctuates, but is an ongoing area of concern. In March of 2020, the Covid-19 pandemic was declared a national emergency. This was followed up with a State declaration and a County declaration. As of August 1, 2020, Grand County had 42 positive cases of Covid-19.

[Table 3.6](#) summarizes the disease occurrences that were reported to the Colorado Department of Public Health and Environment between 2010-2019.



**Table 3.6. Grand County Disease Occurrences: 2010-2019**

Disease	2010	2015	2016	2017	2018	2019
Animal Bites	3	20	28	34	39	39
Campylobacteriosis	1	2	5	2	4	4
Chicken Pox (varicella)	4	1	1	3	0	0
Giardiasis	1	2	0	2	2	1
Haemophilus Influenza	0	2	1	0	0	1
Hepatitis A	1	0	1	0	0	0
Hepatitis B, chronic	0	0	0	1	0	0
Hepatitis C, acute	0	0	0	1	0	0
Hepatitis C, chronic	7	4	4	5	6	10
Influenza, hospitalized	0	2	1	1	3	3
Meningitis aseptic/viral	0	1	0	0	0	0
Pertussis	1	1	1	11	1	0
Salmonellosis	1	0	2	0	2	0
Shiga toxin producing E.coli	0	2	1	2	2	0
Streptococcus pneumonia- invasive	0	0	0	1	1	3
Tularemia	0	0	0	0	0	0
<b>Total</b>	<b>19</b>	<b>37</b>	<b>45</b>	<b>63</b>	<b>60</b>	<b>61</b>

Source: Grand County Public Health

### Probability of Future Occurrence

**Likely**—10-100 percent chance of occurrence in next year or has a recurrence interval of 10 years or less. Contagious diseases will occur to some degree in the planning area every year. More severe outbreaks that rapidly overwhelm the County will probably occur with less frequency.

### Magnitude/Severity

**Variable**— the rating system used in the plan update does not necessarily lend itself well to this hazard given the variability of severity depending on the specific outbreak. Nevertheless the potential for a highly significant disease outbreak event in the County should be acknowledged in this plan update. One of the main issues with any type of disease outbreak in the County is the limited staff resources. Public Health staff can quickly become overwhelmed in a widespread outbreak. The logistics of immunization clinics are highly demanding, and Public Health staff must also manage public information during outbreaks. This can be especially trying when public anxiety is high, as was the case across the U.S. during the H1N1 pandemic in 2009-2010. Several illnesses and possibly deaths could occur.

During the update of this Plan, September, 2020, Grand County had 65 positive case of COVID-19 and 27 associated case (primary residence out of County).



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Primary damages or losses associated with an outbreak or outbreaks could include economic losses associated with work absences or a decrease in productivity due to disease, human losses associated with disease and fatalities in the community, adverse impacts on hospitals and other health care facilities and staff, and the fear and anxiety associated with a severe outbreak. High public anxiety can cause behaviors such as panic buying at grocery stores, which is especially serious in more remote areas such as Grand County where food and medicine deliveries may not happen as quickly and frequently as other places. The severity of a disease outbreak could also increase if the disease primarily affects more vulnerable populations such as the very young and the elderly.

The 2008 hazard mitigation plan identified several assumptions that can impact the severity of a disease outbreak. These assumptions were related specifically to pandemic influenza but can theoretically be applied to other disease outbreaks.

- Localities must be prepared to rely on their own resources to respond. The effect of influenza on individual communities will be relatively prolonged (weeks to months) in comparison to other types of disasters.
- Health care workers and other first responders may be at higher risk of exposure and illness than the general population, further straining the health care system.
- Outbreaks can be expected to occur simultaneously throughout much of the U.S., preventing shifts in human and material resources that usually occur in response to other disasters.
- Of those who become ill with influenza, 50% will seek outpatient medical care.
- The typical incubation period (interval between infection and onset of symptoms) for influenza is two days. Infected individuals may be contagious before symptoms present.
- Persons who become ill may “shed” the virus and can transmit infection for up to one day before the onset of illness. Viral shedding and the risk of transmission will be greatest during the first two days of illness. Children usually shed the greatest amount of virus and therefore are likely to pose the greatest risk for transmission.
- On average, infected persons will transmit the infection to approximately two other people.
- In an infected community, a pandemic outbreak will last about six to eight weeks.
- Multiple waves (periods during which community outbreaks occur across the country) of illness could occur with each wave lasting 2-3 months. Historically, the largest waves have occurred in the fall and winter, but the seasonality of a pandemic cannot be predicted with certainty.
- Effective prevention and therapeutic measures, including vaccine and antiviral agents, will be delayed and in short supply.
- Widespread illness in the community could increase the likelihood of sudden and potentially significant shortages of personnel in other sectors that provide critical public safety services.

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## 3.2.4 Drought

### Hazard 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. Lack of annual precipitation and poor water conservation practices can result in drought conditions.

Drought is a gradual phenomenon. Although droughts are sometimes characterized as emergencies, they differ from typical emergency events. Most natural disasters, such as floods or forest fires, occur relatively rapidly and afford little time for preparing for disaster response. Droughts occur slowly, over a multi-year period, and it is often not obvious or easy to quantify when a drought begins and ends.

Due to Colorado's semiarid conditions, drought is a natural but unpredictable occurrence in the state. Single season droughts over some portion of the state are quite common. The onset of drought in western Colorado mountain counties is usually signaled by a lack of significant winter snowfall. Hot and dry conditions that persist from spring into 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. During the update of this Plan, September, 2020, Grand County was put into a Stage 1 Drought Restrictions.

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

- **Meteorological** drought is usually defined by a period of below average water supply.
- **Agricultural** drought occurs when there is an inadequate water supply to meet the needs of 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.

Drought affects the water supply of communities and water districts in the County, as well as the ski and recreation industries that drive the County’s economy.

### Geographic Location

The geographic extent of this hazard in Grand County is **large**—with more than 50 percent of the planning area affected.

The Western Regional Climate Center reports precipitation data from weather stations in and around Grand County. The data reported here are from three of the stations: Kremmling, Grand Lake, and Winter Park. These stations were selected due to their locations in the County and extent of their data (number of years with recorded data). Precipitation is greatest in Winter Park, where the month with the most average precipitation is April. Precipitation is least in Kremmling, where July is the month with the most average precipitation. Table 3.7 contains precipitation summaries for the three stations, and Figure 3.2 through Figure 3.4 show monthly average total precipitation. These summaries include rainfall only. Drought in Colorado and Grand County is largely contingent upon winter snowpack. Snowfall summaries can be found in *Section 3.2.11 Severe Winter Weather*.

**Table 3.7. Grand County Precipitation Summaries<sup>1</sup>**

Station	Average Annual Precipitation	Month with Most Precipitation/Average Precipitation	Highest Monthly Precipitation	Highest Annual Precipitation
Kremmling <sup>2</sup>	11.88	July/1.44	4.32/June 1969	16.86/1985
Grand Lake <sup>3</sup>	13.96	Aug./1.66	5.30/Sept. 1961	22.32/1951
Winter Park <sup>4</sup>	26.53	April/3.02	7.14/Sept. 1961	38.64/1957

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

<sup>1</sup>All totals are reported in inches;

<sup>2</sup>Period of Record: 1/1/1908-9/30/2012; <sup>3</sup>Period of Record: 8/1/1948-9/30/2012; <sup>4</sup>Period of Record: 3/1/1942-9/30/201

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## Previous Occurrences

Colorado has experienced multiple severe droughts. Colorado has experienced drought in 2013-2012, 2004-2000, 1996, 1994, 1990, 1989, 1979-1975, 1965-1963, 1957-1951, 1941-1931, and 1905-1893 (source: Colorado Drought Mitigation and Response Plan, 2010). The most significant of the instrumented period (which began in the late 1800s) are listed in Table 3.8. Although drought conditions can vary across the state, it is likely that Grand County suffered during these dry periods.

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**Table 3.8. 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
2012-2013	X		2

Source: McKee, et al.

\*Modified for the Colorado State Drought Plan in 2010 and Grand County Mitigation Plan 2013 based on input from the Colorado Climate Center

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The following droughts were significant to Grand County:

- **2006**—The U.S. Agriculture Secretary designated Grand among 59 counties in Colorado as disaster area due to the ongoing drought, high winds, insect pests, and a late freeze (Grand received its designation as a contiguous county).
- **2002**—This year was the driest year on record for the Denver region and much of the state. For the first time in state history, the Colorado governor asked the federal government to declare all of Colorado a drought disaster area. With an average temperature of 52 degrees, 2001 was the warmest year since 1986. The drought started in late 1999 and was compounded by scarce snowfall in 2001. Total precipitation for 2002 was 7.48 inches; the average is 15.81 inches (National Weather Service, Denver Office).
- **2000**—Strong La Niña conditions created below average precipitation and above average temperatures for most months in 2000. Statewide, snowpack started out well below average but recovered to near average in March. However, an early snowmelt resulted in low stream flows, and by June, drought conditions began to affect most of the state. By fall, weather patterns returned to near normal with average precipitation and below average temperatures.
- **1989**—In March 1989, the State Drought Water Availability Task Force met to assess drought conditions within Colorado. Warm dry conditions during April of 1989 reduced snowpack to 50 percent of average.
- **1980–1981**—This drought, beginning in the fall of 1980 and lasting until the summer of 1981, had costly impacts to the ski industry.
- **1976–1977**—This drought was characterized as a winter event, limited in duration. It was the driest winter in recorded history for much of Colorado’s high country and western slope, severely impacting the ski industry. Colorado agriculture producers and municipalities received over \$110 million in federal drought disaster aid.

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: online drought-related news stories and scientific publications, members of the public who visit the website and submit a drought-related impact for their region, members of the media, and members of relevant government agencies. The database is being populated beginning with the most recent impacts and working backward in time.

The Drought Impact Reporter contains information on 185 drought impacts from droughts that affected Grand County between 1990 and 2013. The list is not comprehensive. Most of the impacts, 87, were classified as “agricultural.” Other impacts include “business and industry” (11), “energy” (1), “fire” (19), “plants and wildlife” (15), “relief, response, and restrictions” (54), “society and public health” (27), “tourism and recreation” (11), and “water supply and quality” (13). These categories are described as follows:

- 
- **Agriculture**—Drought effects associated with agriculture, farming, aquaculture, horticulture, forestry, or ranching. Examples of drought-induced agricultural impacts include damage to crop quality; income loss for farmers due to reduced crop yields; reduced productivity of cropland; insect infestation; plant disease; increased irrigation costs; cost of new or supplemental water resource development (wells, dams, pipelines) for agriculture; reduced productivity of rangeland; forced reduction of foundation stock; closure/limitation of public lands to grazing; high cost or unavailability of water for livestock, Christmas tree farms, forestry, raising domesticated horses, bees, fish, shellfish or horticulture.
  - **Business & Industry**—This category tracks drought’s effects on non-agriculture and non-tourism businesses, such as lawn care, recreational vehicles or gear dealers, and plant nurseries. Typical impacts include reduction or loss of demand for goods or services, reduction in employment, variation in number of calls for service, late opening or early closure for the season, bankruptcy, permanent store closure, and other economic impacts.
  - **Energy**—This category concerns drought’s effects on power production, rates, and revenue. Examples include production changes for both hydropower and non-hydropower providers, changes in electricity rates, revenue shortfalls and/or windfall profits, and purchase of electricity when hydropower generation is down.
  - **Fire**—Drought often contributes to forest, range, rural, or urban fires, fire danger, and burning restrictions. Specific impacts include enacting or easing burning restrictions, fireworks bans, increased fire risk, occurrence of fire (number of acres burned, number of wildland fires compared to average, people displaced, etc.), state of emergency during periods of high fire danger, closure of roads or land due to fire occurrence or risk, and expenses to state and county governments of paying firefighters overtime and paying equipment (helicopter) costs.
  - **Plants & Wildlife**—Drought effects associated with unmanaged plants and wildlife, both aquatic and terrestrial, include loss of biodiversity of plants or wildlife; loss of trees from rural or urban landscapes, shelterbelts, or wooded conservation areas; reduction and degradation of fish and wildlife habitat; lack of feed and drinking water; greater mortality due to increased contact with agricultural producers, as animals seek food from farms and producers are less tolerant of the intrusion; disease; increased vulnerability to predation (from species concentrated near water); migration and concentration (loss of wildlife in some areas and too much wildlife in others); increased stress on endangered species; salinity levels affecting wildlife; wildlife encroaching into urban areas; and loss of wetlands.
  - **Relief, Response & Restrictions**—This category refers to drought effects associated with disaster declarations, aid programs, requests for disaster declaration or aid, water restrictions, or fire restrictions. Examples include disaster declarations, aid programs, USDA Secretarial disaster declarations, Small Business Association disaster declarations, government relief and response programs, state-level water shortage 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 & Public Health**—Drought effects associated with human, public and social health include health-related problems related to reduced water quantity and/or quality, such as increased concentration of contaminants; loss of human life (e.g. from heat stress, suicide); increased respiratory ailments; increased disease caused by wildland fire concentrations; increased human disease caused by changes in insect carrier populations; population migration (rural to urban areas, migrants into the United States); loss of aesthetic values; change in daily activities (non-recreational, like putting a bucket in the shower to catch water); elevated stress levels; meetings to discuss drought; communities creating drought plans; lawmakers altering penalties for violation of water restrictions; demand for higher water rates; cultural/historical discoveries from low water levels; prayer meetings; cancellations of fundraising events; cancellation/alteration of festivals or holiday traditions; stockpiling water; public service announcements and drought information websites; protests; and conflicts within the community due to competition for water.
  - **Tourism & Recreation**—Drought effects associated with recreational activities and tourism include closure of state hiking trails and hunting areas due to fire danger; water access or navigation problems for recreation; bans on recreational activities; reduced license, permit, or ticket sales (e.g. hunting, fishing, ski lifts, etc.); losses related to curtailed activities (e.g. bird watching, hunting and fishing, boating, etc.); reduced park visitation; and cancellation or postponement of sporting events.
  - **Water Supply & Quality**—Drought effects associated with water supply and water quality include dry wells, voluntary and mandatory water restrictions, changes in water rates, easing of water restrictions, increases in requests for new well permits, changes in water use due to water restrictions, greater water demand, decreases in water allocation or allotments, installation or alteration of water pumps or water intakes, changes to allowable water contaminants, water line damage or repairs due to drought stress, drinking water turbidity, change in water color or odor, declaration of drought watches or warnings, and mitigation activities.
  - **General Awareness**—General Awareness applies only to media reports and usually indicates that people are concerned about drought, but no specific impact has occurred yet or the information is too general to use for an impact.
  - **Other**—Drought impacts that do not easily fit into any of the above categories.

Figure 3.5 compares the severity of the drought in Colorado in June of 2020 with the severity of the drought in June of 2015 and 2010. Grand County experienced extreme drought conditions in 2012 and severe drought conditions in 2013. 2012 was a severe fire year for Colorado, resulting in a Presidential Disaster Declaration for the Waldo Canyon and High Park wildfires.

Figure 3.6. shows the Drought Monitor for the entire United States as of June 18, 2020, with an excerpt for the State of Colorado dated June 23, 2020.

Figures 3.5. U.S. Drought Monitor for Colorado, June 2020 (top) vs. June 2015 & June 2010

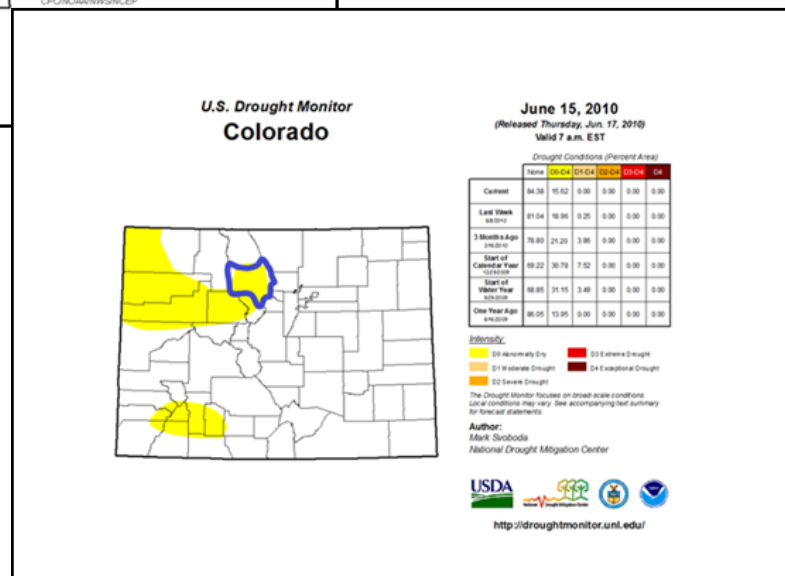
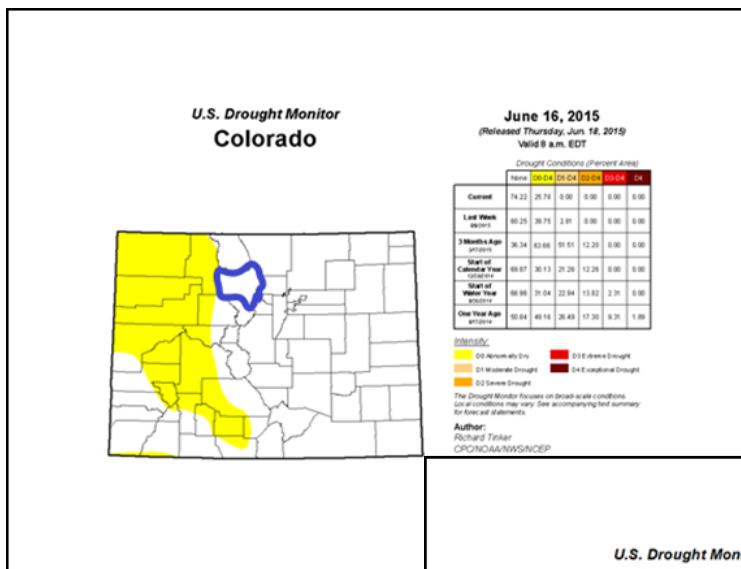
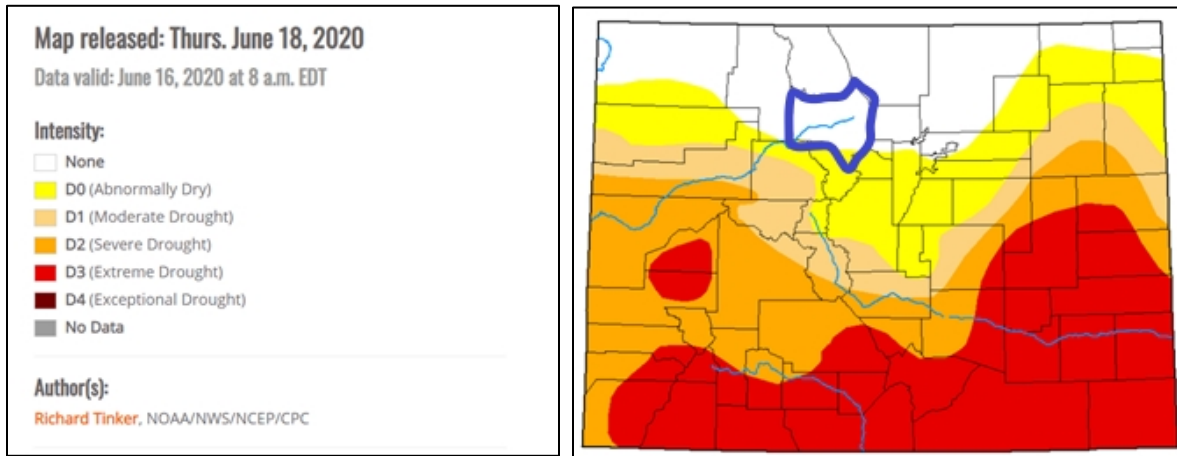
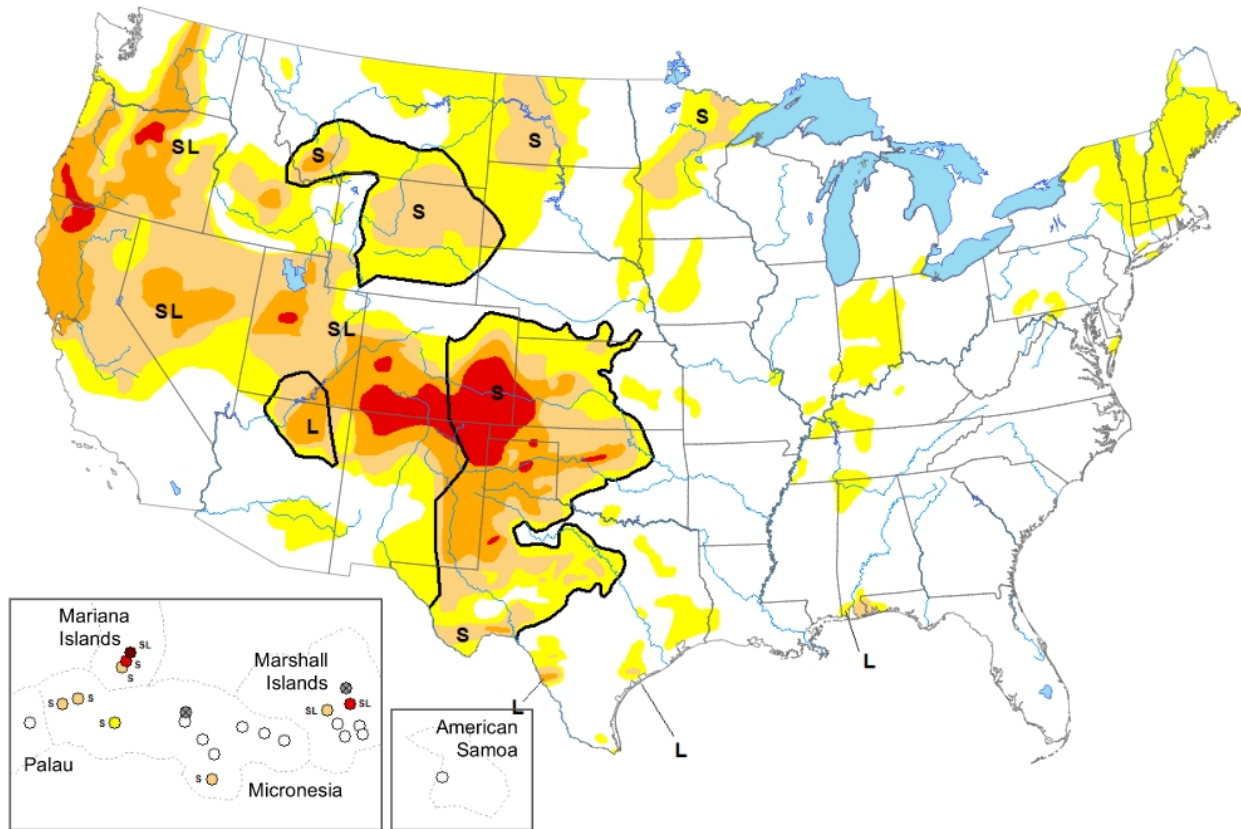


Figure 3.6. United States Drought Monitor <https://droughtmonitor.unl.edu/>

Map released: June 18, 2020

Data valid: June 16, 2020



June 23, 2020, Colorado: *While the Intermountain West saw widespread beneficial moisture early in the month, conditions have again turned for the worse. The last seven days have been hotter and drier than normal for much of Colorado. Areas that did receive moisture this week were northern Utah, northern Wyoming, the northern Colorado Front Range and far SE Colorado. The eastern plains of Colorado have been 6-8 degrees warmer than normal for the month of June to date. This includes several episodes of 100-degree temperatures in SE CO, and widespread wind events. Agricultural weather stations have shown a sharp uptick in potential evapotranspiration, as has the Evaporative Demand Drought Index. Red flag warnings have been common, top soil is short, winter wheat crops are failing, and cattle are being sold. Campo, on the CO/OK border, is still showing about a 5 inch deficit in precipitation for 2020 and is the 3rd driest start to 2020.*

Drought impacts in Grand County can be wide-reaching: economic, environmental, and societal. The most significant impacts associated with drought are those related to water intensive activities such as wildfire protection, commerce, tourism, recreation, municipal usage, and wildlife preservation. Drought during the winter season impacts the ski industry and economy of Grand County. The Fraser River flows north about 28 miles from the headwaters near the continental Divide, through the towns of Winter Park, Fraser, Tabernash, and Granby, and is one of the major tributaries to the Upper Colorado River. Increasing urban development, as well as the seasonal influx of tourists, places more demands on the water resources in the Fraser River watershed. According to the State's Economic Impact Task Force Report on the Economic Impact of Drought (April 30, 2002), Grand County is highly dependent upon tourism and receives 76% of its income and 51% of its jobs from tourism. The effects of drought can severely diminish tourism revenue.

“A county with a strong economic dependence on the ski industry is more vulnerable to drought impacts than a county with recreational attractions ranging from hiking and camping to rafting and boating.” Grand County falls within both of those categories. **The highest ranking counties for drought vulnerability in the Recreation Sector** are Archuleta, Moffat, Mesa, Garfield, Eagle, **Grand**, Routt, Fremont, and Pueblo.

*State of Colorado 64 Drought Mitigation and Response Plan August 2013*

Drought in the summer increases problems with dust and erosion and can cause deterioration in water quality. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding. It also increases the wildfire hazard. Drought impacts increase with the length of a drought, as carry-over supplies in reservoirs are depleted and water levels in groundwater basins decline. A portion of Grand County relies on individual ground wells and constructed water retention structures for their water resources. Ground wells service a significant portion of the population, while local ranchers rely upon ponds and ditches for livestock and crops.

The County does not own rights to most of the water in its borders, and much of the water is allocated elsewhere. Winter Park and Granby are primarily dependent on streamflow as the primary water source. Wastewater treatment plants are also dependent on stream flows; if stream flows are inadequate, this can become a public health and sanitation concern. The incidence of blue algae increases during periods of extreme heat, which often accompanies drought, and zebra mussels are also a potential issue.

### **Potential Future Losses**

\*According to the Future Avoided Cost Explorer tool (F.A.C.E.), a future drought scenario using a moderate climate (due to climate change) and a low estimated population growth (24,300), would economically bring twenty-two million dollars in damages to Grand County, decreasing revenue for commercial rafting and the ski industry; also an increased feed cost for livestock and decreased crop production.

## 3.2.5 Earthquake

### Hazard Description

An earthquake is caused by a sudden slip on a fault. 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.

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. Other damage-causing effects of earthquakes include surface rupture, fissuring, settlement, and permanent horizontal and vertical shifting of the ground. Secondary impacts can include landslides, seiches, liquefaction, fires, and dam failure.

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 3.9 features abbreviated descriptions of the 12 levels of intensity.

**Table 3.9. 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.

According to the Colorado Geological Survey, Colorado is comprised of areas with low to moderate potential for damaging earthquakes. There are about 90 potentially active faults that have been identified in Colorado, with documented movement within the last 1.6 million years. However, there are several thousand other faults that have been mapped in Colorado that are believed to have little or no potential for producing future earthquakes.

## Geographic Location

The geographic extent of this hazard in Grand County is **large**—with more than 50 percent of the planning area affected.

According to the Colorado Geological Survey, Colorado has areas with low to moderate potential for damaging earthquakes. The presence of potentially active faults is an indicator of potential earthquake risk. There are about 90 potentially active faults that have been identified in Colorado, with documented movement within the last 1.6 million years. However, there are several thousand other faults that have been mapped in Colorado that are believed to have little or no potential for producing future earthquakes. Colorado's Earthquake and Fault Map developed by CGS in 2008 depicts the location of historic epicenters and potentially active faults. An excerpt of this map displaying Grand County and vicinity is shown in Figure 3.7. Another map produced by the CGS shows these potentially active faults with maximum credible earthquake determinations, illustrated in Figure 3.8.

Faults are classified based on the geologic time frame of their latest suspected movement (in order of activity occurrence, the 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)

According to the Colorado Geological Survey, there are at least 11 northwest-striking late Cenozoic faults in the Granby Basin Fault area. The faults lie between the Town of Granby and Lake Granby and extend across Granby Mesa and the Colorado River. The term “Granby Basin” is used by experts to describe the late Tertiary structural basin in the vicinity of the Town of Granby. The faults are well defined by topographic, vegetation, and tonal lineaments and it has been concluded that fault activity occurred prior to middle to early Pleistocene time.

One suspected fault structure is known as “Granby Faults West-unnamed.” This north-south-striking unnamed fault lies west of the Town of Granby on the western margin of the late Cenozoic Granby Basin and extends from Trail Creek southward to east of Cottonwood Pass. Several other faults in this basin have documented movement.

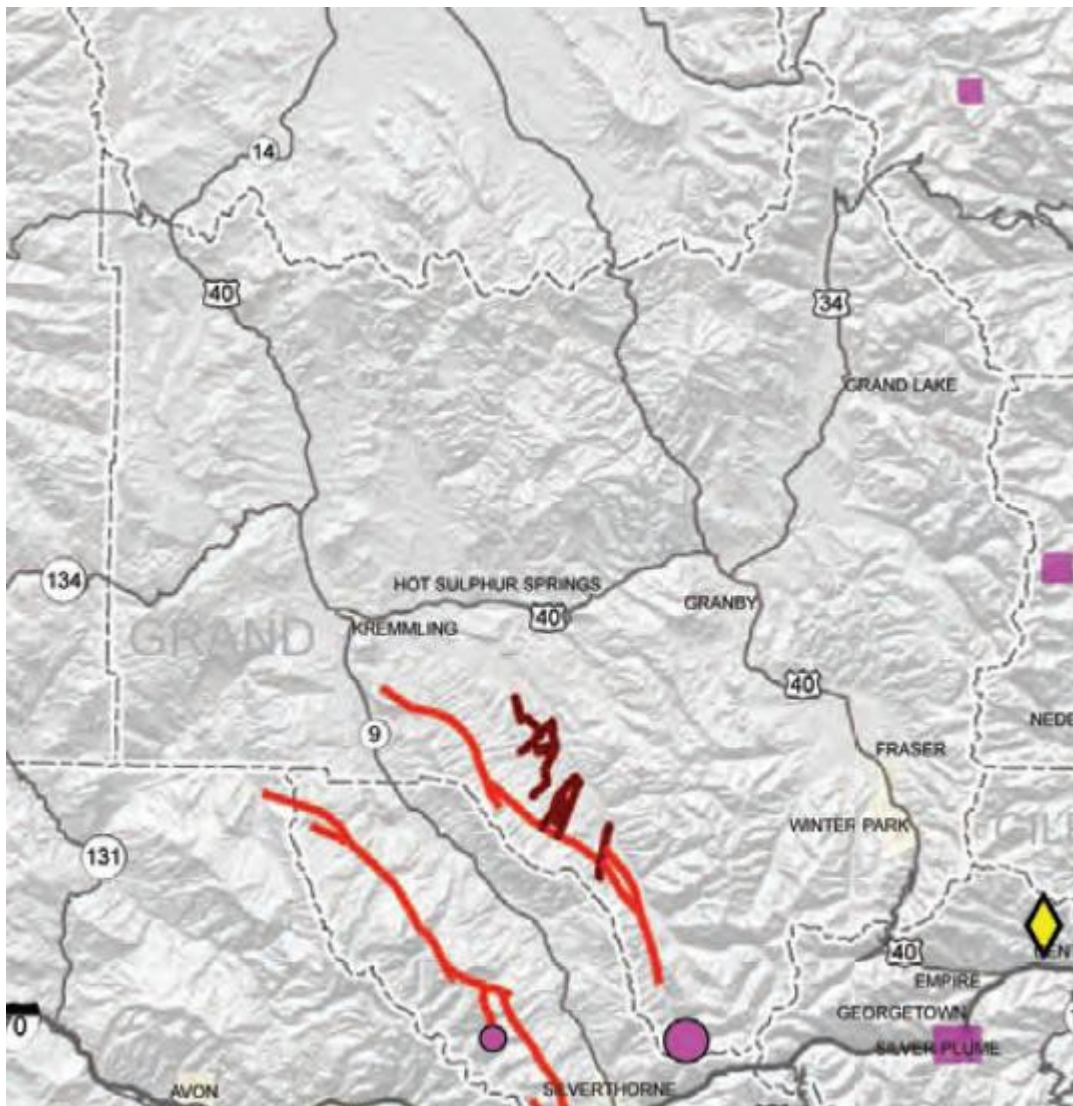
Another fault structure lacks a name, but lies in the Gore Range west of Kremmling. Recent data suggests this fault has had major movement on the east flank and minor movement on its west flank.

The Parshall fault trends northwest on its west end and east-west on its east end. It extends southeastward from the East Fork of Troublesome Creek north of State Highway 40 to Blue Ridge near the Town of Parshall. The fault lies in Middle Park.

The Grand County HMPC identified the Williams Fork fault as another potential source of seismic activity in the planning area. According to a study by GEO-HAZ consulting, “the Williams Fork normal fault was discovered in 2002 in a dense pine forest at the foot of the Williams Fork Mountains in central Colorado. This fault is now the northernmost known Quaternary fault associated with the Rio Grande rift zone, where scarps are clearly late Quaternary in age, and trenches show displacement of late Quaternary strata.”




Seismic hazard zone maps and earthquake fault zone maps are used to identify where such hazards are most likely to occur based on analyses of faults, soils, topography, groundwater, and the potential for earthquake shaking that can trigger landslide and liquefaction.

**Figure 3.7. Statewide Earthquake Hazard Map Excerpt Showing Grand County**









## EARTHQUAKE EPICENTERS

Instrumentally located epicenters (~1962 to 2007)  
Size of dot indicates magnitude.

-  5–5.5
-  4–4.9
-  3–3.9



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

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

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

## QUATERNARY FAULTS

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

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

Source: Excerpt from Colorado Geological Survey;

Note: legend may not match map scale. Earthquakes shown on map are in the 3-3.9 and 4-4.9 M range



### **Figure 3.8. Potentially Active Faults in Colorado with Maximum Credible Earthquake Determinations from the Colorado Geological Survey**

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

#### **Previous Occurrences**

No significant earthquake events have occurred to date in Grand County based on CGS records. However, historical earthquakes in other parts of the State may have impacted Grand County. The largest earthquake recorded in Colorado occurred on November 7, 1882 and was likely felt in Grand County. The epicenter is thought to have been located in the Front Range near Rocky Mountain National Park; the magnitude was estimated to be about 6.2 on the Richter scale. This was the first earthquake to cause damage in Denver and was felt as far away as Salina, Kansas, and Salt Lake City, Utah.

No significant earthquake events were found to have occurred between 2015 and 2020.

#### **Probability of Future Occurrence**

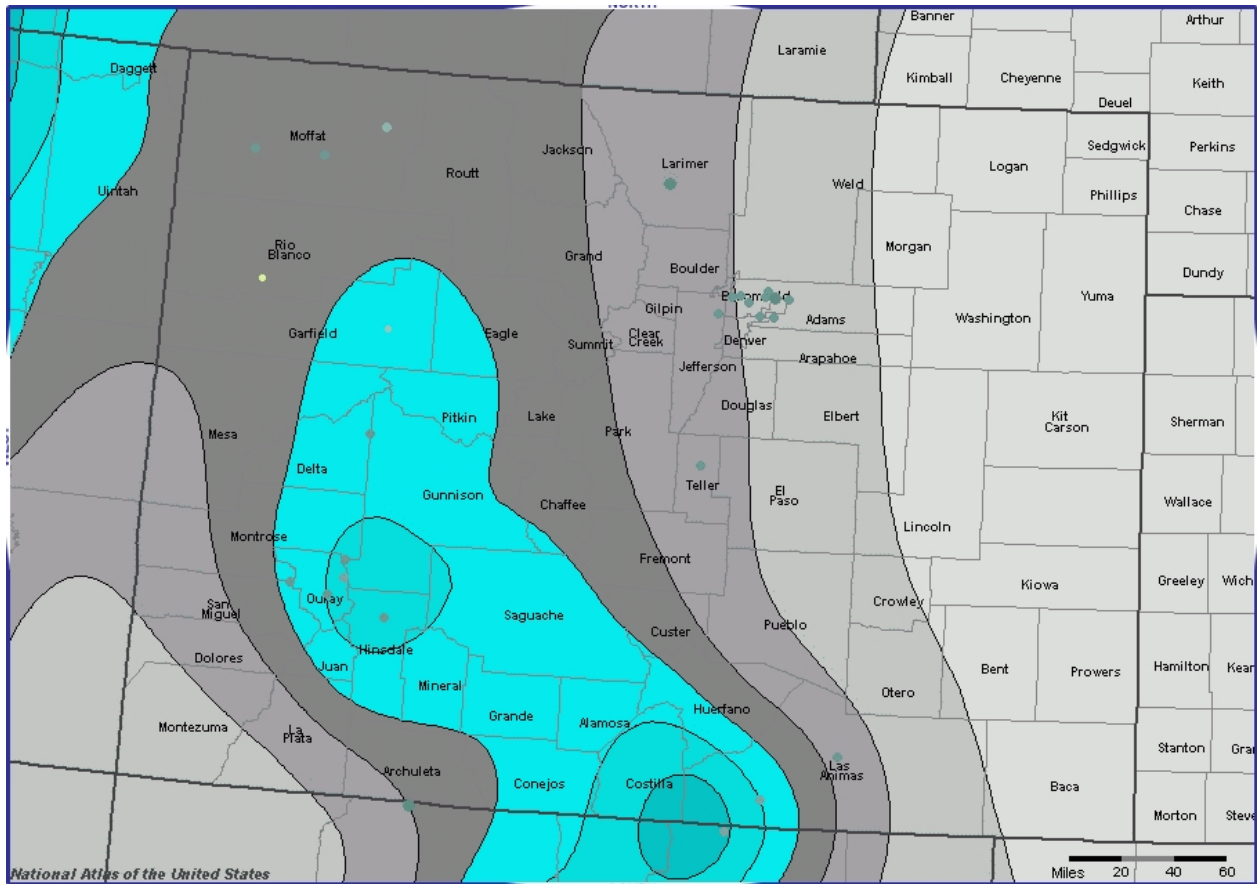
**Occasional**—1-10 percent chance of occurrence in the next year or has a recurrence interval of 11 to 100 years

It is difficult to accurately forecast the timing or location of future damaging earthquake activity. Over the years, seismic activity has been detected as close to Grand County as Pitkin and Eagle counties. No significant events have been recorded to date in Grand County, however, and it is largely for that reason that this potentially destructive hazard is considered a relatively minor threat to the planning area. However, the County is growing and is located over several faults. Seismic activity could potentially cause significant damage in the future as the County continues to grow.

Figure 3.9 is a probabilistic seismic hazard map of Colorado from the U.S. Geological Survey that depicts the probability that ground motion will reach a certain level during an earthquake. It shows the shaking level that has a 10 percent chance of being exceeded over a period of 50 years (as well as earthquakes in Colorado between 1568 and 2009).



**Figure 3.9. Colorado Seismic Hazard Map—10% Probability of Exceedance in 50 Years**



Peak Acceleration (%g) with 10% Probability of Exceedance in 50 Years



Source: USGS, [www.nationalatlas.gov](http://www.nationalatlas.gov)

## **Magnitude/Severity**

**Limited**—Minor injuries and illnesses; minimal property damage that does not threaten structural stability; and/or interruption of essential facilities and services for less than 24 hours.

As shown in Figure 3.9, the shaking level that has a 10 percent chance of being exceeded over a period of 50 years is in the range of 3 to 5 percent peak acceleration in Grand County. Significant earthquake damage typically does not occur until peak accelerations are greater than 30 percent.

### **3.2.6 Flood**

#### **Hazard 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. It also occurs as a result from snowmelt, in which case the extent of flooding depends on the depth of winter snowpack and spring weather patterns.

The area adjacent to a river channel is its floodplain. In its common usage, “floodplain” most often refers to that area that is inundated by the 100-year flood, the flood that has a 1 percent chance in any given year of being equaled or exceeded. Other types of floods include general rain floods, thunderstorm generated flash floods, alluvial fan floods, dam failure floods (see Section 3.2.2), and local drainage floods. The 100-year flood is the national standard to which communities regulate their floodplains through the National Flood Insurance Program.

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

Flooding as a natural hazard is a problem for Grand County and the rugged terrain in the area increases the potential for flash flooding in some areas of the County. Major stream flooding on Grand County streams is caused by snowmelt, which increases as temperatures rise. The total duration of snowmelt floods is usually over a period of weeks rather than days. Snowmelt runoff generally reaches its peak in June and recedes to a normal flow by mid-July or August. Flooding concerns in the Rockies are usually associated with snow water equivalents (SWE) in the range of 120-140% or higher according to the Colorado Water Conservation Board. Rains that occur prior to mid-June do not increase the streamflow appreciably. However, after peak snowmelt

runoff has occurred, rainfall usually increases the runoff. Heavy rains that occur in July and August have potential to cause flash flooding, but rarely result in major flooding.

Stream gage records show almost all of the annual peak flows in Grand County occur between April and July as the result of melting winter snow accumulations. Spring runoff usually begins the first week in April, increases to a peak by mid-June, and then returns to a normal flow by early August.

Ice jam flooding generally occurs when warm weather and rain break up frozen rivers or any time there is a rapid cycle of freezing and thawing. The broken ice floats down rivers until it is blocked by an obstruction such as a bridge or a shallow area. An ice dam forms, blocking the channel and causing flooding upstream (FEMA, 2005). Ice jam flooding can occur in Grand County, but is rare due to the steeper gradient of rivers and streams. Windy Gap Reservoir has helped mitigate ice jams on the Colorado River according to the HMPC.

Flooding due to debris blockage at bridges tends to be an issue in the County. Other sources of flooding include localized storm water drainage problems that may not be represented on a flood hazard map.

### **Geographic Location**

The geographic extent of this hazard in Grand County is small—10-25% of the planning area affected. The following is a discussion of the primary streams and rivers in the County that are potential sources for flooding.

The Colorado River (originally called the Grand River) begins its journey in Rocky Mountain National Park. Soon after leaving Rocky Mountain National Park, it enters Colorado's largest natural lake, Grand Lake. From Grand Lake, it makes its way through Lake Granby and Shadow Mountain Reservoir.

The Town of Grand Lake has flood hazard mapping along Little Columbine Creek, which drains into Shadow Mountain Reservoir, and along the North Inlet, which drains into Grand Lake.

The Town of Hot Sulphur Springs has flood hazard mapping for the Colorado River. Specific flood concerns are for the town's water treatment plant.

The first major tributary to the Colorado is the Fraser River, which joins the Colorado River near Granby. From Granby the Colorado heads through Hot Sulphur Springs, Byers Canyon and Kremmling.

The Fraser River is a tributary of the Colorado River, approximately 32.5 miles in length. It drains a large portion of the Middle Park basin in Grand County. The river begins just below the continental divide on the north side of Berthoud Pass in the Arapaho National Forest. It flows north-northwest past Winter Park, Fraser, and Tabernash, and joins the Colorado from the south

two miles west of Granby. Its drainage area, from the Continental Divide at Berthoud Pass to Leland Creek, is approximately 61 square miles. Its major tributary is Vasquez Creek, whose confluence with the Fraser River is located in Winter Park. Vasquez Creek has a drainage area of approximately 28 square miles.

Along the Fraser River, the towns of Winter Park, Fraser and Granby are subject to flooding. Winter Park has flood hazard mapping along the Fraser and its tributaries, Leland Creek, Vasquez Creek, and Jim Creek. North of Winter Park, insufficient capacity of the culvert under US Highway 40 restricts flood flows from Leland Creek, on the west side of the highway, from entering the Fraser River.

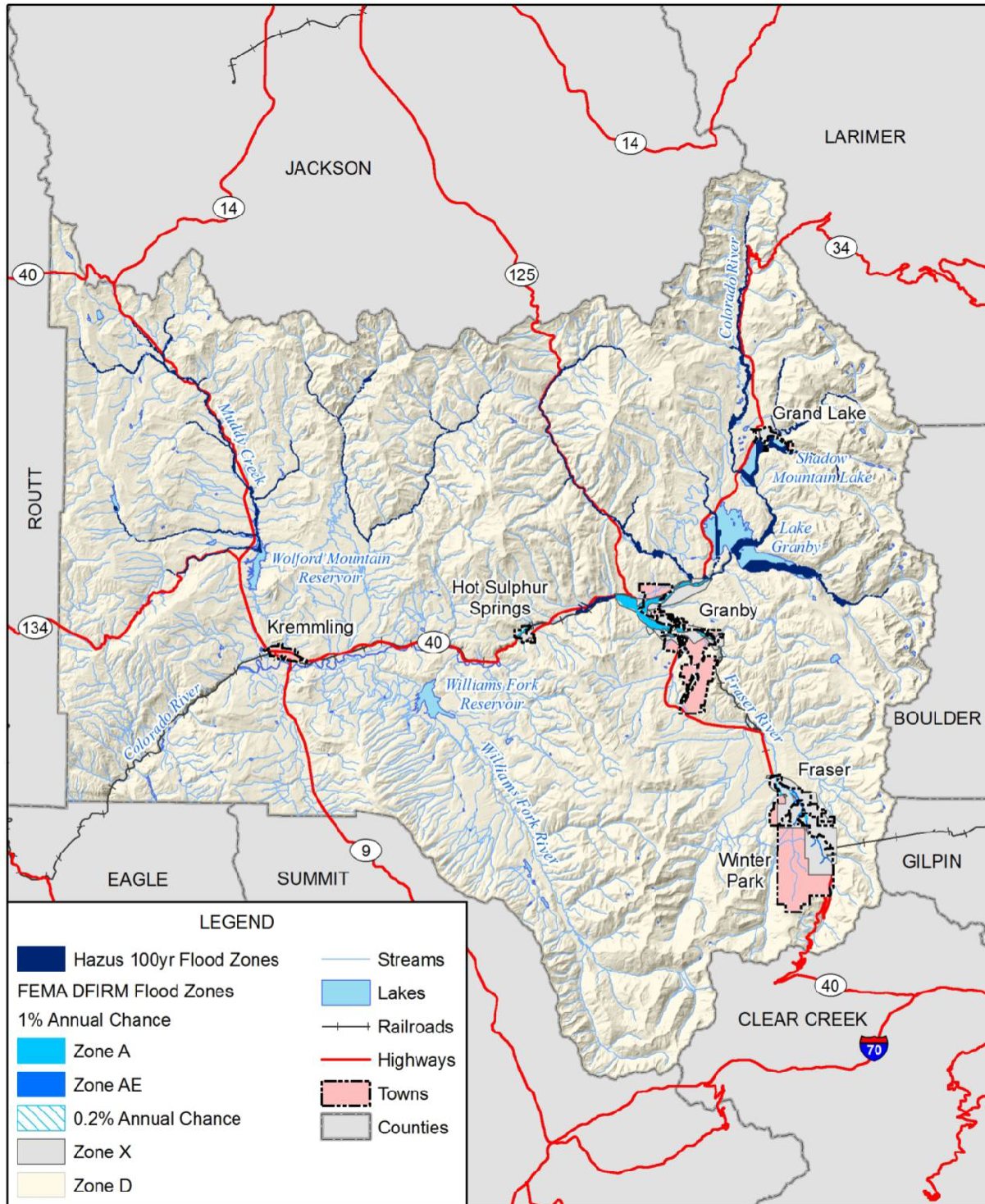
Just downstream is the Town of Fraser with flood hazard mapping on the Fraser River and Leland Creek, as well as the tributaries St. Louis Creek and Elk Creek. The Town of Granby, near the confluence of the Fraser River and the Colorado River has flood hazard mapping for both the Fraser River and its tributary Ten Mile Creek. Flooding along the Fraser River and its tributaries occurs primarily in June and is largely due to snowmelt.

Willow Creek is a tributary of the Colorado River, approximately 35 miles long. It begins in northwestern Grand County, in the Arapaho National Forest south of Willow Creek Pass at the continental divide. It flows southeast, through Willow Creek Reservoir and joins the Colorado three miles northeast of Granby. No flood hazard mapping is available for Willow Creek, but it does have a history of flooding.

Muddy Creek is a tributary of the Colorado River, approximately 60.5 miles long. It drains northwestern Grand County, in the Routt National Forest west of Rabbit Ears Pass at the continental divide. It flows south, east, then southwest, and joins the Colorado near Kremmling. According to the Grand County Flood Insurance Study (FIS) of 2008, there are no significant flood hazards in the Town of Kremmling and no special flood hazards are mapped. However, there is a history of flooding in the western part of town. Wolford Reservoir may provide some flood protection. The railroad currently serves as a natural dam for the town's wastewater treatment plant.

Every community in Grand County is at risk to riverine flooding. Localized storm water flooding can cause minor problems. According to the January 2, 2008 FIS, Kremmling does not have any Special Flood Hazard areas identified. The effective flood insurance rate map (FIRM) for the County was adopted in 2008. The digital FIRM (DFIRM) was used during the 2013 update to refine the flood loss estimation. The DFIRM extent does not include the unincorporated County and is limited to the incorporated areas, with the exception of Kremmling. A 100-year floodplain generated with HAZUS by FEMA was used to represent the flood hazard in the unincorporated areas. Figure 3.10 is a map of Grand County's DFIRM and HAZUS 100-year floodplain.

**Figure 3.10. Grand County DFIRM and HAZUS 100-Year Flood Zones**



Map compiled 4/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT, Hazus-MH MR2,  
 FEMA DIFRM 1/2/2008

## ***Flood Protection Measures***

The major flood protection measures along the Colorado River are Lake Granby and Shadow Mountain Reservoir. Though these reservoirs are not designated as flood control, controlled releases do provide some flood protection downstream.

Ritschard Dam (a.k.a Wolford Mountain Reservoir) is along Muddy Creek and though not designated as a flood control dam, does provide some protection for the Town of Kremmling. There is some concern that this earthen dam, completed in 1995, is settling twice as fast as the expected rate (see *Section 3.2.2 Dam Failure*).

According to the County Flood Insurance Study, there are no structures in the Fraser River basin specifically designed for flood protection. There are, however, several diversion structures and railroad and road embankments that affect flooding. Water is diverted from the Fraser River, Jim Creek, Vasquez Creek and Little Vasquez Creek by the Denver Water Board. Total capacity of the diversion system is 750 cfs (Grand County FIS, January 2, 2008).

Highway US 40 traverses Grand County in a general northwest to southeast direction. Hydraulic structures under the highway have sufficient capacity so that floodflows are generally unaffected. However, north of Winter Park, insufficient capacity of the culvert under US 40 restricts flow from Leland Creek, on the west side of the highway, from entering the Fraser River (Grand County FIS).

The Denver and Rio Grande Western Railroad also traverses the County in a generally east-west direction. Some minor ponding at crossings is expected, although most of the culverts do not flow full.

No other structures such as dams, levees, canals, or other flood control devices were found to provide protection from the 1% annual chance flood event.

## **Previous Occurrences**

According to the flood insurance studies and NCDC, there is some evidence of significant flooding in Grand County in recent years. Events of note from the studies, NCDC, and the HMPC include the following:

- **July 5-6, 2011**— A combination of heavy rain and spring runoff caused flash flooding along St. Louis Creek. As a result, some of the streets in the town of Fraser were flooded. Streamflow peaked at 353 cfs compared to the average streamflow for this time of year of 83 cfs. There was a washout on County Road 731. Property damage was estimated to be \$5,000.
- **June, 2011** – With a river basin snowpack at 277 percent of average for early June, warmer temperatures in the high country at the start of the month intensified runoff in mountain valleys. Water was running near or at bank levels along most rivers and



streams, with some flooding in low-lying areas from Parshall to Kremmling. A few culverts were replaced, according to the Grand County Office of Emergency Management. Muddy and Troublesome creeks were flooding and water levels at Willow Creek were rising by a foot per day, according to the Bureau of Reclamation. Property owners along Willow Creek reported widespread flooding. The C Lazy U Ranch dealt with massive flooding in hay fields. The flows maxed-out the gauge at 1,200 cfs. A flow of 1,500 cfs is considered a 500-year flood event on Willow Creek. On the Fraser River, portions of the Fraser River Trail in town were damaged and river banks eroded. Repairs were made in 2012.

- **June 7-8, 2010**— Two days of high temperatures rapidly melted high-elevation snows and created rampant runoff and flooding on the Fraser River. Peak river flows washed out a culvert and driveway that accessed a home near Old Town Winter Park. Voluntary evacuations were announced with concern for residents being unable to access emergency services if the nearby bridges were to wash out.
- **May 18-24, 2008** – Floods resulted on Muddy Creek near Kremmling from rapid melt of above average snowpack in the contributing watershed. Damages consisted of roadways being overtopped or damaged, debris accumulation, land erosion, and isolated cases of structure inundation. Peak discharge was 902 cfs. Flooding on Troublesome Creek, Tenmile Creek, Eightmile Creek, and the Fraser River caused minor damage to fields and barns. No damage estimates were available (CWCB Flood Decision Support System and 2008 State of Colorado Flood Documentation Reports).
- **May 30, 2003 - Grand River Ditch Failure** - The Grand River Ditch is owned by the Water Supply and Storage Company. In May 2003 a 100 foot section of the ditch breached about 2.4 miles south of La Poudre Pass, causing the water to cascade down the slopes and into the Colorado River. Approximately 105 cubic feet per second (cfs) of water from the Grand River Ditch spilled into the park for several hours at a location where a natural water drainage was not already present, causing a large amount of rock, soil, sediment and trees to be removed and transported downstream. The flood left a visible scar on the mountainside, causing significant damage to a lodgepole pine and an old growth riparian spruce/fir forest, Lulu Creek, the Colorado River and associated wetlands and park visitor infrastructure. The breach occurred at a time when the Colorado River was experiencing typical high water levels adding additional stress to downstream road and foot bridges. The bridges were closed to the public for safety concerns. The Water Supply and Storage Company was ordered to pay \$9 million in damages to Rocky Mountain National Park.
- **June 20, 2000**— Heavy rain, up to 3.5 inches in an hour, deluged the streets, drains, homes, and businesses in Granby. In many places, water was gushing out of the storm drains because the drainage system could not handle the high volume of water. Some hillsides were washed out and many yards had surface soil stripped clean. Water up to 2 feet in depth covered some of the city streets. Several offices and businesses were also flooded. The Granby Library, in the basement of Granby Town Hall, was also flooded.

Numerous books and computers were damaged, forcing the closure of the library for a week.

- FEMA flood-related statistics show the town of Winter Park suffered a loss of nearly \$6 million in a flood-related event sometime after 1978. The precise date and circumstances of this event are not known (Grand County PDHMP, 2008).

The USACE Ice Jam Information Clearinghouse shows no recorded ice jam events in Grand County between 1955 and 2013.

### Potential Future Losses

\*According to the Future Avoided Cost Explorer tool (F.A.C.E.), a future flood scenario using a moderate climate (due to climate change) and a low estimated population growth (24,300), would cause 2.7 million dollars in damages to Grand County buildings and bridges. If the scenario is changed to a more severe climate, it estimates 3.9 million dollars in damages.

The HMPC suggests that some level of flooding is almost an annual occurrence in Grand County. Zone A floodplains on FEMA FIRMs are often called the ‘100-year’ flood zone, but really have a 1% annual chance of flooding any given year. The various FEMA zones are defined in Table 3.10.

**Table 3.10. FEMA Flood Zone Definitions and Probabilities**

Zone	Definitions
A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the lift of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
AE	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the lift of a 30-year mortgage. The ‘E’ stands for Engineering Study and represents areas where base flood elevations have been determined. AE zones are now used on new format FIRMs instead of A1-A30 Zones.
AO	River or stream flood hazard areas and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these flood zones.
AH	Areas with a 1% annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
Shaded Zone X or 0.2%	Areas with a 0.2% annual chance of flooding; also referred to as the 500 year floodplain.

Source: <https://msc.fema.gov/webapp/wcs/stores/servlet/info?storeId=10001&catalogId=10001&langId=-1&content=floodZones&title=FEMA%2520Flood%2520Zone%2520Designations>

## **Magnitude/Severity**

**Limited**—Minor injuries and illnesses; minimal property damage that does not threaten structural stability; and/or interruption of essential facilities and services for less than 24 hours.

In Grand County, floods can cause minor injuries. Flood water, as well as debris from steep tributary channels, can damage property and infrastructure and close roads. However, past flood damages have been limited. While the overall severity for the County is limited, the severity for certain jurisdictions within the County may be higher.

## **3.2.7 Hazardous Materials Release**

### **Hazard Description**

Grand County is susceptible to accidents involving the transport of hazardous materials on County roads and highways. A hazardous material is any item or agent (biological, chemical, physical, radiological) that has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors. An accident could occur at any time or as a result of a natural disaster. The release of hazardous materials can threaten people and natural resources in the immediate vicinity of the accident, including residences, resorts, and businesses along transportation routes.

The HMPC provided a commodity flow study, which examined the type and number of vehicles that transport hazardous materials through the County, the type of material transported, and the hazard class of the vehicles. Semi tractors/trailers, box trucks, and pick-up trucks are the most frequently occurring type of vehicle transporting hazardous materials through Grand County. Most trailer types are dump trucks, mixed cargo on flatbed trailers, mixed cargo in box trailers, and MC-306 non-pressure trailers that usually contain fuel. Class 3 flammable liquids is the most frequently occurring hazard class. This is consistent with the finding that fuel and gasoline are two of the most frequently transported materials.

### **Geographic Location**

The geographic extent of this hazard in Grand County is small—10-25 percent of the planning area affected—(based on historical experience), but depending on the type and quantity of spill and the medium affected, the geographic extent could become large.

Colorado State Patrol has designated Colorado 9 from U.S. Highway 40 in Kremmling to I-70 in Silverthorne as a hazmat route. Closure of Colorado 9 due to a hazmat incident could impact commerce and tourism, particularly during ski season. U.S. Highway 40 crosses the County from east to west and is the alternate route to Salt Lake City and primary detour route for closures of the I-70 corridor; trucks and tankers transporting hazardous materials may often use this route. Past hazmat transportation incidents have occurred on Berthoud Pass, Byers Canyon, and Rabbit Ears Pass. The Union Pacific railroad is another potential site of hazmat incidents in the planning area. An estimated 15-30 trains use the railroad each day.

There are several Tier II facilities in Grand County. The 2012-2013 reporting facilities are listed in Table 3.11.

**Table 3.11. Reporting Tier II Facilities in Grand County: 2019**

Facility	Jurisdiction	Reporting Year
Century Link: Grand Lake Central Office	Grand Lake	2019
Century Link: Granby Grouse Mountain	Granby	2019
Century Link: Granby Central Office	Granby	2019
Century Link: Kremmling San Toy	Kremmling	2019
Century Link: Kremmling Central Office	Kremmling	2019
Century Link: Radium NNS Central Office	Radium	2019
Century Link: Radium Regen	Radium	2019
Century Link: Fraser Regen	Fraser	2019
Century Link: Fraser Main Central Office	Fraser	2019
Elam-Fraser (Morrow Pit)	Fraser	2019
Ferrellgas-Granby	Granby	2019
First Transit, Inc.	Winter Park	2019
Henderson Mill:	Parshall	2019
MCI DBA Verizon- Kremco	Kremmling	2019
Rocky Mountain National Park	Estes Park	2019
Tri-State Generation and Transmission Fraser and Mettler	Fraser	2019
Western Area Power Administration (WAPA): Granby Pumping Plant	Granby	2019
WAPA: Granby Substation	Granby	2019
WAPA: Kremmling Substation	Kremmling	2019
WAPA: Willow Creek Pumping Plant Switchyard	Granby	2019
Winter Park, CO	Winter Park	2019

Source: CDPHE

### Previous Occurrences

Hazardous materials incidents in Grand County have been relatively insignificant. Statistics from the National Response Center, which serves as the sole national point of contact for reporting all oil, chemical, radiological, biological, and etiological discharges into the environment anywhere in the United States and its territories, indicate that between 2008 and 2012, 20 hazardous materials incidents were reported in Grand County. The majority of the incidents were related to gasoline and diesel fuel spills resulting from an accident (i.e., not from cargo). These events are summarized in Table 3.12.

**Table 3.12. Hazardous Materials Incidents: 2008-2012**

Date	Description	Type	Cause	Nearest City
2/7/2020	Loose chain punctured saddle tank, Hwy 40, MP 190 near HSS during a blizzard. 100 gallons of diesel was discharged.	Mobile	Loose chain punctured saddle tank	Hot Sulphur Springs
11/11/19	Estimated 40 gallons diesel fuel discharged onto ground from auxiliary tank in back of pickup truck, due to a vehicle rollover.	Mobile	Rollover	Unk
7/10/19	Semi fuel-tanker rollover in Berthoud Pass. 175 gallons of diesel spilled, driver injured.	Mobile	Rollover	Winter Park

2/1/17	Blue Valley Ranch in Kremmling – loader tipped over spilling motor oil into ditch, operator error, absorbents applied, material contained.	Mobile	Equipment tipped over	Kremmling
9/22/15	Climax Molybdenum Co & Henderson Mill, hydrogen sulfide released in air due to phosphorous pentasulfide spill. Employees evacuated; no fatalities.	Fixed	Spill/unk	Parshall
6/24/14	Coca-Cola (resp) tractor trailer collided with car, 150 gal diesel spilled on dirt shoulder. State Patrol-HM140113	Mobile	Head-on collision	Kremmling HSS
2/19/2012	Caller reported that an electrical fire started in a locomotive. While putting out the fire, 2 employees were exposed to smoke inhalation.	Railroad non-release	Equipment failure	Granby

Date	Description	Type	Cause	Nearest City
1/9/2011	Caller reported that a 79 year old male passenger passed away from unknown causes while aboard a passenger train. Caller stated that the individual had a do not resuscitate document with him.	Railroad non-release	Other	Winter Park
5/15/2011	Caller reported a leak from a fuel tank from someone driving off with the nozzle still in the tank. There was a release of 110 gallons of gasoline. The gas entered a drain that goes to a roadway on the property and back into a reclaim area of the facility.	Fixed	Operator Error	Parshall
8/17/2011	Caller stated that a freight train struck and fatally injured a trespasser near a grade crossing.	Railroad non-release	Trespasser	Clifton
9/4/2011	Caller reported a release of raw sewage from a clogged manhole due to an unknown cause at this time.	Fixed	Unknown	Grand Lake
9/13/2011	Caller stated that a tractor trailer rolled off of the highway, rupturing its saddle tanks. The caller stated that approximately 100 gallons spilled onto the soil.	Mobile	Unknown	Kremmling
9/13/2011	A commercial truck drove off the right side of the road and rolled 1 ¼ times. The right fuel tank was crushed in the crash. Approximately 150 gallons of fuel leaked onto the ground.	Mobile	Transport Accident	
8/6/2010	Caller reported a spill of diesel fuel from a tanker truck due to a transportation accident. The caller stated that the tanker truck rolled over. No injuries were reported. The caller stated the truck was upright but the tanker had rolled over.	Mobile	Transport Accident	Kremmling
8/6/2010	Caller reported a discharge of diesel fuel from a tanker truck that rolled over as the result of a single vehicle accident.	Mobile	Transport Accident	Kremmling
8/17/2010	Caller stated that there was a release of 2,000 gallons of automatic transmission fluid from a tanker truck. The cause was due to a transportation accident. There was no waterway impact. The number of injuries was unknown. An investigation was conducted following the accident.	Mobile	Transport Accident	Kremmling

Source: U.S. Coast Guard National Response Center

Other past events include a tanker crash on Berthoud Pass in 2003, a tanker crash in Byers Canyon which spilled product into the Colorado River, three major train derailments, and accidents near Rabbit Ears Pass due to poor visibility and winding, narrow roads.

### **Probability of Future Occurrence**

**Highly Likely**—Near 100 percent chance of occurrence next year or happens every year

Transportation- related hazardous materials incidents occur in Grand County every year. These are most often fuel spills that are not related to the cargo being transported. Based on previous experience, the probability of a spill of a nonfuel hazardous material or a spill with significant impact to people, the environment, or the economy is much less likely.

## **Magnitude/Severity**

**Critical**—Isolated deaths and/or multiple injuries and illnesses; major or long-term property damage that threatens structural stability; and/or interruption of essential facilities and services for 24-72 hours

Impacts in the past have been limited but depending on the type and quantity of spill and the medium affected, an event’s magnitude and severity could become catastrophic. A hazardous materials release could cause personal injury or death to humans or damage to property or the environment. Humans are affected through inhalation, ingestion, or direct contact with skin. Air releases can prompt large-scale population evacuations and spills into water or onto the ground can adversely affect public water and sewer systems. Population centers and critical facilities, including hospitals and health clinics, along the roadways are vulnerable to accidents involving hazardous materials. Damage to the environment and road closures due to accidents would negatively impact the tourism and recreation based economy.

### **3.2.8 Landslide, Mudflow/Debris Flow, Rock Fall**

#### **Hazard Description**

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. For the purposes of this plan, the term “landslide” includes mudslides, debris flows, and rock falls. 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.

A mudslide is a mass of water and fine-grained earth materials that flows down a stream, ravine, canyon, arroyo, or gulch. 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. 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. The mud and debris flow problem can be exacerbated by wildfires that remove vegetation that serves to stabilize soil from erosion. Heavy rains on the denuded landscape can lead to rapid development of destructive mudflows.

A rock fall 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 rock falls. Rock falls 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 rock fall. Rocks in a rock fall can be of any

dimension, from the size of baseballs to houses. Rock fall occurs most frequently in mountains or other steep areas during the early spring when there is abundant moisture and repeated freezing and thawing.

Landslides, mudslides, and rock falls occur commonly throughout Colorado, and the annual damage is estimated to exceed \$3 million to buildings alone. California, Washington, and Colorado were the first three states to use federal disaster funds to acquire property in landslide hazard areas.

## **Geographic Location**

The geographic extent of this hazard in Grand County is **isolated**—less than 10 percent of the planning area affected.

In 2002 an update to Colorado’s Landslide Mitigation Plan was completed. It identified several areas of vulnerability in Grand County. Colorado’s plan compiled these areas into different priorities described in three distinct categories or tiers based upon the criticality of the threat. The three categories are further described as:

- Tier One listings are serious cases needing immediate or ongoing action or attention because of the severity of potential impacts.
- Tier Two listings are very significant but less severe; or where adequate information and/or some mitigation actions have taken place; or where current development pressures are less extreme.
- Tier Three listings are similar to Tier Two but with less severe consequences or primarily local impact.

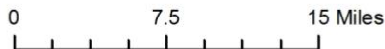
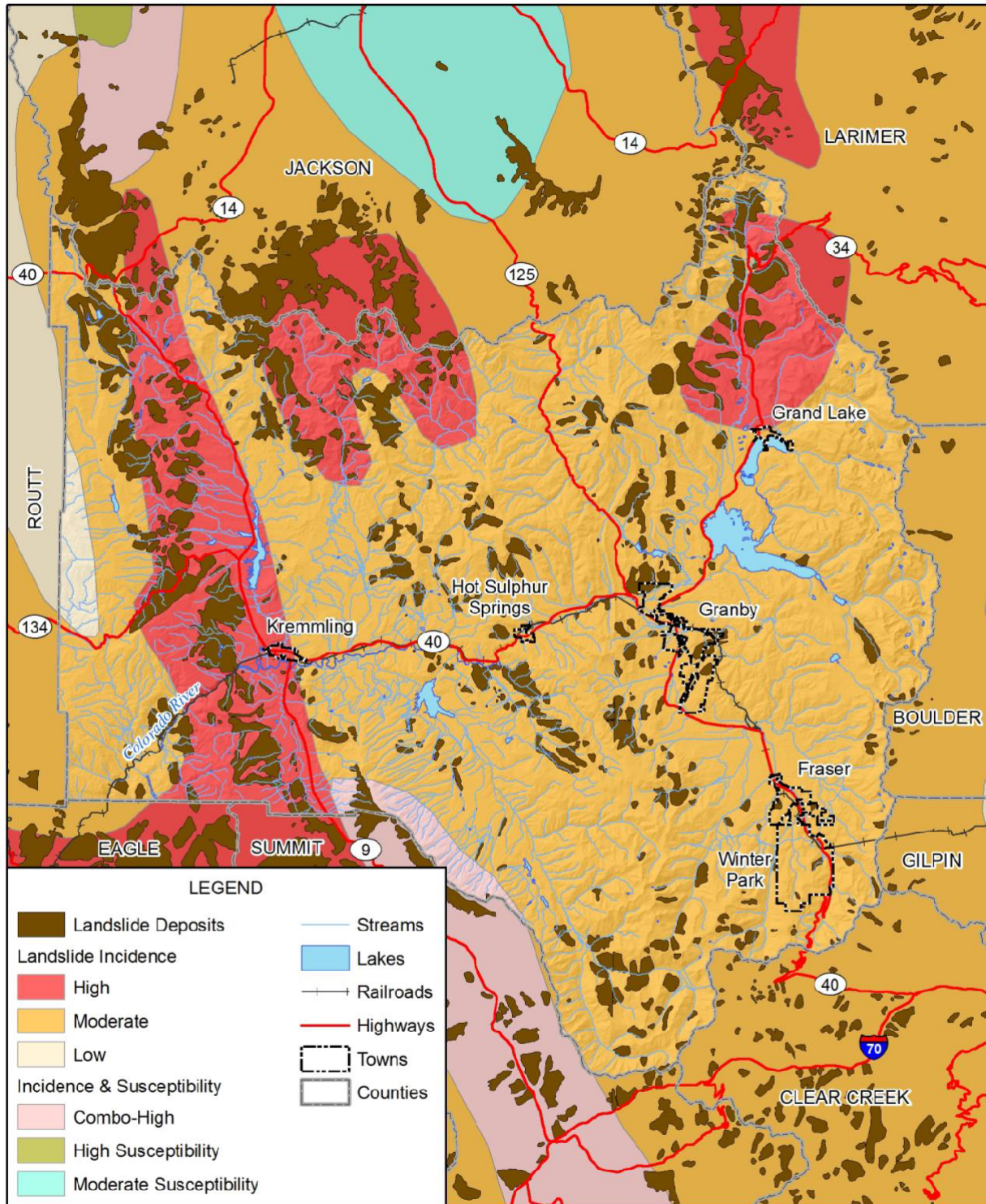
Grand County faces its share of landslide-related problems, especially in the western part of the County. Most of the County overall is rated a “medium” level landslide hazard area according to the State map. Fraser Canyon is identified as a Tier Two landslide/rockfall area. A landslide in Fraser Canyon derailed an Amtrak train in 1985. This event is discussed in further detail in “Previous Occurrences.”

According to the HMPC, problem areas for landslide and rockfall include Byers Canyon, Highway 125, Highway 40 at Windy Gap, the landfill on Highway 34, and CR 1 near Inspiration Point. Highway 40 and the Union Pacific railroad pass through several canyons where rockslides occur annually. A burn area on the west side of Sheep Mountain was also identified as a potential debris flow hazard. Issues also exist in avalanche chutes and in Gore Canyon where there is potential for a train derailment.

Figure 3.11 illustrates significant landslide hazard areas in Grand County.



**Figure 3.11. Grand County Landslide Hazard Areas**



Map compiled 4/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT, U.S. Geological Survey,  
 Colton/USGS Earth Data Analysis Center

## Previous Occurrences

Despite conscientious land use planning for rockfall and landslide, concerns still exist in Grand County. Examples of historical problems, some of which continue to this day, are summarized below:

The Fraser Canyon corridor was for years a high risk area for landslides. On April 16, 1985, that area experienced a significant slide that undercut the embankment and railroad tracks. Because of the ensuing damage, a 14-car Amtrak passenger train was derailed and two locomotives and five passenger cars were thrown into the resulting breach. There were no fatalities, but 26 people were injured and damage was estimated at \$3.4 million. The landslide was extensively investigated and repairs were made by the railroad immediately following the incident. A rockfall alarm fence was installed along all potential landslide areas of the railroad in Byers Canyon, shown in Figure 3.12 and Figure 3.13. The poles alongside the railroad track carry alarm wires that stop trains in the event of a landslide or rockslide.

This incident provided a vivid illustration of the serious potential consequences of even a small, but strategically located slope failure (the volume of the April 16, 1985 slide was estimated to be about 4,000 cubic yards, small by many standards of such activity). Due to the property losses and the potential for multiple fatalities, this landslide area was aggressively mitigated immediately after the incident. The Fraser Canyon site was selected for a Priority List maintained by the Colorado Geological Survey to exemplify the vulnerability of major rail transportation corridors that are constrained to the narrow floors of Colorado's many hazardous canyons. In these areas, the consequences of landslides, rockfall, or snow avalanches are so severe that mitigation and surveillance measures are a necessity.

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**Figure 3.12. Rockfall Alarm Fence in Byers Canyon**



Source: HMPC

**Figure 3.13. Close-up of Rockfall Alarm Fence in Byers Canyon**



Source: HMPC

**Probability of Future Occurrence**

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

**Magnitude/Severity**

**Critical**—Isolated deaths and/or multiple injuries and illnesses; major or long-term property damage that threatens structural stability; and/or interruption of essential facilities and services for 24-72 hours

Landslide is a serious geological hazard that can threaten human life, impact transportation corridors and communication systems, and result in other infrastructure (e.g., reservoirs) and property damage. Actual losses can range from mere inconvenience or high maintenance costs where very slow or small-scale destructive slides are

involved. Rapidly moving large slides have the capacity to completely destroy buildings, roads, bridges, and other costly manmade structures. Such slides also have the potential for inflicting loss of life when they occur in developed areas. Land use planning should consider slide potential and either avoid or mitigate potential problem areas.

### 3.2.9 Lightning

#### Hazard Description

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

Although not as common, cloud-to-ground lightning is the most damaging and dangerous form of lightning. Most flashes originate near the lower-negative charge center and deliver negative charge to earth. However, a large minority of flashes carry positive charge to earth. These positive flashes often occur during the dissipating stage of a thunderstorm's life. Positive flashes are also more common as a percentage of total ground strikes during the winter months. This type of lightning is particularly dangerous for several reasons. It frequently strikes away from the rain core, either ahead or behind the thunderstorm. It can strike as far as 5 or 10 miles from the

storm in areas that most people do not consider to be a threat. Positive lightning also has a longer duration, so fires are more easily ignited. And, when positive lightning strikes, it usually carries a high peak electrical current, potentially resulting in greater damage.

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.

**Geographic Location**

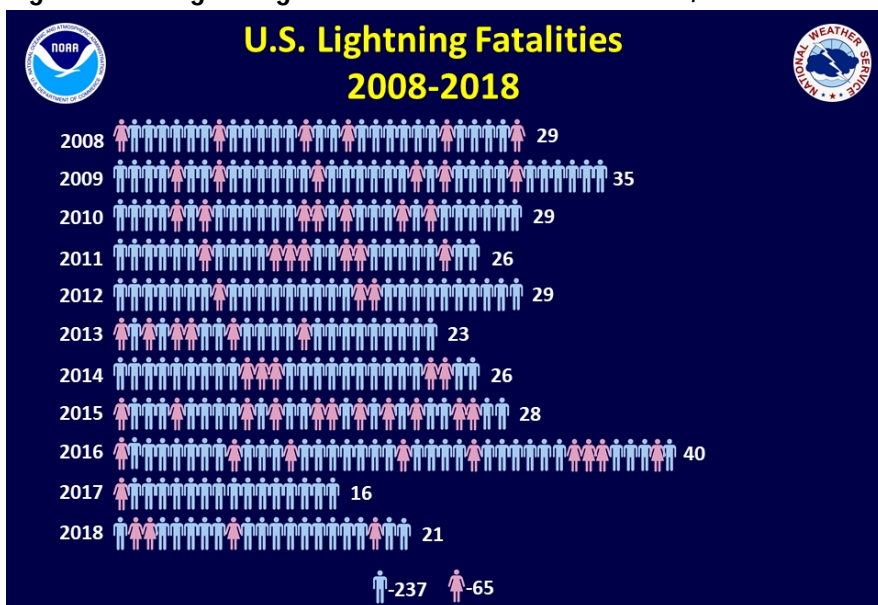
The geographic extent of this hazard in Grand County is large, in that it can occur anywhere in the County.

**Previous Occurrences**

Data from the National Lightning Detection Network ranks Colorado 32nd in the nation (excluding Alaska and Hawaii) with respect to the number of cloud-to-ground lightning flashes with an average number of 506,131 flashes per year (based on data collected between 1997 and 2012).

Figure 3.14 shows state-by-state lightning deaths between 1959 and 2012. Colorado ranks fifth for the number of deaths at 141. Florida (468), Texas (215), Virginia (194), and Ohio (146) were ranked higher. . From 2003 to 2012, Colorado ranked second in lightning fatalities with 24 deaths. Florida again ranked first with 52 deaths. 15 lightning deaths occurred in Colorado between 2006 and May 2013. None of these were in Grand County. In an average year in Colorado, 3 people are killed and 13 are injured.

**Figure 3.14. Lightning Fatalities in the United States, 2008-2018**



Source: <https://www.weather.gov/safety/lightning-fatalities18>

While lightning is a regular occurrence in Grand County, damaging lightning is not. According to the National Climatic Data Center Storm Event Database, there were two notable lightning events in Grand County between 2000 and February 2013:

- **June 20, 2004**— nineteen people were injured by lightning at the Fourth Annual Kremmling Cliff Classic Golf Tournament. The group of people was on a bluff overlooking the Town when lightning struck. Four people had to be hospitalized, and two suffered serious injuries.
- **July 3, 2006**— a man was hit in the head by lightning while golfing at the Grand Elk Ranch and Golf Club golf course in Granby. His clothes were completely blown off by the blast and his body turned purple. His wife performed CPR immediately and was able to resuscitate him.

It should be noted that this database captures only small portion of damaging lightning events; most go unreported.

### **Probability of Future Occurrence**

**Likely**—10-100 percent chance of occurrence in next year or has a recurrence interval of 10 years or less. It is highly likely that lightning will occur every year in Grand County, but not all will be damaging. In the last 13 years, the County experienced two damaging lightning events. This averages to a damaging lightning event roughly every six years, or a 46 percent chance of an event in any given year.

### **Magnitude/Severity**

**Limited**—Minor injuries and illnesses; minimal property damage that does not threaten structural stability; and/or interruption of essential facilities and services for less than 24 hours.

Lightning can cause deaths, injuries, and property damage, including damage to buildings, communications systems, power lines, and electrical systems. In Grand County it poses a risk to people recreating or working outdoors. It also is a common ignition source for forest and brush fires.

### 3.2.10 Insect Disease Infestation

#### Hazard Description

The lodgepole pine forests of Grand County are in the final stages of a mountain pine beetle (MPB) epidemic that has spread from Canada down the length of the Rocky Mountains. While the infestation may be reaching its end, the resulting mortality will be evident for decades to come. The resulting tree mortality presents a number of hazards. While wildfire is discussed in further detail in a subsequent section, it is here addressed as it relates to the changing forest conditions subsequent to this epidemic.

The MPB is endemic to the ponderosa, lodgepole, and limber pine forests of western North America and is a major cause of mortality in these forests. The beetle typically attacks trees that lack vigor due to age, overstocking, damage, diseases, or drought. During an outbreak, healthy trees may fall prey to attack. A full epidemic can endanger entire forests across vast areas, as is currently the case in the Rocky Mountains. The direction and spread rate of an infestation is impossible to predict, but attacked trees usually are adjacent to or near previously killed trees.

Once the beetle infests a tree, nothing practical can be done to save it, so prevention is critical. Prevention includes forest management (e.g., creating diversity in age and structure) and treating infested trees to kill developing beetles before they emerge as adults. Discolored foliage is generally the first sign of beetle-caused mortality. Needles on infested trees begin changing color several months to one year after attack, going from green to yellowish green, then sorrel and red to rusty brown. In year two, the needles begin to drop off. In year three to four the remaining needles and smaller limbs drop. Beginning about five years post mortem, the dead stems become increasingly susceptible to rot and blow-down.

The vast majority of the forests affected by the MPB epidemic in Grand County are lodgepole pine stands. Lodgepole forests lack diversity of age and species, with stands dominated by lodgepole pine of the same age. A disturbance, such as a fire followed by erosion, clears the land. This provides sunlight and site preparation required for lodgepole regeneration. A dense stand of lodgepole emerges and crowds out other species. These stands eventually become crowded, old, and ripe for a new disturbance. The fire return interval for this species is extremely variable, but is generally 25 to 75 years in stands experiencing mixed severity fire and 100 to 300 years in stand replacement fire regimes (Anderson 2003, Arno and Fielder 2005). In the absence of fire, insect infestation may assume this perturbation role. The shallow rooted lodgepole depend on the collective shelter of the stand. Even partial mortality within a stand can leave the remaining trees susceptible to blow-down in high winds.

## Geographic Location

While mountain pine beetle will attack a variety of pine trees, the epidemic in Grand County is largely limited to lodgepole pine in which mortality rates have exceeded 90% of mature lodgepole pine (Grand County 2008 [forest mgmt. plan]). Various studies suggest different limits to MPB activity in lodgepole pine, such as stands with basal areas below 100 square feet per acre, elevation over 10,000 feet, and stands where the average diameter at breast height is <8 inches (Amman et al. 1977). The epidemic in Grand County has challenged these preconceptions to the point that most lodgepole pine stands were impacted (Costello and Howell 2007).

As of 2012 over three million acres have been infested statewide. In 2012, mountain pine beetle activity in Colorado declined for the fourth consecutive year as food sources become depleted in many areas of the state. Having reached a peak of over one million acres of active infestation in 2008, there were 264,000 acres of active infestation detected in 2012. This brings the total impacted area in Colorado 3,400,000 acres since the epidemic began in 1996 (CSFS 2013).

**Figure 3.15. Beetle-killed Trees Near Granby, Colorado**

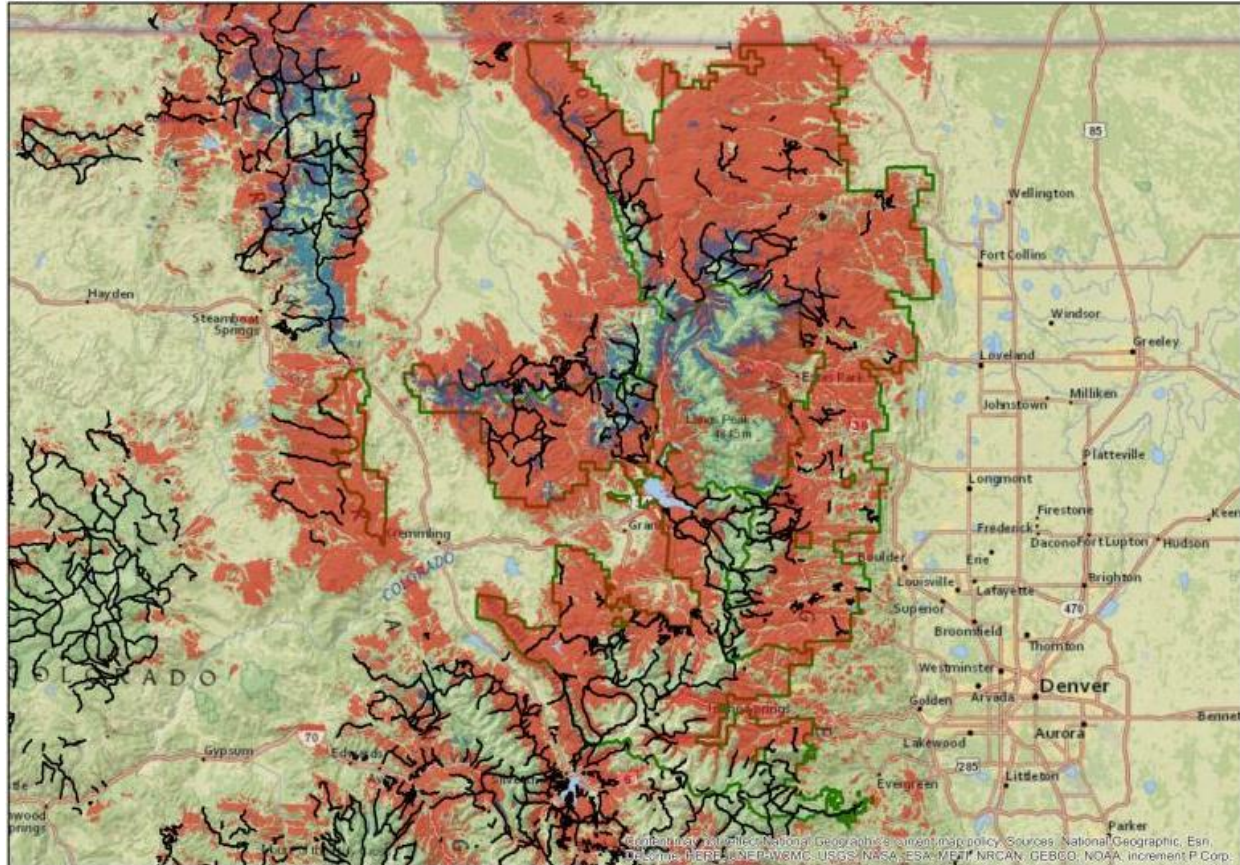


Mountain Pine Beetle

### Figure 3.16. Mountain Pine Beetle Progression: 1996-2016

In the map below, depicting the Arapahoe and Roosevelt National Forests of Grand County, the blue areas represent Spruce Beetle activity from 1996 – 2016. The red areas represent Mountain Pine Beetle activity in all host types from 1996 – 2016.

Arapaho Roosevelt NFs: Trails and Beetle Activity



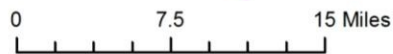
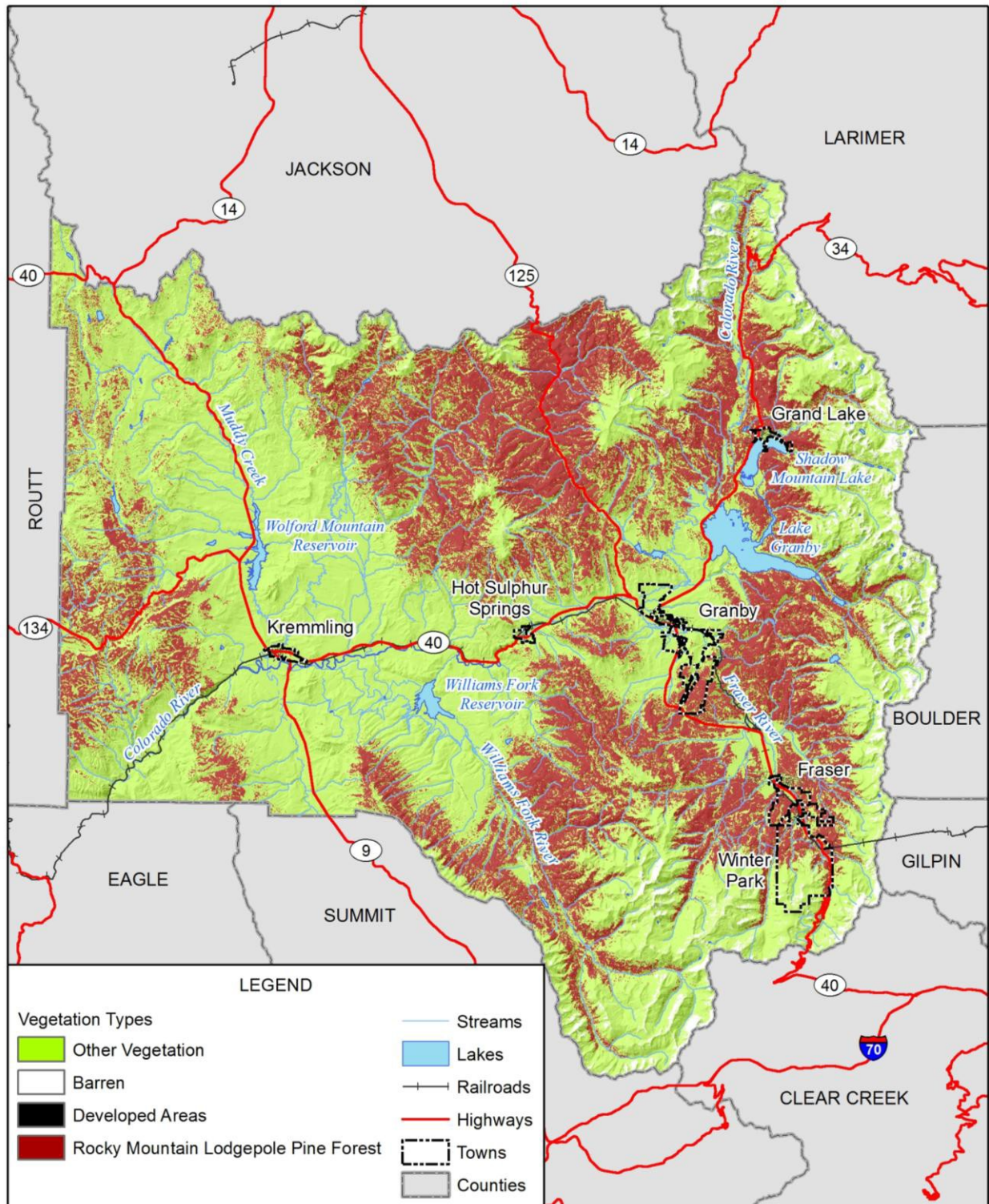
Source: U.S. Forest Service Rocky Mountain Ranger Station, August 21, 2019  
<https://www.fs.usda.gov/rmrs/science-spotlights/mountain-pine-beetle-colorado-story-changing-forests>

### Climate Change and Mountain Pine Beetles

In 2012, **ScienceMagazine.Org** reported that climate change could be throwing mountain pine beetles into a reproductive frenzy. It was suggested that some beetles living in Colorado, which normally reproduce just once annually, now churn out an extra generation of new bugs each year, in turn further devastating the region's forests. In what used to be late summer in the Colorado Rockies, pine beetles single out individual lodge pole pines. Females dig burrows inside the pines' trunks and drop their eggs. While hiking in mid-June to survey pines east of Boulder, researchers saw adult beetles out and flying close to 2 months early that year. The cue for this early flight seemed to be unseasonably hot weather. The researchers also found that June-emerging bugs attacked nearby pines almost immediately, laying their own eggs. Those offspring developed speedily, becoming adults by August or September, just in time to infest another round of pine trees—the second that season.



**Figure 3.17. Lodgepole Pine Forests in Grand County**



Map compiled 4/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT, LANDFIRE

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## Previous Occurrences

While this is the second outbreak of mountain pine beetle in the past thirty years, the scale and severity of the current mountain pine beetle epidemic is unprecedented within the past several centuries. Forest ecologists are unable to say whether or not epidemics of this scale have ever occurred previously. At its peak in 2008, this epidemic impacted over a million acres of Colorado's forests.

## Probability of Future Occurrence

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

Mountain pine beetle are endemic to the area, with outbreaks occurring cyclically. Since lodgepole pine forests are subject to stand replacing fires roughly every 100 to 300 years the species is well adapted to recovering from, and in fact requires, whole scale disturbances (Kaufmann et al 2008). However, the people who visit and live in Grand County are less accustomed to such widespread changes on the landscape. Because it will require decades for mature lodgepole pine stands to become reestablished there is a low probability that an epidemic of this magnitude will occur again in the twenty-first century.

The Colorado State Forest Service released its annual report on the health of the State's forests in 2019, showing the growing shadow of a lingering threat. The spruce beetle has now replaced the mountain pine beetle as the biggest insect disease threat to Colorado's forests, as wildfire continues to threaten communities and drain resources.

## Magnitude/Severity

**Limited**—Minor injuries and illnesses; minimal property damage that does not threaten structural stability; and/or interruption of essential facilities and services for less than 24 hours

The definitions for Magnitude/Severity for this planning effort are not well-suited to this hazard. Although the MPB is unlikely to cause deaths or injuries or significant damage to property and infrastructures, it is killing millions of trees each year. The forest mortality resulting from this epidemic creates a number of direct and indirect hazards:

While the infestation phase of the current MPB epidemic has run its course in Grand County, the impacts will continue to be felt for years as mortality continues, forests fall to the ground, and forest regeneration begins anew. Moderate load conifer litter (fuel model TL3) can be expected to transition into high load conifer litter (fuel model TL5) as dead fall begins to accumulate approximately 10 years post mortem. As the understory is released and lodgepole pine regenerates, the fuel model is likely to become a very high load of timber and shrub (fuel model TU5) (Green 2007).

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These changes in fuel loads will initially increase crown fire potential to some degree, as the needles dry on the trees. Once the needles and limbs begin to drop to the ground, crown fire potential diminishes, while the potential for more intense surface fire grows with the fuel load. Depending on how the new vegetation emerges on individual sites, the potential exists for very intense surface fires through brush and pine saplings until the forests mature. While it is impractical to treat the entirety of the affected area, fuels mitigation projects are being prioritized and undertaken near vulnerable areas as set forth in the Grand County Community Wildfire Protection Plan. Hazards along roadways are addressed in the Grand County Forest Management Plan for County Road Right of Ways (2008).

The mountain pine beetle epidemic in the County has made firefighting operations very difficult due to the inability to approach fires because of downfall. Falling tree hazards limit escape routes and the ability to establish safety zones, placing firefighters at serious risk. Dead and even green trees fall with or without wind due to rotting bases and wind exposure to isolated and unprotected trees.

**Figure 3.18. Moderate Load Conifer Litter (Fuel Model TL3) Prior to Beetle Infestation**

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**Figure 3.19. High Load Conifer Litter (Fuel Model TL5) Following to Beetle Infestation**



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**Figure 3.20. Very High Load Timber and Shrub (Fuel Model TU5) as a New Cohort of Pine is Released**

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## 3.2.11 Severe Winter Weather

### Hazard Description

Winter weather includes snow, ice, blizzard conditions, and extreme cold. Heavy snow can immobilize a region, stranding commuters, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can collapse roofs and knock down trees and power lines. The cost of snow removal, damage repair, and business losses can have a tremendous impact on Grand County's municipalities.

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.

Extreme cold often accompanies a winter storm or is left in its wake. Prolonged exposure to the cold can cause frostbite or hypothermia and can become life-threatening. Infants and the elderly are most susceptible. Pipes may freeze and burst in homes or buildings that are poorly insulated or without heat. Extreme cold is most likely to occur in the winter months of December, January, and February. The National Weather Service (NWS) will issue a Wind Chill Warning for Grand County when wind and temperature combine to produce wind chill values of -35°F.

Additional criteria NWS Boulder uses for winter-type weather warnings:

- Winter Storm Warning & Watch: 8" in 12 hours, 12" in 24 hours
- Winter Weather Advisory: 4-7" in 12 hours, 6-7" in 24 hours
- Blizzard Warning & Watch: Sustained winds of 50 mph or more AND Considerable falling and/or blowing snow with visibility frequently reduced to ¼ mile or less.
- Wind Chill Warning & Watch: Wind Chill Index less than -35F.
- Ice Storm Warning: Freezing rain & 1/4" or more accumulation of ice. This would be an incredibly rare event for Grand County, maybe not worth mention.
- Winter Storm Warning & Watch for sleet: 1/2" or more accumulation of sleet (ice pellets). Same as freezing rain, rare for Grand.
- High Wind Warning & Watch: Sustained wind 50 mph for an hour or more, or gusts to 75 mph.

## Geographic Location

The geographic extent of this hazard in Grand County is large—more than 50 percent of the planning area affected.

Winter weather can occur throughout Grand County.

The Western Regional Climate Center receives data from weather stations in and around Grand County. The data reported here is from Grand Lake 1 NW, Kremmling, and Winter Park stations. Table 3.13 contains maximum 1-day total snowfall for the three stations and illustrates differences within the County. Figure 3.14 shows maximum 3-day total snowfall and figure 3.15 shows minimum 1-day mean minimum winter temperatures for Grand County.

Grand Lake 1 NW: <https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?co3496>

Kremmling: <https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?co4664>

Winter Park: <https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?co9175>

All sites in CO: <https://wrcc.dri.edu/summary/Climsmco.html>

**Table 3.13. Grand County Winter Weather Summary**

### Maximum 1-Day Total Snowfall for Grand County, CO

[Click column heading to sort ascending, click again to sort descending.](#)

Name	Station Type	County	Value	Ending Date	Valid Date Range
GRAND LAKE 1 NW	COOP	Grand	48.0	1921-04-15	1907-10-01 to 2020-05-28
TABERNASH 2.5 ENE	CoCoRaHS	Grand	35.5	2003-03-19	2003-02-15 to 2020-03-12
WINTER PARK	COOP	Grand	30.0	2003-03-19	1942-03-03 to 2020-06-04
FRASER	COOP	Grand	23.0	2003-03-18	1989-05-01 to 2020-06-01
KREMMLING 10.0 NW	CoCoRaHS	Grand	22.0	2020-02-07+	2009-10-11 to 2020-04-24
KREMMLING	COOP	Grand	20.0	1951-12-30	1908-01-01 to 2020-05-19
WILLIAMS FORK DAM	COOP	Grand	18.0	1985-11-09	1982-06-01 to 2020-06-04
KREMMLING 7.8 WNW	CoCoRaHS	Grand	18.0	2020-02-07+	2004-06-11 to 2020-04-27
TABERNASH 1.9 NW	CoCoRaHS	Grand	16.5	2019-03-14	2010-01-01 to 2020-05-30
TABERNASH 2.7 NW	CoCoRaHS	Grand	12.7	2019-03-14	2015-07-04 to 2020-05-20
GRANBY 7.7 N	CoCoRaHS	Grand	11.5	2017-01-05	2016-10-05 to 2020-05-28
PARSHALL 3.0 NNW	CoCoRaHS	Grand	9.0	2017-05-19	2009-11-19 to 2020-05-30
TABERNASH 4.1 WNW	CoCoRaHS	Grand	0.5	2020-02-20	2019-05-29 to 2020-03-02
KREMMLING MCELROY AIRFIELD	WBAN	Grand	0.0	2020-06-03+	2017-11-01 to 2020-06-03

+ indicates value also occurred in one or more previous years.

Source: National Weather Service-Boulder Office

**Table 3.14. Grand County Winter Weather Summary**

**Maximum 3-Day Total Snowfall for Grand County, CO**

[Click column heading to sort ascending, click again to sort descending.](#)

Name	Station Type	County	Value	Ending Date	Missing Days	Valid Date Range
WINTER PARK	COOP	Grand	54.0	2003-03-19	0	1942-03-03 to 2020-06-04
TABERNASH 2.5 ENE	CoCoRaHS	Grand	52.8	2003-03-20	0	2003-02-15 to 2020-03-12
GRAND LAKE 1 NW	COOP	Grand	48.0	1921-04-17+	1	1907-10-01 to 2020-05-28
WILLIAMS FORK DAM	COOP	Grand	34.0	1985-11-11+	0	1982-06-01 to 2020-06-04
KREMMLING 7.8 WNW	CoCoRaHS	Grand	30.0	2014-05-12	0	2004-06-11 to 2020-04-27
KREMMLING 10.0 NW	CoCoRaHS	Grand	29.0	2020-02-09+	0	2009-10-11 to 2020-04-24
KREMMLING	COOP	Grand	28.0	1996-01-31	0	1908-01-01 to 2020-05-19
FRASER	COOP	Grand	28.0	2003-04-25+	0	1989-05-01 to 2020-06-01
GRANBY 7.7 N	CoCoRaHS	Grand	25.2	2020-02-09	0	2016-10-05 to 2020-05-28
TABERNASH 2.7 NW	CoCoRaHS	Grand	19.9	2020-02-09	0	2015-07-04 to 2020-05-20
PARSHALL 3.0 NNW	CoCoRaHS	Grand	19.5	2013-04-18	0	2009-11-19 to 2020-05-30
TABERNASH 1.9 NW	CoCoRaHS	Grand	19.5	2020-02-18	0	2010-01-01 to 2020-05-30
TABERNASH 4.1 WNW	CoCoRaHS	Grand	0.5	2020-02-22+	1	2019-05-29 to 2020-03-02
KREMMLING MCELROY AIRFIELD	WBAN	Grand	0.0	2020-06-05+	2	2017-11-01 to 2020-06-03

+ indicates value also occurred in one or more previous years.

Source: National Weather Service-Boulder Office

**Table 3.15. Grand County Winter Weather Summary**

**Minimum 1-Day Mean Min Temperature for Grand County, CO**

[Click column heading to sort ascending, click again to sort descending.](#)

Name	Station Type	County	Value	Ending Date	Valid Date Range
KREMMLING	COOP	Grand	-49.0	1951-02-01	1908-01-01 to 2020-05-19
GRAND LAKE 6 SSW	COOP	Grand	-46.0	1962-01-10	1948-08-01 to 2020-06-03
WILLIAMS FORK DAM	COOP	Grand	-44.0	1989-02-08	1982-06-01 to 2020-06-04
BUFFALO PARK	Snotel	Grand	-44.0	2011-02-02	1995-09-15 to 2020-05-31
GRAND LAKE 1 NW	COOP	Grand	-43.0	1963-01-13	1939-10-01 to 2020-05-28
FRASER	COOP	Grand	-43.0	2011-02-02	1989-05-01 to 2020-06-01
HARBISON MEADOW COLORADO	RAWS	Grand	-38.0	2005-12-08	2003-02-20 to 2020-06-01
WILLOW CREEK PASS	Snotel	Grand	-35.0	1989-02-06	1986-08-09 to 2020-05-31
KREMMLING MCELROY AIRFIELD	WBAN	Grand	-33.0	2016-01-02+	2012-01-16 to 2020-06-03
BERTHOUD SUMMIT	Snotel	Grand	-31.0	1990-12-23	1985-09-26 to 2020-05-31
ARAPAHO RIDGE	Snotel	Grand	-31.0	2011-02-01	2002-08-14 to 2020-05-31
PHANTOM VALLEY	Snotel	Grand	-30.0	1989-02-06	1985-10-01 to 2020-05-31
LAKE IRENE	Snotel	Grand	-30.0	1990-12-23	1985-10-01 to 2020-05-31
JONES PASS	Snotel	Grand	-29.0	2011-02-02	1999-10-04 to 2020-05-31
STILLWATER CREEK	Snotel	Grand	-28.0	1989-02-06	1985-10-30 to 2020-05-31
GUNSIGHT COLORADO	RAWS	Grand	-27.0	2011-02-02+	1987-10-16 to 2020-06-01
HIGH LONESOME	Snotel	Grand	-14.0	2020-02-05+	2013-09-06 to 2020-05-31

+ indicates value also occurred in one or more previous years.

Source: National Weather Service-Boulder Office

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## Previous Occurrences

Historical data from SHELDUS and the National Climatic Data Center Storm Events Database was combined to determine the top recorded winter weather events in Grand County.

Data limitations: Some events may have been missed due to limitations in the manner in which events that occurred over multiple forecast zones are reported. Dollar figures reported for winter weather events in both SHELDUS and the National Climatic Data Center Storm Events database are total damages for all counties associated with an event. Specific Grand County losses are not always available.

Descriptions of notable events from NCDC are included below:

- **March 1-7, 2019** - A prolonged period of heavy snow and strong winds pounded the central mountains of Colorado in the first week of March 2019. Snow totals for the entire period were as high as 4 feet, and the combination of snow and wind resulted in a high avalanche danger. An avalanche occurred along Interstate 70 between Frisco and Copper Mountain late in the afternoon on the 3<sup>rd</sup> and again on the 7<sup>th</sup>. Several vehicles were trapped by the snow both times as it swept across the interstate. Large stretches of I-70 were closed through the mountains. On the 5<sup>th</sup>, both directions of Interstate 70 between Herman Gulch and Silverthorne were closed for 9 hours for avalanche mitigation work. One of the avalanches brought down more snow than expected and covered the westbound lanes with 15 feet of snow and the eastbound lanes with 8 feet. Later studies showed that areas impacted by avalanches had not seen an avalanche in over 100 years.
- **March 17-19, 2003**—A very moist, intense and slow moving Pacific storm system made its way across the four corners area and into southeastern Colorado from March 17<sup>th</sup> to the 19<sup>th</sup>, allowing for a deep easterly upslope flow to form along the Front Range. The storm dumped 31.8 inches of snow at the former Stapleton International Airport, the second highest amount in the Denver weather history record book. The heavy wet snow caused roofs of homes and businesses to collapse across the Urban Corridor. The snow also downed trees, branches, and power lines. Up to 135,000 people lost power at some point during the storms and it took several days in some areas to restore power. Avalanches in the mountains and foothills closed many roadways, including Interstate 70 in both directions, stranding hundreds of skiers and travelers. In all, the estimated cost of the damage to property alone (not including large commercial buildings) was \$93 million, making it easily the costliest snowstorm ever in Colorado. The second costliest snowstorm was the 1997 blizzard where damage totaled \$10.5 million. The areas hardest hit by heavy snow were the northern mountains east of the Continental Divide, the Front Range Foothills and Palmer Divide, where snowfall totals ranged from 3 feet to over 7 feet. Grand County was one of 29 Colorado counties that received a Presidential Emergency declaration for this storm.
- **2000**—The County experienced a four-day power outage.



- January 17, 1998**—A blizzard that did not end until the next day struck Grand County, among other Colorado mountain areas. Heavy snow and high winds pounded the northern mountains as well as portions of Middle Park as a vigorous strong storm system moved through the area. Sustained winds from 30 to 50 mph were common, causing whiteout conditions. Blizzard conditions developed above 10,000 feet with winds gusting to near 100 mph, and peak wind gusts to 98 mph were recorded at the Winter Park ski area. The combination of heavy snow and high wind triggered numerous avalanches which blocked roads and highways. Berthoud Pass was closed and scores of travelers had to seek shelter overnight until roads and highways could be cleared and avalanche control operations completed the following day. Snowfall totals included 16 inches at the Eisenhower Tunnel, 12 inches 12 miles west of Walden and 11 inches at Grand Lake. Elsewhere, snowfall generally ranged from 6 to 9 inches.
- January 6-9, 1993**—An upper level storm moved across Colorado and combined with abundant moisture to produce heavy snow for much of the state. Snow began early on the 6<sup>th</sup> over the mountains and west. The snow began falling over the eastern plains on the 8<sup>th</sup>, and continued until the early morning hours of the 9<sup>th</sup>. The snow dumped up to 3 feet over the mountains and nearly a foot over the lower elevations. Mountain snowfall totals included 19.5 inches at Mary Jane ski area and 15 inches at Winter Park. There were no fatalities or injuries reported. Property losses, if any, were not available.

SHELDUS recorded 51 winter weather events in Grand County between 1960 and 2011. NCDC recorded 112 events (including blizzards, extreme cold and wind chill events, heavy snow, winter storms, and winter weather) between January 2000 and February 2013.

#### **2014 & 2015 Snowfall Recorded**

11/11-13/2014 8-10" Berthoud/Winter park  
 11/22-24/2014 16" Buffalo Park snotel, 17" Lake Irene  
 12/21-23/2014 Wind over 80 mph above timberline: 84 mph wind Berthoud Pass, (98 mph Loveland Pass), 6-12" snow valleys, 13" Berthoud Pass,  
 12/21-23/2015, 12-18 inches snow. 18" Arapahoe Ridge SNOTEL.

#### **2016 Snowfall Recorded**

01/16-17/2016 10+ inches of snow, 50-70mph wind above timberline.  
 2/1-2/2016 snow/blowing snow, 4/10", bigger event on the plains.  
 12/10-11 8-10 inches, wind above timberline 55-65 mph.  
 12/15-17/2016 11" Winter park

#### **2017 Snowfall Recorded**

1/3-5 10-12" plus, 11" Grand Lake, 12" Winter Park  
 1/8-11, 30" Winter Park, 20" Lake Irene, 50-70mph wind above timberline (roof collapse in Breckenridge)  
 10/1-2, 9.5" Winter Park.  
 12/23 10-15" of snow & 60-80 mph wind closed I-70 from Morrison Rd to Vail, and US 40 north of I-70.  
 Western Grand Co above 9000 ft had 16-22 inches.  
 12/24 1-2 ft snow above 9000 ft 8-14" lower & wind 45-55 mph above timberline

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## 2018 Snowfall Recorded

1/20-21 9" Lake Irene snotel

2/14-15 17" Berthoud Falls, 81 mph wind at Berthoud Pass

4/5 10"-15" over the passes

11/4 8-12", 50-65 mph wind above timberline

11/22-25, main impacts I-70 corridor 24rd & 24<sup>th</sup>. Multi-car crashes on I-70 forced closure at Eisenhower tunnel, shelters in Summit County. 8-12" lower elevations of Grand County, 15.5" at Berthoud Pass, 13" Winter Park. Wind 55-65 mph.

## 2019 Snowfall Recorded

1/17-18 16" Lake Irene, 11" Buffalo Park, 75 mph wind above timberline

3/1-5 2-3 ft over the passes, avalanches, etc.

3/6-7 additional 12-18".

4/10-11 15" Winter Park, 30-40 mph wind

4/29 16" Lake Irene

5/28 about a foot over northern/western passes

10/19-20 around a foot northern Grand, 7" Berthoud Falls. Wind 60-70 mph over passes.

11/25-26 Front Range storm 8-16 inches

12/12-14 2-3.5 ft of snow west & NW part of Grand County, 8-11" eastern Grand County. 31" Berthoud Pass, 21" Winter Park. 60mph wind over passes.

2/6-8 Around 3 feet of snow: 41.5" 11 S Rabbit Ears Pass, 34 inches near Cameron Pass, 33" Berthoud pass, 30" Winter Park. Peak wind 55-65 above timberline

2/15 15-30" above 9K feet.

The HMPC also described a few severe winter weather events that have occurred in the past few years. The Town of Winter Park is hit by major winter storms and extreme cold temperatures roughly twice a year. These events often result in frozen pipes in residential structures and frozen water mains. Blizzards can result in businesses not being able to open, as well as causing road closures that isolate the Town and other parts of the County. Disaster relief was provided for one severe winter storm in 2004.

Grand County's emergency experts provided information about winter storms that extended back many years. Based on their collective experiences, it was estimated that winter storms, characterized in the County by "Accident Alert" designations, generally close Highway 40 and 9 approximately twice each season. Highway 40 is a major transportation artery running through Grand County. But despite its occasional closure during severe winter storms, County officials characterize the community as adequately prepared for dealing with this hazard.

## Probability of Future Occurrence

**Highly Likely**—Near 100 percent chance of occurrence in next year or has a recurrence interval of 10 years or less

There were 161 recorded winter weather events in Grand County between 1960 and February 2013. On average, there are roughly 3 severe winter weather events in the County each year, which equals over 100 percent chance of occurrence in each year.

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## Magnitude/Severity

**Limited**—Minor injuries and illnesses; minimal property damage that does not threaten structural stability; interruption of essential facilities and services for less than 24 hours

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

Grand County can be isolated on all sides by highway closures or blocked vehicles stopped on the interstate for miles. The County usually has about three days' worth of commodities (food and gasoline). Though residents are used to dealing with severe winter weather, the economic impact of a large snowstorm can be significant. Ski resorts lose an estimated \$100,000 an hour when Berthoud Pass is closed due to weather during ski season. The County experienced an extended power outage in 2003 and a four day power outage in 2000 due to winter weather. Snowstorms have even occurred in the summer, such as a July 4th storm one year. The County has good building codes, though buildings constructed before 1970 may be more susceptible to structural damage in a very heavy snowstorm. Extreme cold causes some issues with frozen pipes, but the County is very accustomed to dealing with low temperatures. The main issues with this hazard include getting medical supplies to home-bound residents and keeping grocery stores stocked when roads are closed. There were concerns about this during the heavy snows of 2010-2011.

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## 3.2.12 Wildfire

### Hazard Description

Wildland fire is a naturally occurring disturbance across the landscape of the western United States. While the vegetative communities in Grand County are for the most part adapted to this natural force, many human communities are not. The wildland-urban interface (WUI) is the convergence of these two communities. The Grand County Community Wildfire Protection Plan (2006) and four local Community Wildfire Protection Plans (CWPP) recognize the Health Forest Restoration Act (2002) default definition of WUI as extending 1.5 miles from the edge of a community-at-risk where warranted by topographic and fuel conditions. Each CWPP specifies in detail the WUI within each fire protection district

The degree of hazard posed by wildfire is largely a function of the potential fire behavior. Fire behavior is the manner in which a fire reacts to the influences of fuel, weather, and topography. A low intensity, slow moving surface fire is obviously less hazardous to human communities than a rapidly moving crown fire. Fire behavior may be classified as ground fires smoldering in duff and roots, surface fire burning in the forest litter or grass and low shrubs, or crown fires. Crown fire moves through the canopy of trees or shrubs and can be further classified as active or passive. Passive crown fire, often called “torching”, ignites individual or small groups of trees. Active crown fire spreads through the forest canopy as a flaming front. High intensity surface fires and crown fires pose the greatest challenge to suppression resources and the greatest threat to community values.

Generally, there are three major factors that sustain wildfires and predict a given area’s potential to burn. These factors are fuel, topography, and weather.

- **Fuel**—Fuel is the material that feeds a fire and is a key factor in wildfire behavior. Fuel is generally classified by type and by volume and categorized as fire behavior fuel models. Fuel sources are diverse and include everything from dead tree needles and leaves, twigs, and branches to dead standing trees, live trees, brush, and cured grasses. Also to be considered as a fuel source are manmade structures, such as homes and associated combustibles. The type of prevalent fuel directly influences the behavior of wildfire. Light fuels such as grasses burn quickly and serve as a catalyst for fire spread. In addition, “ladder fuels” can spread a ground fire up through brush and into trees, leading to a devastating crown fire that burns in the upper canopy and cannot be controlled. The volume of available fuel is described in terms of fuel loading.
- **Topography**—An area’s terrain affects its susceptibility to wildfire spread. Both fire intensity and rate of spread increase as slope increases due to the tendency of heat from a fire to rise via convection. The distribution and types of vegetation on 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 wildfire. High temperatures and low relative humidity dry out the

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fuels that feed the wildfire creating a situation where fuel will more readily ignite and burn more intensely. Wind is the most treacherous weather factor. The greater the wind, the faster a fire will spread and the more intense it will be. In addition to wind speed, wind shifts can occur suddenly due to temperature changes or the interaction of wind with topographical features such as slopes or steep hillsides. Lightning also ignites wildfires, which often occur in terrain that is difficult for firefighters to reach. Drought conditions contribute to concerns about wildfire vulnerability. During periods of drought, the threat of wildfire increases.

Wildfires are of significant concern throughout Colorado. According to the Colorado State Forest Service, vegetation fires occur on an annual basis; most are controlled and contained early with limited damage. For those ignitions that are not readily contained and become wildfires, damage can be extensive. There are many causes of wildfire, from naturally caused lightning fires to human-caused fires linked to activities such as smoking, campfires, equipment use, and arson.

According to the State of Colorado Natural Hazards Mitigation Plan, a century of aggressive fire suppression combined with cycles of drought and changing land management practices has left many of Colorado's forests unnaturally dense and ready to burn. Further, the threat of wildfire and potential losses are generally increasing as human development and population increases and the wildland-urban interface expands.

### **Geographic Location**

Most of Grand County is in the WUI; wildfires affect a large extent of the County, meaning that over 50 % of the planning area is affected.

With seventy percent of the county's approximately 1.2 million acres under public management, the majority of the county will remain in an undeveloped condition that is susceptible, and largely adapted to, periodic wildfire. Between 2000 and 2010 Grand County's population increased by nineteen percent to nearly 15,000, a slightly larger rate than the state's seventeen percent.

The WUI according to the Grand County Community Wildfire Protection Plan (CWPP) is shown below. The CWPP divides the county into three regions, West Grand, Three Lakes, and Fraser Valley.

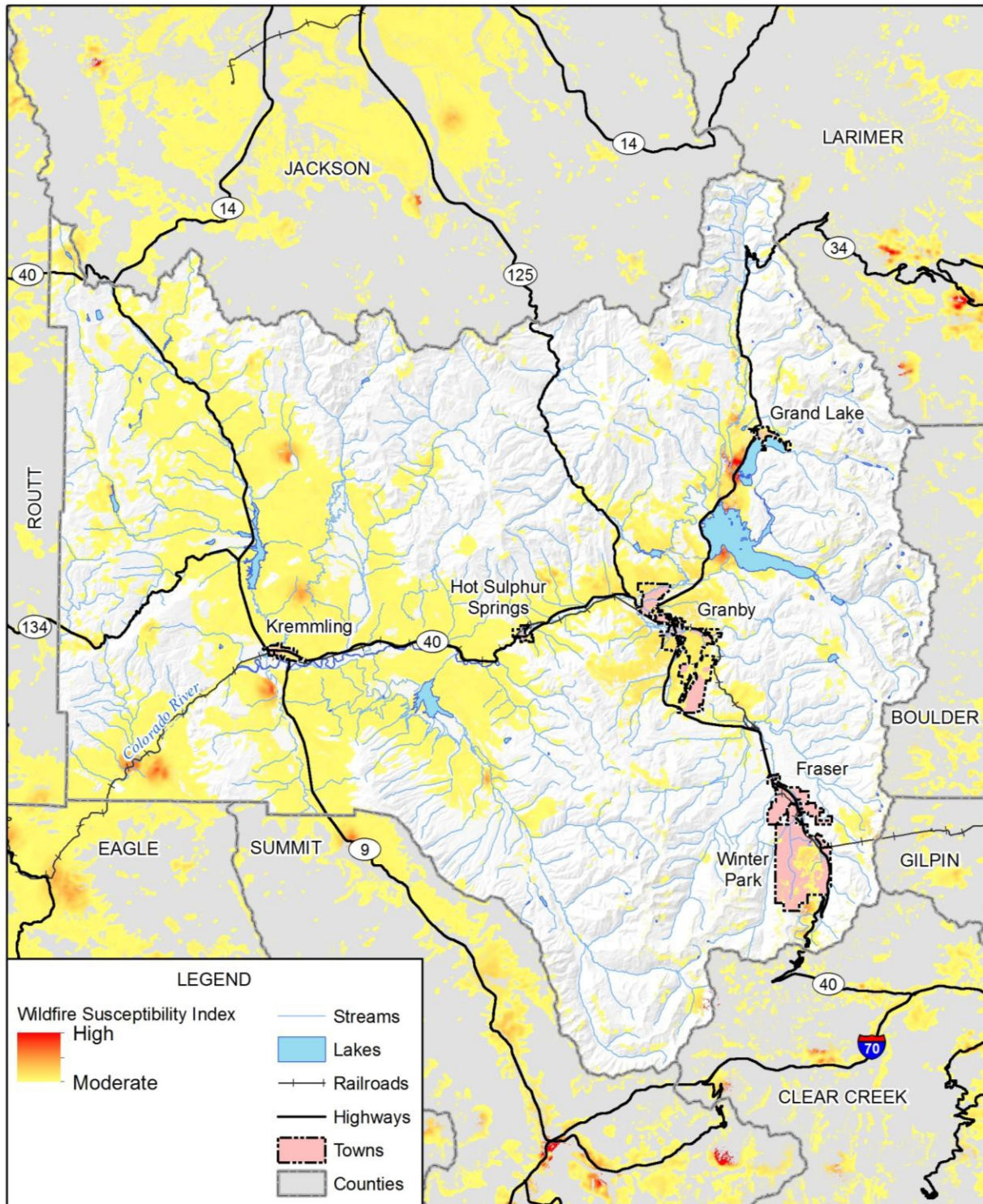
The University of Wisconsin's Spatial Analysis for Conservation and Sustainability SILVIS Lab has mapped the WUI throughout the United States based on housing density and proximity to wildlands. SILVIS WUI areas are composed of both interface and intermix communities. In both interface and intermix communities, housing must meet or exceed a minimum density of one structure per 40 acres. Intermix communities are places where housing and vegetation intermingle. In intermix areas wildland vegetation is continuous, with more than 50 percent vegetation and more than 1 house per 16 hectares. Interface communities are areas with housing in the vicinity of contiguous vegetation. Interface areas have more than 1 house per 40 acres,

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have less than 50 percent vegetation, and are within 1.5 miles of an area (made up of one or more contiguous Census blocks) over 1,325 acres that is more than 75 percent vegetated. WUI areas are delineated in Figure 3.30 from the County CWPP.

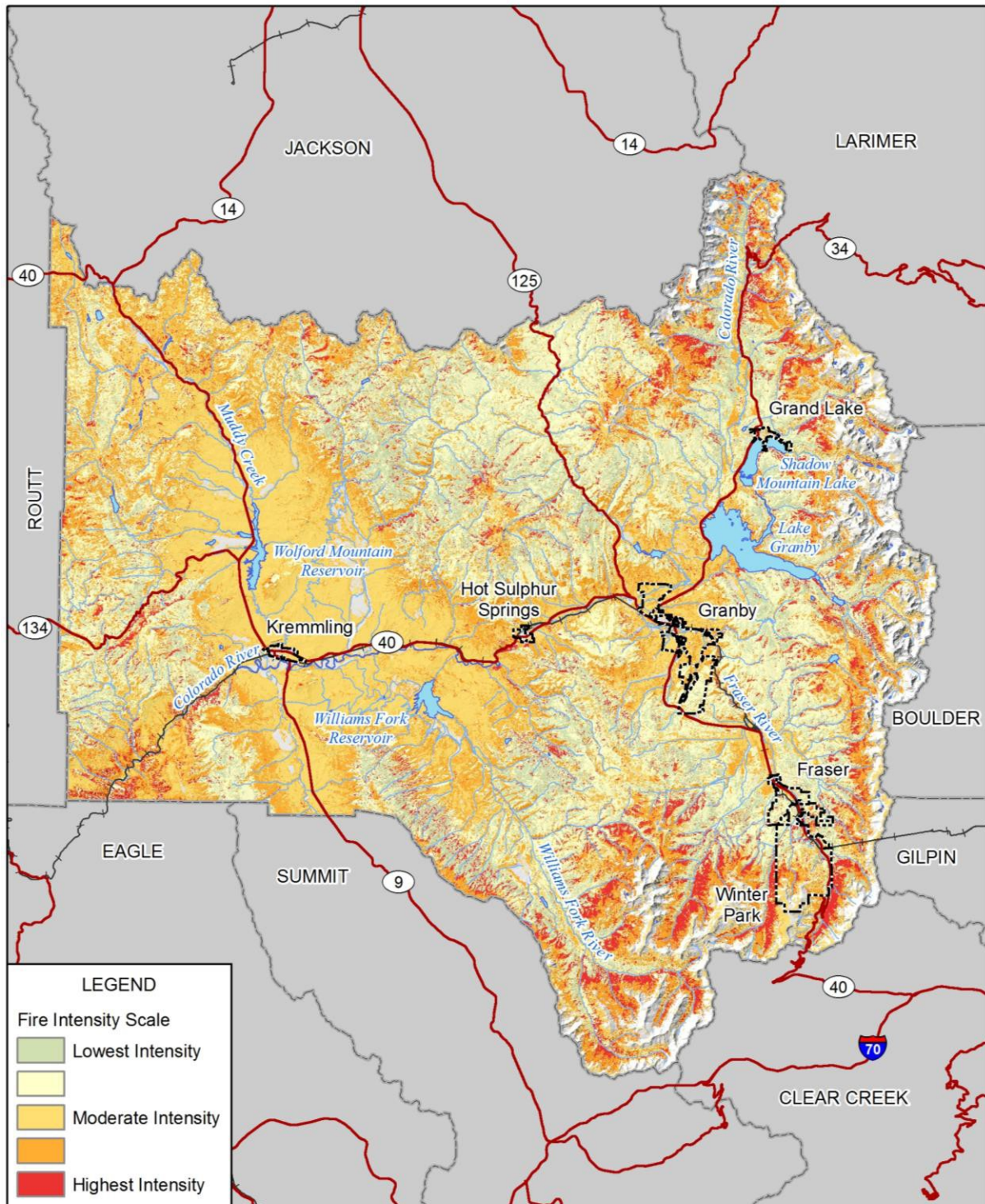
The Colorado State Forest Service has modeled areas susceptible to wildfire statewide based on available fuels, terrain, and ignition sources such as proximity to roads. This data is available on the Colorado Wildfire Risk Assessment Portal (CO WRAP) and displayed on the map in Figure 3.28. The Wildfire Intensity Scale map (Figure 3.29) displays areas where significant fuel hazards and dangerous fire behavior potential exist.

**Figure 3.28. Grand County Wildfire Susceptibility**



Map compiled 4/2013; intended for planning purposes only.  
Data Source: Grand County, CDOT, CSFS

**Figure 3.29. Grand County Wildfire Intensity**



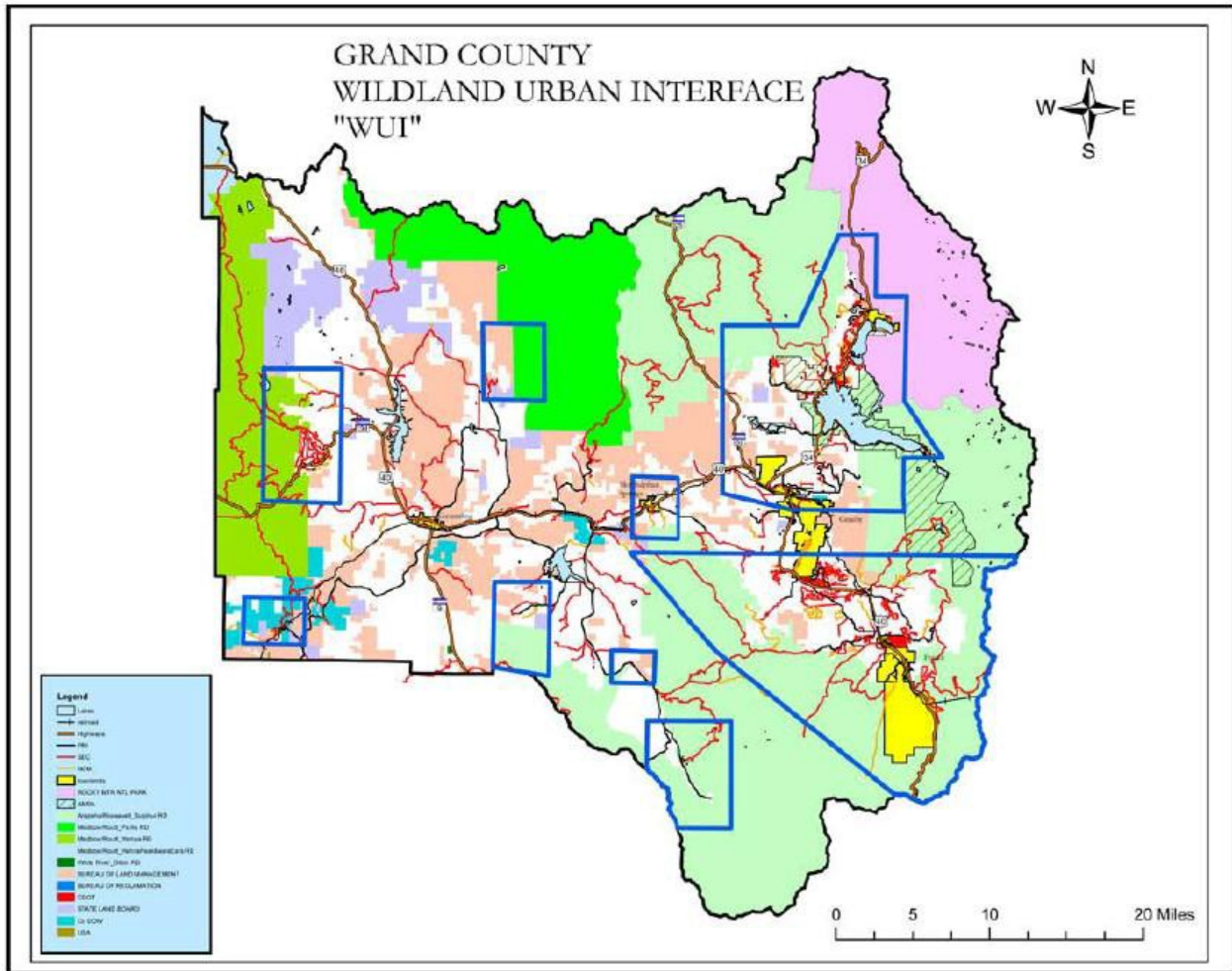
0 7 14 Miles



Map compiled 6/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT,  
 Colorado State Forest Service: CO-WRAP



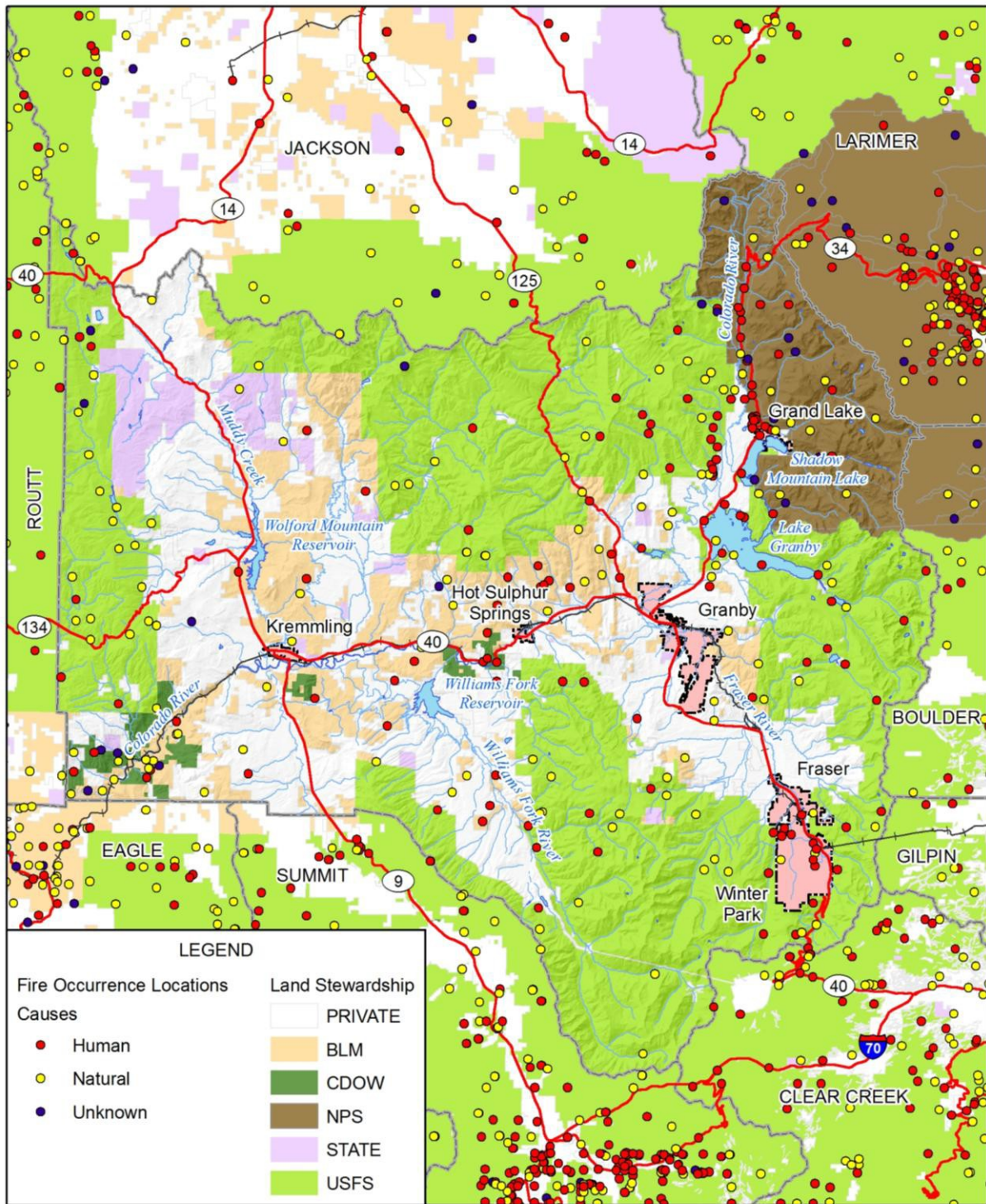
**Figure 3.30. Grand County Wildland-Urban Interface**



**Previous Occurrences**

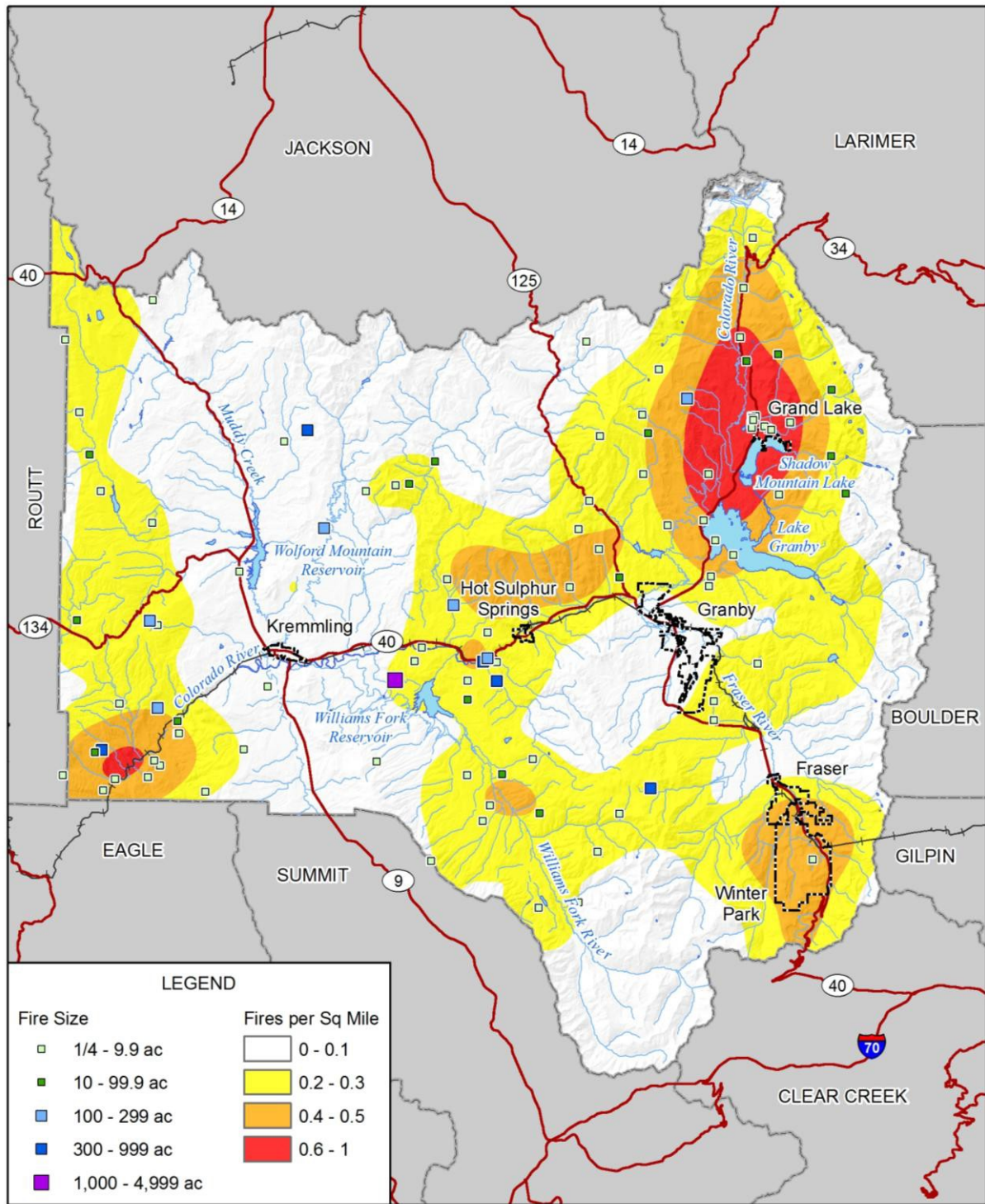
From 1980 through 2012, 303 Grand County fires were recorded in the Federal Wildland Fire Occurrence Data (<http://wildfire.cr.usgs.gov>). Though averaging only 13.7 fires per annum, fire occurrence appears to have increased significantly since the 1980s. Nineteen of the twenty-nine fires that burned more than ten acres have occurred since 2000.

Figure 3.31. Grand County Wildfire Occurrence: 1980-2012



Map compiled 4/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT, COMaP v9,  
 DOI, USFWS and USFS

Figure 3.32. Grand County Wildfire Occurrence Density: 1980-2012

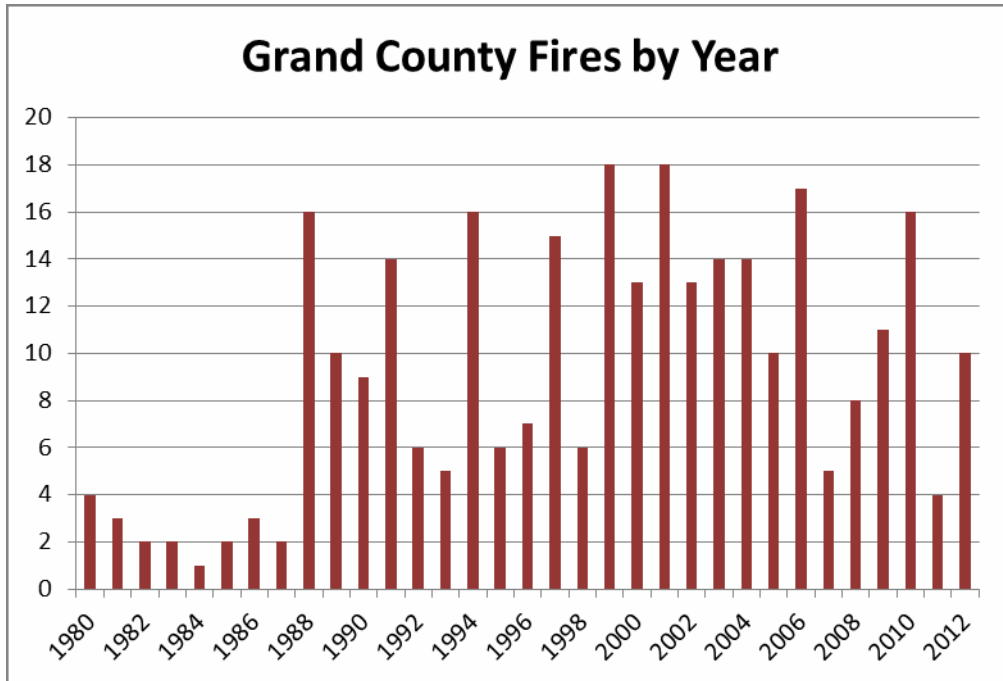


0 7.5 15 Miles



Map compiled 4/2013; intended for planning purposes only.  
Data Source: Grand County, CDOT, USFWS and USFS

**Figure 3.33. Federal Wildfire Occurrence in Grand County: 1980-2012**



Sixty-seven percent of Grand County’s wildfires since 1980 have remained smaller than a quarter of an acre. Less than ten percent (28 fires) have exceeded ten acres during this period (reference Table 3.14), the largest being the Sentinel Fire (1104 acres) in 1988 near Green Mountain Reservoir. While the vast majority of fires in remain, the potential impact of wildland fires in Grand County should not be underestimated. Just over the Divide east of Grand County a twenty acre fire in June of 2012 in Estes Park destroyed twenty-one homes, illustrating the devastation that even a small fire can have in the WUI. In addition, many areas in Colorado and across the west are beginning to see fires of unprecedented size and intensity.

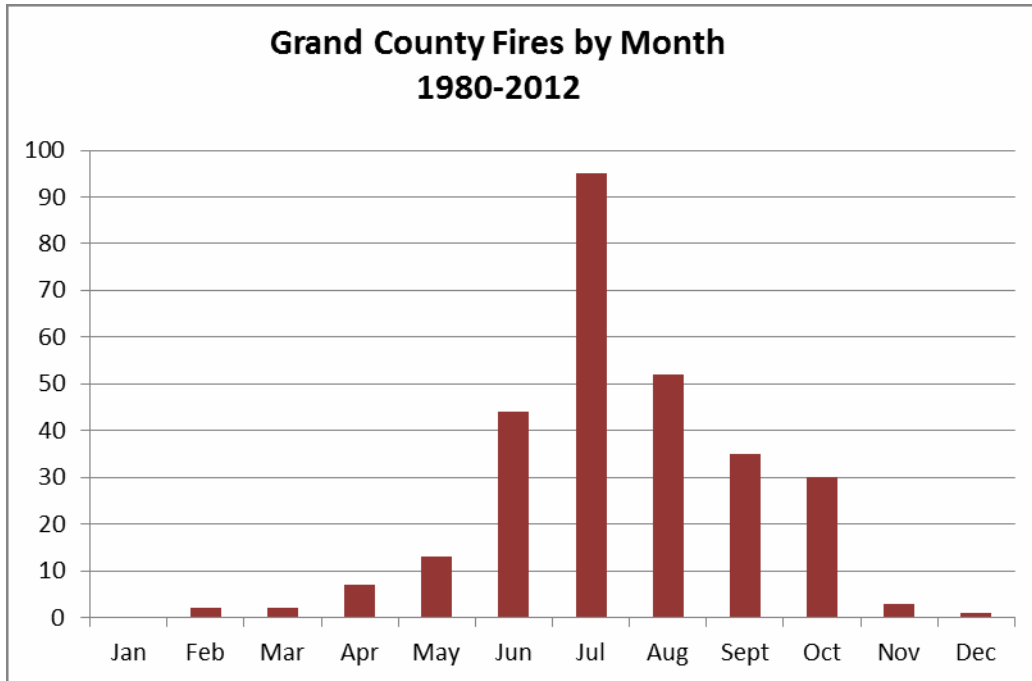
**Table 3.14. Grand County Federal Wildfires by Size Class: 1980-2012**

Size Class	Acres	Number	Percentage
A	0-.25	202	67%
B	.25-10	73	24%
C	10-100	16	5%
D	100-300	6	2%
E	300-1,000	5	2%
F	1,000-5,000	1	0%

Source: National Wildfire Coordinating Group (<http://www.nwcg.gov/pms/pubs/glossary/s.htm>)

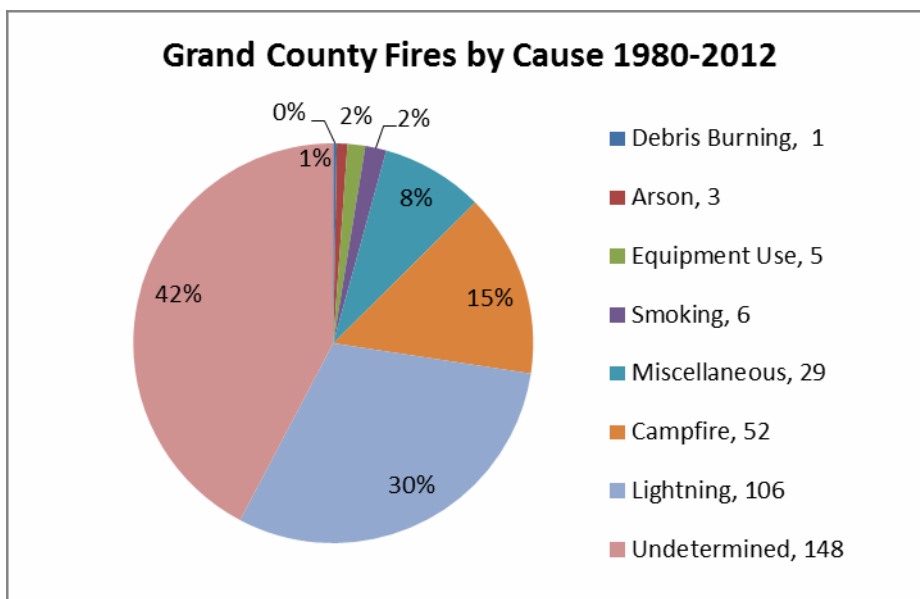
Grand County has a pronounced summer fire season that peaks in July. Eighty percent of the fires occur from June through September, though the majority of larger fires are human caused and occur outside of this fire season.

**Figure 3.34. Federal Wildfires in Grand County by Month: 1980-2012**



Federal records indicate fire cause in general terms was almost evenly split between human caused (forty-eight percent) and natural fires (forty-five percent) with only seven percent of fires causes unidentified.

**Figure 3.35. Federal Wildfires in Grand County by Cause: 1980-2012**



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Recent fires worth noting:

- **October 3, 2010** - the human caused Churches Park fire burned 473 acres in beetle killed forest approximately 5 miles northwest of Fraser. It forced the evacuation of a youth camp. Photos from the event are shown in Figure 3.37.
- **October 10, 2010** - Tracer rounds set off the Rifle Range Fire that burned 190 acres and was stopped just short of getting into beetle killed forest.
- **June 10, 2013** – this fire was ignited by lightning about 5 miles north of Grand Lake. It grew rapidly after ignition due to high winds, high temperatures, low humidity, and a large amount of beetle kill. It is estimated that the fire burned roughly 617 acres. Northern Water was monitoring the impact of the fire on water supplies.
- **September 12, 2018** – the 20,000 acre Silver Creek Fire, NW of Kremmling, was started with a lightning strike on July 19<sup>th</sup>. It was among 229 fires that burned in NW Colorado that year, one of the worst and most expensive fire seasons on record.

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**Figure 3.36 Silver Creek Fire, September 2018**



Source: 9news.com

### **Probability of Future Occurrence**

**Highly Likely**—Near 100 percent chance of occurrence next year or happens every year.

With an average of 13.7 fires per annum, Grand County will continue to experience wildfires on an annual basis. Small fires are typical with ninety percent of fires since 1980 remaining smaller than ten acres.

The mature even-aged lodge pole pine stands found locally (discussed further in the Mountain Pine Beetle Hazard section) were established after heavy mining and settlement utilization from 1860 to 1940 (USDA 2004). These forests tend to experience either very small low intensity surface fires or high severity stand replacing fires. The spruce-fir stands that develop on moist, cool sites also experience infrequent stand replacing fires on order of 150 to over 300 years apart.

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**Figure 3.37. Church’s Park Fire: October 3, 2010**



Source: Todd Holzwarth, East Grand FPD

### **Magnitude/Severity**

**Catastrophic**—Multiple deaths; property destroyed and severely damaged; interruption of essential facilities and service for more than 72 hours

Potential losses from wildfire include: human life, structures and other improvements, natural and cultural resources, the quality and quantity of the water supply, assets such as timber and range, recreational opportunities, and economic losses. Smoke and air pollution from wildfires can be a severe health hazard. In addition, wildfire can lead to secondary impacts such as increased susceptibility to future flooding, landslides and erosion during heavy rains due to vegetation loss and hydrophobic soil development.

Flammability issues have decreased as the beetle infestation has killed much of the vegetation. However, this causes concern for potential wildfires in the coming decades. Fallen trees litter the forest floor, and as vegetation comes back, available fuel increases. This creates conditions that could potentially result in a very significant wildfire. The County does not experience a high number of starts, but with the right conditions a massive wildfire could still occur.

### **Potential Future Losses**

\*According to the Future Avoided Cost Explorer tool (F.A.C.E.), a future wildfire scenario using a moderate climate (due to climate change) and a low estimated population growth (24,300), would economically bring \$200,000.00 in damages to Grand County, including residential and commercial buildings and increased firefighting costs.

In calculating a future scenario in the North Central Mountain Region of Colorado, wildland fires during the summer recreation season in a more severe climate would bring 5.5 million dollars in damages.

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### 3.2.13 Wildlife-Vehicle Collisions

Although traffic in the planning area is relatively low during parts of the year, wildlife-vehicle collisions are an important issue to discuss. Most wildlife-vehicle collisions (WVCs) in the County involve deer and elk. Other large wildlife in the area include bighorn sheep, mountain lions, pronghorn antelope, and black bears. Grand County is also home to one of the largest Shiras moose populations in the State.

#### Geographic Location

The geographic extent of wildlife hazards in Grand County is **large**. It is possible for wildlife-vehicle collisions to occur on any of the County's roadways, though perhaps more likely along well traveled routes or near wildlife migration corridors.

State Highway 9 from mile marker 126.00 to 136.37, part of which falls within Grand County, is designated as a wildlife crossing zone.

#### Previous Occurrences

Wildlife-vehicle collisions are, unfortunately, an often unavoidable part of life in rural areas. As the population of the planning area has grown over the past several years, the incidence of WVCs has increased accordingly. State Highway 9 from mile marker 126.00 to 136.37, part of which falls within Grand County, is designated as a wildlife crossing zone. CDOT recorded the number of WVCs in this area between 2002 and 2006. A total of 75 WVCs occurred along this stretch of highway during that time period. Fifty-five of these (73%) happened between 5pm and 7am between September and April.

Table 3.15 shows the number of property damage only events (PDOs- refers to events in which no injuries or fatalities occurred), injuries, and fatalities from wildlife-vehicle collisions in Grand County between 2008 and 2017. Fortunately, no fatalities occurred in this time period.

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**Tables 3.15 Wildlife-Vehicle Collisions: 2008-2017**

Year	PDO	Injuries	Fatalities	Total
2008	60	4	0	64
2012	66	3	0	69
2015	76	3	0	79
2017	64	2	0	66

Source: Colorado Department of Transportation



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## Wild Animal Crashes in Grand County 2008-2017



Source: Colorado Department of Transportation

### Probability of Future Occurrence

Vehicular accidents or encounters involving wildlife are highly likely to occur in any given year in Grand County. According to the CDOT data described in Table 3.15, a total of 745 wildlife-vehicle accidents occurred between 1994 and 2006. Seven hundred forty-five events over a 12 year span of time averages out to roughly 62 events per year. This equates to a 100% probability that a wildlife-vehicle crash will occur in the planning area during any year.

WVCs are most likely to occur between dusk and dawn, particularly during migration seasons (spring and fall). Additionally, traffic in Grand County increases seasonally during ski season. This increases exposure to wildlife-vehicle hazards in the County between roughly September and April. Incidentally, ski season corresponds with deer and elk migration season, potentially increasing the likelihood of WVCs.

### Magnitude/Severity

The impacts of wildlife-human hazards in Grand County would likely be negligible. Less than 10 percent of the planning area would be affected by any single event. Generally, only a few people are affected by a wildlife hazard at any one time, although injuries or death are possible. It is unlikely that critical facilities and services would be impacted.

## 3.2.14 Windstorm

### Hazard Description

High winds occur year round in Grand County. In the spring and summer, high winds often accompany severe thunderstorms. These winds are typically straight-line winds, which 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 (mph) that represent the most common type of severe weather and are responsible for most wind damage related to thunderstorms.

In the mountains of Colorado, strong winds are also common throughout the winter months and can exceed 50 to 100 mph in exposed locations. Specifically, these winter winds can force the closure of highways (blowing snow) and induce avalanches (see *Section 3.2.1 Avalanche* and *Section 3.2.11 Severe Winter Weather*).

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## Geographic Location

The geographic extent of this hazard in Grand County is **large**—more than 50 percent of the planning area affected.

High winds can occur throughout Grand County and may be most severe at high elevations.

## Previous Occurrences

Historical data from SHELDUS and the National Climatic Data Center Storm Events Database was combined to determine that there were roughly 47 recorded wind events in Grand County between 1955 and February 2013. (Note: These wind events were reported as wind only or thunderstorm wind events. The summary does not include winds that were part of severe winter weather (see *Section 3.2.11 Severe Winter Weather*.)

Data limitations: Some events may have been missed due to limitations in the manner in which events that occurred over multiple forecast zones are reported. Dollar figures reported for wind events in both SHELDUS and the National Climatic Data Center Storm Events database are total damages for all counties associated with an event. Specific Grand County losses are not always available.

Notable events in NCDC include the following:

- **June 6, 2003** - strong thunderstorm winds damaged the roof of West Grand Elementary School, lifting large sections of rolled roofing and insulation off the roof.
- **April 8, 2005** - a mixture of a strong gradient wind, coupled with thunderstorm outflow winds, swept across parts of North-Central and Northeast Colorado during the afternoon. The strong wind downed power lines and knocked out electricity to approximately 19,000 customers on the east side of the Denver area. Peak wind reports from around the region included 61 mph winds 11 miles north-northeast of Kremmling.
- **June 30, 2011** - severe thunderstorms produced straight-line winds in Granby, causing extensive damage. Town officials in Granby estimated at least 30 trees were knocked down within the city limits. At least two roofs were separated from the buildings themselves. The damage to the high school was estimated to be at least \$200,000.
- **June 6, 2020** - a line of severe thunderstorms crossed Colorado bringing down trees and producing over 100 mph winds in Winter Park. The storm met the criteria to be classified as a Derecho, a line of intense, widespread, and fast-moving windstorms characterized by damaging winds. According to National Weather Service Boulder, a gust at the top of Winter Park approached the strength of a Category 3 hurricane.

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SHELDUS recorded 44 high wind events not associated with winter weather in Grand County between 1960 and 2011.

### **Probability of Future Occurrence**

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

SHELDUS recorded 44 high wind events between 1960 and 2011. Forty-four events over a period of 51 years indicates that high wind events will occur in Grand County every 1.16 years on average, or an 86% chance of occurrence in any given year.

### **Magnitude/Severity**

**Limited**—Minor injuries and illnesses; minimal property damage that does not threaten structural stability; interruption of essential facilities and services for less than 24 hours

Wind storms in Grand County are rarely life threatening, but do threaten public safety, disrupt daily activities, cause damage to buildings and structures, increase the potential for other hazards (e.g., wildfire), and have adverse economic impacts from business closures and power loss. Power losses may be increasing from high wind events due to the decreased forest health resulting from the pine beetle infestation. Dead trees and branches are more prone to being blown into power lines. Healthy trees are also being felled more frequently; they are no longer shielded by dead trees resulting from the mountain pine beetle infestation. An HMPC member noted an apparent increase in higher speed, sustained wind events in recent years. Although windstorms are likely to occur in the future, data indicates that past losses have not been significant, and the overall magnitude of this hazard is limited. Mountain Parks Electric, WAPA, and Tri-State have been mitigating along transmission and distribution lines to reduce the likelihood of a large power outage event from wind and tree damage.

### 3.2.15 Hazard Profiles Summary

This section summarizes the results of the hazard profiles and assigns a level of overall planning significance to each hazard of low, moderate, or high. Significance was determined based on the hazard profile, focusing on key criteria such as frequency and resulting damage, including deaths/injuries and property, crop, and economic damage. This assessment was used by the HMPC to prioritize those hazards of greatest significance to the planning area; thus enabling the County to focus resources where they are most needed. Those hazards that occur infrequently or have little or no impact on the planning area were determined to be of low significance. Those hazards determined to be of high and moderate significance were characterized as priority hazards that required further evaluation in Section 3.3 Vulnerability Assessment.

**Table 3.16. Summary of Hazard Profiles**

Hazard Type	Geographic Location*	Probability*	Magnitude*	Overall Vulnerability
Avalanche	Isolated	Highly Likely	Critical	Medium
Dam Failure	Large	Unlikely	Catastrophic	Low
Disease Outbreak	Large	Likely	Variable	High
Drought	Large	Likely	Limited	Medium
Earthquake	Large	Occasional	Limited	Low
Flood	Small	Likely	Limited	Medium
Hazardous Materials	Small	Highly Likely	Critical	High
Landslide/Mudflow/Debris Flow/Rockfall	Isolated	Occasional	Critical	High
Lightning	Large	Likely	Limited	Low
Mountain Pine Beetle Infestation	Large	Occasional	Limited	
Severe Winter Weather	Large	Highly Likely	Limited	High
Wildfire	Large	Highly Likely	Catastrophic	High
Wildlife-Vehicle Collisions	Large	Highly Likely	Negligible	Moderate
Windstorm	Large	Likely	Limited	Low

Source: Grand County Hazard Mitigation Planning Committee, 2013

\*See section 3.2 for definitions of these factors

The following tables summarize the results of the hazard profiles for incorporated communities that are participating jurisdictions in the hazard mitigation plan.

**Table 3.17. Probability of Future Occurrence of Identified Hazards by Jurisdiction**

Hazard Type	Grand County	Fraser	Granby	Grand Lake	Hot Sulphur Springs	Kremmling	Winter Park	Denver Water	Northern Water	FPDs
Avalanche	Highly Likely	Occasional	Unlikely	Unlikely	Likely	Unlikely	Highly Likely	Likely	Highly Likely	Highly Likely
Dam Failure	Unlikely	Unlikely	Likely	Unlikely	Occasional	Unlikely	Occasional	Unlikely	Unlikely	Unlikely
Disease Outbreak	Likely	Likely	Likely	Likely	Likely	Likely	Likely	Likely	Likely	Likely
Drought	Likely	Unlikely	Highly Likely	Likely	Highly Likely	Occasional	Likely	Likely	Likely	Likely
Earthquake	Occasional	Likely	Unlikely	Unlikely	Occasional	Unlikely	Unlikely	Occasional	Occasional	Occasional
Flood	Likely	Likely	Likely	Occasional	Occasional/ Likely	Likely	Likely	Likely	Likely	Likely
Hazardous Materials (Transportation)	Highly Likely	Highly Likely	Highly Likely	Unlikely	Likely	Occasional	Highly Likely	Unlikely	Highly Likely	Highly Likely
Landslide, Mudflow/Debris Flow, and Rockfall	Occasional	Unlikely	Likely	Unlikely	Likely	Unlikely	Highly Likely	Occasional	Occasional	Likely
Lightning	Likely	Highly Likely	Highly Likely	Occasional	Occasional	Likely	Highly Likely	Likely	Likely	Highly Likely
Mountain Pine Beetle Infestation	Occasional	Occasional	Occasional	Occasional	Occasional	Occasional	Occasional	Occasional	Occasional	Occasional
Severe Winter Weather	Highly Likely	Highly Likely	Highly Likely	Highly Likely	Highly Likely	Highly Likely	Highly Likely	Highly Likely	Highly Likely	Highly Likely
Wildfire	Highly Likely	Highly Likely	Highly Likely	Highly Likely	Highly Likely	Highly Likely	Likely	Highly Likely	Likely	Highly Likely
Wildlife Incidents	Highly Likely	Highly Likely	Highly Likely	Highly Likely	Highly Likely	Highly Likely	Highly Likely	Highly Likely	Highly Likely	Highly Likely
Windstorm	Likely	Highly Likely	Highly Likely	Occasional	Likely	Occasional	Highly Likely	Likely	Likely	Likely

\*See Section 3.2 for definitions of these factors

**Table 3.18. Magnitude/Severity of Identified Hazards by Jurisdiction**

Hazard Type	Grand County	Fraser	Granby	Grand Lake	Hot Sulphur Springs	Kremmling	Winter Park	Denver Water	Northern Water	FPDs
Avalanche	Critical	Limited	Negligible	Limited	Limited	Negligible	Critical	Limited	Critical	Critical
Dam Failure	Limited	Limited	Limited	Limited	Critical	Catastrophic	Limited	Critical	Limited	Limited

Hazard Type	Grand County	Fraser	Granby	Grand Lake	Hot Sulphur Springs	Kremmling	Winter Park	Denver Water	Northern Water	FPDs
Disease Outbreak	Variable	Variable	Variable	Variable	Variable	Variable	Variable	Variable	Variable	Variable
Drought	Limited	Critical	Limited	Critical	Critical	Limited	Negligible	Limited	Limited	Limited
Earthquake	Limited	Critical	Critical	Negligible	Limited/ Negligible	Limited	Catastrophic	Limited	Limited	Critical
Flood	Limited	Limited	Critical	Limited	Critical	Limited		Critical	Limited	Negligible
Hazardous Materials (Transportation)	Critical	Critical	Critical	Negligible	Limited	Critical	Catastrophic	Catastrophic	Critical	Critical
Landslide, Mudflow/Debris Flow, and Rockfall	Critical	Limited	Limited	Limited	Limited	Negligible	Limited	Limited	Critical	Critical
Lightning	Limited	Limited	Limited	Limited	Limited	Critical	Limited	Limited	Limited	Limited
Mountain Pine Beetle Infestation	Limited	Limited	Limited	Limited	Limited	Limited	Limited	Limited	Limited	Limited
Severe Winter Weather	Limited	Limited	Limited	Critical	Critical	Limited	Critical	Critical	Limited	Limited
Wildfire	Catastrophic	Limited	Limited	Catastrophic	Catastrophic	Limited	Catastrophic	Critical	Critical	Critical
Wildlife Incidents	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Windstorm	Limited	Limited	Limited	Limited	Limited	Limited	Critical	Limited	Limited	Limited

\*See Section 3.2 for definitions of these factors

**Table 3.19. Planning Significance of Identified Hazards by Jurisdiction**

Hazard Type	Grand County	Fraser	Granby	Grand Lake	Hot Sulphur Springs	Kremmling	Winter Park	Denver Water	Northern Water	FPDs
Avalanche	Medium	Low	Low	Medium	Low	Low	High	High	Medium	Medium
Dam Failure	Low	Medium	Medium	Low	Medium	High	Medium	High	Low	Low
Disease Outbreak	High	High	High	High	High	High	High	High	High	High
Drought	Medium	Low	High	High	Medium	High	Low	Medium	Medium	Medium
Earthquake	Low	Medium	Low	Low	Low	High	Low	Low	Low	Low
Flood	Medium	Medium	Medium	Medium	Medium	Medium	Medium	High	Medium	Low
Hazardous Materials (Transportation)	High	High	High	Low	Low	High	High	Medium	High	High

<b>Hazard Type</b>	<b>Grand County</b>	<b>Fraser</b>	<b>Granby</b>	<b>Grand Lake</b>	<b>Hot Sulphur Springs</b>	<b>Kremmling</b>	<b>Winter Park</b>	<b>Denver Water</b>	<b>Northern Water</b>	<b>FPDs</b>
Landslide, Mudflow/Debris Flow, and Rockfall	High	Low	Low	Medium	Medium	Low	Medium	Medium	High	Medium
Lightning	Low	Medium	Medium	Medium	Low	Medium	Low	Medium	Low	Low
Mountain Pine Beetle Infestation	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Severe Winter Weather	High	Medium	Medium	High	High	High	High	Medium	High	Medium
Wildfire	High	Medium	Medium	High	High	Medium	High	High	High	High
Wildlife Incidents	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Negligible
Windstorm	Low	Medium	Medium	Medium	Low	Medium	Medium	Low	Low	Low

## 3.3 Vulnerability Assessment

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**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.

### 3.3.1 Methodology

The vulnerability assessment further defines and quantifies populations, buildings, critical facilities and infrastructure, and other community assets at risk to natural hazards. The vulnerability assessment for this plan followed the methodology described in the FEMA publication *Understanding Your Risks—Identifying Hazards and Estimating Losses* (2002).

The vulnerability assessment was conducted based on the best available data and the overall planning significance of the hazard. Data to support the vulnerability assessment was collected from the same sources identified in Section 3.1 Hazard Identification and Section 3.2 Hazard Profiles and from FEMA’s HAZUS-MH loss estimation software for earthquake and flood hazards (unincorporated County).

The vulnerability assessment includes three sections:

- **Community Asset Inventory**—This section inventories assets exposed to hazards in Grand County, including the total exposure of people and property; critical facilities and infrastructure; natural, cultural, and historic resources; and economic assets.
- **Vulnerability by Hazard**—This section describes the County’s overall vulnerability to each hazard; identifies existing and future structures, critical facilities, and infrastructure in identified hazard areas; and estimates potential losses to vulnerable structures, where data is available. Only hazards of moderate or high planning significance, or that have identified hazard areas are addressed in the vulnerability assessment.
- **Development and Land Use Trends**—The final section analyzes trends in population growth, housing demand, and land use patterns.

In addition, a capability assessment was conducted for each jurisdiction as part of the risk assessment process. A capability assessment identifies the existing programs, policies, and plans that mitigate or could be used to mitigate risk to disasters. This information can be found in the annex for each jurisdiction.



### 3.3.2 Community Asset Inventory

This section assesses the population, structures, critical facilities and infrastructure, and other important assets in Grand County at risk to natural hazards.

#### Total Exposure to Hazards

Table 3.21 shows building exposure by property type. Building counts and values are based on county assessor's data and aggregated by town (includes building contents). According to the assessor's data, the sum of the actual value improvements in the County is \$5,928,540,055 (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, mixed use and government structures, 0% for vacant land), based on standard FEMA methodologies.

**Table 3.21. Building Exposure by Property Type**

Property Type	Total Parcel Count	Improved Parcel Count	Land Value	Improved Value	Estimated Content Value	Total Value
Agricultural	1,550	500	\$14,007,970	\$165,191,910	\$165,191,910	\$330,383,820
Commercial Improved	536	513	\$64,516,180	\$139,525,670	\$139,525,670	\$279,051,340
Commercial Vacant	215	7	\$16,769,830	\$286,910	\$286,910	\$573,820
Conservation Easement	146	25	\$4,292,810	\$10,620,330	\$10,620,330	\$21,240,660
Industrial Improved	6	6	\$816,970	\$1,594,960	\$2,392,440	\$3,987,400
Industrial Vacant	4	0	\$265,420	\$0	\$0	\$0
Mining	7	0	\$125,940	\$0	\$0	\$0
Mixed Use	77	76	\$15,430,640	\$32,959,030	\$32,959,030	\$65,918,060
Residential Improved	14,159	14,051	\$756,082,470	\$3,118,691,500	\$1,559,345,750	\$4,678,037,250
Residential Vacant	5,824	204	\$312,549,070	\$14,963,650	\$7,481,825	\$22,445,475
Tax Exempt	721	166	\$90,384,770	\$67,519,060	\$67,519,060	\$135,038,120
Unknown	7,757	40	\$265,015,450	\$194,433,750	\$194,433,750	\$388,867,500
Vacant Land	406	27	\$36,581,680	\$2,996,610	\$0	\$2,996,610
<b>Total</b>	<b>31,408</b>	<b>15,615</b>	<b>\$1,576,839,200</b>	<b>\$3,748,783,380</b>	<b>\$2,179,756,675</b>	<b>\$5,928,540,055</b>

Source: Grand County Assessors Data, 2013 (no figures received for 2020)

## Critical Facilities and Infrastructure

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. Table 3.22 displays the inventory of critical facilities (based on available data) in Grand County as provided by the HMPC and Grand County GIS data. Specific information on facilities and their locations can be found in the jurisdictional annexes.

**Table 3.22. Critical Facilities in Grand County**

Facility Type	Unincorporated Areas	Fraser	Granby	Grand Lake	Hot Sulphur Springs	Kremmling	Winter Park
Bridges	61	-	1	3	1	-	2
Communications	41	-	2	1	5	3	7
EMS	-	-	1	-	-	-	-
Fire Station	1	1	1	1	1	1	-
Government	-	2	1	-	2	-	3
Hazmat	5	-	-	-	-	-	-
Hospital	-	-	1	-	-	1	-
Natural Gas Facility	1	-	-	-	-	-	-
Police Station	-	-	-	-	1	1	1
Pumphouse	-	-	-	-	-	-	3
School	1	1	4	1	-	3	-
Waste Water Facility	4	1	-	-	-	-	-
Water Facility	-	-	-	-	-	-	1
<b>Total</b>	<b>115</b>	<b>5</b>	<b>11</b>	<b>6</b>	<b>10</b>	<b>9</b>	<b>17</b>

Source: Grand County GIS Department

Grand County also provided a list of assets which primarily included government facilities belonging to administration, law enforcement, public works, public health, communications, EMS, livestock barns, judicial centers, and more. The total fixed asset value for all of the facilities in the list was \$30,902,655. A large percentage of this is insured with a total insured value of \$24,556,186, or 79.5% of the total fixed asset value. The total replacement value was estimated at \$45,692,495.

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Other facilities in the County, such as ski areas or locations that hold concerts, sporting events, and other events that attract large numbers of people, may also be at higher risk due to concentrations of people.

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

Assessing the vulnerability of Grand County to disaster also involves inventorying the natural, historic, 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 Grand County, including wetlands, endangered species, and imperiled plant communities.

### **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. According to the Colorado Natural Heritage Program website, the National Wetland Inventory has mapped 20,391 acres of wetland in Grand County, though a large portion of the County has not been mapped yet.

## 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). 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 endangered within the foreseeable future throughout all or a significant portion of its range. Both endangered and threatened species are protected by law and future hazard mitigation projects are subject to these laws.

According to the U.S. Fish and Wildlife Service, as of July, 2020, there are 12 federal endangered, threatened, or candidate species in Grand County. These species are listed in Table 3.23 along with 11 State listed species, overlapping the USFWS list. Since the 2015 HMP update, 15 rare species have been removed as endangered or threatened, including the Bald Eagle.

**Table 3.23. Select List of Rare Species Found in Grand County**

Common Name	Scientific Name	Type of Species	Status
Bonytail chub*	<i>Gila elegans</i>	Fish	Federal/State Endangered
Canada lynx	<i>Lynx canadensis</i>	Mammal	Federal/State Threatened
Colorado pikeminnow*	<i>Ptychocheilus lucius</i>	Fish	Federal/State Endangered
Greenback Cutthroat trout**	<i>Oncorhynchus clarki Stomias</i>	Fish	Federal/State Threatened
Humpback chub*	<i>Gila cypha</i>	Fish	Federal/State Endangered
Mexican Spotted Owl	<i>Strix occidentalis lucida</i>	Bird	Federal Threatened
Osterhout milkvetch	<i>Astragalus osterhoutii</i>	Plant	Federal/State Endangered
Penland beardtongue	<i>Penstemon penlandii</i>	Plant	Federal/State Endangered
Razorback sucker*	<i>Xyrauchen texanus</i>	Fish	Federal/State Endangered
Uncompahgre fritillary butterfly	<i>Boloria acrocneuma</i>	Insect	Federal/State Endangered
Western prairie fringed Orchid	<i>Platanthera praeclara</i>	Plant	Federal Threatened
Wolverine	<i>Gulo gulo luscus</i>	Mammal	State Proposed Threatened
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	Bird	Federal/State Threatened

Source: Endangered, Threatened, Proposed and Candidate Species by County (June 2018), U.S. Fish and Wildlife Service Mountain-Prairie Region, <https://ecos.fws.gov/ecp0/reports/species-by-current-range-county?fips=08049>

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

\*\* Recent genetic tests identified cutthroat population as GB lineage, therefore, consultation is an interim measure until genetic and taxonomic issues are resolved.

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## Imperiled Natural Plant Communities

According to the Colorado Natural Heritage Program, the following natural plants in Grand County have been identified as critically imperiled, imperiled, or imperiled/rare or uncommon:

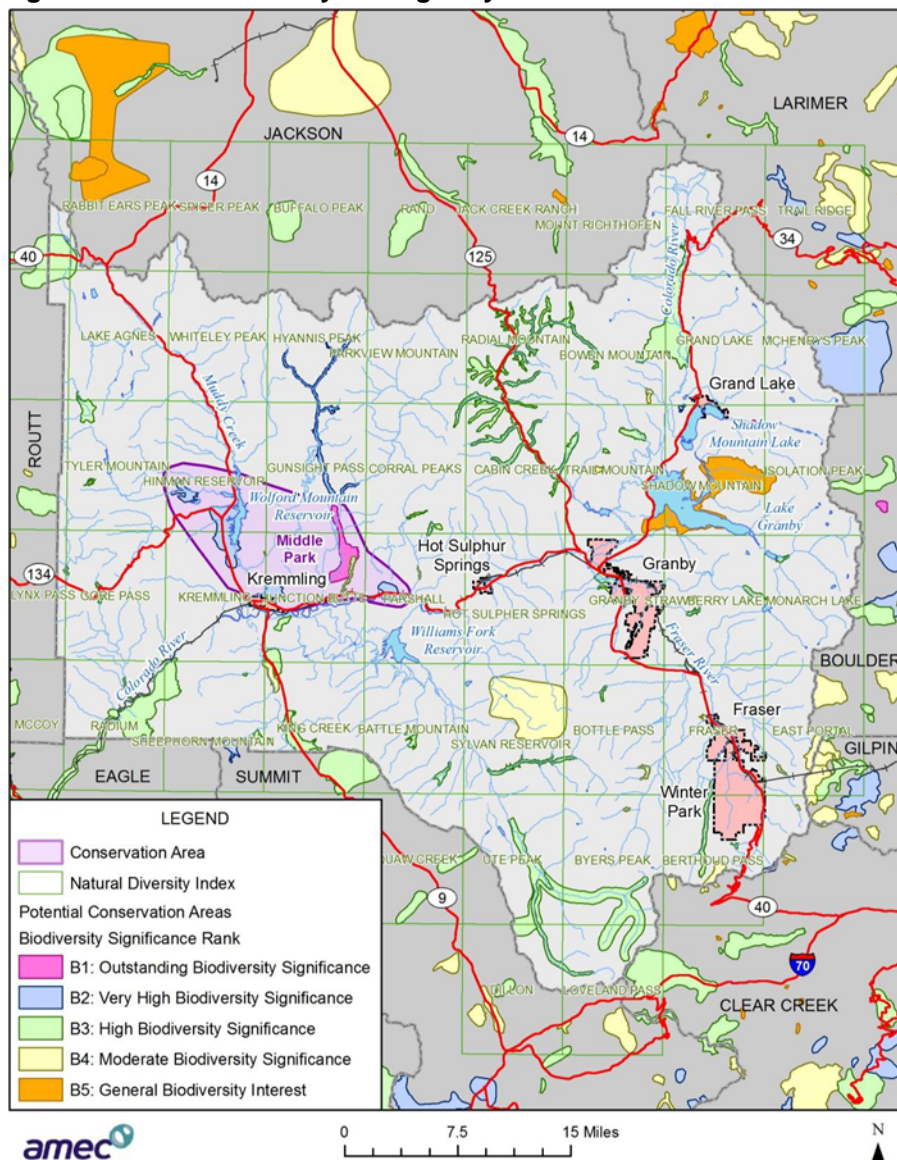
- Alpine meadows
- American Mannagrass
- Aspen Forests
- Booth's Willow/Mesic Forb
- Bulrush
- Coniferous Wetland Forests
- Cottonwood Riparian Forests
- Diamondleaf Willow/Beaked Sedge
- Engelmann Spruce/White Marsh Marigold
- Geyer's Willow/Mesic Graminoid
- Lower Montane Willow Carrs
- Mixed Foothill Shrublands
- Mixed Mountain Shrublands
- Montane Grasslands
- Montane Riparian Forest
- Montane Riparian Meadow
- Montane Riparian Shrubland
- Montane Riparian Willow Carr
- Montane Wet Meadows
- Montane Wetland
- Montane Willow Carr
- Narrowleaf Cottonwood/Mixed Willows Montane Riparian Forest
- Riparian Willow Carr
- Sagebrush Bottomland Shrublands
- Subalpine Riparian Shrubland
- Subalpine Riparian Willow Carr
- Thinleaf Alder/Mesic Forb Riparian Shrubland
- Thinleaf Alder-Mixed Willow Species
- Thinleaf Alder-Red-osier Dogwood Riparian Shrubland
- Timberline Forests
- Western Slope Grasslands
- Western Slope Sagebrush Shrublands
- Wet Meadow
- Xeric Western Slope Pinyon-Juniper Woodlands

<https://cnhp.colostate.edu/projects/county-survey-reports/#Grand> To view the full report from 2006:  
[https://cnhp.colostate.edu/wp-content/uploads/download/documents/2006/GRAND\\_FINAL\\_REPORT05\\_2006.pdf](https://cnhp.colostate.edu/wp-content/uploads/download/documents/2006/GRAND_FINAL_REPORT05_2006.pdf)

## Ecologically Sensitive Areas

Figure 3.38 is a map of ecologically sensitive areas that displays the areas in Grand County where threatened and endangered species and imperiled natural plant communities are most likely to be found. The map also shows statewide network of conservation areas (NCA) identified by the Colorado Natural Heritage Program that are located in Grand County. An NCA may represent a landscape area that encompasses potential conservation areas that share similar species or natural communities and ecological processes. It may also represent a mostly intact, lightly fragmented landscape that supports wide-ranging species and large scale disturbances and include unoccupied or unsurveyed areas that demonstrate the connectivity of the landscape. The only currently designated NCA in Grand County is Middle Park, which includes part of Kremmling and the Wolford Mountain Reservoir.

**Figure 3.38. Grand County Ecologically Sensitive Areas**



## Historical and Cultural Resources

Several national and state historic inventories were reviewed to identify historic and cultural assets in Grand County:

- 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 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 3.24 lists the properties and districts in Grand County that are on the Colorado State Register of Historic Properties. Those properties that are also on the National Register of Historic Places are indicated with an asterisk.

**Table 3.24. Grand County Historic Properties/Districts in State and National Registers**

Property Name	City	Location	Date Listed
The Barger Gulch Locality B*	Kremmling	Address restricted (arch dig)	3/25/2009
Byers Peak Ranch	Fraser	1102 St. Louis Creek Rd	3/12/2018
Cozens Ranch House*	Fraser	State Highway 40	6/9/1988
Denver and Rio Grande Railroad snowplow car AX- 044 (1918)	Hot Sulphur Springs	110 Byers Ave.	6/10/1998
Dutchtown*	Grand Lake	Mining settlement in Never Summer Mountains	1/29/1988
E.C. Yust Homestead*	Kremmling	Off State Hwy 9, S/of Kremmling	10/29/1982
East Inlet Hiking Trail* (10.6M)	Grand Lake	RMNP-Grand Lake	2/28/2005
Grand County 1897 Jail**	HS Springs	GRCO Museum Complex	
Grand County Museum Building Complex**	HS Springs	110 E. Byers Avenue	
Grand Lake Community House	Grand Lake	1025 Grand Avenue	8/11/1993
Grand Lake Lodge*	Grand Lake	15500 U.S. Highway 34	7/22/1993
Grand River Ditch/Specimen Ditch*	Grand Lake	North of Grand Lake	9/29/1976
Greenwood Lodge*	Grand Lake	161 County Road 451	11/29/2010
Holzwarth Historic District*	Grand Lake	N. of Grand Lake - Trail Ridge Rd	12/2/1977

Property Name	City	Location	Date Listed
Kauffman House*	Grand Lake	Pitkin and Lake Ave.	11/21/1974
Little Buckaroo Ranch Barn*	Grand Lake	20631 Trail Ridge Rd, RMNP	7/8/2009
Lulu City Site*	Grand Lake	North of, on Trail Ridge Rd	9/14/1977
McElroy Barn	Kremmling	204 4 <sup>th</sup> St.	12/9/1992
Milner Pass Road Camp Mess Hall and House*	Grand Lake	RMNP-Grand Lake	7/20/1987
North Inlet Trail*	Grand Lake	Along North Inlet and Hallett Creek to Flattop Mtn, RMNP	3/5/2008
Rollinsville and Middle Park Wagon Road – Denver Northwestern and Pacific Railway Hill Route Historic District/Moffat Road*	Winter Park	Rollinsville to Winter Park	9/30/1980
Shadow Mountain Lookout*	Grand Lake	S/E of Grand Lake, RMNP	8/2/1978
Shadow Mountain Trail*	Grand Lake	East side of Shadow Mtn Lake, RMNP	3/5/2008
Smith-Eslick Cottage Camp Building	Grand Lake	729 Lake Avenue	6/30/2011
Timber Creek Campground Comfort Station No. 245*	Grand Lake	RMNP-Grand Lake	1/29/1988
Timber Creek Campground Comfort Station No. 246*	Grand Lake	RMNP-Grand Lake	1/29/1988
Timber Creek Campground Comfort Station No. 247*	Grand Lake	RMNP-Grand Lake	1/29/1988
Timber Creek Road Camp Barn*	Grand Lake	RMNP-Grand Lake	7/30/1987
Tonahutu Creek Trail*	Grand Lake	RMNP, roughly along Tonahutu Creek to Flattop Mountain	3/5/2008
Trail Ridge Road*	Grand Lake	RMNP-Grand Lake	11/14/1984

Source: [https://en.wikipedia.org/wiki/National\\_Register\\_of\\_Historic\\_Places\\_listings\\_in\\_Grand\\_County,\\_Colorado](https://en.wikipedia.org/wiki/National_Register_of_Historic_Places_listings_in_Grand_County,_Colorado)

\*On both the Colorado State Register of Historic Properties and the National Register of Historic Places.

\*\*Historical significance of at least 50 years, but only historical to Grand County.

RMNP = Rocky Mountain National Park

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.

## Economic Assets

Economic assets at risk may include major employers or primary economic sectors, such as, agriculture, whose losses or inoperability would have severe impacts on the community and its ability to recover from disaster. After a disaster, economic vitality is the engine that drives recovery. Every community has a specific set of economic drivers, which are important to understand when planning ahead to reduce disaster impacts to the economy. When major



employers are unable to return to normal operations, impacts ripple throughout the community. Table 3.25 lists the top employers in Grand County by district.

**Table 3.25. Top Employers in Grand County by District**

<b>Name</b>
<b>District 1 Winter Park/Fraser</b>
Alterra/Winter Park Resort
Devils Thumb Resort
YMCA of the Rockies
Town of Winter Park
<b>District 2 Granby/Grand Lake</b>
East Grand School District
Granby Ranch Resort
City Market
Middle Park Hospital
<b>District 3 Kremmling/Hot Sulphur Springs</b>
Grand County Government
West Grand School District
Kremmling Memorial Hospital

Source: Grand County Chambers of Commerce for each district and Colorado LMI Gateway

It is evident by the information presented in Table 3.25 that several of the County’s largest employers are involved in the ski/tourism industry. A natural hazard, such as a drought or pandemic, could severely impact the industry as well as the County’s economy (businesses).

### **3.3.3 Vulnerability by Hazard**

This section describes overall vulnerability and identifies structures and estimates potential losses to buildings, infrastructure, and critical facilities located in identified hazard areas. This assessment was limited to the hazards that were considered moderate or high in planning significance, based on HMPC input and the hazard profiles.

This assessment is also limited by the data available for the hazards. The methods of analysis vary by hazard type and data available. Many of the identified hazards, particularly weather related hazards, affect the entire planning area, and specific hazards areas cannot be mapped geographically. For these hazards, which include drought, lightning, and winter weather, vulnerability is mainly discussed in qualitative terms because data on potential losses to structures is not available. Geographic hazard areas can be mapped for the following identified hazards: dam failure; earthquake; flood; landslide, mudflow/debris flow, and rock fall; and wildfire.

#### **Avalanche**

Grand County is highly vulnerable to avalanche-related injuries and fatalities due to the major ski areas located in the County and the high recreational use of backcountry areas. Thousands of people are exposed to avalanche risk in Grand County every winter and spring. Motorists along

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highways are also at risk of injury and death due to avalanches, which also cause road and highway closures. Seven people died in avalanches in Grand County between 2005 and 2010. This averages out to 1.4 avalanche-related deaths per year in Grand County. Road closures and the associated economic losses are another impact of avalanches. The Town of Winter Park' economy is impacted whenever Highway 40 is closed due to avalanche, losing roughly \$100,000 for each 24 hour period the road is closed. Road closures due to avalanches on Berthoud Pass and Highway 40 occur an estimated 4 times a year according to the Town of Winter Park.

CDOT has been using automated avalanche control measures on Berthoud Pass such as preemptively triggering avalanches using WWII howitzers to launch missiles or using helicopters to drop explosives. This triggers controlled, lower-intensity avalanches.

### ***Existing Development***

The County does not have any comprehensive information or mapping of avalanche hazard areas, so there is not data available to identify specific structures at risk or estimate potential losses to structures.

### ***Future Development***

The Grand County Master Plan encourages development that minimizes the impact on environmentally sensitive areas, such as those with steep slopes, but there is no avalanche hazard identified or mapped. There are no guidelines related to utility lines in avalanche hazard areas.

### **Dam Failure**

Although there is no specific evidence to indicate the likelihood of dam failure within the County, there are ten high hazard and sixteen significant hazard dams located in Grand County. A dam failure could result in impacts greater than the 100-year flood event and could be catastrophic. Vulnerability to dam failure is highest in Granby which lies downstream of several high hazard dams and dikes. A catastrophic dam failure would challenge local response capabilities and require evacuations downstream to save lives. Impacts to life safety will depend on the warning time available and the resources to notify and evacuate the public. Major loss of life could result as well as potentially catastrophic effects to roads, bridges, and homes. Associated water quality and health concerns could also be an issue.

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### ***Existing Development***

Dams in the County are monitored frequently by irrigators and dam owners and operators. The Denver Daily Water Reports monitor capacity and use of the dams, and EAPs are exercised regularly. These resources can help the County protect existing development downstream of the multitude of dams in the planning area.

Each dam owner is responsible for having an EAP and inundation map for their facility. Due to security concerns and the sensitive nature of these documents, the EAPs and inundation maps are not available for public inspection or release. Therefore, structures and potential loss estimates in these areas could not be calculated.

### ***Future Development***

Flooding due to a dam failure event is likely to exceed the special flood hazard areas regulated through local floodplain ordinances. The County and towns should consider the dam failure hazard when permitting development downstream of the ten high hazard and sixteen significant hazard dams. Low hazard dams could become significant or high hazard dams if development occurs below them. Catastrophic flooding due to a failure of Dillon Reservoir or Green Mountain could also impact Grand County. The County should also continue to monitor Ritschard Dam due to the rapid settling issue.

### ***Disease Outbreak***

Disease outbreaks affect people, the economy, and business functions rather than structures, making it difficult to estimate the impact of this hazard on existing or future development. Primary damages or losses associated with an outbreak or outbreaks could include economic losses associated with work absences or a decrease in productivity due to disease, human losses associated with disease and fatalities in the community, adverse impacts on hospitals and other health care facilities and staff, and the fear and anxiety associated with a severe outbreak. High public anxiety can cause behaviors such as panic buying at grocery stores, which was evident during the first few months of the 2020 Covid-19 Pandemic.

Data from CDPHE indicates that roughly 25 cases of disease occurrence are recorded in Grand County each year. Severity in terms of illnesses, fatalities, economic losses, etc. is highly dependent on which diseases occur and how widely and quickly they spread.

### ***Drought***

The majority of past disaster declarations are related to drought, which indicates the County's vulnerability to this hazard. Ongoing drought has left areas more prone to beetle kill and

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associated wildfires. Other past impacts of drought have included degradation of air quality due to dust, reduction of tourism and recreation activities, and damage to the ranching economy.. The economy of Grand County, which is based upon the ski industry and other outdoor recreation and tourism, is very vulnerable to drought conditions.

The 2010 Colorado Drought Plan’s drought vulnerability study identifies Grand County as having relatively high vulnerability to drought in the recreation sector. The recreation sector includes skiing, wildlife viewing, hunting, fishing, camping, golfing, boating, and rafting. Among these factors, Grand County had the highest vulnerability score in skiing. A high score implies a distinct recreational draw to the County that is significant compared to the population. Additionally, Grand County may not have sufficient adaptive capacities or economic diversification to decrease its vulnerability to drought. Adaptive capacities include snowmaking in ski resorts. However, snow generation can require millions of gallons of water annually. Ski resorts have rights for this water but their ability to divert water can be limited by instream flow rights during drought. The impact to specific resorts will vary by location and depending on where diversions occur relative to other rights. Some resorts may not be impacted at all during drought but can still be hurt by public perception of ski conditions. A widely publicized drought can keep visitation down regardless of actual conditions.

A decline in tourism and agricultural revenues could also impact the rest of the County’s economy. According to the 2010 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, 306). The study indicates that Grand County has a high vulnerability in the socioeconomic sector, largely due to the lack of economic diversity and tourism economy base.

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. Significant impacts from drought will be on agriculture, wildland fire protection, municipal usage, commerce, tourism and ski industry, and wildlife preservation. Grand County’s economy is largely dependent on tourism, recreation and, to a lesser extent, agriculture. A lack of precipitation can impact skiing, fishing, hunting and more. Drought can also exacerbate the potential occurrence and intensity of wildland fires. The wildland areas of the County have seen an increase in dry fuels, beetle kill and some loss of tourism revenue during the ski season. Water supply issues for domestic needs also present an issue given the County’s lack of water rights and ownership.

### ***Existing Development***

Drought normally does not impact structures and can be difficult to identify specific hazard areas. Data is not available to estimate potential losses to structures in identified hazard areas.

Many of the towns use public education efforts to encourage water conservation during the summer months.

### **Future Development**

As population grows, so do the water needs for household, commercial, industrial, recreation, and agricultural uses. Vulnerability to drought will increase with these growing demands on existing water supplies. Future water use planning in Colorado is complex and has to account for increasing population size as well as the potential impacts of climate change.

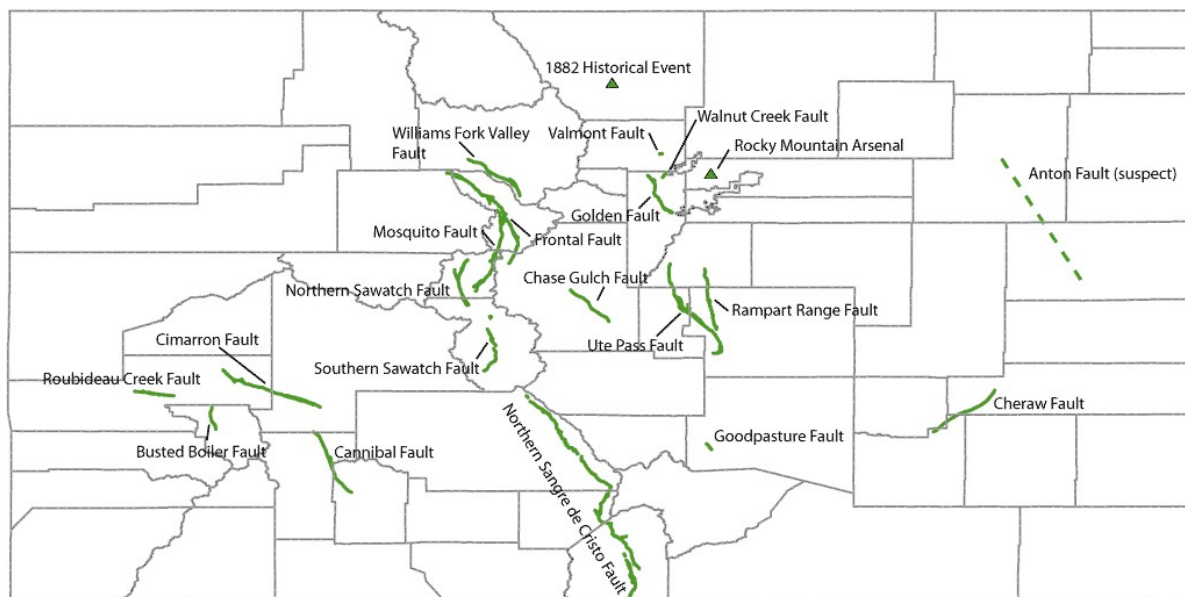
### **Earthquake**

Past impacts due to earthquakes have been minimal and potential magnitude and severity is believed to be low, so the County’s overall vulnerability to earthquake is low. Data on Colorado’s earthquake hazard is limited.

### **Existing Development**

The Colorado Geological Survey (CGS) ran a series of deterministic scenarios for selected Colorado faults using HAZUS-MH to assess potential economic and social losses due to earthquake activity in Colorado. Deterministic analyses provide “what if” scenarios (e.g., determines what would happen if an earthquake of a certain magnitude occurred on a particular fault). The earthquake magnitudes used for each fault were the “maximum credible earthquake” as determined by the U.S. Geological Survey. The faults analyzed for Grand County were Frontal, Mosquito, Northern Sawatch, and Williams Fork (see Figure 3.39). Table 3.26 summarizes the results for Grand County.

**Figure 3.39. Faults Analyzed for Potential Losses, Statewide**



Source: Earthquake Evaluation Report

**Table 3.26. Potential Earthquake Losses in Grand County by Fault**

Fault/Magnitude	Fatalities	Total Economic Loss (\$)*	Loss Ratio (%)**
<b>Frontal</b>			
M7.0	0	52.5 million	1.6
M5.5	0	1.1 million	0.03
<b>Mosquito</b>			
M7.0	0	16.9 million	0.5
M5.5	0	0.2 million	0.0
<b>Northern Sawatch</b>			
M7.0	0	3.6 million	0.1
<b>Williams Fork</b>			
M6.75	1	77.3 million	2.4
M6.5	0	45.2 million	1.4
M6.0	0	13.1 million	0.4
M5.5	0	3.8 million	0.1

Source: Earthquake Evaluation Report

\*Direct and indirect losses

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

The results of the statewide analysis indicate that Grand County is not one of the top counties in any category, including most damaging faults, total direct economic loss, highest loss ratio, or counties at greatest risk (high monetary loss, casualties, and loss ratios). This is consistent with prior estimates that earthquake is a relatively low significance hazard in Grand County. The greatest losses would likely result from a M6.75 earthquake or greater on the Williams Fork fault, which is predicted to cause one fatality and millions of dollars in damage.

Specific details about the earthquake potential in Grand County and Colorado in general remain largely unknown. A 2,500 year probabilistic HAZUS earthquake scenario was performed as part of the 2013 HMP update and the results can be referenced below in Table 3.27. 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 6% of the total number of buildings in the County to be affected, with roughly 750 buildings experiencing at least moderate damage. Total economic impacts could exceed \$59.68 million, but casualty estimates are relatively small. 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 3.27. HAZUS-MH Earthquake Loss Estimation 2.500-Year Scenario Results**

Type of Impact	Impacts to County
Total Buildings Damaged	Slight: 1,529 Moderate: 654 Extensive: 92 Complete: 4
Building and Income Related Losses	\$33.22 million 72% of damage related to residential structures 23% of loss due to business interruption

Type of Impact	Impacts to County
Total Economic Losses (includes building, income and lifeline losses)	\$59.68 million
Casualties (based on 2 a.m. time of occurrence)	Not requiring hospitalization: 4 Requiring hospitalization: 0 Life threatening: 0 Fatalities: 0
Casualties (based on 2 p.m. time of occurrence)	Not requiring hospitalization: 4 Requiring hospitalization: 1 Life threatening: 0 Fatalities: 0
Casualties (based on 5 p.m. time of occurrence)	Not requiring hospitalization: 4 Requiring hospitalization: 0 Life threatening: 0 Fatalities: 0
Damage to Transportation and Utility Systems and Essential Facilities	Damage to utility pipeline systems include 46 leaks and 11 breaks for potable water, 23 leaks and 6 breaks for waste water, 8 leaks and 2 breaks for natural gas, and no leaks or breaks for oil. No expected damage shown to essential facilities.
Displaced Households	8
Shelter Requirements	4

Source: AMEC and HAZUS-MH ver. 2.0: Global Summary Report

Historic buildings constructed of unreinforced masonry are most vulnerable to seismic ground shaking. Other potential impacts of an earthquake in Grand County could include damage to infrastructure networks, such as water, power, communication, and transportation lines. Secondary impacts could include landslides or dam failure in a strong event.

### ***Future Development***

Building codes substantially reduce the costs of damage to future structures from earthquakes.

### **Flood**

Flood hazards affect most of the communities in the County and will continue to occur in the future. They can be limited to critical in their magnitude, depending on where in the County they occur, causing injuries and damaging property and infrastructure.

### ***Existing Development***

Potential losses to Grand County from flooding were analyzed by using the effective DFIRM, where available, with parcel data and building address point data provided by the Grand County Assessor's Office. Below is a discussion of the methodology, including limitations, assumptions, and observed trends of the methodology's results.

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A flood vulnerability assessment was performed for the entire County using GIS during 2013. Grand County's effective DFIRM was used as the hazard layer where available, which was limited to the incorporated municipalities (all except Kremmling) with a mapped flood hazard area. DFIRM is FEMA's flood risk mapping that depicts the 1% annual chance (100-year) and, in some locations, the 0.2% annual chance (500-year) flood events. Flood zones A, AE, AH and AO are variations of the 1% annual chance event. The "Shaded Zone X" represents the 0.2% annual chance hazard zone on the DFIRM. The effective DFIRM for the municipalities, dated January 2, 2008, was the best available flood hazard data. Since the DFIRM extent does not include the unincorporated County a 100-year floodplain generated with HAZUS by FEMA was used to represent the approximate flood hazard in the unincorporated areas. Note that this data is for loss estimation purposes only and mainly covers the northern half of the county and was not available for the southern half and much of the lower Colorado River. However the area covered by DFIRM or HAZUS floodplains addresses the areas most likely to have development.

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 (or HAZUS where appropriate) 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 the points were based on the assessor's data and summed for the unincorporated county and for the municipalities.

Results of the overlay analysis area shown in Table 3.28 and Table 3.29, and are summarized by jurisdiction. More detail on the types of buildings impacted is provided in the appropriate jurisdictional annexes. Occupancy type refers to the land use of the parcel and includes residential, commercial, agricultural, industrial, government, mixed use, open space, backcountry, and other. Contents values were estimated as a percentage of building value based on their occupancy type, using FEMA/HAZUS guidance on 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 25% loss factor was applied to the totals, also based on FEMA depth damage functions, assuming a 2 foot deep flood.

There are 199 improved parcels in the 1% annual chance flood zone. The total building exposure (actual building value plus content value estimate) in that flood zone is \$67 million. Assuming a 2 foot deep flood, losses could be on the order of \$16.8 million from the 1% annual chance flood event in Grand County. The countywide loss ratio (the ratio of the building value at risk divided by the overall county building value) is 1.80%.

Based on this analysis, the greatest losses in terms of the number of improved parcels impacted from a 1% annual chance flood would occur in unincorporated Grand County (78), followed by



Winter Park (53). The unincorporated County would have the highest potential dollar losses. Countywide, losses could exceed \$16.8 million. Kremmling is not expected to suffer any losses from a 100-year flood.

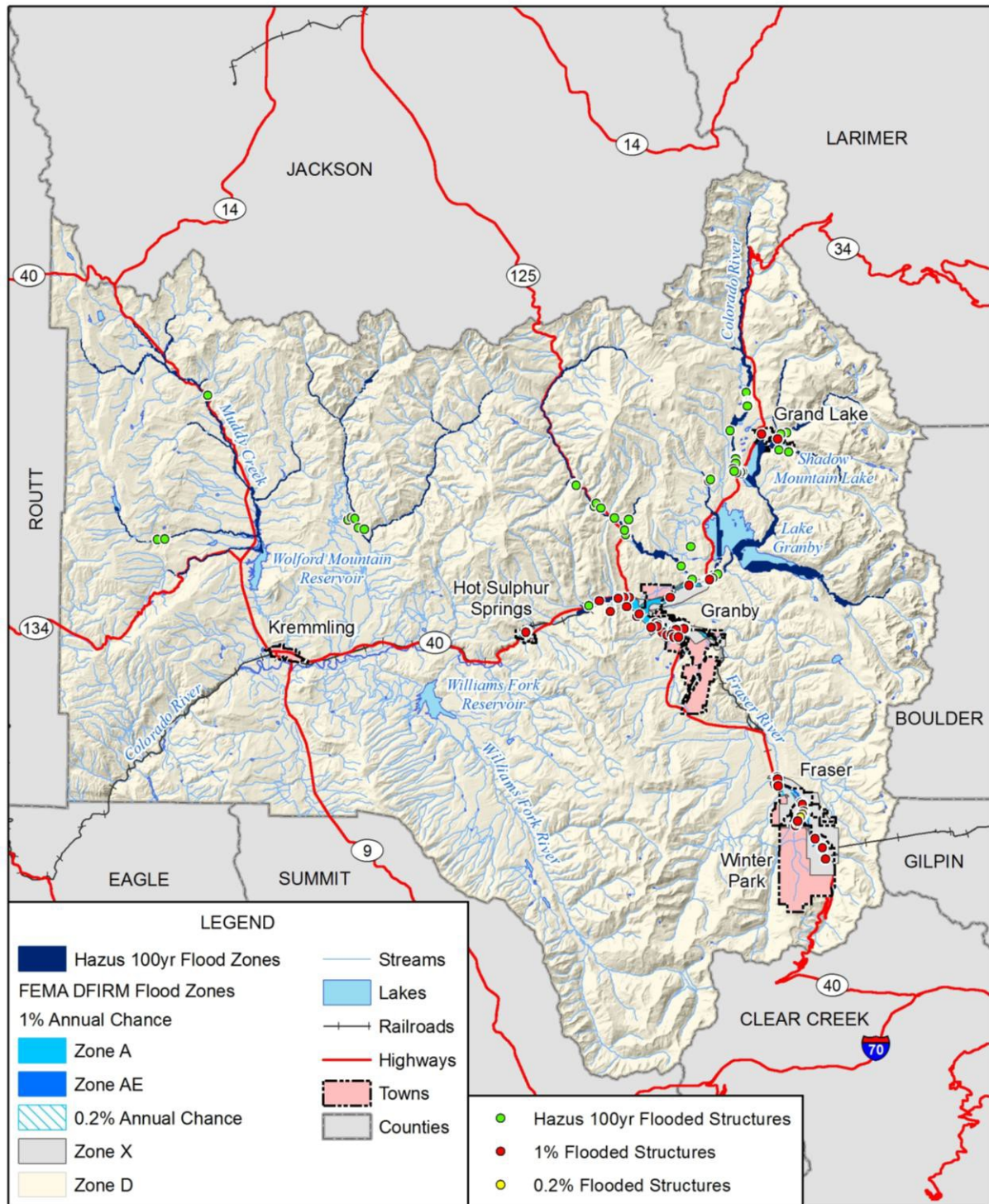
**Table 3.28. Summary of 1% Annual Chance Flood Building Exposure and Potential Loss by Jurisdiction**

Jurisdiction	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Loss Estimate	Loss Ratio
Fraser	36	\$5,507,320	\$2,798,695	\$8,306,015	\$2,076,504	0.5%
Granby	19	\$3,186,370	\$2,264,025	\$5,450,395	\$1,362,599	0.3%
Grand Lake	11	\$2,737,170	\$1,460,250	\$4,197,420	\$1,049,355	0.3%
Hot Sulphur Springs	2	\$351,090	\$175,545	\$526,635	\$131,659	0.2%
Kremmling	-	-	-	-	-	-
Winter Park	53	\$9,199,180	\$4,793,240	\$13,992,420	\$3,498,105	0.3%
Unincorporated Areas	78	\$20,865,710	\$13,910,105	\$34,775,815	\$8,693,954	0.2%
<b>Total</b>	<b>199</b>	<b>\$41,846,840</b>	<b>\$25,401,860</b>	<b>\$67,248,700</b>	<b>\$16,812,176</b>	<b>1.80%</b>

**Table 3.29. Summary of 0.2% Annual Chance Flood Building Exposure and Potential Loss by Jurisdiction**

Jurisdiction	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Loss Estimate	Loss Ratio
Fraser	-	-	-	-	-	-
Granby	-	-	-	-	-	-
Grand Lake	-	-	-	-	-	-
Hot Sulphur Springs	-	-	-	-	-	-
Kremmling	-	-	-	-	-	-
Winter Park	30	\$5,493,000	\$3,673,675	\$9,166,675	\$2,291,669	0.2%
Unincorporated Areas	-	-	-	-	-	-
<b>Total</b>	<b>30</b>	<b>\$5,493,000</b>	<b>\$3,673,675</b>	<b>\$9,166,675</b>	<b>\$2,291,669</b>	<b>0.2%</b>
<b>Total 1% &amp; 0.2% Zones</b>	<b>229</b>	<b>\$47,339,840</b>	<b>\$29,075,535</b>	<b>\$76,415,375</b>	<b>\$19,103,845</b>	<b>2.00%</b>

**Figure 3.40. Grand County Effective DFIRM and Flood Prone Properties**



0 7.5 15 Miles



Map compiled 4/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT, Hazus-MH MR2,  
 FEMA DIFRM 1/2/2008

There are 30 additional improved parcels in the 0.2% annual chance flood zone (all located in Winter Park) with a total building exposure (actual building value plus content value estimate) of \$9,166,675. Table 3.29 shows the combined loss estimate from the 1% annual chance and the 0.2% annual chance flood events. The total building exposure in those 2 flood zones is \$76.4 million. Assuming a 2 foot flood depth, there could be roughly \$2.3 million in losses from the 0.2% annual chance flood event. The countywide loss ratio for this flood event is 0.2%.

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 population exposed to the flood hazard was estimated by applying an average household size factor (based on 2010 U.S, Census estimates for each jurisdiction) to the number of improved parcels identified in the flood hazard areas. Based on this estimate, a 1% annual chance flood would displace 348 people and a 0.2% flood would displace an additional 45 people. Table 3.30 summarizes the results of this analysis.

**Table 3.30. Population at Risk to 1% and 0.2% Annual Chance Floods**

Community	Average Household Size*	Parcel Count	Population at Risk
<b>1% Annual Chance Flood</b>			
Fraser	2.26	34	77
Granby	2.40	12	29
Grand Lake	1.96	10	20
Hot Sulphur Springs	2.49	2	5
Kremmling	2.35	-	-
Winter Park	2.05	50	103
<b>Unincorporated</b>	<b>2.26</b>	<b>51</b>	<b>115</b>
<b>Total</b>		<b>159</b>	<b>348</b>
<b>0.2% Annual Chance Flood</b>			
Winter Park	2.05	22	45
<b>Total</b>		<b>22</b>	<b>45</b>
<b>Grand Total</b>		<b>181</b>	<b>393</b>

An analysis of critical facilities in flood zones based on available GIS data indicated two facilities to be potentially at-risk: the Visitors Center in Fraser and the Lodge at Sunspot in Winter Park. Both facilities are at risk to the 1% annual chance flood.

## National Flood Insurance Program Policies Analysis

Table 3.31 provides detailed information on National Flood Insurance Program (NFIP) policies in participating jurisdictions in Grand County. The County is not a participant in the NFIP and has been sanctioned since 1/2/2009. The Town of Hot Sulphur Springs has an identified Special Flood Hazard Area but does not participate in the NFIP and has been sanctioned since 11/27/1975. The 2008 Flood Insurance Study for Grand County notes that the Town of Kremmling is not flood prone, has no Special Flood Hazard Areas identified, and thus is not required to participate in the NFIP. Currently none of the communities in Grand County participate in the Community Rating System (CRS) program.

**Table 3.31. Community Participation in the NFIP**

Jurisdiction	Date Joined	Effective FIRM Date	Policies in Force	Insurance in Force (\$)	Number of Claims Since 1978	Claims Totals (\$)
Town of Fraser	1/2/08	1/2/2008	15	\$3,359,800	0	\$0
Town of Granby	5/15/08	1/2/2008	3	\$980,000	1	\$0
Town of Grand Lake	1/1/86	1/2/2008	10	\$2,818,400	0	\$0
Hot Sulphur Springs	-	1/2/2008	-	\$0	0	\$0
Town of Winter Park	11/15/85	1/2/2008	115	\$19,528,100	1	\$5,960

Source: National Flood Insurance Program 2013. Note: for 2020 update, NFIP did not reply when asked for updated information.

NFIP insurance data indicates that as of April, 2013, there were 143 flood insurance policies in force in the County with \$26,686,300 of coverage. There have been 2 historical claims for flood losses totaling \$5,960.

There were no repetitive losses in Grand County at the time of this plan's development.

### Future Development

The risk of flooding to future development should be minimized by the floodplain regulations of the County and the floodplain management programs of its NFIP participating municipalities, if properly enforced. Risk could be further reduced by strengthening floodplain ordinances and floodplain management programs beyond minimum NFIP requirements to align with the CWCB Statewide floodplain rule, which will become effective in January 2014.

### Landslide, Mudflow/Debris Fall, Rock Fall

In Grand County, vulnerability to landslides primarily occurs along roadways, where the hazard could cause deaths or injuries. According to the HMPC, problem areas for landslide and rockfall include Byers Canyon, Highway 125, Highway 40 at Windy Gap, the landfill on Highway 34, and CR 1 near Inspiration Point. Highway 40 and the Union Pacific railroad pass through several canyons where rockslides occur annually. A burn area on the west side of Sheep Mountain was also identified as a potential debris flow hazard. Issues also exist in avalanche chutes and in Gore Canyon where there is potential for a train derailment. Road closures due to landslide events also affect the County economically. Landslides in neighboring counties along

major highways that carry traffic into Grand County also impact the County. Structures and people in them are also at risk to landslide in Grand County.

### **Existing Development**

Potential losses for landslide in Grand County were estimated using County GIS and assessor’s data and were examined in terms of values and critical facilities at risk. GIS was used to create a centroid, or point, representing the center of each parcel polygon, which was overlaid on the landslide hazard polygons. The assessor’s land and improved values for each parcel are linked to the parcel centroids. For the purposes of this analysis, if the parcel’s centroid intersects the landslide hazard polygon, that parcel is assumed to be at risk to the landslide. Values were summed and sorted by landslide hazard zone. Additional landslide hazard analysis was completed using the more comprehensive USGS landslide deposits layer during the 2013 update. The results of the overlay analysis are presented in Table 3.32, and more detailed tables with the property types are provided in the jurisdictional annexes. While the results indicate that the most substantial amount of exposure is located in the unincorporated areas of the County, a more detailed, site-specific analysis would need to be conducted to further assess potential risk.

**Table 3.32. Building Exposure to Landslide by Jurisdiction**

<b>Community</b>	<b>Population 2010</b>	<b>Improved Parcel Count</b>	<b>Land Value</b>	<b>Improved Value</b>	<b>Estimated Content Value</b>	<b>Total Structure Value*</b>
Fraser	0	0	\$108,740	\$0	\$0	\$0
Granby	29	12	\$612,620	\$4,270,770	\$2,135,385	\$6,406,155
Grand Lake	-	-	-	-	-	-
Hot Sulphur Springs	-	-	-	-	-	-
Kremmling	-	-	-	-	-	-
Winter Park	12	7	\$5,027,940	\$7,708,800	\$4,458,150	\$12,166,950
Unincorporated	540	307	\$39,841,460	\$59,399,500	\$39,400,315	\$98,799,815
<b>Total</b>	<b>581</b>	<b>326</b>	<b>\$45,590,760</b>	<b>\$71,379,070</b>	<b>\$45,993,850</b>	<b>\$117,372,920</b>

Source: Grand County GIS and Assessor’s Office (parcel data)

\*Value represents “improved structure value” and includes contents. Does not include land value.

There are four critical facilities at risk to landslides in Grand County, all located in unincorporated areas of the County. The facilities are listed in Table 3.33. A more detailed, site-specific analysis would need to be conducted to further assess potential risk.

**Table 3.33. Critical Facilities in Landslide Hazard Areas**

<b>Type</b>	<b>Name</b>	<b>Facility Count</b>
Bridge	County Road 10	1
Bridge	YCC Camp Road	1
Communications	Granby II/Murphy Site	1
School	Faith in Action Christian School	1
<b>Total</b>		<b>4</b>

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## **Future Development**

The severity of landslide problems is directly related to the extent of human activity in hazard areas. Adverse effects can be mitigated by early recognition and avoiding incompatible land uses in these areas or by corrective engineering. The mountainous topography of the County presents considerable constraints to development, most commonly in the form of steep sloped areas. These areas are vulnerable to disturbance and can become unstable. The County's Master Plan encourages development in or near the existing towns and away from environmentally sensitive areas such as those with steep slopes. This policy can help protect future development from being built in unstable areas.

## **Lightning**

Damaging lightning events are likely to occur and can be critical if a fatality occurs. Outdoor recreationists and others outside at high altitude during summer months are vulnerable to lightning. There is a concern about the impacts lightning can have on the County's power grid and information technology network. Failure of these systems would have cascading effects that would disrupt other critical infrastructure in the County, such as water treatment facilities. Damage to communications infrastructure has the potential to cause widespread impacts. There is also a concern about dry lightning during the summer months causing wildland fires.

Lightning can occur anywhere in Grand County, and it is not possible to identify specific hazard area. Data was not available to identify specific structures at risk or estimate potential losses to these structures.

## **Mountain Pine Beetle Infestation**

It is somewhat difficult to evaluate the vulnerability of existing and future development to Mountain Pine Beetle infestation. Although the Mountain Pine Beetle is unlikely to cause deaths or injuries or significant damage to property and infrastructures, it is killing millions of trees each year. The forest mortality resulting from this epidemic creates a number of direct and indirect hazards:

**Deadfall and Blowdown:** Approximately five years after mortality, the standing dead trees become markedly susceptible to falling and being blown down. This creates a hazard to lives and property near inhabited areas, travel corridors, and recreation areas.

**Powerline impingement:** The hazard to power lines from beetle impact forests merits specific attention. Power lines are dispersed throughout Colorado's forests, and the clearance around these lines is typically inadequate to address the threat of large scale mortality. Contact between power lines and trees has caused several fires in recent years and creates the potential for local power outages. It is noteworthy that a tree impinging on a powerline in Ohio in 2003 caused the largest electrical outage in United States history, directly impacting an estimated 50 million people and causing billions of dollars in economic losses. In 2010, a multi-forest environmental

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assessment paved the way to allow for clearance of hazardous trees around power lines, but the implementation schedules rest with the individual utility operators.

**Erosion:** The loss of the lodgepole pine overstory should not increase erosion in and of itself. Quite unlike the effects of fire, the ground cover provided by duff, forest litter, and the understory remains in place. In fact, the surface litter load increases as needles, limbs, and tree stems fall to the forest floor in the years following mortality. Impacted areas may see an increase in overall water runoff in the absence of the water uptake required by a mature forest (Kaufmann et al 2008). As lodgepole pine near ski runs are lost, wind scouring may become more pronounced on ski runs, requiring increased snow fencing and other mitigative efforts to prevent loss of cover.

**Hazardous fuels:** There is no doubt that the MPB epidemic will greatly increase the amount of dead biomass in lodgepole forests, but predictions that this translates into an immediately drastic increase in the fire hazard is an oversimplification. The cycle is nuanced and complex, and a variety of fuel profiles and fire concerns will emerge. Predicted changes in fuel loads and fire behavior are discussed in more detail in the following section on Probability of Future Occurrence and Conditions.

## **Severe Winter Weather**

### ***Existing Development***

In the alpine environment of Grand County, severe winter weather occurs several times every season. This hazard has been critical in its magnitude and severity in the past, most recently during March of 2020, where long-standing blizzard-like conditions caused closures on Berthoud Pass and the Highway 40 gate on the west end of Kremmling. Vulnerability is high along roadways and mountain passes, particularly on Highway 40 and Highway 9, where severe winter weather conditions may cause traffic related deaths and injuries and increase avalanche risk. Road closures due to winter weather conditions also restrict or prevent the movement of people and goods and services (including food and gas), which can be crippling during the high tourism season and create the need for emergency sheltering for travelers.

It is impossible to identify specific winter weather hazard areas within Grand County, and data was not available to identify specific structures at risk or estimate potential losses to these structures.

### ***Future Development***

Future residential or commercial buildings built to code should be able to withstand snow loads from severe winter storms. Population growth in the County and growth in visitors will increase problems with road, business, and school closures and increase the need for snow removal and emergency services related to severe winter weather events.

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## **Wildfire**

Vulnerabilities to wildfire include:

- Structures and private property
- Critical infrastructure such as power lines and roadways
- Key Resources such as medical facilities, schools, watersheds, reservoirs, and public buildings
- Tourism and habitat resources such as trails, ski resorts, dispersed recreation sites, viewsheds, and wildlife habitat

The highest potential for negative and even deadly impacts of wildland fire is in the WUI. Every fire season in the United States catastrophic losses from wildfire plague the WUI. Homes are lost, businesses are destroyed, community infrastructure is damaged, and, most tragically, lives may be lost.

### ***Existing Development***

The county is divided into 5 fire protection districts: East Grand, Granby, Grand (Granby), Grand Lake, Hot Sulphur Springs/Parshall, and Kremmling. Each district has a local Community Wildfire Protection Plan (CWPP) that evaluates the wildfire hazards and vulnerabilities within their jurisdictions. Vulnerability discussions from these documents are summarized below.

### ***Grand County CWPP***

The broader scope Grand County CWPP divides the county into three regions: Three Lakes (rated moderate to very high hazard), the Fraser Valley (moderate to very high hazard), and West Grand (low to high hazard). In the eastern areas of Three Lakes and the Fraser Valley, the landscape is dominated by beetle killed lodgepole pine while West Grand generally has lighter grass and brush fuels. While grass and shrub fuels can pose a significant fire hazard, the towns of Kremmling and Hot Sulphur Springs are surrounded by areas of these light and sparse fuels.

In addition to Kremmling and Hot Sulphur Springs, Grand County has four additional incorporated towns and three unincorporated towns. While the county CWPP does not assess the more than 950 subdivisions, it does evaluate the hazards to the towns (reference Table 3.34). Hazard ratings range from Winter Park and Grand Lake at high to very high hazard, down to Parshall and Kremmling at low hazard. It is worth noting that the majority of homes in the county are second homes or absentee owned, and some may lie outside of a fire protection district. The majority are within fire protection district boundaries.



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**Table 3.34. Grand County Community Wildfire Hazard Ratings**

<b>Hazard Rating</b>	<b>Community</b>
High to Very High	Winter Park
High	Grand Lake
Medium to High	Fraser Radium
Low to Medium	Tabernash Hot Sulphur Springs Granby
Low	Parshall Kremmling

In addition to the standard WUI, Grand County has other values vulnerable to damage from wildfires:

**Developed and High Valued Recreation Areas** - Winter Park/Mary Jane and Ski Granby Ranch have extensive infrastructure and buildings in the WUI. Additionally, the ability of the terrain to serve as viable ski runs can be put at risk by damage to the surrounding forest stands from wildfire. The County also has five Nordic ski areas including the Devils Thumb Ranch, Snow Mountain Ranch (YMCA of the Rockies), Granby Ranch, Latigo Ranch near Rabbit Ears Pass, and Grand Lake Touring Center near Rocky Mountain National Park.

**Critical Infrastructure** - Communication towers, power lines, and substations throughout the county can be vulnerable to wildfire. The most difficult and most important of these to protect are transmission power lines and remote mountaintop communication sites. As discussed in the Mountain Pine Beetle Hazard section, increased clearance around these lines and communication sites has been planned, but is primarily designed to provide clearance from hazard trees and not fire protection.

The Henderson Mill in the Williams Fork Valley and the associated mine (located just over the county line in Clear Creek County), are significant contributors to the local economy and have substantial infrastructural vulnerabilities to wildfire. These facilities have undertaken extensive wildfire planning and mitigation initiative on their property, and emergency planners can obtain further details by contacting their offices.

**Transportation Corridors** - US Highways 40 and 34 transect the county as do Colorado Highways 125 and 139. These are regular thoroughfares at the state and regional level and are susceptible to closure during wildfires, negatively impacting local traffic as well as visitor and tourist traffic which are essential to the county's economy.

***Hot Sulphur Springs-Parshall Fire Protection District #3 CWPP***

The Hot Sulphur Springs-Parshall CWPP planning area covers the Town of Hot Sulphur Springs, Parshall, the northern portion of the Copper Creek Subdivision, Aspen Canyon Ranch, Valentine,

and the southern portion of the Copper Creek Estates. Parshall, Hot Sulphur Springs, and the northern portion of Copper Creek lie within the FPD boundaries, but the other communities do not. The total population in the planning area is 1,205 as of the 2000 U.S. Census. Most of the planning area is designated as moderate to high risk, depending on fuel type, but Copper Creek and Copper Creek Estates are very vulnerable to wildfire. The Grand County CWPP ranked Parshall at low and Hot Sulphur Springs at low to moderate.

Values at risk include the two communities (Hot Sulphur Springs and Parshall), ranches, small groupings of homes, freestanding homes throughout the planning area, Hot Sulphur Springs Resort, Drowsy Water Guest Ranch, Aspen Canyon Resort, a variety of small businesses, churches, and county offices and facilities. Distribution lines for electricity and natural gas run through the planning area. Other important infrastructure at risk includes water diversion structures, communication sites, and bridges.

***Kremmling Fire Protection District CWPP***

The Kremmling CWPP covers the Town of Kremmling and seven residential WUI areas in and around the district. The Town of Kremmling, with a population of approximately 1,600, is not considered to be at direct risk of wildfire, but economic impacts and surrounding infrastructure are a concern.

**Table 3.35. Kremmling Fire Protection District Community Wildfire Hazard Ratings**

<b>Hazard Rating</b>	<b>Community</b>
Very High	Big Horn Park
	Grand River Ranch / Gorewood
	Lake Agnes
	Old Park / Gore Lakers
	Rabbit Ears Village
High	Big Valley Acres 1 & 2
	Troublesome Valley
Low	Kremmling

Infrastructure at risk includes communication sites at Grouse Mountain, Lawson Ridge, Wolford Mountain, and San Toy Mountain. There are three electrical substations that service the electrical transmission and distribution system in the area. Power lines are particularly difficult to protect from wildfire due to the geographic length of their exposure. Oil and gas leases are being developed in surrounding BLM lands. While drill pads and underground transmission pipelines tend to be relatively well protected from wildfire, man camps and gathering systems can be more vulnerable and require more detailed assessments and specific mitigation. Finally, while not an infrastructure at risk, this CWPP noted the lack of a water supply infrastructure throughout the district.

**Grand Lake Fire Protection District CWPP**

The Grand Lake CWPP recognizes WUI in terms of both home ignition zones (the area immediately around the home) and the 1.5 mi buffer, but feels WUI is conditional to each asset at risk. This plan divides the WUI into 3 zones and maps the entire area as high to very high hazard, consistent with the county plan. Specific communities have not been assessed in detail.

Grand Lake WUI Zones:

- North Zone- West of US Highway 34 and north of CR 466. Contains over 920 homes in two major subdivisions, including Columbine Lake and Sun Valley.
- Town Zone- This is the Town of Grand Lake with over 900 homes.
- South Zone- The area south of CR 466 on both sides of US Highway 34. The area has many subdivisions and over 1,700 homes.

At risk infrastructure includes Western Area Power Authority transmission lines (Mackenzie substation to the Adams tunnel) and distribution lines along US Highway 34. Also listed in the CWPP in general terms are gas lines, watersheds, cell towers, and water and sanitation facilities.

**Grand Fire Protection District No. 1 CWPP**

This fire district includes the Town of Granby and 24 distinct communities and three areas of special interest, five of which are extreme or very high risk. Eighty percent of the single family homes in this area are second homes, and the economy is tourism service based.

**Table 3.36. Grand Fire Protection District Community Wildfire Hazard Ratings**

Hazard Rating	Community
Extreme	Bussy Hill
	Winter Park Highlands
Very High	Homestead Hills
	Carol Linke Tracts
	Sunny Shore Park
High	C Lazy U Homestead
	Mouny Chauncey
	Scan Loch
	Shadow Mountain Ranch
	Still Water
	Trail Creek
Moderate	Alpine Acres
	Granby Ranch/Sol Vista
	Highway 125
	Idle Glenn
	Innsbruck
	Joslin Ranch
	Legacy Park
	Ridge
	Estates Val
	Moritz
Walden Hollow/Ouray Ranch	
Low	Granby Mesa
Hazard Rating	Community
	Lake
	Shore

**East Grand Fire Protection District #4 Upper Fraser Valley CWPP**

The Upper Fraser Valley is home to numerous communities, including Winter Park Resort which is largest ski area in Grand County. There are also two Nordic cross-country resorts and the area is heavily utilized for both winter and summer outdoor recreation. As is the case for much of eastern Grand County, a large proportion of residences are second homes and the economic base is tourism services.

**Table 3.37. Upper Fraser Valley Community Wildfire Hazard Ratings**

Hazard Rating	Community
Extreme	Hurd Creek
	Meadow Creek
	Hamilton Creek
Very High	County Road 8
	Arapahoe Road
	Mary Jane
High	Winter Park Ranch
	Beaver Village
	Winter Park Resort/Old Town
	Reserve at Elk Horn Ridge
	Beaver Mountain Preserve
	Rendezvous North
	Rendezvous South
	Idlewild Meadows
	High Country Haus
	Moose Run
	Sunset Ridge Estates
	The Fairways
	Elk Run/Leland Creek
Ice Box Estates/Sky View Acres	
Moderate	Alpine Timbers
	Stagecoach
	Sheep Mountain Ridge
	Pole Creek Meadows
Low	Town of Winter Park
	Tabernash
	Fraser
	County Road 5170

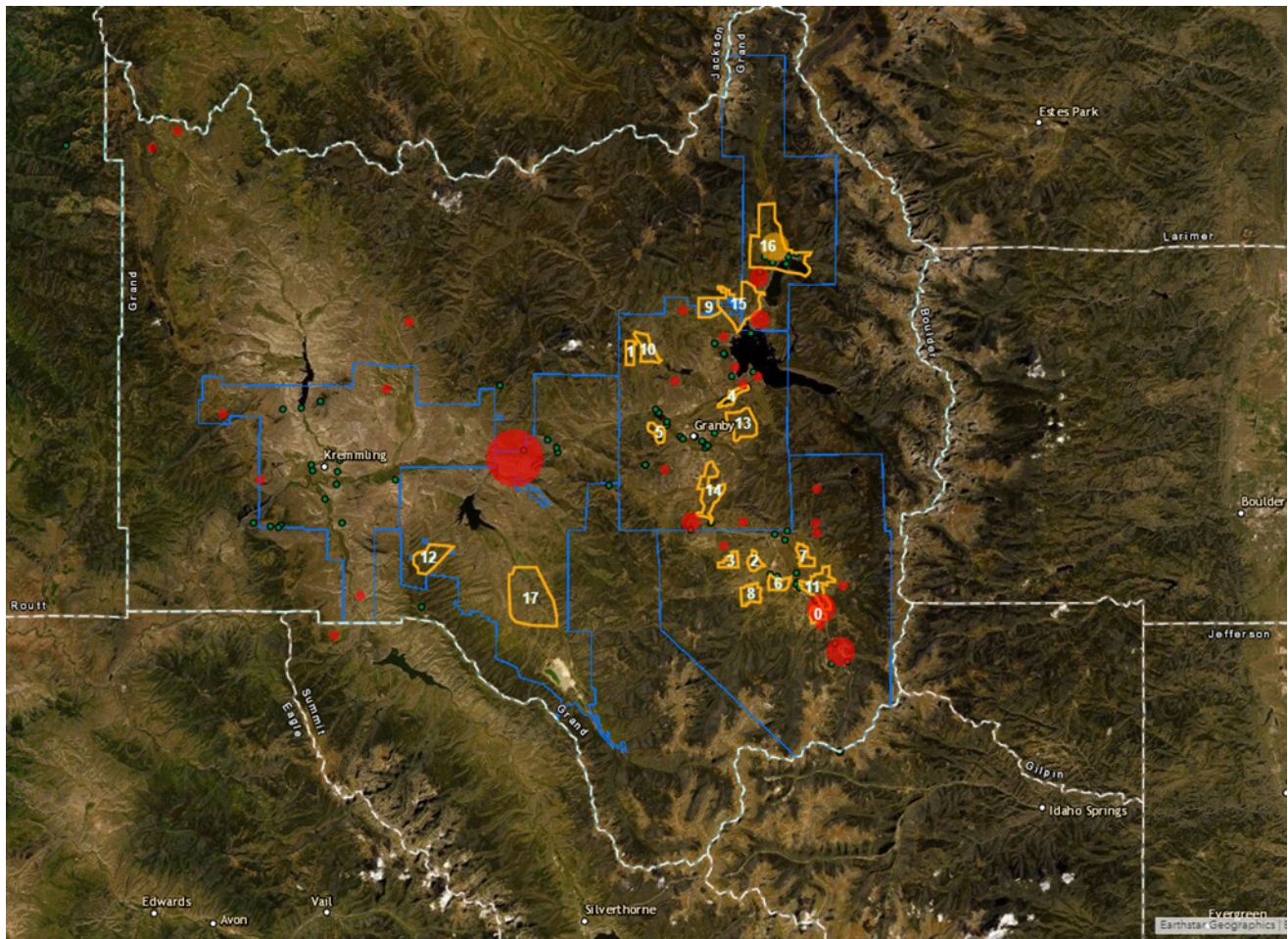
Infrastructure in the area includes two water treatment plants for the Town of Winter Park, US Highway 40, the Mettler substation, and the associated electric power infrastructure. It is notable that the electrical transmission lines in the Upper Fraser Valley are important for the operation of the Henderson Mill. Other infrastructure includes natural gas pipelines and well heads, which are generally fire resistant, but require individual evaluation.

## County Fire Risk Zones and Critical Infrastructure

Currently Grand County has approximately 202.7 square miles of areas designated as medium risk or higher by the various CWPP's. Of that over 145 is designated as high risk or higher and constitutes 2.1 billion in built property values threatened. Total built property value of the areas designated medium or higher is 4.8 billion. The built property value consists of 7347 structures in the medium risk areas and 5493 structures in the High risk and above zones.

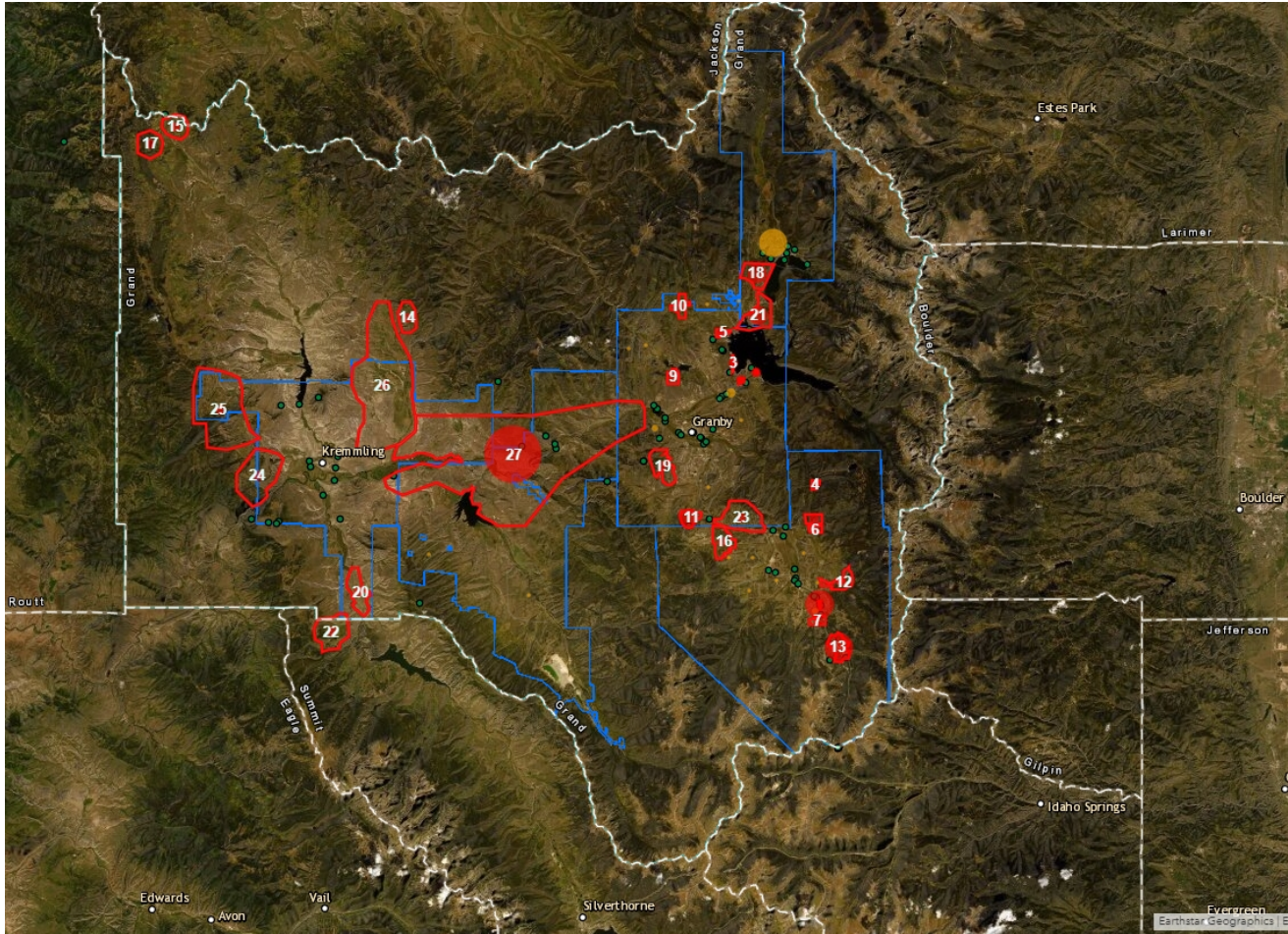
County wide there are 30 public safety and commercial communications sites having a replacement cost averaging 1 million dollars each totaling 30 million, 8 of which are inside one of the designated risk zones with an additional 9 more within one mile or less of these zones. There are 2 communication or radar sites operated by the FAA with unknown replacement value. Other critical infrastructure points included are 9 electrical substations costing an average of 9 million each per Tri States Generation and 38 ingress/egress bridges averaging 2 million each per Grand County Road & Bridge and Colorado Department of Transportation totaling 187 million in critical infrastructure. Of this, 54 million in critical infrastructure is within a medium zone or higher.

**Map 1. Grand County Medium Fire Risk**

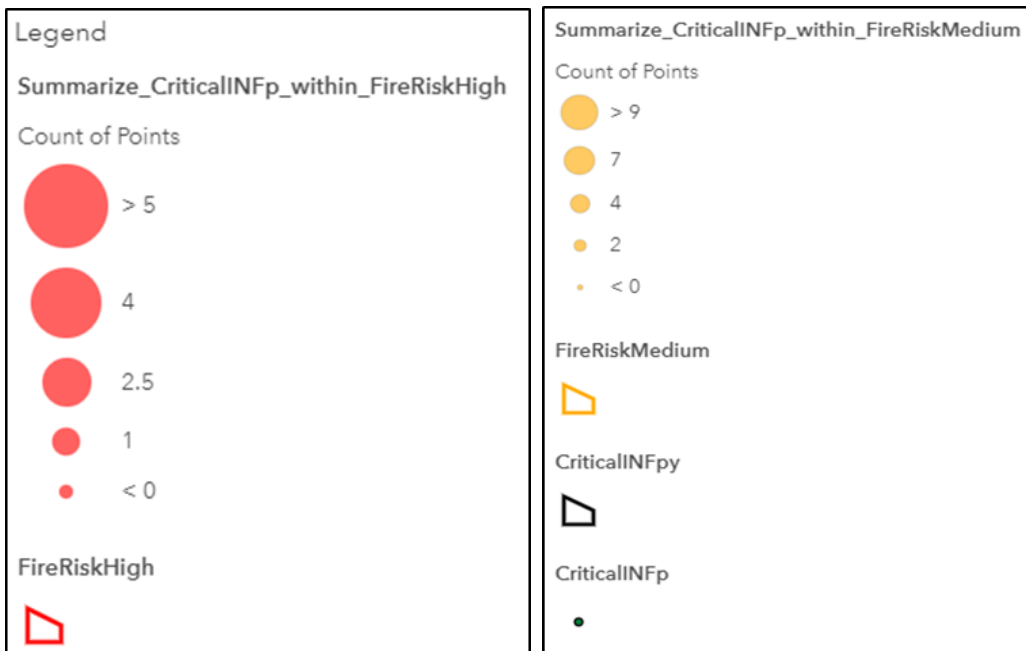


Maps courtesy of EGFPD Firefighter Adam Gosey and Greg Thorne, Grand County GIS, June 2020

## Map 2. Grand County High Fire Risk



Maps courtesy of EGFPD Firefighter Adam Gosey and Greg Thorne, Grand County GIS, June 2020



**GRAND COUNTY FIRE RISK EXTRACT ANALYSIS (Map 1. & 2.)**

ID	PERIMETER	ACRES	STRUCTURES	ASSESSED VALUE	ACTUAL VALUE
0		453.22505	933	\$827,160.00	\$11,246,430.00
1		488.42221	6	\$211,070.00	\$2,950,590.00
2		489.34313	121	\$3,124,810.00	\$41,454,110.00
3		504.34983	35	\$2,384,500.00	\$33,349,390.00
4		543.24460	65	\$1,683,790.00	\$23,549,630.00
5		551.09683	15	\$403,660.00	\$4,241,570.00
6		605.16417	162	\$4,534,220.00	\$59,967,770.00
7		647.54073	149	\$6,384,750.00	\$87,855,980.00
8		879.41738	59	\$7,707,070.00	\$65,405,290.00
9		950.73054	16	\$803,750.00	\$10,630,090.00
10		1001.27300	74	\$3,352,250.00	\$32,517,710.00
11		1545.41340	2276	\$78,011,950.00	\$1,005,322,140.00
12		1691.39050	48	\$827,160.00	\$11,246,430.00
13		1786.77740	63	\$2,556,960.00	\$33,695,030.00
14		1831.67630	506	\$13,396,710.00	\$184,066,650.00
15		2979.42880	832	\$16,547,930.00	\$220,484,530.00
16		5669.67120	1938	\$64,854,970.00	\$792,494,670.00
17		5936.08930	49	\$1,539,400.00	\$19,774,310.00
	total acres	28554.25437			
	total sq miles	45.68680699			
	Total Structures		7347		
			Total Assessed	\$209,152,110.00	
				Total Actual	\$2,640,252,320.00

Based on the maps and analysis, Winter Park is the town with the highest total value at risk to wildfire, and Fraser has the second highest total value at risk to wildfire. Overall, the County has nearly \$409 million in property values in medium to high wildfire threat zones.

**Potential Future Losses**

\*According to the Future Avoided Cost Explorer tool (F.A.C.E.), a future wildfire scenario using a moderate climate (due to climate change) and a low estimated population growth (24,300), would economically bring \$200,000.00 in damages to Grand County, including residential and commercial buildings and increased firefighting costs. If the scenario is bumped up to a severe climate with medium population growth in the County (pop. 27,400), the economic damage will reach \$210,000.00.

Table 3.39 lists critical facilities in lowest, low-moderate, moderate, high-moderate, and highest wildfire intensity zones.

**Table 3.39. Critical Facilities in Lowest to Highest Wildfire Intensity Zones by Jurisdiction**

Jurisdiction	Facility Type	Facility Name	Facility Count
<b>Highest Wildfire Intensity</b>			
<b>Grand Lake</b>	Bridges	Grand Ave	1
	<b>Total</b>		<b>1</b>
<b>Unincorporated</b>	Bridges	County Road 57	1
	Bridges	County Road 8022	1
	Bridges	US 40 ML	1
	<b>Total</b>		<b>3</b>
<b>Grand Total</b>			<b>4</b>



Jurisdiction	Facility Type	Facility Name	Facility Count
<b>High-Moderate Wildfire Intensity</b>			
<b>Granby</b>	Communications	Power World	1
	Communications	Sol Vista Peak	1
	<b>Total</b>		<b>2</b>
<b>Winter Park</b>	Communications*	Sunspot	1
	Pumphouse	Sunspot Water Pump Station	1
	Water Facility	Winter Park Water and Sanitation Treatment	1
	<b>Total</b>		<b>3</b>
<b>Unincorporated</b>	Bridges	County Road 00	1
	Bridges	County Road 32	1
	Bridges	County Road 330	1
	Bridges	County Road 57	1
	Bridges	County Road 6	1
	Bridges	County Road 627	1
	Bridges	County Road 64	1
	Bridges	SH 134 MI	1
	Bridges	US 40 MI	1
	Bridges	YCC Camp Road	1
	Communications*	Cottonwood	1
	Communications*	Grouse Mountain	1
	Communications	Acadia Condominiums	1
	Communications	Hwy 40 Grand County Wireless	1
	Communications	LTTK, Inc. Teddy's Car Wash	1
	Communications	Mount Bross	1
	Communications	Parshall Divide HSSPPFD	1
	Communications	Parshall Divide Microwave Reflector	1
	Communications	Radium Boost Station	1
	Communications	San Toy Mountain (West)	1
	Communications	Table Mountain Forest Service	1
	Communications	Tri-State Troublesome Sub Station	1
	Communications	Val Moritz HOA	1
	School	Faith In Action Christian School	1
Waste Water Facility	Galloway Inc. (GW)	1	
Waste Water Facility	Granby Sanitation District	1	
<b>Total</b>		<b>24</b>	
<b>Grand Total</b>			<b>30</b>
<b>Moderate Wildfire Intensity</b>			
<b>Fraser</b>	Government	Fraser Valley Library	1
	<b>Total</b>		<b>1</b>
<b>Granby</b>	Hospital*	MPMC	1
	Bridges	US 40 ML	1
	EMS Station*	Grand County EMS and OEM	1
	Fire Station	Grand Fire Protection District Station	1
	School	Middle Park High School	1
	<b>Total</b>		<b>5</b>

Jurisdiction	Facility Type	Facility Name	Facility Count
<b>Hot Sulphur Springs</b>	Government*	Courthouse	1
	Government*	Sheriff's Office	1
	Jail*	Jail	1
	Government*	County Administration	1
	Bridges	Grand Avenue	1
	Fire Station	Hot Sulphur Springs - Parshall Fire Protection	1
	<b>Total</b>		<b>6</b>
<b>Kremmling</b>	EMS Station*	EMS Station	1
	Government*	Coroner's Office	1
	Communications	Kremmling Airport	1
	Fire Station	Kremmling Fire Department	1
	School	West Grand Elementary School	1
<b>Total</b>		<b>5</b>	
<b>Winter Park</b>	Bridges	Winter Park Drive	1
	Communications	Lodge at Sunspot	1
	Communications	Moffat Station	1
	Communications	Winter Park (Denver Water)	1
	Government	Administration Building	1
	Government	Town Hall	1
	Pumphouse	Booster Pumphouse	1
<b>Total</b>		<b>7</b>	
<b>Unincorporated</b>	Bridges	County Road 1	1
	Bridges	County Road 10	1
	Bridges	County Road 11	1
	Bridges	County Road 2	1
	Bridges	County Road 25	1
	Bridges	County Road 3	1
	Bridges	County Road 30	1
	Bridges	County Road 39	1
	Bridges	County Road 40	2
	Bridges	County Road 6	1
	Bridges	County Road 620	1
	Bridges	County Road 73	1
	Bridges	County Road 8	1
	Bridges	County Road 83	1
	Bridges	County Road 84	1
	Bridges	SH 9 ML	2
	Bridges	US 40 ML	12
	Communications	Fraser Boost Station	1
	Communications	Fraser Road & Bridge	1
	Communications	Hwy 40 106.3 FM Radio Tower	1
Communications	Jasper Mountain (North Cottonwood)	1	
Communications	Parshall Road & Bridge	1	
Communications	San Toy Mountain (East)	1	
Communications	South Grouse Mountain	1	

Jurisdiction	Facility Type	Facility Name	Facility Count
	Communications	Table Mountain (South)	1
	Communications	Williams Peak / Blue Ridge	1
	Communications	Wolford Mountain	1
	Emergency Operations Center	EOC County Road 5	1
	Fire Station	East Grand Fire Protection District Station	1
	Waste Water Facility	Three Lakes Water & Sanitation District	1
	<b>Total</b>		<b>43</b>
	<b>Grand Total</b>		<b>67</b>
<b>Low-Moderate Wildfire Intensity</b>			
<b>Fraser</b>	EMS Station	EMS Station	1
	Fire Station	East Grand Fire Protection District #4	1
	<b>Total</b>		<b>2</b>
<b>Winter Park</b>	Bridges	US 40 ML	1
	Pumphouse	Pumphouse Building	1
	<b>Total</b>		<b>2</b>
<b>Unincorporated</b>	Bridges	County Road 21	1
	Bridges	County Road 302	1
	Bridges	County Road 4	1
	Bridges	FDR 348	1
	Bridges	Lions Gate Drive	1
	Bridges	SH 125 ML	1
	Bridges	U.S.F.S. ROAD 106	1
	Bridges	US 34 ML	1
	Communications	Fraser 4 Bar 4	1
	Communications	Grouse Mountain (North)	1
	Communications	Grouse Mountain (South)	1
	Communications	Lake Hill	1
	Communications	Mount Chauncey	1
	Communications	South Cottonwood	1
	Communications	State Highway Radio Relay Station	1
	Communications	Table Mountain (North)	1
	Natural Gas Facility	Public Service Co Williams Fork	1
	Waste Water Facility	Conrad John J.	1
	<b>Total</b>		<b>18</b>
	<b>Grand Total</b>		<b>22</b>
<b>Low Wildfire Intensity</b>			
<b>Grand Lake</b>	Communications	Grand Lake Lodge	1
	<b>Total</b>		<b>1</b>
<b>Unincorporated</b>	Bridges	County Road 491	1
	Bridges	SH 125 ML	1
	Communications	Granby II / Murphy Site	1
	<b>Total</b>		<b>3</b>
	<b>Grand Total</b>		<b>4</b>

\*Added per assessment of Grand County OEM

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### ***Wildlife Habitat and Fisheries***

Each of the CWPPs for Grand County recognizes the importance of natural habitat for both its intrinsic and economic value. The county is home to several federally listed species including the lynx, wolverine, and boreal toad. Healthy ecosystems and fisheries were consistently sited as a value to local residents, and with a large portion of the local economy based on outdoor recreation, they are essential to these communities.

The CWPPs recognized the threat that wildfires can pose to the local habitats, and also documented the fact that fire exclusion has impacted the long term health of the area's ecosystems. These two issues, however, are difficult to reconcile. Federal land managers, state and local officials, and local residents all have a role to play in mitigating the damaging effects of wildfire while fostering its continued use across a fire adapted landscape.

### ***Watersheds***

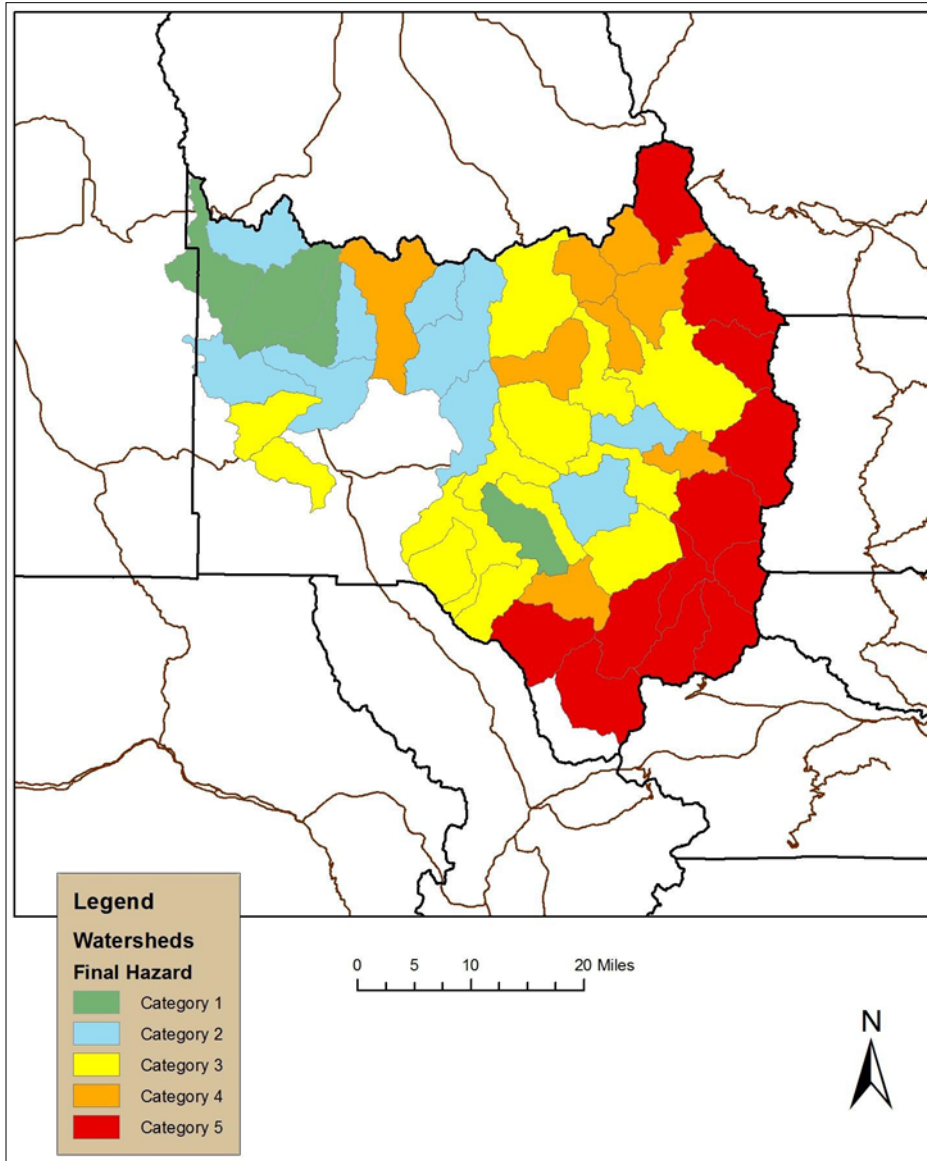
Watersheds and the numerous associated reservoirs in the county could be significantly impacted by high severity wildfire, especially in the wake of the mountain pine beetle epidemic. For example, the damage to Strontia Springs Reservoir caused by siltation from the 1996 Buffalo Creek Fire took fifteen years to complete and cost Denver Water over \$30 million.

The Upper Colorado Headwaters Wildfire/Watershed Assessment (Piehl 2013) provides a detailed assessment of post-fire watershed concerns that covers a majority of Grand County. Three types of hazards are evaluated to establish the final hazard priority layer for sixth-level watersheds (ref map below). Fire hazard, flooding/debris flow hazard, and soil erosion susceptibility are all evaluated. Final consideration is paid to those watersheds with water supplies features, such as reservoirs, to arrive at the final hazard priority.

Those watersheds on the steep western slope of the Front Range feed directly into reservoirs and are of highest concern. Priority lessens further west in the County, away from the larger reservoirs and highest peaks.

Watersheds can be considered as assets in their own right. Consultation with those water supply agencies with facilities, reservoirs, and properties should be included in mitigation discussions, and are in fact required to take part since the passage of Colorado House Bill 09-1162. Further consultation with members of a Burned Area Emergency Response Team may provide further guidance in mitigating and preparing for the effects of wildfire in a watershed.

**Figure 3.42. Upper Colorado Headwaters Wildfire/Watershed Assessment**



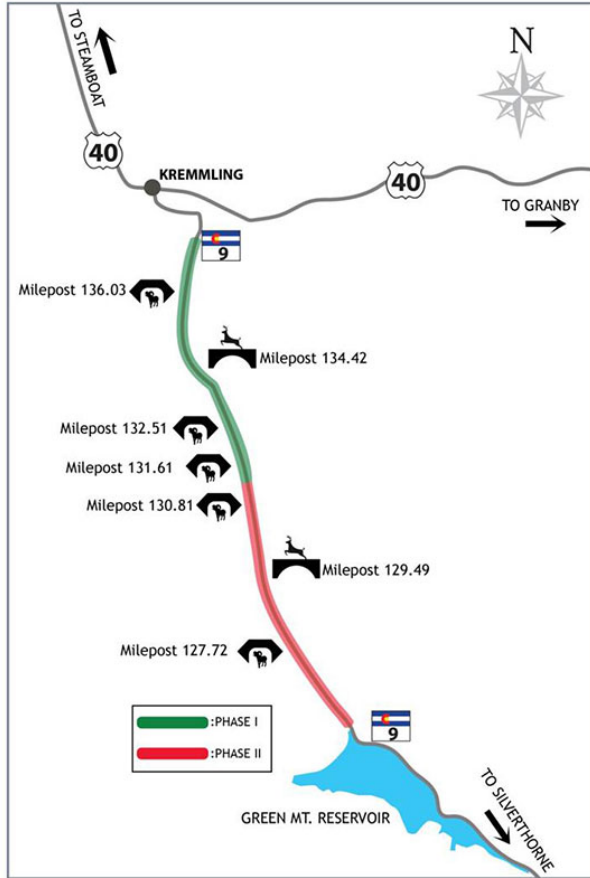
Source: Upper Colorado Headwaters Wildfire/Watershed Assessment

### ***Future Development***

Continued growth of Grand County’s population will generally mean an expanded WUI and potential exposure of buildings and people. Grand County’s subdivision regulations will help temper the risk to future development. It is important that CWPPs and other planning documents and regulations remain current to ensure improved community adaptation to the fire prone environment in which they are being built. This especially important in the heavy, beetle impacted fuels in the eastern half of the County.

## Wildlife-Vehicle Collisions

According to Colorado Parks and Wildlife, 1,597 animal-vehicle collisions (AVC) were tallied in Grand County in 2013. That figure climbed to 1,627 in 2014, went up to 1,859 in 2015 and reached 2,086 in 2016. Deer alone accounted for 1,455 of the collisions in 2016.



In 2016, CDOT in cooperation with Colorado Parks and Wildlife and other partners, completed Colorado's first-of-its-kind wildlife overpass and underpass system on Highway 9 between Green Mtn Reservoir and Kremmling. This innovative solution to keeping wildlife off a busy road resulted in a 90% reduction in AVCs.

The nearly 11-mile stretch of road bisects important wildlife habitat and movement corridors, specifically, mule deer and elk winter range. Prior to the project, an average of 63 wildlife carcasses were recorded along this stretch of road each winter, 98 percent of which were mule deer.

Other species using the structures, although fewer in number, include elk, pronghorn, moose, bighorn sheep, black bear, mountain lion, and coyote. There has also been at least one recorded underpass crossing by turkeys and river otters.



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## Windstorm

It is difficult to identify specific windstorm hazard areas within Grand County. Data was not available to identify specific structures at risk or estimate potential losses to these structures. NCDC data did not provide enough details on past damages and casualties to perform an average annual loss assessment.

### 3.3.4 Development and Land Use Trends

As part of the planning process, the HMPC looked at changes in growth and development and land use trends and examined these changes in the context of hazard-prone areas, and how the changes in growth and development affect loss estimates and vulnerability. Information from the following sources form the basis of this discussion:

- Grand County Master Plan,
- Colorado Department of Local Affairs Demography Section,
- U.S. Census Bureau

#### ***Current Status and Past Development***

According to the U.S. Census Bureau, the 2010 estimated population of Grand County was 14,843. This is an increase of over 19% from the 2000 census population of 12,442. Table 3.40 through Table 3.43 illustrate past growth in Grand County in terms of population, housing units, and density (2010 data is used because sub county estimates are not available for 2012).

**Table 3.40. Grand County Population Growth 1960-2010**

Census Year	Population	Average Annual Increase (%)	Population Colorado	Average Annual Increase (%)
1960	3,557		1,753,947	
1970	4,107	1.50	2,207,259	2.60
1980	7,475	8.20	2,889,964	3.00
1990	7,966	0.60	3,294,394	1.40
2000	12,442	5.60	4,301,261	3.00
2010	14,843	1.93	5,029,196	1.72
2019	15,734			

Source: Grand County Master Plan 2011, U.S. Census Bureau estimates from 2019

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**Table 3.41. Population Growth for Jurisdictions in Grand County, 2010-2019**

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Jurisdiction	2000	2010	2019 Estimate
Fraser	910	1,224	1,326
Granby	1,525	1,864	2,139
Grand Lake	447	471	506
Hot Sulphur Springs	521	663	733
Kremmling	1,578	1,444	1,524
Winter Park	662	999	1,090
Unincorporated Areas	6,799	8,178	8,416
<b>TOTAL</b>	<b>12,442</b>	<b>14,843</b>	<b>15,734</b>

Source: U.S. Census Bureau 2019 figures are estimates.  
The 2020 U.S. Census was not complete as of this Plan update.

### Housing Needs

According to the Grand County Housing Needs Assessment of 2018, the for-sale market has recovered since the recession. In 2017, the median price for homes sold was similar to 2007. With the rising housing costs and reduced availability, however, housing has again become the primary reason employees either decline jobs or leave the area within a couple years of being hired.

As of 2018, Granby was growing more quickly and had more opportunity sites for housing than the other communities. Granby also currently houses a mix of employees, primarily from Winter Park through Hot Sulphur Springs.

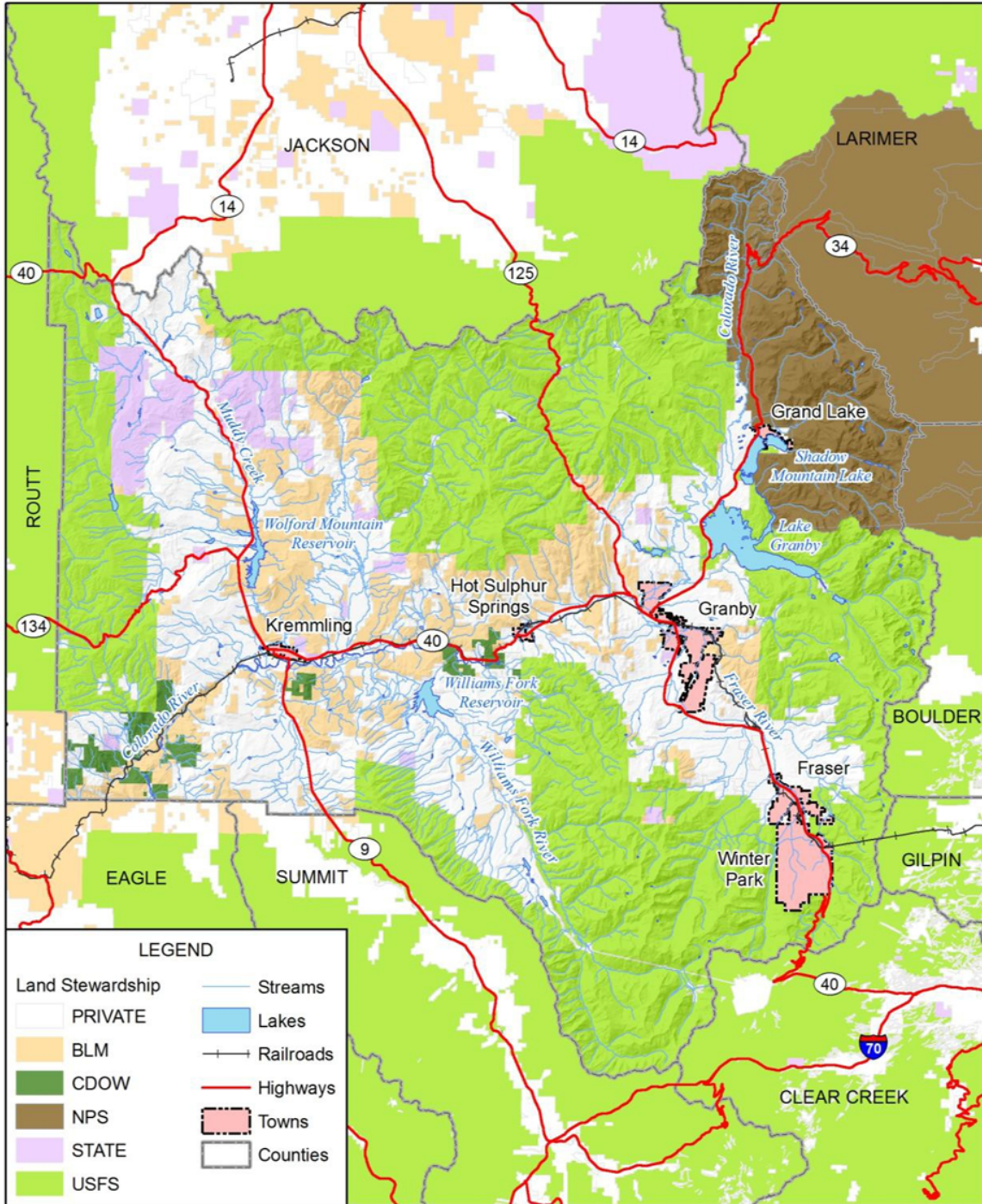
It was noted in the last Plan revision (2013) that housing unit growth surpassed population growth in all areas of the County. In 2018, the Estimated Total Housing Units numbered at 16,740, with only 6,742 of those housing units occupied (due to Grand County's resort (rental) status and number of second homes). Grand County receives over one million visitors annually (estimated).

Source: Grand County Housing Needs Assessment, June 2018



**Land Use**

**Figure 3.43. Grand County Land Stewardship**



Map compiled 4/2013; intended for planning purposes only.  
Data Source: Grand County, CDOT, COMaP v9

0 7.5 15 Miles



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## **Future Development**

As indicated in the previous section, Grand County has grown substantially over the last four decades. Growth is projected to continue through 2040. Table 3.44 shows the population projections for the County as a whole through 2040. The State Demography Office does not produce population forecasts for municipalities.

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**Table 3.44. Population Projections for Grand County, 2015-2040**

	2015	2020	2025	2030	2035	2040
Population	15,778	18,008	20,672	23,282	25,752	28,028
Percent Change (%)		2.7%	2.8%	2.4%	2.0%	1.7%

Sources: Colorado Department of Local Affairs Demography Section, [www.dola.colorado.gov/dlg/demog/](http://www.dola.colorado.gov/dlg/demog/)

Public opinion and official policy in the Grand County Master Plan is that future growth should be directed in and around the existing towns and development areas. This strategy minimizes the impact on the County’s natural environment and scenic character, and utilizes existing water, sewer, and road infrastructure. Members of the public who participated in the Master Plan development process were concerned about protecting “sensitive areas,” which includes areas with wetlands and steep slopes.

The Grand County Master Plan includes a few policies related to new development and wildfire mitigation, including the following:

- The County will continue to work with emergency service providers in the review of new developments to ensure adequate access is provided for fire, police, and other emergency services.
- Continue to ensure that all new proposed subdivisions and special uses comply with applicable wildfire mitigation as required by the Grand County Department of Natural Resources, Colorado State Forest Service, and local fire protection districts.
- Continue to work with local and state entities and support emergency management planning related to: Local Emergency Operations, Hazard Mitigation Planning and Pre-Disaster Mitigation Planning, as well as other natural hazard planning.
- Support Community Wildfire Protection Planning and local wildfire mitigation efforts in order to minimize risks with the wildland-urban interface.

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## 3.4 Risk Assessment Summary

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The Grand County Risk Assessment revealed a number of problem areas to be addressed in the mitigation strategy. These key findings are summarized in the following list.

### Avalanche

- *History of Colorado Avalanche Accidents, 1859-2006* recorded 20 avalanche-related deaths in Grand County between 1859 and 2006. The HMPC reported seven avalanche-related deaths in the County between 2005 and 2010.
- 12 avalanche events between 1998 and 2013 were recorded in NCDC, CAIC, and the 2008 Grand County HMP.
- In the past, avalanches have closed roads and highways. Winter Park and other ski resorts can lose an estimated \$100,000 for every 24 hours that major roads such as Highway 40 are closed.

### Dam Failure

- 9 high hazard and 12 significant hazard dams are located in Grand County
- The largest water storage is in Granby Dam and the Granby Dikes 1-4, where failures could result in catastrophic flooding
- New development in dam inundation areas increases risk and may cause dam hazard rankings to change

### Disease Outbreak

- Outbreaks can quickly overwhelm Grand County Public Health and its two hospitals.
- Primary damages or losses associated with an outbreak or outbreaks could include economic losses associated with work absences or a decrease in productivity due to disease, human losses associated with disease and fatalities in the community, adverse impacts on hospitals and other health care facilities and staff, and the fear and anxiety associated with a severe outbreak.

### Drought

- Multi-year droughts occur every 10 years on average in Grand County
- Drought can affect both water quantity and quality
- The tourism and recreation economy is particularly vulnerable to drought
- Drought increases risk to other hazards, such as erosion and deposition, mountain pine beetle infestation, and wildfire

### Earthquake

- Roughly 750 buildings with at least moderate damage in 2,500-Year Probabilistic Scenario. Total economic impacts could exceed sixty million.

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## **Flood**

- Greatest losses in terms of people and number of improved parcels in unincorporated areas of the County
- Countywide losses could exceed \$16.8 million
- \$26,686,300 in flood insurance in force (143 policies) in Grand County

## **Hazardous Materials Release (Transportation)**

- There were 20 transportation-related hazardous materials incidents reported between 2008-2012; these mainly related to gasoline and diesel fuel spills resulting from an accident
- Highways 40 and 9 and Rabbit Ears Pass are of particular concern
- Streams and reservoirs are also vulnerable to contamination, especially near roadways and railroads

## **Landslide, Mudflow/Debris Flow, Rock Fall**

- Estimated 581 people and \$117 million structure value at risk to landslides countywide
- Problem areas mostly exist along roadways, in canyons, and in avalanche chutes
- Has caused train derailments in the past

## **Lightning**

- Lightning-caused injuries have occurred in Grand County in the past
- Outdoor recreationists during summer months are very vulnerable to lightning
- Lightning can damage power grid and information technology and communications networks

## **Mountain Pine Beetle Infestation**

- The mountain pine beetle hazard is widespread
- This hazard contributes to other hazards such as blowdown and high-speed sustained winds
- The infestation is likely to significantly affect forest ecosystems, the economy, and wildfire risk

## **Severe Winter Weather**

- There is high vulnerability to severe winter weather along highways and mountain passes
- Increased population exposed to hazards and emergencies during high tourist seasons
- 161 recorded events between 1960 and 2013
- Severe winter storms can close roads, strand travelers, and isolate the County, possibly for days at a time

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## **Wildfire**

- Countywide there is an estimated \$2.8 billion in property value in high wildfire risk areas; \$2 billion in moderate wildfire risk areas
- Critical roads, including Highways 40 and 9 are also vulnerable to wildfire

## **Wildlife-Vehicle Collisions**

- Wildlife-vehicle collisions are a common occurrence in Grand County and endanger the lives of residents, visitors, and wildlife
- Wildlife-vehicle collisions are especially likely to occur in spring and fall between the hours of dusk and dawn when animals are most active

## **Multi-Hazard**

- Past emergency declarations have been for drought and severe winter weather; state declaration for flood; and local/state declarations for 2020 Pandemic.
- Hazard events that cause road closures, such as landslides, avalanches, and winter storms, affect the economy of Grand County by restricting visitor access, workers, and goods
- Unique vulnerabilities of resort economy
- Need improved coordination between local governments and with state and federal agencies

# 4 MITIGATION STRATEGY

**44 CFR Requirement 201.6(c)(3): The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.**

This section presents the mitigation strategy developed by the Grand County Hazard Mitigation Planning Committee (HMPC) based on the County's risk assessment in Chapter 3. The mitigation strategy was developed through a collaborative group process and consists of goals, objectives, and mitigation actions. The following definitions are based upon those found in FEMA publication 386-3, *Developing a Mitigation Plan* (2002):

- **Goals** are general guidelines that explain what you want to achieve. Goals are defined before considering how to accomplish them so that they are not dependent on the means of achievement. They are usually long-term, broad, policy-type statements.
- **Objectives** define strategies or implementation steps to attain the identified goals and are specific and measurable.
- **Mitigation Actions** are specific actions that help achieve goals and objectives.

This section describes how the County accomplished Phase 3 of FEMA's 4-phase guidance-Develop the Mitigation Plan-and includes the following from the 10-step planning process:

- Planning Step 6: Set Goals
- Planning Step 7: Review Possible Activities
- Planning Step 8: Draft an Action Plan

## 4.1 Mitigation Strategy Overview

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The results of the planning process, the risk assessment, the goal setting, the identification of mitigation actions, and the hard work of the HMPC are captured in this mitigation strategy and mitigation action plan. As part of the 2020 plan update, a comprehensive review and update of the mitigation strategy portion of the plan was conducted. Some of the initial goals and objectives from the 2013 plan were revisited and refined. The end result was an updated mitigation strategy that reflects the updated risk assessment and the new priorities of this plan update. Section 4.2 below identifies the current goals and objectives of this plan update, and Section 4.4 details the updated mitigation action plan.

## 4.2 Goals and Objectives

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**44 CFR 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 HMPC developed goals and objectives to provide direction for reducing hazard-related losses in Grand County. These were based upon the results of the risk assessment and a review of goals and objectives from other state and local plans, specifically, the Colorado State Multi-

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Hazard Mitigation Plan, 2010, Grand County Master Plan, and Community Wildfire Protection Plans for Grand County and several fire protection districts. This review was to ensure that this plan's mitigation strategy was integrated with existing plans and policies.

Goals and objectives are listed below, but not prioritized:

**Goal 1: Reduce the loss of life and personal injuries from hazard events**

- Enhance life safety for residents and responders
- Improve public education and awareness of all hazards
- Improve emergency response and early notification capabilities for all hazards within the County
- Reduce the potential for impact from transported hazardous materials to the public, the County, and participating jurisdictions
- Identify and characterize facilities and companies that regularly receive or transport hazardous materials
- Reduce disease outbreak occurrences and severity
- Minimize the impact of winter storm on Grand County and participating jurisdictions within the County
- Enhance community policies and procedures to reduce wildfire impact
- Reduce rockslide occurrences and impact potential on human life

**Goal 2: Reduce the impacts of hazards on property and the environment**

- Enhance community policies and regulations as measures to reduce property impacts
- Continue to support development and implementation of Community Wildfire Protection Planning
- Develop and implement fuel-reduction projects
- Mitigate undesirable fire outcomes to residential and commercial property
- Mitigate undesirable fire outcomes to the environment, watersheds, and quality of life
- Improve identification and characterization of landslide hazards

**Goal 3: Protect critical facilities and infrastructure from the impacts of hazards**

- Minimize disruption to critical services from hazard events
- Identify and reduce the wildfire threat to critical infrastructure
- Improve physical mitigation actions for high risk landslide hazard areas

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#### Goal 4: Minimize economic losses

- Reduce financial exposure and disaster expenditures of county and municipal governments and special districts
- Strengthen disaster resistance, and resiliency of businesses and employers
- Speed recovery and redevelopment following future disaster events
- Support future grant requests for pre- and post-disaster initiatives

### 4.3 Identification and Analysis of Mitigation Actions

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**44 CFR 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.**

At the second HMPC meeting, representatives from the participating jurisdictions met to update, and analyze current and potential mitigation actions to achieve the mitigation goals. The group discussed different types and categories of mitigation actions.

The HMPC used the 2013 mitigation action categories during the planning process:

- **Prevention:** Administrative or regulatory actions or processes that influence the way land and buildings are developed and built.
- **Property protection:** Actions that involve the modification of existing buildings or structures to protect them from a hazard or remove them from the hazard area.
- **Structural:** Actions that involve the construction of structures to reduce the impact of a hazard.
- **Natural resource protection:** Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems.
- **Emergency services:** Actions that protect people and property during and immediately after a disaster or hazard event.
- **Public information/education and awareness:** Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them.

Next, the HMPC discussed the key issues for each priority hazard that emerged from the Risk Assessment and brainstormed potential mitigation alternatives to address these. To facilitate the brainstorming process, the HMPC referred to a matrix of typical mitigation alternatives organized by CRS category for the hazards identified in the plan. HMPC members discussed possible new mitigation actions that would work toward mitigating the specific hazards.



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Based upon the key issues identified in the risk assessment, including the existing capabilities of jurisdictions, and the overall political, technical, and financial feasibility of the potential actions, the HMPC came to consensus on new mitigation actions for each hazard. Certain hazards were best addressed through multi-hazard actions.

### 4.3.1 Prioritization Process

Once the mitigation actions were identified, the HMPC was provided with several decision-making tools, including FEMA's recommended prioritization criteria, STAPLEE sustainable disaster recovery criteria, and others, to assist in deciding why one recommended action might be more important, more effective, or more likely to be implemented than another.

STAPLEE stands for the following:

- **Social:** Will the action be acceptable to the community? Could it have an unfair effect on a particular segment of the population?
- **Technical:** Is the action technically feasible? Are there secondary impacts? Does it offer a long-term solution?
- **Administrative:** Are there adequate staffing, funding, and maintenance capabilities to implement the project?
- **Political:** Will there be adequate political and public support for the project?
- **Legal:** Does the jurisdiction have the legal authority to implement the action?
- **Economic:** Is the action cost-beneficial? Is there funding available? Will the action contribute to the local economy?
- **Environmental:** Will there be negative environmental consequences from the action? Does it comply with environmental regulations? Is it consistent with community environmental goals?

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)?

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## 4.4 Mitigation Action Plan

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**44 CFR Requirement §201.6(c)(3)(iii): [The mitigation strategy shall include] an action plan describing how the actions identified in paragraph (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which to which benefits are maximized according to a cost benefits review of the proposed projects and their associated costs. to which benefits are maximized according to a cost benefits review of the proposed projects and their associated costs.**

This section outlines the development of the updated mitigation action plan. The action plan consists of the specific projects, or actions, designed to meet the plan's goals. Over time the implementation of these projects will be tracked as a measure of demonstrated progress on meeting the plan's goals.

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## 4.4.1 Progress on Previous Mitigation Actions

During the 2020 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.

In general, the review shows that much progress has been made since the original plan was adopted in 2008. Implementation of the actions has resulted in greater community awareness of Grand County's vulnerability to natural hazards and reduced vulnerability for hazards such as wildfire and mountain pine beetle. Several of these actions have increased the mitigation and response capabilities of the County, and thus will help save lives in future incidents.

Table 4.2 lists over 80 actions from the 2013 plan that have been implemented or are ongoing and being carried forward; 25 have been deleted. The actions that have been deleted and the reasons why are shown in Table 4.2.

Past mitigation success stories include:

- Mitigation work by the YMCA prevented damage to buildings during the YMCA fire.
- Grand FPD received funding from BLM to form a Grand County Wildfire Council.
- Winter Park Highlands HOA, Grand FPD, and CSFS worked together on getting Winter Park Highlands designated as a FireWise community. Winter Park Highlands HOA also added a fire pond, named Bielenberg Pond, at Elk Park. The HOA also implemented fuels reduction projects, created fire breaks on properties, and added reflective, fireproof addressing.
- Pole Creek Meadows HOA also engaged in public outreach by issuing a forestry newsletter with details on the FireWise program, removal of blown down and dead trees, slash pile burning, and clear cutting.

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## **4.4.2 Continued Compliance with NFIP**

Given the importance of the NFIP in mitigating flood losses, an emphasis will be placed on continued compliance with the NFIP by all NFIP participating jurisdictions including Fraser, Granby, Grand Lake, and Winter Park. As NFIP participants, these communities have and will continue to make every effort to remain in good standing with NFIP. This includes continuing to comply with the NFIP's standards for updating and adopting floodplain maps and maintaining and updating the floodplain zoning ordinance. Other details related to NFIP participation are discussed in the community capabilities section of each jurisdictional annex and the flood vulnerability discussion in Section 3.3. The County has considered the costs and benefits of participation in the NFIP over the years. During the plan update the County maintained that NFIP participation was not a priority out of concern that flood insurance requirements may place a financial burden on some residents. The County has been proactive in its land use and development policies that have limited placement of structures in flood prone areas.

## **4.4.3 Updated Mitigation Action Plan**

The new and continuing mitigation actions developed by the HMPC are summarized in Table 4.2. For each identified project a worksheet designed to capture additional details was filled out by the HMPC member or organization taking the lead on project implementation. The worksheets document background information, ideas for implementation, lead agency, partners, potential funding, cost estimates, benefits, and timeline for each identified action. Action details are presented in the respective jurisdictional annex, or following Table 4.2 for multi-jurisdictional actions.

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Grand County and the towns of Fraser, Granby, Grand Lake, Hot Sulphur Springs, Kremmling, and Winter Park have significant regulatory, personnel, technical, and financial resources and capabilities that are described in more detail in their respective jurisdictional annexes. The communities have been very proactive about mitigating risk to natural hazards when the need is identified and guiding new development away from hazard areas. Table 4.2 lists several actions related to identifying and mapping hazard areas to keep existing and future development safe. Several of the special districts have also been very proactive about mitigating risk to natural hazards, especially wildfire. As a result, there are few structural mitigation projects that need to be addressed in these jurisdictions. The mitigation strategy instead focuses on improving communication and coordination within the County and among its jurisdictions to improve efficiency and effectiveness of existing mitigation activities. Many actions are also aimed at additional proactive planning efforts and integrating existing plans to further enhance local capabilities.

The County's highest priority hazards in the mitigation strategy are wildfire, winter storm, landslide/rockfall, hazmat, and disease outbreak. The County and jurisdictions continue to contribute their own resources to education, planning, land use and building regulations, defensible space, and fuel reduction. However, continued resources are required to implement needed loss reduction measures.

Table 4.2 summarizes all of the prioritized mitigation actions and indicates which jurisdictions plan to implement them; it also provides information on the hazards and plan goals addressed. 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 an asterisk '\*' in the action title. These actions include those that promote wise development and hazard avoidance, such as code, mapping and zoning improvements. The mitigation action implementation worksheets for multi-jurisdictional actions follow the matrix. The implementation worksheets for the jurisdictions are included in each jurisdiction's annex to the plan.

**Table 4.2. Mitigation Action Matrix**

Action ID	Action	Priority	Lead Agency/Dept.	Hazards Addressed	Goals Addressed	Status and Comments
<b>Multi-Jurisdictional</b>						
2015-1	Develop and implement fuel-reduction projects.	High	USFS, CDOT, All Jurisdictions	Wildfire	1, 2, 3	<b>Deleted</b> – redundant with FPDs action items.
2015-2	Adopt the proposed countywide wildfire regulations.*	High	County Planning, participating jurisdictions	Wildfire	1, 2, 3	Ongoing in subdivisions. 2008 burn ban ordinance adopted in County and municipalities
2015-3	Conduct a survey in selected business parks to identify use, storage, and transportation of hazardous materials.	High	LEPC Hazmat committee	Hazmat	1, 2, 4	<b>Deleted</b> – can pull data from CDPHE.
2015-4	Conduct commodity flow studies of main highways and railroads throughout the County.	High	OEM; LEPC	Hazmat	1	<b>Deleted</b> – after completing, data was deemed invaluable.
2015-5	Plan and execute hazmat exercises, including private stakeholders identified in the surveys from the 2008 HMP.	High	OEM; LEPC	Hazmat	1	<b>Deleted</b> – Under the county’s Fire Protection District’s training/exercise committee.
2015-6	Create a countywide hazmat response plan.	High	LEPC	Hazmat	1	Ongoing, in progress through LEPC Hazmat committee
2015-7	Conduct hazmat training to bring all responders to awareness (at minimum) level.	High	LEPC	Hazmat	1	Ongoing – revolving door with FPDs, long-term plan is to include road & bridge. Less than 50% of first responders are at Operations level.
2015-8	Provide community awareness education classes, seminars, advertising, brochures, etc. specifically for hazmat	High	LEPC	Hazmat	1	Ongoing
2015-9	Rock fall mitigation Hwy 40, Byers Canyon, MP 200	High	CDOT, County Road and Bridge	Rock fall	1	Ongoing – need to identify & upgrade alternate routes.

■ Status changed or Action Item Deleted

Multi-Jurisdictional						
Action ID	Action	Priority	Lead Agency/Dept.	Hazards Addressed	Goals Addressed	Status and Comments
2015-10	Implement warning and alert systems with specific coverage of the hazard areas.	High	OEM / SO/ CDOT	Multi-Hazard	1	Complete – <b>Deleted</b> . Systems set up in Byers Canyon; also avalanche warnings and closure systems in Berthoud Pass. CAIC issues avalanche forecasts.
2015-11	Adoption of International Fire Code.*	Medium	County Planning and FPDs	Wildfire	1, 2	County has convened a working committee to consider adopting International Fire Code; identified negative impacts to residential structures and commercial operations; has sent recommendations to Fire Chiefs Association for further consideration before meeting with commissioners.
2015-12	Complete defensible space projects around all built-up areas.	Medium	FPDs, CSFS, USFS, County Natural Resources Dept.	Wildfire	1, 2, 3, 4	Ongoing
2015-13	Identify then certify all privately owned bridges with load limits to support emergency response.	Medium	County Road & Bridge Supervisor wants this left in plan.	Multi-hazard	1	Ongoing - complete in Grand Lake Fire PD. RMNP has ID'd & certified bridges. Work needs to be done in other parts of the County.
2015-14	Update and validate previously completed assessments of the quantity and frequency for transported petroleum products in incorporated areas within the County.	Medium	LEPC Hazmat committee	Hazmat	1	<b>Deleted</b> . Completed with 2015-15.
2015-15	Distribute results of the petroleum assessments to all relevant stakeholders & FPDs.	Medium	LEPC Hazmat committee	Hazmat	1	<b>Deleted</b> . Completed.
2015-16	Coordinate countywide hazmat response resources.	Medium	LEPC	Hazmat	1	<b>Deleted</b> . Completed.
2015-17	Organize local landslide committees with regular meetings to prioritize needs, make recommendations, etc.	Low	Road & Bridge & CDOT	Landslide	1, 2, 3, 4	<b>Deleted</b> per R&B as they are aware of landslide areas.

■ Status changed or Action Item Deleted

Multi-Jurisdictional						
Action ID	Action	Priority	Lead Agency/Dept.	Hazards Addressed	Goals Addressed	Status and Comments
2015-18	Improve forest and watershed conditions in Grand County by implementing hazardous fuels treatments and removing hazardous biomass.	High	Denver Water/USFS	Wildfire	1, 2	<b>Deleted</b> – redundant to other hazardous fuels action items. Partners have identified areas.
2015-19	Wildlife mitigation on Highway 9.	Medium	County and Kremmling	Wildlife	1	<b>Deleted</b> – Town of Kremmling has duplicate action item.
Grand County						
2015-1	Have County staff certified by the National Wildfire Coordinating Group.	High	Sheriff's Office and County Road and Bridge	Wildfire	1, 2	Ongoing. Completed for R&B. (1) Deputy is now trained as a FF. Sheriff also has (1) seasonal fire liaison. County staff were signed up for May 2020 4-day Wildland Firefighting class; due to Covid-19 it was canceled.
2015-2	Prioritize wildfire mitigation in landslide hazard areas to improve secondary impact of landslide following a wildfire.	High	County Planning	Wildfire/ Landslide	1, 2	<b>Deleted.</b> It was completed as of last Plan update.
2015-3	Verify, and provide as necessary, where feasible, dual ingress/egress in landslide hazard areas to support emergency response and evacuation.	High	County road & bridge, OEM	Landslide	1, 2	<b>Deleted</b> per R&B. Have ID'd roads and landslide areas.
2015-4	Create or update as necessary maps useful to planning and public, including landslide inventories, landslide-susceptibility maps and landslide hazard maps.*	High	County Planning	Landslide	1, 2	Ongoing Mapping and GIS based analysis improved in 2013 update including DFIRM flood hazards and landslide data; Additional landslide data being requested of CGS.

■ Status changed or Action Item Deleted



Grand County						
Action ID	Action	Priority	Lead Agency/Dept.	Hazards Addressed	Goals Addressed	Status and Comments
2015-5	Identify county areas with the most vulnerable segments of the population such as the elderly, and very young.	High	GC Public Health	Disease Outbreak	1	Ongoing
2015-6	Ensure emergency responders and other County staff receives appropriate training in disease outbreak issues.	High	GC Public Health	Disease Outbreak	1	Ongoing
2015-7	Consider formalizing a warning system that includes disease outbreak. Potential outlets include newspapers, County website, radio, tv, social media, reverse 911.	High	GC Public Health	Disease Outbreak	1	Ongoing
2015-8	Update mutual aid agreements, especially with other northwest region counties.	High	GC Public Health	Disease Outbreak	1, 4	Ongoing
2015-9	Identify priority groups among first responders and families for emergency prophylaxis so they can perform their duties in the event of a disease outbreak.	High	GC Public Health	Disease Outbreak	1	Redundant. Deleted.
2015-10	Enhance awareness and preparedness in the County through a concerted effort. Adapt existing educational and preparedness materials from various sources to Grand County's needs.	High	GC Public Health	Disease Outbreak	1	Ongoing
2015-11	Fix addressing countywide.	High	Grand County GIS	Multi-Hazard	1, 2, 3	Ongoing
2015-12	Evacuation plans for public and privately-maintained PA roads.	High	OEM and Road and Bridge	Multi-Hazard	1	Ongoing

■ Status changed or Action Item Deleted

Grand County						
Action ID	Action	Priority	Lead Agency/Dept.	Hazards Addressed	Goals Addressed	Status and Comments
2015-13	Develop, implement, and promote subdivision wildfire protection protocols.	Medium	County Planning	Wildfire	1, 2	<b>Deleted.</b> Completed as of last Plan update.
2015-14	Ensure an adequate county work force is available in the event of a disease outbreak.	High	GC Public Health	Disease Outbreak	1, 3	Ongoing. Priority changed from Medium to High.
2015-15	Assign to one County official the duty of monitoring the availability of funds from all sources for the purpose of planning, prevention, and purchasing needed supplies or equipment.	High	GC Public Health	Disease Outbreak	1, 4	Ongoing. Priority changed from Medium to High.
2015-16	Implement code changes so that new developments have dual ingress/egress to support emergency response and evacuation.*	Medium	County Planning	Multi-Hazard	1, 2, 3	<b>Deleted.</b> Completed as of last Plan update.
2015-17	Establish Storm Ready programs, adapted for winter storms, within the County.	Medium	OEM, Road & bridge	Multi-Hazard	1, 2	Process begun to NWS certification, relates to outreach programs, shelters
2015-18	Implement "overlay zoning" provisions to minimize development in high risk areas.*	Medium	County Planning	Multi-Hazard	1, 2	<b>Deleted.</b> Completed as of last Plan update.
2015-19	Expand use of risk assessment to guide future land use and policy information.*	Medium	County Planning	Multi-Hazard	1, 2	<b>Deleted.</b> Completed as of last Plan update.
2015-20	Review and implement or update as necessary building and grading codes in the hazard areas.*	Medium	County Planning	Multi-Hazard	1, 2	Ongoing. Building code was updated in 2018.
2015-21	Review and implement or update as necessary land use regulations.*	Medium	County Planning	Multi-Hazard	1, 2	Ongoing. Done as necessary.

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Grand County						
Action ID	Action	Priority	Lead Agency/Dept.	Hazards Addressed	Goals Addressed	Status and Comments
2015-22	Develop public awareness programs to notify stakeholders in hazard areas of policies and regulations in the areas.	Medium	County Planning	Multi-Hazard	1	Ongoing. Deferred in 2015 due to other priorities. Priority changed from high to medium in last update.
2015-23	Determine who receives priority vaccinations in Grand County.	High	GC Public Health	Disease Outbreak	1	Ongoing. Priority changed from Low to High.
2015-24	Strengthen and formalize oversight and enforcement for compliance to land use standards (H.B. 1041).*	Low	County Planning	Multi-Hazard	1, 2, 3	The County has only adopted 1041 regulations for water & sewer. This action was modified in 2013 to include action to evaluate adoption of regulations related to areas of state interest that relate to hazards.
2015-25	Incorporate GIS layer for land-ownership parcels into emergency response procedures.	Low	County	Multi-Hazard	1, 2, 3	Partially complete - Responders have mobile GIS capabilities; County GIS can provide on request, information also available online Sidwell GIS enhancements in works
2015-26	Expand radio coverage within the County to better support the all-hazard warning/alert system (NOAA weather alert system).	Low	OEM	Multi-Hazard	1	<b>Deleted.</b> Completed - NOAA weather coverage completed 2013-2015. Transmitter installed and functioning in N. Cottonwood.
2015-27	Implement, if necessary, and publicize emergency shelters for use immediately following a hazard event.	Low	OEM	Multi-Hazard	1	Ongoing. Outreach to public done through Code Red & social media. Red Cross will use hotel rooms during the pandemic (social distancing). OEMs pandemic shelter plan, if lodging is at capacity, is using school classrooms.
2015-28	Public information/outreach where the public can find information during an emergency event.	Low	OEM	Multi-Hazard	1	Ongoing. OEM currently uses FB, Twitter, & Nextdoor. Also, Grand County Recovers, where the public can get updated info, volunteer or donate.
2015-29	Expand airport capacity for air assets in case of wildfire.	Low	OEM	Wildfire	2	Ongoing. Major repaving in 2020.
Town of Fraser						
2015-1	Fraser/St. Louis Creek bank stabilization to keep waters within banks during high water events.	High	Town of Fraser	Flood	1, 2	<b>Deleted.</b> Completed.

■ Status changed or Action Item Deleted

Action ID	Action	Priority	Lead Agency/Dept.	Hazards Addressed	Goals Addressed	Status and Comments
2015-2	Forest mitigation. Rendezvous and Grand Park have completed extensive hazard tree removal.	High	Private	Wildfire, mountain pine beetle, windstorm	1, 2	Ongoing
<b>Town of Granby</b>						
2015-1	Water Supply Protection for Fraser River and Val Moritz Wells.	High	Town of Granby	Wildfire, hazmat	1, 2	Ongoing. Granby added: 'advertise the importance of source water protection.'
<b>Town of Grand Lake</b>						
2015-1	Grand Lake FPD CWPP Implementation Support and Outreach.	High	Town of Grand Lake, GLFPD	Wildfire	1, 2	Ongoing
2020-1	Source Water & Storage Water Contamination	High	Grand Lake FPD	Multiple	1, 2	Related to wildland fire flooding. <b>New-2020</b>
<b>Town of Hot Sulphur Springs</b>						
2015-1	Develop and implement fuel reduction projects.	High	Grand County Wildfire Council, Town of HSS	Wildfire	1, 2	Ongoing – continual fuel loads each year.
2015-2	Repair Town fire hydrants.	Medium/High	Dana Kepner Company	Wildfire	1, 2	Completed the project. <b>Deleted.</b>
2015-3	Sewer collection system maintenance	High	Anderson Services	Disease outbreak, flooding	1, 2	Completed the project. <b>Deleted.</b>
2015-4	Street Repairs	High	Acord Asphalt, Inc.	Multi-hazard	1, 2	Ongoing-still updating the streets.
2020-1	Power Outage	High	HSS Public Works	Loss of Water	1	<b>New in 2020</b>
<b>Town of Kremmling</b>						
2015-1	Wildlife mitigation on Highway 9	Medium	County and Kremmling	Wildlife	1	Ongoing
2015-2	Improve safety at pedestrian crosswalks in Kremmling.	High	County and Kremmling	Multi-hazard, winter weather	1	Ongoing
2015-3	Pave roads and install drainage pans to protect houses	Medium	Kremmling	Flood	2	Ongoing
<b>Town of Winter Park</b>						
2015-1	Develop and implement fuel reduction projects.	High	Grand County Wildfire Council, Town of Winter Park	Wildfire	1, 2	Ongoing. Associated actions have been incorporated in the CWPPs, HOAs are applying for grants.

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Fire Protection Districts						
Action ID	Action	Priority	Lead Agency/Dept.	Hazards Addressed	Goals Addressed	Status and Comments
2015-1	Develop and implement a voluntary wildfire protection program for residents within wildfire/urban interface.	High	FPD's, local municipalities	Wildfire	1, 2	Ongoing – wildfire council formed in 2015
2015-2	Identify high-risk critical structures within the WUI; develop fire protection strategies appropriate for those structures.	High	FPD's, OEM	Wildfire	1, 2, 3	<b>Deleted.</b> Completed in CWPPS.
2015-3	Acquire 4-wheel drive pumper trucks.	Medium	FPD's & GC Fire Chief Association	Wildfire	1, 2	<b>Deleted.</b> Completed – (7) type-1 tactical tenders, (9) type-6, (5) type-4, (5) type-3 in the County.
2020-1	Alternate Route Improvement	High	FPD's	Emergency Access	1	Improve bypass traffic-ways during closures from accidents or rock fall. <b>New in 2020</b>
BLM-Kremmling						
2020-1	Mitigate fuel loads surrounded by private property.	High	BLM-KFO	Fuel loads, diseased trees	2	Create 200' fuel break on land adjacent to private property to reduce future fuel load and keep the public safe. <b>New-2020.</b>
2020-2	10-Mile Hand Thinning & Piling.	Low	BLM-KFO	Diseased MPB trees	1	Proposed treatment will be to chainsaws to buck, cut, pile the trees. <b>New-2020.</b>
Northern Water						
2015-1	Colorado-Big Thompson Headwaters Partnership for watershed protection	High	Northern Water	Multi-Hazard	2	Ongoing – MOU revised in 2017; 5-yr plan update in progress; quarterly meetings occurring between partners.
2015-2	Upper Colorado and Colorado-Big Thompson Watershed Analyses	High	Northern Water	Multi-Hazard	2	Completed-updated post-fire sediment reports in 2016. <b>Deleted.</b>
2015-3	Colorado-Big Thompson Headwaters Partnership Post-Wildfire Planning	High	Northern Water	Multi-Hazard	2	Report completed. <b>Deleted.</b>
2015-4	Willow Creek Timber Sale	High	Northern Water	Multi-Hazard	2	Completed-all timber sold. <b>Deleted.</b>
2015-5	Colorado Department of Natural Resources Wildfire Risk Reduction Grant	High	Northern Water	Multi-Hazard	2	Completed-funds handed out. <b>Deleted.</b>
2015-6	Supply Creek Watershed Fuels Reduction Project	High	Northern Water	Multi-Hazard	2	Completed-NW paid the \$90,000 (50%) of the project. <b>Deleted.</b>

■ Status changed or Action Item Deleted

Denver Water						
Action ID	Action	Priority	Lead Agency/Dept.	Hazards Addressed	Goals Addressed	Status and Comments
2015-1	Update drought management plan	High	Denver Water	Drought	3	<b>Deleted.</b> Completed-reviewed annually.
2015-2	Develop IGA with Grand County	Low	Denver Water	Multi-Hazard	1	<b>Deleted.</b> Updating procedures with fire agencies. Have an agreement w/State EM.
2015-3	Update Annual Operating Plan for Property Owners	Low	Denver Water	Drought	2	<b>Deleted.</b> Completed- Annual AOPs are reviewed and updated. Denver Water is included in these plans.
2015-4	Public Outreach in Grand County	Low	Denver Water	Dam failure, drought	1	Ongoing.
2015-5	GIS Mapping Coordination Project	Low	Denver Water	Dam failure	1	<b>Deleted.</b> Completed- Flood inundation maps were updated.
2020-1	Right-of-Way (ROW) Vegetation Maintenance	Low	Denver Water	Wildland Fire	1	<b>New in 2020.</b>

\*Action addresses reducing losses to future development

■ Status changed or Action Item Deleted

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## Mitigation Action: Multi-Jurisdictional 2015-2 Adopt Wildfire Regulations

<b>Jurisdiction:</b>	Multi-Jurisdictional
<b>Hazard Addressed</b>	Wildfire
<b>Project Description, Issue &amp; Background</b>	Adopt and implement the International Wildland-Urban Interface Code and certain special building construction regulations regarding fire hazard severity reduction. See <i>Wildfire Mitigation Law in the Mountain States of the American West: A Comparative Assessment</i> by Lloyd Burton, PhD
<b>Lead Agency and Title of Lead Person</b>	Grand County Wildfire Council, Schelly Olson?
<b>Partners:</b>	Fire Districts, Department of Natural Resources, Planning Dept., CSFS
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Variable, create a county-level position to coordinate all mitigation, education, and funding efforts
<b>Benefits: (Losses Avoided)</b>	Protect life, property, wildlife, watersheds, and infrastructure from wildfire, increase property values, create a Fire-Adapted Community
<b>Potential Funding:</b>	Staff time, grants, federal funding (BLM, FEMA)
<b>Timeline:</b>	18 months
<b>Status:</b>	Ongoing in subdivisions. 2008 burn ban ordinance adopted in County and municipalities.

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## Mitigation Action: Multi-Jurisdictional 2015-6 Countywide Hazmat Plan

**Jurisdiction:** Multi-Jurisdictional

**Hazard Addressed** Hazardous Materials

**Project Description, Issue & Background** Creating and maintaining a current hazmat plan is essential for effective response and mitigation of an incident.

**Lead Agency and Title of Lead Person** LEPC Hazmat Committee, Lt. Adam Gosey with EGFPD #4

**Partners:**

**Priority:** High

**Cost Estimate:** Staff time

**Benefits: (Losses Avoided)** Protect life safety, property, and critical facilities from hazmat incidents; identify strengths and gaps in hazmat response and recovery capabilities

**Potential Funding:** County funds

**Timeline:** Ongoing

**Status:** Ongoing



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## Mitigation Action: Multi-Jurisdictional 2015-7 Hazmat Training

<b>Jurisdiction:</b>	Multi-Jurisdictional
<b>Hazard Addressed</b>	Hazardous Materials
<b>Project Description, Issue &amp; Background</b>	Conduct hazmat training to bring all responders to awareness level (at minimum). Additional training is needed to ensure the safety of first responders.
<b>Lead Agency and Title of Lead Person</b>	LEPC Hazmat Committee, Lt. Adam Gosey with EGFPD #4
<b>Partners:</b>	Fire protection districts, OEM, County Road and Bridge
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Staff time, approximately \$175.00 per student
<b>Benefits: (Losses Avoided)</b>	Protect life safety, property, and critical facilities from hazardous materials spills; improve hazmat emergency response and recovery capabilities
<b>Potential Funding:</b>	County or state funds
<b>Timeline:</b>	Ongoing
<b>Status:</b>	Ongoing – revolving door with FPDs, long-term plan is to include road & bridge. Less than 50% of first responders are at Operations level.

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## Mitigation Action: Multi-Jurisdictional 2015-8 Hazmat Community Education

<b>Jurisdiction:</b>	Multi-Jurisdictional
<b>Hazard Addressed</b>	Hazardous Materials
<b>Project Description, Issue &amp; Background</b>	Provide community awareness education classes, seminars, advertising, brochures, etc. for hazmat issues in the County. Hazardous materials are transported on the major roadways and railways in Grand County. Public information and education can help increase citizen awareness of hazmat issues, including safety, emergency/continuity plans for businesses and homes, and proper storage and disposal of hazardous materials.
<b>Lead Agency and Title of Lead Person</b>	LEPC Hazmat Committee, Lt. Adam Gosey with EGFPD #4
<b>Partners:</b>	
<b>Priority:</b>	High
<b>Cost Estimate:</b>	County or state funds
<b>Benefits: (Losses Avoided)</b>	Protect life safety and property; improve citizen knowledge of prevention, mitigation, response, and recovery regarding hazmat incidents.
<b>Potential Funding:</b>	SARA Title III; COEM
<b>Timeline:</b>	Five years
<b>Status:</b>	Ongoing

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## Mitigation Action: Multi-Jurisdictional 2015-9 Highway 40 Rockfall Mitigation

<b>Jurisdiction:</b>	Multi-Jurisdictional
<b>Hazard Addressed</b>	Rockfall
<b>Project Description, Issue &amp; Background</b>	Implement rockfall mitigation along Highway 40 in Byers Canyon at mile marker 200. There have been continuous rockfall issues along Highway 40 between mile markers 196 and 202. Vehicles traveling through this segment of the Highway have been damaged by rockfall. The last mitigation effort was 6 to 8 years ago. Nearly every rain event causes rockfall issues.
<b>Lead Agency and Title of Lead Person</b>	CDOT
<b>Partners:</b>	Grand County Road and Bridge (with BOCC approval)
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Est. \$500,000
<b>Benefits: (Losses Avoided)</b>	Protect life safety and property, prevent, or reduce road closures that can impact local tourism-based economy or delay commuters and emergency response. Secure transportation and safe travel year-round.
<b>Potential Funding:</b>	CDOT, F.A.S.T.E.R. (Funding Advancement for Surface Transportation and Economic Recovery)
<b>Timeline:</b>	Within a year
<b>Status:</b>	Ongoing – need to identify & upgrade alternate routes.

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## Mitigation Action: Multi-Jurisdictional 2015-11 Adoption of International Fire Code

<b>Jurisdiction:</b>	Multi-Jurisdictional
<b>Hazard Addressed</b>	Wildfire
<b>Project Description, Issue &amp; Background</b>	The International Fire Code (IFC) addresses fire prevention measures in completed and occupied buildings. Combined with the International Building Code, which focuses on construction and design, the IFC can help improve life safety and mitigate fire damage to buildings. The IFC has several provisions for improving fire departments' ability to respond to a building fire and keep their personnel safe, such as having shut-off mechanisms for utilities clearly marked, prohibiting traffic calming devices on fire apparatus access roads, inspecting and testing emergency lighting, etc. This project could be implemented by convening a working committee to understand implications of adopting International Fire Code.
<b>Lead Agency and Title of Lead Person</b>	Grand County Planning and fire protection districts, Lt. Adam Gosey with EGFPD #4
<b>Partners:</b>	Grand County OEM, elected leadership of participating jurisdictions
<b>Priority:</b>	Medium
<b>Cost Estimate:</b>	Staff time
<b>Benefits: (Losses Avoided)</b>	Improving life safety, enhancing emergency preparedness, preventing or reducing fire damage to structures
<b>Potential Funding:</b>	Staff time
<b>Timeline:</b>	Ongoing since 2008
<b>Status:</b>	County has convened a working committee for consideration of adopting International Fire Code. Working committee is developing recommendations and local amendments to Fire Chiefs Association for further consideration before meeting with commissioners.

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## Mitigation Action: Multi-Jurisdictional 2015-12 Complete Defensible Space Projects

<b>Jurisdiction:</b>	Multi-Jurisdictional
<b>Hazard Addressed</b>	Wildfire
<b>Project Description, Issue &amp; Background</b>	Complete defensible space projects around all built-up areas. Defensible space can help mitigation property losses to existing structures from wildfire. Implement through County and local CWPPs.
<b>Lead Agency and Title of Lead Person</b>	Grand County Wildfire Council, Schelly Olson with GFPD. Dependent on individual jurisdictions.
<b>Partners:</b>	Grand County Natural Resources Department, fire protection districts, CSFS, USFS, Grand County OEM
<b>Priority:</b>	Medium
<b>Cost Estimate:</b>	Variable, create a county-level position to coordinate all mitigation, education, and funding efforts
<b>Benefits: (Losses Avoided)</b>	Protect life, property, wildlife, watersheds, and infrastructure from wildfire, increase property values, create a Fire-Adapted Community
	Mitigation projects can reduce damage from wildfires and potentially decrease the cost of response and recovery.
<b>Potential Funding:</b>	CSFS; State Wildfire Risk Reduction Grant, BLM, FEMA
<b>Timeline:</b>	Ongoing. See local CWPP for specifics
<b>Status:</b>	Ongoing

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## Mitigation Action: Multi-Jurisdictional 2015-13 Bridge Load Limits

<b>Jurisdiction:</b>	Multi-Jurisdictional
<b>Hazard Addressed</b>	Multi-Hazard
<b>Project Description, Issue &amp; Background</b>	Identify then certify all privately owned bridges with load limits to support emergency response. Some private bridges are not adequate to support emergency response vehicles. Knowing the location of these bridges in advance of an incident would allow responders to identify potential alternate routes or provide recommendations for bridge owners for enhancements.
<b>Lead Agency and Title of Lead Person</b>	Grand County Road and Bridge Supervisor - wants this left in the Plan.
<b>Partners:</b>	County GIS
<b>Priority:</b>	Medium
<b>Cost Estimate:</b>	Staff time
<b>Benefits: (Losses Avoided)</b>	Improved emergency response; improved ability to protect life safety of first responders and public
<b>Potential Funding:</b>	County general funds/ private funding
<b>Timeline:</b>	Ongoing
<b>Status:</b>	Ongoing. Completed in Grand Lake FPD. Rocky Mountain National Park has identified and certified bridges. More work to be done in other parts of the County.

# 5 PLAN IMPLEMENTATION AND MAINTENANCE

This chapter provides an overview of the overall strategy for plan implementation and maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

Section 2.0 Planning Process includes information on the implementation and maintenance process since the 2008 plan was adopted. This section includes information on the ongoing implementation and maintenance process and reflects adjustments made in the 2013 update.

## 5.1 Implementation

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Implementation and maintenance are critical to the mitigation plan's overall success. While this plan makes many important recommendations, the jurisdictions 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 actions most easily demonstrate progress toward successful plan implementation.

An important implementation mechanism that is highly effective and low-cost is incorporation of the hazard mitigation plan recommendations and their underlying principles into other plans and mechanisms, such as comprehensive planning, capital improvement budgeting, economic development goals and incentives, and other regional plans. *Mitigation is most successful when it is incorporated in the day-to-day functions and priorities of government and in land use and development planning.* This integration can be accomplished through identifying multi-objective, win-win programs and projects and through the routine actions of monitoring agendas, attending meetings, sending memos, and promoting safe, sustainable communities.

Simultaneous to these efforts, it is important to maintain a constant monitoring of funding opportunities that can be leveraged to implement some of the more costly recommended actions. This will include creating and maintaining a bank of ideas on how to meet local match or participation requirements. When funding does become available, the participating jurisdictions 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. Additional mitigation strategies include consistent and ongoing enforcement of existing rules and regulations and vigilant review of countywide programs for opportunities for better coordination.

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## 5.2 Monitoring, Evaluating, and Updating the Plan

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### 5.2.1 Role of Hazard Mitigation Planning Committee in Monitoring and Maintenance

With adoption of this plan, the HMPC will be tasked with plan monitoring, evaluation, and maintenance. The participating jurisdictions and agencies, led by the County Emergency Manager within the Grand County Office of Emergency Management or other designated organization elements, plan to conduct the following meetings and activities:

- Meet annually or after a disaster event to monitor and evaluate the implementation of the plan. The annual review meeting will take place in the month of January each year.

HMPC members also serve on various public safety planning committees and have regular meetings that are hazard specific. The County Emergency Manager will bring HMP topics into these meetings as an ongoing way to keep mitigation the discussion and monitor implementation. These meetings may include, as an example, the Local Emergency Planning Committee (LEPC) which meets 4 times annually;

Additionally 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- or no-cost recommended actions;
- Maintain vigilant monitoring of multi-objective, cost-share, and other funding 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;
- 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;
- Report on plan progress and recommended changes to the Grand County Board of County Commissioners and governing bodies of participating jurisdictions; and
- Inform and solicit input from the public.

The HMPC is an advisory body and will not have any powers over county, city, town, or district staff. Its primary duty is to see the plan successfully carried out and to report to the community governing boards and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, hearing stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information on the County website.



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## 5.2.2 Plan Maintenance Schedule

The HMPC agrees to meet annually or after a hazard event to monitor progress and update the mitigation strategy. The Grand County emergency manager is responsible for initiating these plan reviews. In conjunction with the other participating jurisdictions, a five-year written update of the plan will be submitted to the Colorado Office of Emergency Management and FEMA Region VIII.

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 unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule. Efforts to begin the next update should begin no later than January 2018. The County will inquire with COEM and FEMA for funds to assist with the update in 2016 as most applicable grants have multiple years to expend the funds. Funding sources may include the Emergency Management Performance Grants, Pre-Disaster Mitigation, Hazard Mitigation Grant Program (if a presidential disaster has been declared), and Flood Mitigation Assistance grant funds. The next plan update is anticipated to be completed and reapproved by COEM and FEMA Region VIII by November 2025.

## 5.2.3 Plan Maintenance Process

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Changes in vulnerability can be identified by noting:

- Decreased vulnerability as a result of implementing recommended actions,
- Increased vulnerability as a result of failed or ineffective mitigation actions, and/or
- Increased vulnerability as a result of new development (and/or annexation).

Updates to this plan will:

- Consider changes in vulnerability due to action 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,
- Incorporate new data or studies on hazards and risks,
- Incorporate new capabilities or changes in capabilities,
- Incorporate growth and development-related changes to inventories, and
- Incorporate new action recommendations or changes in action prioritization.

To best evaluate any changes in vulnerability as a result of plan implementation, the participating jurisdictions will follow the following process:

- A representative from the responsible office identified in each mitigation action will be responsible for tracking and reporting on an annual basis to the jurisdictional lead on action

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status and provide input on whether the action as implemented meets the defined objectives and is likely to be successful in reducing vulnerabilities.

- If the action does not meet identified objectives, the jurisdictional lead will determine what additional measures may be implemented, and an assigned individual will be responsible for defining action scope, implementing the action, monitoring success of the action, and making any required modifications to the plan.

As a measure of progress the HMPC will evaluate the overall percentage of actions implemented within each 5 year update cycle. Changes will be made to the plan to accommodate for actions that have failed or are not considered feasible after a review of their consistency with established criteria, timeframe, community priorities, and/or funding resources. Actions that were not ranked high but were identified as potential mitigation activities will be reviewed as well during the monitoring and update of this plan to determine feasibility of future implementation. Updating of the plan will be by written changes and submissions, as the Grand County Office of Emergency Management deems appropriate and necessary, and as approved by the Grand County Board of Commissioners and the governing boards of the other participating jurisdictions.

### 5.3 Incorporation into Existing Planning Mechanisms

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**44 CFR Requirement §201.6(c)(4)(ii):[The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.**

Where possible, plan participants will use existing plans and/or programs to implement hazard mitigation actions. Based on the capability assessments of the participating jurisdictions, communities in Grand County continue to plan and implement programs to reduce losses to life and property from hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through the following plans:

Grand County Master Plan

Grand County Emergency Operations Plan

Grand County Community Wildfire Protection Plan

Comprehensive or master plans of participating jurisdictions

Local CWPPs

Ordinances of participating jurisdictions

Capital improvement plans and budgets

Other community plans within the County, such as water conservation plans, stormwater management plans, source water protection plans, and parks and recreation plans

- Other plans and policies outlined in the capability assessments in the jurisdictional annexes

The County intends to incorporate information from the multi-hazard mitigation plan into the Emergency Operations Plan, LEPC planning rubric, and County Planning and Zoning planning

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mechanisms, and to improve integration with the Community Wildfire Protection Plan and the multi-hazard mitigation plan.

Efforts should be made to monitor the progress of mitigation actions implemented through these other planning mechanisms and, where appropriate, their priority actions should be incorporated into updates of this hazard mitigation plan.

## 5.4 Continued Public Involvement

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**44 CFR Requirement §201.6(c)(4)(iii): [The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.**

The update process provides an opportunity to publicize success stories from the plan's implementation and seek additional public comment. A public hearing(s) or survey to receive public comment on the plan 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 who joined the HMPC after the initial effort, to update and revise the plan. Public notice will be posted and public participation will be invited, at a minimum, through available website postings and press releases to the local media outlets as well as email and social media announcements. Continued public outreach is an aspect of the mitigation strategy. Activities related to public involvement during the 2020 update are documented in Appendix B.

# ANNEX A: UNINCORPORATED GRAND COUNTY

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Jurisdictional annexes provide specific information unique to each jurisdiction participating in the hazard mitigation plan. For unincorporated Grand County, countywide information related to sections A.1 Community Profile, A.2 Hazard Identification and Profiles, and A.3 Vulnerability Assessment is addressed previously in the main plan. The location of this information is referenced below. The remainder of this annex focuses on the Capability Assessment and Mitigation Strategy unique to the County government.

## A.1 Community Profile

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Community profile information and the base map for Grand County are provided in Section 1.5 Planning Area Profile.

## A.2 Hazard Identification and Profiles

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Countywide hazard identification and profiles information can be found in Section 3.1 Hazard Identification and Section 3.2 Hazard Profiles.

## A.3 Vulnerability Assessment

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The vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of moderate or high significance and estimates potential losses where data is available. So as not to duplicate pages in this Plan, see Table H.2. under the fire districts for Building Exposure Abstracts.

Countywide critical facilities and assets are inventoried in Table A.2. Other countywide vulnerability information is covered in Section 3.3 Vulnerability Assessment in the main plan.

**Table A.2. Grand County—Critical Facilities and Other Community Assets**

Facility Type	Name	Address	City
Bridges	County Road 00		
Bridges	County Road 1		
Bridges	County Road 10		
Bridges	County Road 11		
Bridges	County Road 2		
Bridges	County Road 21		
Bridges	County Road 25		
Bridges	County Road 3		
Bridges	County Road 30		
Bridges	County Road 302		
Bridges	County Road 32		
Bridges	County Road 330		
Bridges	County Road 39		
Bridges	County Road 4		
Bridges	County Road 40		
Bridges	County Road 491		
Bridges	County Road 57		
Bridges	County Road 6		
Bridges	County Road 620		
Bridges	County Road 627		
Bridges	County Road 64		
Bridges	County Road 66		
Bridges	County Road 73		
Bridges	County Road 8		
Bridges	County Road 8022		
Bridges	County Road 83		
Bridges	County Road 84		
Bridges	FDR 348		
Bridges	Grand Avenue		
Bridges	Jericho Road		
Bridges	Lions Gate Drive		
Bridges	Service Road		
Bridges	SH 125 MI		
Bridges	SH 134 MI		

Facility Type	Name	Address	City
Bridges	SH 9 MI		
Bridges	U.S.F.S. Road 106		
Bridges	Us 34 MI		
Bridges	Us 40 MI		
Bridges	Wapiti Street		
Bridges	West Portal Drive		
Bridges	Winter Park Drive		
Bridges	YCC Camp Road		
Communications		259 County Road 53	
Communications	Acadia Condominiums	554 County Road 834 (Cranmer Avenue)	
Communications	Colorado Mines Peak	North Of Berthoud Pass	
Communications	Cooper Creek Square	37, 47, 63 Cooper Creek Way	
Communications	Educational Communications		
Communications	Fraser 4 Bar 4		
Communications	Fraser 4 Bar 4 (Dismantled)		
Communications	Fraser Boost Station		
Communications	Fraser Road & Bridge	350 County Road 5103	
Communications	Granby li / Murphy Site	1025 County Road 5721	
Communications	Grand County Administration Building	308 Byers Avenue	
Communications	Grand Lake / MPEI Site	102 County Road 471	
Communications	Grand Lake Lodge	15500 Us Highway 34	
Communications	Grouse Mountain (North)		
Communications	Grouse Mountain (South)		
Communications	Hwy 40 106.3 Fm Radio Tower	Linke Ranch	
Communications	Hwy 40 Grand County Wireless	Linke Ranch	
Communications	Indian Peaks Rental	68 County Road 85 (Elkhorn Drive)	
Communications	Jasper Mountain (North Cottonwood)	4330 County Road 5721 (Blm Road 2752)	
Communications	Kremmling Airport		
Communications	Kremmling Tower		
Communications	Lake Hill		
Communications	Lodge At Sunspot	677 Winter Park Drive	
Communications	LTTK, Inc. Teddy's Car Wash	32429 Us Highway 40	
Communications	Mary Jane		
Communications	Moffat Station	81699 Us Highway 40	
Communications	Mount Bross		
Communications	Mount Chauncey		
Communications	Mount Eva	Atop Summit Of Berthoud Pass	
Communications	Parshall Divide Hot Sulphur Springs/Parshall FPD		
Communications	Parshall Divide Microwave Reflector		

Facility Type	Name	Address	City
Communications	Parshall Road & Bridge		
Communications	Power World	61000 Us Highway 40	
Communications	Radium Boost Station		
Communications	San Toy Mountain (East)	4905 County Road 1	
Communications	San Toy Mountain (West)		
Communications	Sheriff's Office (Center)	307 Moffat Avenue	
Communications	Sheriff's Office (East)	307 Moffat Avenue	
Communications	Sheriff's Office (North West)	307 Moffat Avenue	
Communications	Sheriff's Office (Tower)	307 Moffat Avenue	
Communications	Sol Vista Peak		
Communications	South Cottonwood		
Communications	South Cottonwood (Terminated)		
Communications	South Grouse Mountain		
Communications	State Highway Radio Relay Station		
Communications	Table Mountain (Dismantled)		
Communications	Table Mountain (North)		
Communications	Table Mountain (South)		
Communications	Table Mountain Forest Service		
Communications	Town & Country (Kremmling)		
Communications	Tri-State Troublesome Sub Station		
Communications	Val Moritz HOA	Val Moritz Tract E	
Communications	Williams Fork Reservoir		
Communications	Williams Peak / Blue Ridge		
Communications	Winter Park (Denver Water)	100 Vintage Way	
Communications	Winter Park Ski Area 1		
Communications	Winter Park Ski Area 2		
Communications	Wolford Mountain		
Communications	Wolford Mountain (Dismantled)		
EMS Station 1	Grand County EMS	81 W Agate Ave	Granby
EMS Station 2	Grand County EMS	216 Eisenhower	Fraser
EMS Station 3	Grand County EMS	201 W. Portal Road	Grand Lake
EMS Station 4	Grand County EMS	1003 Eagle	Kremmling
Fire Station	East Grand Fire Protection District #4	77601 Us Hwy 40	Winter Park
Fire Station	East Grand Fire Protection District Station	40 County Rd 526	Tabernash
Fire Station	Grand Fire Protection District Station	60500 Us Hwy 40	Granby
Fire Station	Grand Lake Fire Department Protection	201 W Portal Rd	Grand Lake
Fire Station	Hot Sulphur Springs - Parshall Fire Prot	513 Aspen St	Hot Sulphur Springs
Fire Station	Kremmling Fire Department	1320 Eagle Ave	Kremmling
Government	Administration Building	85 Parsenn Road	Winter Park

<b>Facility Type</b>	<b>Name</b>	<b>Address</b>	<b>City</b>
Government	Fraser Town Hall	153 Fraser Avenue	Fraser
Government	Fraser Valley Library	421 Norgren Rd	Fraser
Government	Grand Lake Town Hall	1026 Park Avenue	Grand Lake
Government	Granby Town Hall	Zero W Jasper Ave	Granby
Government	Hot Sulphur Town Hall	513 Aspen St	Hot Sulphur Springs
Government	Kremmling Town Hall	200 Eagle Avenue	Kremmling
Government	Winter Park Town Hall	50 Vasquez Rd	Winter Park
Government	Grand County Administration Building	308 Byers Ave	Hot Sulphur Springs
Government	Grand County Courthouse	307 Moffat Ave	Hot Sulphur Springs
Government	Visitors Center	120 N Zerex St	Fraser
Government	Visitors Center	78841 Us Hwy 40	Winter Park
Government	Grand County Road And Bridge - Granby	467 East Topaz	Granby
Government	Grand County Road And Bridge - Fraser	350 County Road 5103	Fraser
Government	Grand County Road And Bridge - Parshall	91 County Road 3	Parshall
Government	Grand County Road And Bridge - Kremmling	1008 Railroad Avenue	Kremmling
Government	Grand County Road And Bridge - Grand Lake	217 Marina Drive	Grand Lake
Government	Grand County Public Health	150 Moffat	Hot Sulphur Springs
Government	Grand County Judicial Building	307 Moffat Avenue	Hot Sulphur Springs
Hazmat	Climax Molybdenum Co. - Henderson Mill	19302 County Rd. 3	Parshall
Hospital	Kremmling Memorial Hospital	214 South Grand Avenue	Kremmling
Hospital	Middle Park Medical Center	1000 Granby Park Drive	Granby
Natural Gas Facility	Public Service Co Williams Fork	Sec 23 T2S R78W	Parshall
Electrical Facility	Mountain Parks Electric	321 West Agate Avenue	Granby
Telephone Facility	CenturyLink Building	195 East Jasper	Granby
Transfer Station	Granby Transfer Station	723 Cr 612	Granby
Police Station	Grand County Sheriff Dept	670 Spring Street	Hot Sulphur Springs
Police Station	Granby Police	0 Jasper Avenue	Granby
Police Station	Fraser/Winter Park Police	79050 Us Highway 40	Winter Park
Police Station	Kremmling Police Dept	1318 Park Ave	Kremmling
Pumphouse	Booster Pumphouse	2498 Parsenn Road	Winter Park
Pumphouse	Pumphouse Building	300 Canal Way	Winter Park
Pumphouse	Sunspot Water Pump station	3853 Parsenn Road	Winter Park
School	East Grand Middle School	251 West Diamond	Granby
School	Faith In Action Christian School	115 N Spruce St	Kremmling
School	Fraser Valley Elementary School	125 Eastom	Fraser



Facility Type	Name	Address	City
School	Granby Elementary School	202 West Topaz	Granby
School	Grand Lake Elementary School	301 Marina Drive	Grand Lake
School	Indian Peaks Charter School	197 W. Diamond	Granby
School	Middle Park High School	795 North 2Nd Street	Granby
School	West Grand Elementary School	715 Kinsey Avenue	Kremmling
School	West Grand High School	208 12Th Street	Kremmling
School	West Grand Middle School	109 9Th Street	Kremmling
Waste Water Facility	Conrad John J.	63 County Road 820	Tabernash
Waste Water Facility	Galloway Inc. (GW)	3 Miles South Of Town	Kremmling
Waste Water Facility	Granby Sanitation District	3493 County Road 57	Granby
Waste Water Facility	Grand County W&S District #1	78841 U.S. Highway 40	Winter Park
Waste Water Facility	Three Lakes Water & Sanitation District	1111 County Road 48	Grand Lake
Water Facility	Winter Park Water And Sanitation Treatment	160 Alpenglow Way	Winter Park

Source: HMPC

## A.4 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. The capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

### Regulatory Mitigation Capabilities

Table A.3 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Grand County.

**Table A.3. Grand County—Regulatory Mitigation Capabilities**

Regulatory Tool (Ordinances, Codes, Plans)	Yes/No	Comments
Comprehensive or Master Plan	Yes	2011 Master Plan
Zoning Ordinance	Yes	
Subdivision Ordinance	Yes	
Growth Management Ordinance	No	
Floodplain Ordinance	Yes	Contained within Land Use Regulations
Other Special Purpose Ordinance (Stormwater, Steep Slope, Wildfire)	Yes	Contained within Land Use Regulations
Building Code	Yes	

<b>Regulatory Tool (Ordinances, Codes, Plans)</b>	<b>Yes/No</b>	<b>Comments</b>
Erosion or Sediment Control Program	Yes	Granby Airport, Kremmling Airport, Granby Landfill, Kremmling Landfill
Stormwater Management Program	Yes	Granby Airport, Kremmling Airport, Granby Landfill, Kremmling Landfill
Site Plan Review Requirements	Yes	Stormwater Permit required on Disturbance over 1 acre per state requirements
Capital Improvements Plan	Yes	
Economic Development Plan	No	
Local Emergency Operations Plan	Yes	Updated in 2012
Other Special Plans	No	
Flood Insurance Study or Other Engineering Study for Streams	No	County does not participate in NFIP
Elevation Certificates (for floodplain development)	No	
Other	No	

## Countywide Master Plan, 2011

The Grand County Master Plan serves as the County’s policy guidance and directs decisions that affect the physical and socioeconomic development of the County. The plan updates the County’s 1998 Master Plan, with “the general purpose of guiding and accomplishing a coordinated, adjusted and harmonious development of the county.” The Master Plan includes seven plan elements: (1) Natural and Cultural Resources; (2) Land Use (Growth and Development); (3) Development: the Built Environment; (4) Community and Public Facilities; (5) Transportation; (6) Economic Base; and (7) Administration and Process. The first four elements are most closely related to hazard mitigation. Emergency Management is incorporated into the Master Plan under the Community and Public Facilities element, including references to Hazard Mitigation Planning and Community Wildfire Protection Planning. Goals and policies related to hazard mitigation include the following:

- 1.1 Wildlife: The quality, integrity, and interconnected nature of critical wildlife habitat in Grand County should be preserved and protected.
- 1.2 Wetlands: Provide for the long-term protection of wetland functions and values.
- 1.3 Water Resources: Protect the long-term viability of water resources and water quality in Grand County.
- 1.4 Historic and Cultural Resources: Development and development patterns should preserve landscapes that include historically and archeologically significant sites.
- 2.4.1 Rural and Open Lands Pattern Policies: Educate citizens and landowners in Grand County about “Rural Living” and land stewardship related to fencing, water rights, wetlands, noxious weeds, erosion, revegetation (planting grass, flowers, trees, and shrubs), access, emergency response, wildfire, and wildlife.
- 4.6 Emergency Management

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- Continue to work with emergency service providers in the review of new developments to ensure adequate access is provided for fire, police, and other emergency services.

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- Continue to work with local fire districts, state and federal agencies and the Grand County Department of Natural Resources to support Community Wildfire Protection Planning and local wildfire mitigation efforts in order to minimize risks within the wildland-urban interface.
  - Understand wildfire impacts on the county watersheds and support watershed protection planning in conjunction with wildfire protection and mitigation.
  - Continue to ensure that all new proposed subdivisions and special uses comply with applicable wildfire mitigation as required by the Grand County Department of Natural Resources, Colorado State Forest Service and local fire protection districts.
  - Continue to remove hazard trees pursuant and implement the forest management plan along applicable county road rights-of-way.
  - Continue to work with local and state entities and support emergency management planning related to: Local Emergency Operations, Hazard Mitigation Planning, and Pre-Disaster Mitigation Planning, as well as other natural hazard planning.
  - Continue to require all new proposed subdivisions to comply with applicable wildfire mitigation as recommended by Grand County Department of Natural Resources, Colorado State Forest Service, and local fire protection districts.
  - Support Community Wildfire Protection Planning and local wildfire mitigation efforts in order to minimize risks within the Wildland-Urban Interface.

## **Grand County Zoning Regulations**

While Grand County does not participate in the NFIP, it does have zoning and subdivision regulations which restrict development in the floodplain. Land within an existing one hundred (100) year floodplain or land which is subject to inundation shall not be platted for occupancy unless the flooding condition is alleviated according to plans approved by the Grand County Planning Commission and the Board of County Commissioners. Applicable text from the County's Zoning Regulations (Section XIV.14.3) and Subdivision Regulations (Article II – Sections 2.1, 2.7, 2.8, 4.2, 5.2, 5.6 and 7.2) is noted below.

- Section 11, 11.8 Special Uses, Requirement (11): Reservoirs and dams engineered to contain more than one hundred (100) acre feet of water in all zoning districts subject to the following additional provisions:
  - (b) Evidence shall be presented that said structure shall not create a hazard both in construction and afterwards to the existing populated areas of Grand County;
  - (f) Satisfactory proof that the water level of the dam or reservoir shall be maintained even

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in drought years as to prevent dry mud flats which may give rise to dust storms creating a hazard for surrounding roadways and land owners;

- (h) Said reservoirs and dams shall be engineered in such a manner so that they will not be placed near existing public roadways; both so as to prevent hazards to the public created by said proximity and the unsightly visual impact

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- Requirement (6): Public utility facilities, excluding business offices and repair facilities, subject to the following provisions:
    - (g) All extensions of public utility facilities shall give due regard to topsoil, to geologic and watershed characteristics, to which end all extensions shall: consider geologic and natural hazard areas including floodplain and, if applicable, wildfire areas; reflect selection to minimize adverse impact on subsequent development of mineral resources or mineral resource areas; approved or planned reservoir sites; and deposit of construction aggregate...
  - Section 14, 14.3 Major Flood Channels: Buildings or other structures, except a flood control dam or irrigation structure, shall not be constructed in areas subject to inundation unless and until the plans for such building or structure are first approved by the Board of County Commissioners subject to the following special conditions:
    - (1) Any building or structure which is approved shall be located so as to offer minimum obstruction to the flow of flood water, and shall not cause lands outside of the natural flood channel to be flooded;
    - (2) No dwellings shall be permitted;
    - (3) No schools, churches, or other places of public assembly shall be permitted;
    - (4) No storage of materials which could be moved by flood waters shall be permitted
    - (11) Reservoirs and dams engineered to contain more than one hundred (100) acre feet of water in all zoning districts subject to the following additional provisions:
      - (a) Such uses shall serve an obvious public need;
      - (b) Evidence shall be presented that said structure shall not create a hazard both in construction and afterwards to the existing populated areas of Grand County;
      - (c) Satisfactory proof shall be given that such areas will be properly maintained;
      - (d) Satisfactory proof shall be provided that such reservoir or dam site shall not adversely affect wildlife, the environment or stream flows of existing streams to the detriment of the fish population;
      - (e) Satisfactory proof that said dam or reservoir is located in such a manner that minimum damage shall be caused to owners of private land and water rights in the vicinity;
      - (f) Satisfactory proof that the water level of the dam or reservoir shall be maintained even in drought years as to prevent dry mud flats which may give rise to dust storms creating a hazard for surrounding roadways and land owners;

The above regulations were reviewed and revised to conform to the updated State Floodplain Rules and Regulations that became effective statewide on January 14, 2011.

## **Grand County Subdivision Regulations**

- Article II Design Standards, Section 2.1 Special site considerations

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- 1) Steep, unstable or swampy land, and land subject to inadequate drainage, avalanche or rock slides, and geological hazards, shall be identified and unless acceptable provisions

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are made for eliminating or controlling problems which may endanger health, life or property, such sites shall not be platted for residential occupancy. Land not usable for residential purposes may be set aside for open land uses as for parks, conservation areas or various agricultural uses. Building and Development is prohibited on slopes in excess of 30%. Developments in suspected geological hazard areas will be designed or reviewed by a qualified professional geologist.

- (2) Any land subject to flooding or located in a natural drainage channel shall not be platted for occupancy until adequate provisions to eliminate or control hazards are made and approved by the Planning Commission. These provisions shall be made to protect the health, safety and welfare of the public, as well as to eliminate any flood hazard resulting from the development of the area. Areas subject to flooding may be left as open space or reserved as easements.
- Article II Design Standards, Section 2.8 Design Standards for Flood Hazard, Fire Hazard and Geological Hazard Areas:
  - In areas determined to have significant flood, fire or geological hazards the Planning Commission may, in the interest of public safety, require developers to submit for review plans to eliminate or reduce hazards to a reasonable level. Such plans may include, but are not limited to engineering designs, fuel modification, emergency water systems, etc.
- Article V Design Standards for Development of, or Conversion to Condominiums, Townhouse, and Apartment Houses (Greater than Four (4) Units), Section 5.6 Design Standards for Flood Hazard, Fire Hazard, Geological Hazard and Mineral Resource Areas:

(1) The Planning Commission may require the developer to furnish appropriate technical data and other information necessary to determine applicability to and evaluation of development on any land suspected of having significant flood hazard areas, fire hazard areas, geological hazard areas, and mineral resource areas. Technical data and other information requested by the Planning Commission will be prepared and certified by a professional, qualified in the appropriate field of expertise. If it is determined that a proposed development or a portion thereof lies within a hazard area or a mineral resource area, the Planning Commission may require, in the plans, to eliminate or reduce hazards to a reasonable level. Such plans may include, but are not limited to: engineering designs, fuel modification, emergency water systems, etc. In addition, if it is determined that a proposed development or a portion thereof lies within a flood hazard area or a mineral resource area, said area shall not be used unless the following standards and prohibitions are complied with:

  - (a) Flood Hazard Areas
    - (i) Storage or processing of materials that in times of flooding are buoyant, flammable, explosive or otherwise potentially injurious to human, animal or plant life, shall be prohibited.
    - (ii) Solid waste disposal shall be prohibited within flood hazard areas.
    - (iii) Development of any nature must be designed so as to prevent: substantial solid debris from being carried downstream, enlargement of a flood plain, or damage to or on



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lands other than those being proposed for development.

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- (iv) Structures proposed in a flood plain must be adequately flood proofed to or over one foot (1') above maximum water elevation of an intermediate regional flood and be anchored to prevent flotation, collapse or lateral movement.
  - (v) Development in a flood plain shall be consistent with the need to minimize flood damage.
  - (vi) Sewage disposal systems shall be designed and located so as to minimize or eliminate infiltration, avoid their impairment, or their contamination of surrounding areas during or subsequent to flooding.
  - (vii) Water supply systems located in flood plain areas shall be designed and located so as to minimize or eliminate infiltration and avoid their impairment during or subsequent to flooding.
  - (b) Mineral Resource Areas
    - (i) Prior to initiation of exploration or site operation, the operator or developer will provide a general exploration or development plan to the Planning Commission for review to insure compliance with applicable federal, state and county regulations.
    - (ii) In areas where surface and mineral rights are divided, the surface developer will show proof that the mineral owner has been notified of proposed surface development or improvements C.R.S. §24-65.5-103. Said proof may be in the form of a legal publication, one (1) time, in a newspaper of general circulation in Grand County.
    - (iii) Surface development may not preclude development of mineral resources, however, preference may be given to another use if sufficient technical or other evidence demonstrates that the economic value of the minerals present is less than the value of other use.
    - (iv) Mineral extraction and exploration are prohibited if such activity would cause significant danger to the public health and safety.

## **Grand County Storm Drainage Design and Criteria Manual, 2006**

The County's Storm Drainage Design and Criteria Manual applies to all land within the unincorporated areas of the County. Presented in these criteria is the minimum design of storm drainage facilities. All subdivisions, re-subdivisions, planned development, or any other proposed construction public or private submitted for approval under these provisions, shall include adequate storm drainage analysis and appropriate drainage, system design, such analysis and design shall conform to the criteria set forth in the Manual.

- Section 1.4.2 Minor and Major Drainage System
  - The Minor Drainage System shall be designed to convey runoff from a 10-year recurrence interval storm for rural type roads with ditches and cross road culverts. Paved streets with curbs, gutters and storm sewers shall be designed for a 5-year recurrence interval.
  - The Major Drainage System is designed to convey runoff from the 100-year recurrence

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interval flood to minimize health and life hazards, damage to structures, and interruption

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to traffic and services. Major storm flows can be carried in the urban street system (within acceptable depth criteria), channels, storm sewers, and other facilities.

- Section 3.3 Frequency of Design Runoff for Minor Storm
  - The minor storm for design of cross-road culverts on rural type roads, less than 400 acres shall be designed for a return frequency of 10 years. For basins larger than 400 acres, the initial storm shall be 50 year frequency. Bridges shall be designed for a 100 year frequency and a one foot freeboard for the passage of debris. The minor design storm for urban type paved curb and/or gutter streets and storm sewers in the urban growth areas shall be the five year storm.
- 3.3.5 Floodplain Management
  - Naturally occurring floodplains and associated floodways are vital for continued conveyance and storage of runoff. Urban land use can often compete with areas that historically have served this conveyance and storage function. In general, floodplains should be left in historic condition whenever possible. The policy of the County shall be to leave floodplains in a natural state whenever possible.
- 3.3.6 Stormwater Detention
  - The value of storm runoff detention has been explored by many individuals, agencies and professional societies. Detention is considered a viable method to reduce urban drainage costs. Temporarily detaining storm runoff associated with the increase in impervious areas caused by urban development can sufficiently reduce downstream hazards as well as infrastructure requirements. Storage also provides for sediment and debris collection, which helps to keep streams and rivers cleaner thus helping to protect the natural resources of the County. The policy of the County shall be to require onsite detention facilities for all development, expansions, and redevelopment, unless a variance is granted, as noted in the variance procedure below. The required minimum volume and maximum release rates for the 10-year and 100-year storm events will be determined in accordance with these criteria.
- Section 3.4 Frequency of Design Runoff for Major Storm
  - The major storm shall be the 100 year return frequency in all cases. The major storm can be conveyed in all conduits: culverts, storm sewers, roads and streets, but will not be permitted to flood structures or endanger life.

## **Grand County Community Wildfire Protection Plan, 2006**

The purpose of the Grand County Community Wildfire Protection Plan is to establish a focused set of goals, policies, and implementation strategies specific to wildfire prevention and mitigation. A local citizen advisory committee was established to assist Grand County in developing this CWPP. The advisory committee consisted of interested parties who represent

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municipal government, local fire authority, homeowners associations, private property owners and managers, law enforcement, Colorado State Forest Service, U.S. Forest Service, and the Bureau of Land Management. The document is organized into eight sections and five appendices that include maps of focus areas for reducing wildfire risk and mitigation and

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implementation strategies. Sections VII and VIII detail treatment activities and recommendations that support wildfire mitigation in the County.

<https://bewildfireready.org/wp-content/uploads/2013/04/GCCWildfireProtectionPlan.pdf>

### **Upper Colorado Headwaters Wildfire/Watershed Assessment**

This watershed assessment is designed to identify and prioritize sixth-level watersheds based upon their hazards of generating flooding, debris flows and increased sediment yields following wildfires that could have impacts on water supplies. It is intended to expand upon current wildfire hazard reduction efforts by including water supply watersheds as a community value. The watershed assessment follows a procedure prescribed by the Front Range Watershed Protection Data Refinement Work Group (2009). This assessment also provides an identification of opportunities and constraints for each Zone of Concern. Another goal of this assessment is to gather the key water supply stakeholders to communicate the suggested process, listen to any suggested changes, and build collaborative support for the assessment process. Grand County and the towns of Fraser, Granby, Grand Lake, and Winter Park were identified as stakeholders in Appendix A of the assessment.

### **Grand County Emergency Operations Plan (EOP), 2016**

The Grand County EOP establishes the structure for a coordinated response to various types of natural, technological, manmade emergencies and disasters, and terrorist attacks. The Grand County EOP provides a basis for the coordinated planning and management of types of emergencies and disaster events most likely to occur in Grand County and those emergencies and disaster events of “countywide interest.” All Elected Offices and County Departments tasked in the EOP are responsible for developing and maintaining the standard operating procedures and training necessary for implementing the assigned duties and functions of the Grand County EOP. The Grand County EOP is intended to be used when a situation requires that multiple offices or Departments are involved in coordination and integration with outside agencies and entities, an emergency or disaster declaration, or when an incident escalates beyond the capabilities of Grand County and it is necessary to seek State and/or Federal assistance.

### **Grand County Public Health Epidemiology Response Plan and Quarantine & Isolation Plan**

The Grand County Public Health (GCPH) Epidemiology Response Plan documents how disease surveillance, investigation, and epidemiological data management are handled at GCPH. In the event of a public health emergency that involves epidemiological response, elements of this plan can be used as a response guideline. While the plan focuses on communicable disease surveillance and investigation, similar epidemiological processes may be followed for response to non-communicable disease emergencies, such as radiological or chemical agent emergencies or natural disasters. This plan also serves as a training tool for new agency staff.

The GCPH Quarantine and Isolation Plan establishes procedures for quarantining and isolating persons with certain communicable diseases. A public health order for quarantine or isolation is

only one element of case management for an outbreak response. GCPH will consult with several other agencies including the Grand County Board of Health, CDPHE, case investigators, and regional epidemiologists before deciding to execute such an order. GCPH will coordinate with the Grand County Sheriff’s Office, Grand County Emergency Management, and the County’s PIO when appropriate.

## Administrative/Technical Mitigation Capabilities

Table A.4 identifies the personnel responsible for activities related to mitigation and loss prevention in Grand County.

**Table A.4. Grand County—Administrative and Technical Mitigation Capabilities**

Personnel Resources	Yes/No	Department/Position	Comments
Planner/Engineer with Knowledge of Land Development/Land Management Practices	Yes	Planning Director.	
Engineer/Professional Trained in Construction Practices Related to Buildings and/or Infrastructure	Yes		We use a consulting engineer that reviews and comments on all construction plans submitted for land development
Planner/Engineer/Scientist with an Understanding of Natural Hazards			
Personnel Skilled in GIS	Yes	GIS Coordinator, Road and Bridge Safety and Materials Coordinator	
Full-Time Building Official	Yes	Chief Building Official	
Floodplain Manager	No	Planning Department reviews flood risk potential with development permits	
Emergency Manager	Yes		
Grant writer	Yes	Road & Bridge Office Supervisor, Safety Coordinator	
Other personnel			
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Yes	Road & Bridge Safety & Materials Coordinator	
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Yes		
Other			

## Fiscal Mitigation Capabilities

Table A.5 identifies financial tools or resources that Grand County could potentially use to help fund mitigation activities. The County Subdivision Regulations 2008 include provisions for emergency service impact fees to provide a rational system for identifying and mitigating growth-related costs associated with growth and development and the expansion of emergency

services and facilities made necessary by land development activities, a growing population and economic activity levels.

**Table A.5. Grand County—Fiscal Mitigation Capabilities**

<b>Financial Resources</b>	<b>Accessible/ Eligible to Use</b>
Community Development Block Grants	
Capital Improvements Project Funding	
Authority to Levy Taxes for Specific Purposes	
Fees for Water, Sewer, Gas, or Electric Services	
Impact Fees for New Development	Yes – Emergency Service Impact Fee
Incur Debt through General Obligation Bonds	
Incur Debt through Special Tax Bonds	
Incur Debt through Private Activities	
Withhold Spending in Hazard Prone Areas	

## Mitigation Outreach and Partnerships

Grand County is involved in the following mitigation related outreach programs and partnerships:

- The County has worked with the fire protection districts, municipalities, CSFS, USFS, and CDOT to implement fuel reduction projects to mitigate wildfire risk. Specific actions have been incorporated into the countywide and local CWPPs.
- Grand County has adopted the CSFS FireWise Community Fire Prevention Partnership, detailed in the 2006 countywide CWPP.
- The Forests to Faucets program is a joint effort among Denver Water, USFS, the fire protection districts, Grand County OEM, and participating jurisdictions. The program improves forest and watershed conditions in the County by implementing hazardous fuels treatment and removing hazardous biomass.
- Citizens for a Safe Highway 9 has been working with CDOT to implement wildlife-vehicle collision mitigation projects along Highway 9 between Green Mountain Reservoir and the Colorado River.

## Past Mitigation Efforts

The County’s past mitigation efforts include the following:

- In conjunction with CDOT and Union Pacific and Omaha railroads, the County installed warning and alert systems for rockfall and avalanches. Railroad rockfall warning systems in Byers Canyon are monitored by Union Pacific and Omaha. CDOT installed avalanche



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warnings and closure systems along Berthoud Pass and does avalanche control in winter. CAIC also issues avalanche forecasts.

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- The County and the fire protection districts have proposed, planned, implemented and completed several wildfire mitigation projects. See *Section VII Wildland Fire Mitigation and Fuel Reduction Projects* in the 2006 Grand County CWPP for further details.
  - Several forest health projects have been undertaken to remove beetle-killed lodgepole pine, also reducing fuel loads and creating fuel breaks for wildfires.
  - County GIS certified privately owned bridges with load limits to support emergency response (this effort is ongoing).
  - Debris flow risk was identified in the Upper Colorado Headwaters Wildfire/Watershed Assessment study completed in 2013.
  - Code changes were implemented to require new developments to have dual ingress/egress routes.
  - Grand County OEM and the LEPC have conducted annual hazmat exercises and coordinated resources to improve hazmat response and recovery capabilities in the County.

## **A.5 Goals and Objectives**

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Grand County adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 4 Mitigation Strategy.

## **A.6 Mitigation Actions**

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The planning team for the unincorporated areas of the County identified and prioritized the following mitigation actions based on the risk assessment. Background information and information on how each action will be implemented and administered, such as ideas for implementation, responsible agency, potential funding, estimated cost, and timeline also are included.

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## Mitigation Action: Grand County 2015-1 National Wildfire Coordinating Group Certification

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Wildfire
<b>Project Description, Issue &amp; Background</b>	Have County staff certified by the National Wildfire Coordinating Group.
<b>Lead Agency and Title of Lead Person</b>	Sheriff's Office and County Road and Bridge
<b>Partners:</b>	National Wildfire Coordinating Group
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Training time
<b>Benefits: (Losses Avoided)</b>	Protect life safety and property from wildfire, improve wildfire emergency management capabilities
<b>Potential Funding:</b>	Staff time
<b>Timeline:</b>	Partially completed and ongoing
<b>Status:</b>	Ongoing. Completed for road & bridge. (1) Sheriff's Deputy is now trained as a FF. Sheriff also has (1) seasonal fire liaison. Several County staff were signed up for May 2020 4-day Wildland Firefighting class, but was canceled due to Covid-19

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## Mitigation Action: Grand County 2015-4 Create/Update Landslide Hazard Maps

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Landslide
<b>Project Description, Issue &amp; Background</b>	Create or update as necessary maps useful to planning and public, including landslide inventories, landslide-susceptibility maps and landslide hazard maps.
<b>Lead Agency and Title of Lead Person</b>	Grand County Planning
<b>Partners:</b>	Grand County GIS and OEM, CGS
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Staff time
<b>Benefits: (Losses Avoided)</b>	Protect life safety and property from landslides, improve land use planning by identifying landslide hazard areas
<b>Potential Funding:</b>	Staff time
<b>Timeline:</b>	Ongoing
<b>Status:</b>	Mapping and GIS based analysis improved in 2013 update including DFIRM flood hazards and landslide data; Additional landslide data being prepared by CGS.

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## Mitigation Action: Grand County 2015-5 Identify Populations Most Vulnerable to Disease Outbreak

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Disease Outbreak
<b>Project Description, Issue &amp; Background</b>	Identify county areas with the most vulnerable segments of the population such as the elderly and the very young.
<b>Lead Agency and Title of Lead Person</b>	Grand County Public Health - Director
<b>Partners:</b>	Grand County OEM, County GIS
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Staff time
<b>Benefits: (Losses Avoided)</b>	Protect most vulnerable populations from disease outbreak; support disease outbreak emergency plans
<b>Potential Funding:</b>	Staff time
<b>Timeline:</b>	Ongoing
<b>Status:</b>	All populations could be vulnerable. Vulnerable populations will vary based on the specific disease.

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## Mitigation Action: Grand County 2015-6 Disease Outbreak Training for First Responders and Other County Staff

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Disease Outbreak
<b>Project Description, Issue &amp; Background</b>	Ensure emergency responders and other County staff receives appropriate training in disease outbreak issues.
<b>Lead Agency and Title of Lead Person</b>	Grand County Public Health - Director
<b>Partners:</b>	Grand County OEM, ESF 6&8, fire protection districts, law enforcement
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Staff time
<b>Benefits: (Losses Avoided)</b>	Protect life safety, reduce absenteeism among first responders and other County personnel from disease outbreak
<b>Potential Funding:</b>	Staff time
<b>Timeline:</b>	Ongoing
<b>Status:</b>	Ongoing

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## Mitigation Action: Grand County 2015-7 Formalize Warning System for Disease Outbreak

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Disease Outbreak
<b>Project Description, Issue &amp; Background</b>	Consider formalizing a warning system that includes disease outbreak. Potential outlets include newspapers, the County website, radio, television, Facebook, Twitter, reverse 911.
<b>Lead Agency and Title of Lead Person</b>	Grand County Public Health - Director
<b>Partners:</b>	Grand County OEM
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Staff time
<b>Benefits: (Losses Avoided)</b>	Protect life safety and minimize economic impacts to County from disease-related absenteeism; improve disease outbreak emergency management
<b>Potential Funding:</b>	Staff time
<b>Timeline:</b>	Ongoing
<b>Status:</b>	Ongoing

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## Mitigation Action: Grand County 2015-8 Update Mutual Aid Agreements Related to Disease Outbreak

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Disease Outbreak
<b>Project Description, Issue &amp; Background</b>	Update mutual aid agreements, especially with other northwest region counties.
<b>Lead Agency and Title of Lead Person</b>	Grand County Public Health - Director
<b>Partners:</b>	Grand County OEM, school districts, NW Region & State
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Staff time
<b>Benefits: (Losses Avoided)</b>	Protect life safety from disease outbreak; improve emergency management partnerships
<b>Potential Funding:</b>	Staff time
<b>Timeline:</b>	Ongoing
<b>Status:</b>	Ongoing



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**Mitigation Action: Grand County 2015-10 Enhance awareness and preparedness for Disease Outbreak**

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Disease Outbreak
<b>Project Description, Issue &amp; Background</b>	Enhance awareness and preparedness in the County through a concerted effort. Adapt existing educational and preparedness materials from various sources to Grand County's needs.
<b>Lead Agency and Title of Lead Person</b>	Grand County Public Health - Director
<b>Partners:</b>	Grand County OEM, all public safety, healthcare, government, and school partners.
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Staff time
<b>Benefits: (Losses Avoided)</b>	Protect life safety from disease outbreak; improve disease outbreak preparedness
<b>Potential Funding:</b>	Staff time
<b>Timeline:</b>	Ongoing
<b>Status:</b>	Ongoing

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## Mitigation Action: Grand County 2015-11 Fix Addressing Countywide

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Multi-Hazard
<b>Project Description, Issue &amp; Background</b>	Addressing in Grand County needs to be fixed for accuracy and completeness. Inaccurate or incomplete addressing makes it difficult for first responders to locate a home threatened by events such as wildfire. Address signs also need to be fire resistant, legible, and visible from the roadway.
<b>Lead Agency and Title of Lead Person</b>	County GIS – GIS coordinator
<b>Partners:</b>	Fire Protection Districts, municipalities
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Staff time
<b>Benefits: (Losses Avoided)</b>	Protect life safety and property from hazards; improve emergency response
<b>Potential Funding:</b>	County general fund
<b>Timeline:</b>	2014
<b>Status:</b>	Ongoing

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## Mitigation Action: Grand County 2015-12 Evacuation Plans

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Multi-Hazard
<b>Project Description, Issue &amp; Background</b>	Develop evacuation plans for public and privately maintained public access roads
<b>Lead Agency and Title of Lead Person</b>	Grand County OEM and Road and Bridge
<b>Partners:</b>	Fire protection districts, law enforcement
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Staff time
<b>Benefits: (Losses Avoided)</b>	Protect life safety; identify vulnerable populations that may need additional assistance during evacuation
<b>Potential Funding:</b>	Staff time
<b>Timeline:</b>	2014
<b>Status:</b>	Ongoing

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**Mitigation Action: Grand County 2015-14 Ensure Adequate County Workforce during Disease Outbreak**

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Disease Outbreak
<b>Project Description, Issue &amp; Background</b>	Ensure an adequate county work force is available in the event of a disease outbreak, especially public health surveillance staff.
<b>Lead Agency and Title of Lead Person</b>	Grand County Public Health - Director
<b>Partners:</b>	ESF 6 & 8 agencies/departments, all public safety and government partners.
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Staff time
<b>Benefits: (Losses Avoided)</b>	Protect life safety and minimize business/economic disruption from disease outbreak-related absenteeism
<b>Potential Funding:</b>	Staff time
<b>Timeline:</b>	Ongoing
<b>Status:</b>	Ongoing

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## Mitigation Action: Grand County 2015-15 Monitor Funding for Disease Outbreak Planning, Prevention, and Supply Purchasing

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Disease Outbreak
<b>Project Description, Issue &amp; Background</b>	Assign to one County official the duty of monitoring the availability of funds from all sources for the purpose of planning, prevention, and purchasing needed supplies or equipment.
<b>Lead Agency and Title of Lead Person</b>	Grand County Public Health - Director
<b>Partners:</b>	Grand County OEM, first responders
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Staff time
<b>Benefits: (Losses Avoided)</b>	Stay abreast of funding opportunities to enhance the County's capabilities and resiliency related to disease outbreak
<b>Potential Funding:</b>	Staff time
<b>Timeline:</b>	Ongoing
<b>Status:</b>	Ongoing

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## Grand Mitigation Action: Grand County 2015-17 Establish Storm Ready Programs

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Multi-Hazard
<b>Project Description, Issue &amp; Background</b>	Establish Storm Ready programs, adapted for winter storms, within the County.
<b>Lead Agency and Title of Lead Person</b>	Grand County OEM, Road and Bridge
<b>Partners:</b>	National Weather Service
<b>Priority:</b>	Medium
<b>Cost Estimate:</b>	Staff time
<b>Benefits: (Losses Avoided)</b>	Protect life safety and property from winter storms; Formal recognition of preparedness efforts
<b>Potential Funding:</b>	Staff time
<b>Timeline:</b>	Ongoing
<b>Status:</b>	Process begun to NWS certification; relates to outreach programs, shelters

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## Grand Mitigation Action: Grand County 2015-20 Review/Update Building Codes in Hazard Areas

**Jurisdiction:** Grand County

**Hazard Addressed** Multi-Hazard

**Project Description, Issue & Background** Review and implement or update as necessary building and grading codes in the hazard areas.

**Lead Agency and Title of Lead Person** Grand County Planning

**Partners:**

**Priority:** Medium

**Cost Estimate:** Staff time

**Benefits: (Losses Avoided)** Protect life safety and property from hazard areas; reduce potential damage to buildings by adhering to updated building codes

**Potential Funding:** Staff time

**Timeline:** Ongoing

**Status:** Ongoing. Building code was updated in 2018.

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## Grand Mitigation Action: Grand County 2015-21 Review/Implement Land Use Regulations

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Multi-Hazard
<b>Project Description, Issue &amp; Background</b>	Review and implement or update as necessary land use regulations.
<b>Lead Agency and Title of Lead Person</b>	Grand County Planning
<b>Partners:</b>	Municipalities
<b>Priority:</b>	Medium
<b>Cost Estimate:</b>	Staff time
<b>Benefits: (Losses Avoided)</b>	Protect life safety and property from hazards
<b>Potential Funding:</b>	Staff time
<b>Timeline:</b>	Ongoing
<b>Status:</b>	Ongoing. Done as necessary.



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## Grand Mitigation Action: Grand County 2015-22 Develop Hazard/Policy Public Awareness Program

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Multi-Hazard
<b>Project Description, Issue &amp; Background</b>	Fuel reduction projects are needed to reduce the wildfire vulnerability in wildland urban interface areas. Specific actions have been incorporated in the countywide and local CWPPs.
<b>Lead Agency and Title of Lead Person</b>	Grand County Planning
<b>Partners:</b>	Municipalities, Grand County OEM
<b>Priority:</b>	Medium
<b>Cost Estimate:</b>	Staff time
<b>Benefits: (Losses Avoided)</b>	Protect life safety and property; keep public informed and engaged about policy decisions and changes related to hazards
<b>Potential Funding:</b>	Staff time
<b>Timeline:</b>	Deferred in 2015 due to other priorities.
<b>Status:</b>	Ongoing. Priority changed from high to medium in last update.

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## Grand Mitigation Action: Grand County 2015-23 Determine Priority Vaccination Targets

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Disease Outbreak
<b>Project Description, Issue &amp; Background</b>	Determine who receives priority vaccinations in Grand County. Vaccine supplies are frequently limited, particularly at the onset of a disease outbreak. Priority personnel need to be identified to ensure that the County can maintain critical functions during a disease outbreak.
<b>Lead Agency and Title of Lead Person</b>	Grand County Public Health - Director
<b>Partners:</b>	First responders, Grand County OEM, healthcare personnel, municipalities
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Staff time
<b>Benefits: (Losses Avoided)</b>	Protect life safety and minimize interruption to critical functions due to staff illnesses and absenteeism; protect vulnerable populations
<b>Potential Funding:</b>	Staff time
<b>Timeline:</b>	Ongoing
<b>Status:</b>	Dependent on disease and vulnerable populations affected

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## Grand Mitigation Action: Grand County 2015-24 Compliance to Land Use Standards (H.B. 1041)

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Multi-Hazard
<b>Project Description, Issue &amp; Background</b>	Strengthen and formalize oversight and enforcement for compliance to land use standards (H.B. 1041) related to areas of state interest to include natural hazards.
<b>Lead Agency and Title of Lead Person</b>	Grand County Planning
<b>Partners:</b>	Colorado Geological Survey
<b>Priority:</b>	Low
<b>Cost Estimate:</b>	Staff time
<b>Benefits: (Losses Avoided)</b>	Improve protection of life safety and property by strengthening and enforcing land use standards
<b>Potential Funding:</b>	Staff time
<b>Timeline:</b>	2015
<b>Status:</b>	The County has only adopted 1041 regulations for water & sewer. This action was modified in 2013 to include action to evaluate adoption of regulations related to areas of state interest that relate to hazards.

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## Grand Mitigation Action: Grand County 2015-25 Incorporate GIS into Emergency Response Procedures

**Jurisdiction:** Grand County

**Hazard Addressed** Multi-Hazard

**Project Description, Issue & Background** Incorporate GIS layer for land-ownership parcels into emergency response procedures.

**Lead Agency and Title of Lead Person** Grand County OEM

**Partners:** Grand County Planning, County GIS

**Priority:** Low

**Cost Estimate:** Staff time

**Benefits:  
(Losses Avoided)** Improve emergency response capabilities

**Potential Funding:** Staff time

**Timeline:** Ongoing

**Status:** Partially complete - Responders have mobile GIS capabilities; County GIS can provide on request, information also available online. Sidwell GIS enhancements in works

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## Grand Mitigation Action: Grand County 2015-27 Emergency Sheltering

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Multi-Hazard
<b>Project Description, Issue &amp; Background</b>	Implement, if necessary, and publicize emergency shelters for use immediately following a hazard event.
<b>Lead Agency and Title of Lead Person</b>	Grand County OEM
<b>Partners:</b>	First responders, municipalities
<b>Priority:</b>	Low
<b>Cost Estimate:</b>	Staff time
<b>Benefits: (Losses Avoided)</b>	Protect life safety
<b>Potential Funding:</b>	General fund
<b>Timeline:</b>	Ongoing
<b>Status:</b>	Ongoing. Outreach to public done through Code Red & social media. Red Cross will use hotel rooms during the pandemic (social distancing). OEM's pandemic shelter plan, if lodging is at capacity, is using school classrooms.

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## Grand Mitigation Action: Grand County 2015-28 Public Outreach on Emergency Information

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Multi-Hazard
<b>Project Description, Issue &amp; Background</b>	Public information/outreach where the public can find information during an emergency event. OEM currently makes use of Facebook, Twitter, and Nextdoor to reach the public. OEM also utilizes Grand County Recovers, where the public can get updated information, volunteer or donate.
<b>Lead Agency and Title of Lead Person</b>	Grand County OEM - Emergency Manager
<b>Partners:</b>	Towns
<b>Priority:</b>	Low
<b>Cost Estimate:</b>	\$100 per year
<b>Benefits: (Losses Avoided)</b>	Protect life safety; keep public informed and engaged during response or recovery.
<b>Potential Funding:</b>	Grand County OEM budget
<b>Timeline:</b>	Ongoing
<b>Status:</b>	Always ongoing.

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## Grand Mitigation Action: Grand County 2015-29 Expand Airport Capacity

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Wildfire
<b>Project Description, Issue &amp; Background</b>	Expand the capacity at Kremmling McElroy (20v) for air assets in case of wildfire. Grand County is somewhat isolate, which can make multi-jurisdictional fire protection difficult. Expanded capacity for air support can be especially important if roadways are closed during wildfires. This project is part of the CDOT Aeronautics Capital Improvement Plan. This is a very long-term project.
<b>Lead Agency and Title of Lead Person</b>	Grand County OEM (lead person or title?)
<b>Partners:</b>	Local airport managers
<b>Priority:</b>	Low
<b>Cost Estimate:</b>	\$6 million - \$20 million
<b>Benefits: (Losses Avoided)</b>	Improve emergency response capabilities
<b>Potential Funding:</b>	FAA (primary grant funding), CDOT Aero (secondary grant), and Grand County (local match)
<b>Timeline:</b>	Past 2022
<b>Status:</b>	New in 2013

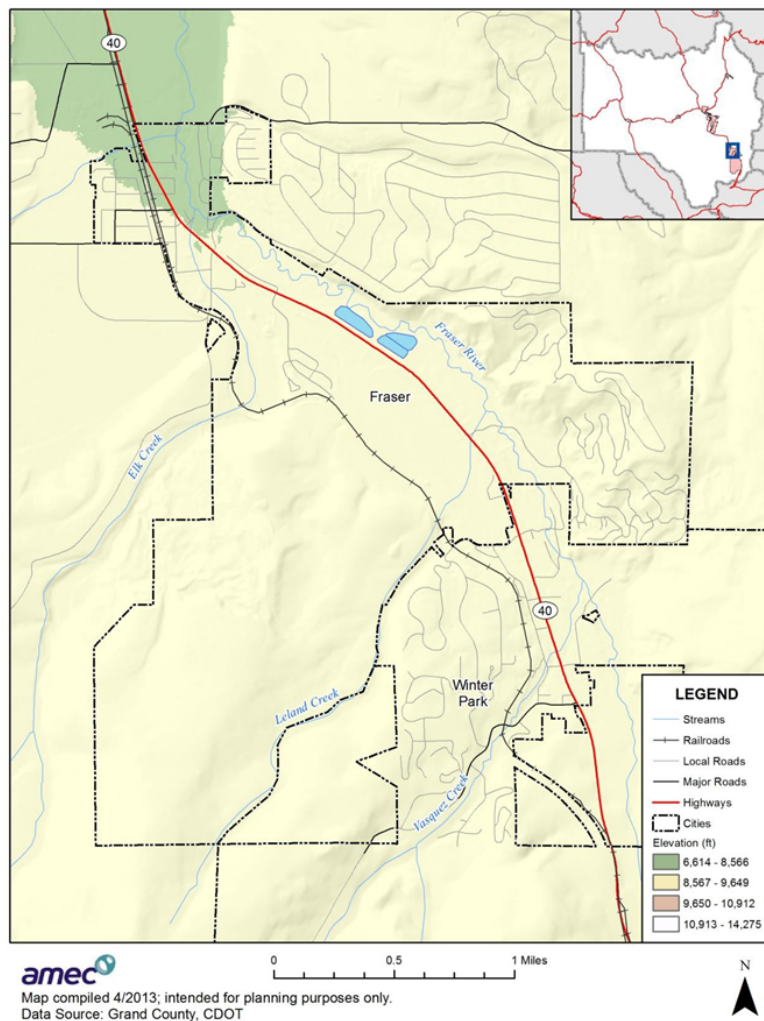
# ANNEX B: TOWN OF FRASER

## B.1 Community Profile

### Geography

Fraser is located in Middle Park in the valley of the Fraser River along U.S. Highway 40. The Town is at an elevation of 8,550 feet and was established in 1871. According to the U.S. Census Bureau, the Town has a total area of 1.9 square miles, with 0.04 square miles being water. Fraser is the coldest incorporated town in the contiguous U.S, based on an annual mean temperature of 32.5 degrees Fahrenheit. Average annual precipitation is roughly 19 inches, with an average annual snowfall of over 142 inches. Figure B.1 shows a map of the Town of Fraser and its location within Grand County.

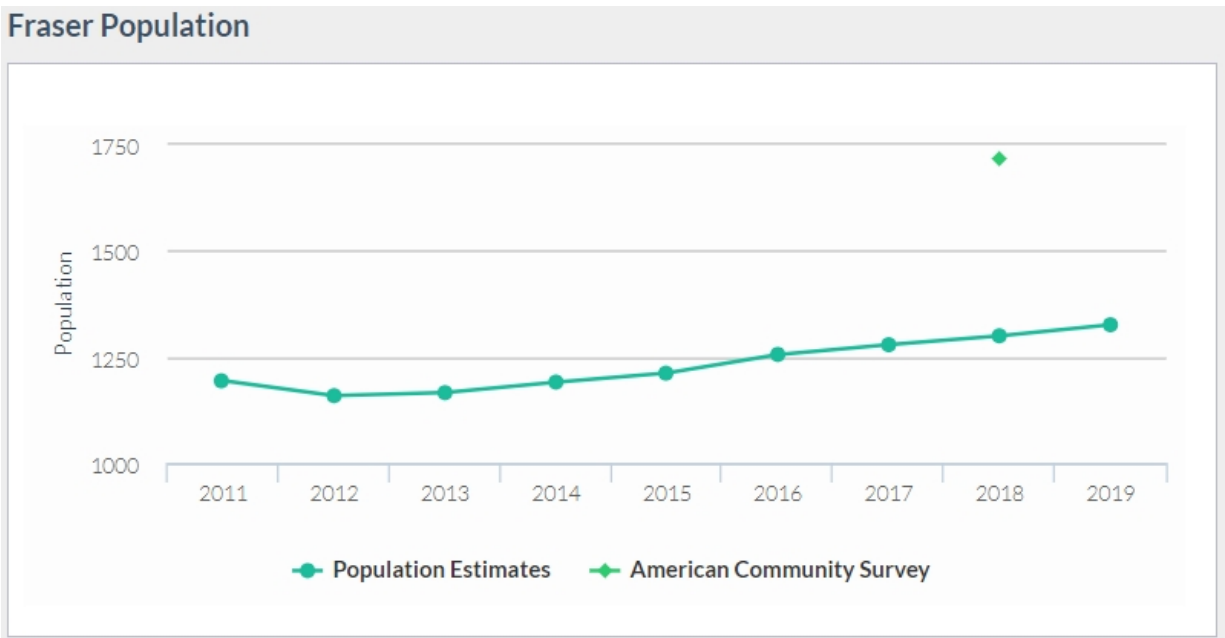
Figure B.1. Map of Fraser





## Fraser Demographic and Social Characteristics

With 1,326 people, Fraser is the 189th most populated city in the state of Colorado out of 451 cities. The median age in Fraser is 30 years, 30.4 years for males, and 28.7 years for females. For every 100 females there are 143.2 males. The largest racial/ethnic groups are White (70.4%) followed by Hispanic (20.6%) and Black (4.2%). In 2018, the median household income of Fraser residents was \$54,940.



The above population and social data is from the U.S. Census American Community Survey 2018 5-year estimates, the U.S. Census 2019 Population Estimates, and the World Population Review 2020: <https://www.colorado-demographics.com/fraser-demographics>  
<https://worldpopulationreview.com/us-cities/fraser-co-population>

## History

According to Grand County History Stories <https://stories.grandcountyhistory.org/article/fraser> the origin of Fraser goes back to 1905; it was incorporated in 1953. Fraser was formerly known as Eastom, for George Eastom, who laid out the town site in 1871. The spelling of Fraser was originally Frazier, after Reuben Frazier. The town came into being because it was the site of a large sawmill and was a railroad terminus for the lumbering operation.

While Fraser was generally considered to be an isolated mountain outpost, at one point there was enough cultural interest to support a local opera house. Fraser was the location of a weather station for several years and during that time it was not uncommon for the winter temperatures to be 45 to 50 degrees below zero; one local resident remembers a morning when it was 60 degrees below zero. Thus the town earned the nickname “Icebox of the Nation.” After a legal battle, that official title went to a town in Minnesota.

A transcontinental motor route dubbed the Midland Trail came through Grand County and by 1913 a Ford sales agency was located outside of Fraser on the 4 Bar 4 Ranch. Avid fly fisherman President Eisenhower was a frequent visitor between 1948 and 1955.

## Economy

According to the ACS 2011 estimates, the industries that employed the highest percentage of Fraser’s labor force were arts, entertainment, recreation, accommodation, and food services (28.4%); retail trade (15.2%); construction (12.4%); and finance, insurance, real estate, and rental and leasing (10.2%).

## Hazard Identification and Profiles

Fraser’s planning team identified the hazards that affect the community and summarized their geographic location, probability of future occurrence, potential magnitude or severity, and planning significance specific to the Town (see Table B.3). In the context of the countywide planning area, there are no hazards that are unique to Fraser.

**Table B.3. Fraser—Hazard Summary**

Hazard Type	Geographic Location*	Probability*	Magnitude*	Hazard Rating
Avalanche	Small	Occasional	Limited	Low
Dam Failure	Small	Unlikely	Limited	Medium
Disease Outbreak	Large	Likely	Variable	High
Drought	Large	Unlikely	Critical	Low
Earthquake	Large	Likely	Critical	Medium
Flood	Small	Likely	Limited	Medium
Hazardous Materials (Transportation)	Large	Highly Likely	Critical	High
Landslide, Mudflow/Debris Flow, and Rockfall	Small	Unlikely	Limited	Low
Lightning	Small	Highly Likely	Limited	Medium
Mountain Pine Beetle Infestation	Large	Occasional	Limited	Medium
Severe Winter Weather	Large	Highly Likely	Limited	Medium
Wildfire	Medium	Highly Likely	Limited	Medium
Wildlife-Vehicle Collisions	Isolated	Highly Likely	Negligible	Medium
Windstorm	Large	Highly Likely	Limited	Medium

\*See Section 3.2 for definitions of these factors; also for information on past hazard events.

## B.2 Vulnerability Assessment

The intent of this section is to assess Fraser’s vulnerability separately from that of the planning area as a whole, which has already been addressed in Section 3.3 Vulnerability Assessment. The following vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of moderate or high significance that may vary from other parts of the planning area. For more information about how hazards affect the County as a whole, see Chapter 3 Risk Assessment.

### Community Assets

According to the 2019 Report to the Governor (of Colorado), Fraser’s assessed value was listed as \$56,921,450 with total revenue listed as \$335,040.

Table B.5 lists critical facilities and other community assets identified by Fraser’s planning team as extremely important to protect in the event of a disaster.

**Table B.5. Fraser—Critical Facilities and Other Community Assets**

Name of Asset	Type*	Replacement Value (\$)	Hazard Specific Info/Comments
East Grand Fire Dept	EF	10,000,000	Fire
Fraser Domestic Water System	EF	5,000,000.	Fire/ Flood
Upper Fraser Valley Wastewater treatment facility	EF	9,000,000	Fire/ Flood
Elementary School	EA	2,000,000	Fire
Safeway	EA	2,000,000	Fire/Flood
Fraser River-Cozens Ranch Open Space	HCNA		Drought /Flood/Fire
Fraser Valley Library	HCNA	1,000,000	Fire
EMS Station 2	EF	500,000	Fire
Fraser Town Hall**	EF		
Visitors Center**	EF		
Grand County Road and Bridge – Fraser**	EF		

Sources: HMPC

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

\*\*Identified separately by Grand County OEM

The Town also needs to further evaluate the seasonal workforce to better understand their impact on the community and what needs to be done to protect them.

## **Vulnerability by Hazard**

This section examines those existing and future structures and other assets at risk to hazards ranked of moderate or high significance that vary from the risks facing the entire planning area and estimates potential losses. These hazards include flood, hazmat, landslide, and wildfire.

### **Flood**

The Town of Fraser has flood hazard mapping for the Fraser River and Leland Creek, as well as the tributaries St. Louis Creek and Elk Creek. Flooding along the Fraser River and its tributaries occurs primarily in June and is largely due to snowmelt. Fraser is subject to flooding from the Fraser River. Localized storm water flooding can also cause minor problems.

#### ***Existing Development***

The effective DFIRM for Fraser, dated January 2, 2008, was the best available flood hazard 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 the points were based on the assessor's data and summed for the unincorporated county and for the municipalities. Property exposure located in flood hazard zones by land use type is shown in

Table B.6. Flood zones A and AE are variations of the 1% annual chance event. The “Shaded Zone X” represents the 0.2% annual chance hazard zone on the DFIRM. Building and estimated content values were totaled. The Town’s A Zone has an exposure value of over \$8 million. To estimate losses a 25% loss factor was applied to the total exposure, based on FEMA depth damage functions associated with a two foot deep flood. Flood loss from the 1% annual chance event based on this assessment would be in the magnitude of \$2 million. There are six parcels in the AE zone, but these are undeveloped. Flooded structures for the DFIRM flood zones are depicted in Figure B.2. More information on the methodology used for this loss estimation can be found in Section 3.3 Vulnerability Assessment.

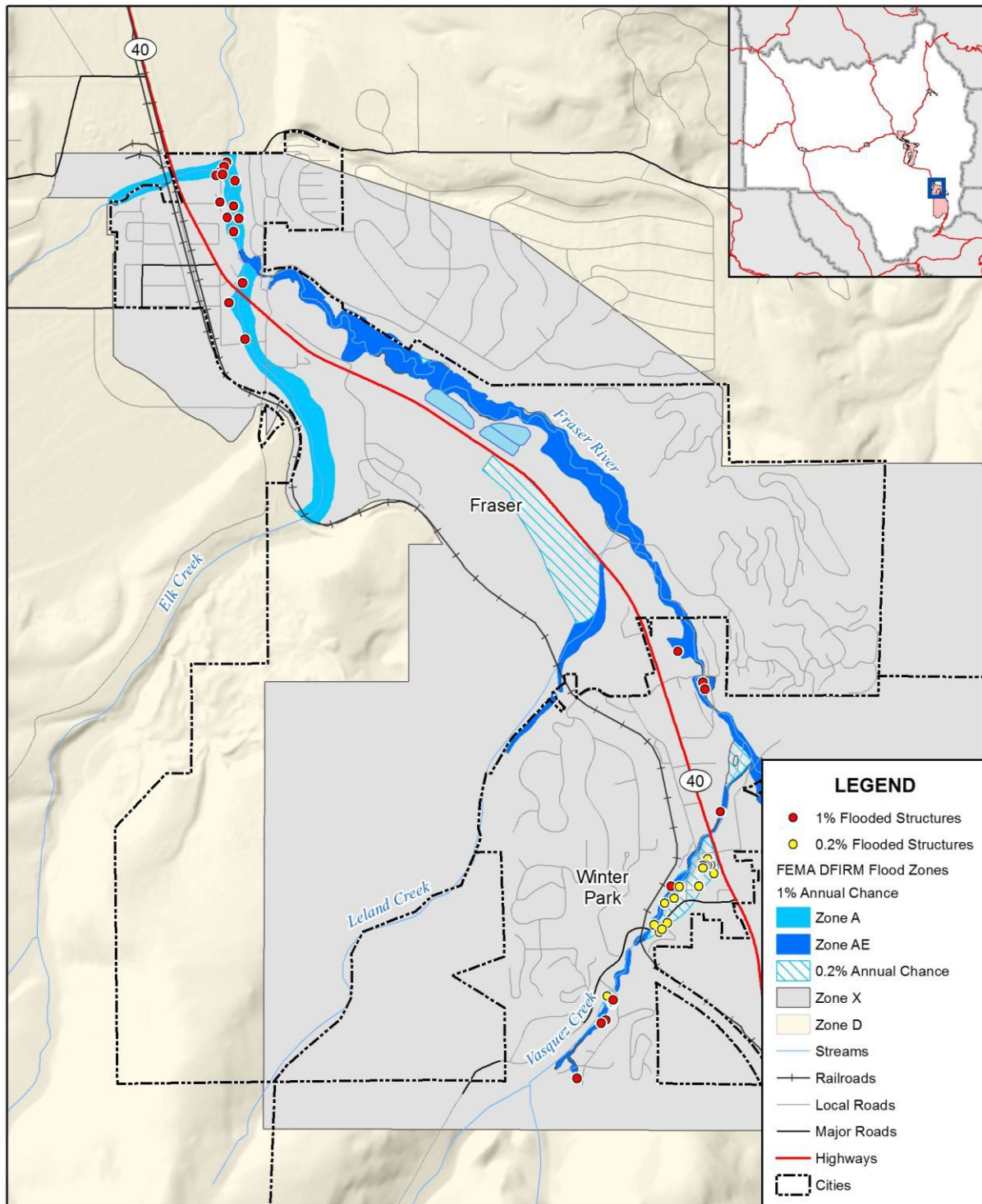
There is one critical facility, the Visitors Center, located in the floodplain in Fraser.

**Table B.6. Fraser—Flood Risk by Flood Zone and Property Type**

Land Use	Total Parcel Count	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Loss Estimate
<b>Zone A</b>						
Agricultural	2	0	\$0	\$0	\$0	\$0
Commercial Vacant	10	0	\$0	\$0	\$0	\$0
Residential Improved	34	34	\$5,417,250	\$2,708,625	\$8,125,875	\$2,031,469
Residential Vacant	1	0	\$0	\$0	\$0	\$0
Tax Exempt	8	2	\$90,070	\$90,070	\$180,140	\$45,035
Unknown	4	0	\$0	\$0	\$0	\$0
<b>Total</b>	<b>59</b>	<b>36</b>	<b>\$5,507,320</b>	<b>\$2,798,695</b>	<b>\$8,306,015</b>	<b>\$2,076,504</b>
<b>Zone AE</b>						
Agricultural	1	0	\$0	\$0	\$0	\$0
Tax Exempt	5	0	\$0	\$0	\$0	\$0
<b>Total</b>	<b>6</b>	<b>0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>Grand Total</b>	<b>65</b>	<b>36</b>	<b>\$5,507,320</b>	<b>\$2,798,695</b>	<b>\$8,306,015</b>	<b>\$2,076,504</b>

Source: AMEC analysis of DFIRM

**Figure B.2. DFIRM Flood Zones and Floodprone Properties in Fraser**



Map compiled 4/2013; intended for planning purposes only.  
Data Source: Grand County, CDOT, FEMA DFIRM 1/2/2008

### ***National Flood Insurance Program***

Fraser joined the National Flood Insurance Program (NFIP) on January 2, 2008. NFIP insurance data indicates that as of March 25, 2013, there were 15 flood insurance policies in force in Fraser with \$3,359,800 of coverage. Eleven of the policies are in Fraser's A zone, and four are located outside of the Special Flood Hazard Area. NFIP did not respond to two requests for data during this 2020 Plan update.

There have been zero historical claims for flood losses. There were no repetitive or severe repetitive loss structures.

### ***Future Development***

The Town of Fraser addresses floodplain management policies in its Town Code (see Regulatory Capabilities section below).

### **Hazardous Materials**

The Town of Fraser is exposed to transported hazardous materials by being in proximity to Highway 40 and the railroad. U.S. Highway 40 is the alternate route to Salt Lake City and primary detour route for closures of the I-70 corridor; trucks and tankers transporting hazardous materials may often use this route. Grand County OEM also identified three reporting Tier II facilities (for 2012 and 2013) in Fraser, so the potential also exists for fixed hazmat incidents in the Town. Data from the National Response Center (NRC) between 2008 and 2012 did not show any reported incidents in Fraser, but it is more likely a matter of "when" rather than "if" given that hazmat events have happened in every other town in the County.

### **Landslide, Mud Flow/Debris Flow, Rock Fall**

Possible landslide areas are identified on steep slopes with unstable soil conditions. Landslide deposits were identified in the western half of Fraser.

### ***Existing Development***

Potential losses for landslide areas were estimated using Grand County GIS and assessor's data and were examined in terms of values and critical facilities at risk. GIS was used to create a centroid, or point, representing the center of each parcel polygon, which was overlaid on the landslide hazard polygons. The assessor's land and improved values for each parcel are linked to the parcel centroids. For the purposes of this analysis, if the parcel's centroid intersects the landslide hazard polygon, that parcel is assumed to be at risk to the landslide. Values were summed and sorted by landslide hazard zone. Additional landslide hazard analysis was completed using the more comprehensive USGS landslide deposits layer during the 2013 update. The results of the overlay analysis for the Town of Fraser are presented in Table B.7. No critical facilities were identified in landslide zones in Fraser.

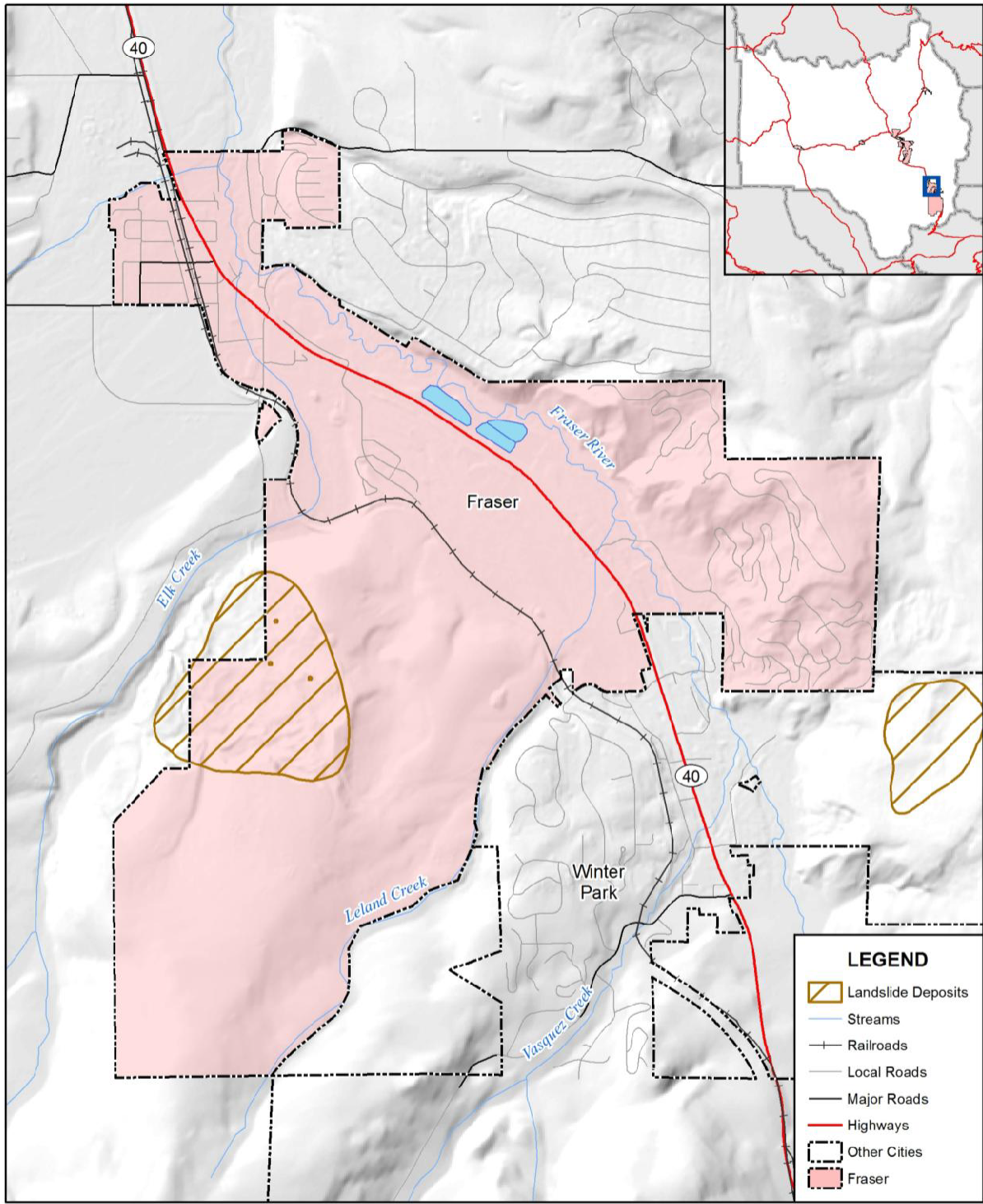
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**Table B.7. Fraser—Landslide Exposure by Land Use**

<b>Land Use</b>	<b>Total Parcel Count</b>	<b>Improved Parcel Count</b>	<b>Land Value</b>	<b>Improved Value</b>	<b>Estimated Content Value</b>	<b>Total Value</b>
Agricultural	1	0	\$240	\$0	\$0	\$0
Residential Vacant	6	0	\$108,500	\$0	\$0	\$0
Unknown	3	0	\$0	\$0	\$0	\$0
<b>Total</b>	<b>10</b>	<b>0</b>	<b>\$108,740</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>



**Figure B.3. Landslide Areas in Fraser**



Map compiled 4/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT,  
 Colton/USGS Earth Data Analysis Center

0 0.5 1 Miles



### ***Future Development***

The severity of landslide problems is directly related to the extent of human activity in hazard areas. Adverse effects can be mitigated by early recognition and avoiding incompatible land uses in these areas or by corrective engineering. The mountainous topography of the County presents considerable constraints to development, most commonly in the form of steep sloped areas. These areas are vulnerable to disturbance and can become unstable. Fraser's Town Code encourages development in or near the existing towns and away from environmentally sensitive areas such as those with steep slopes. This policy can help protect future development from being built in unstable areas.

### **Wildfire**

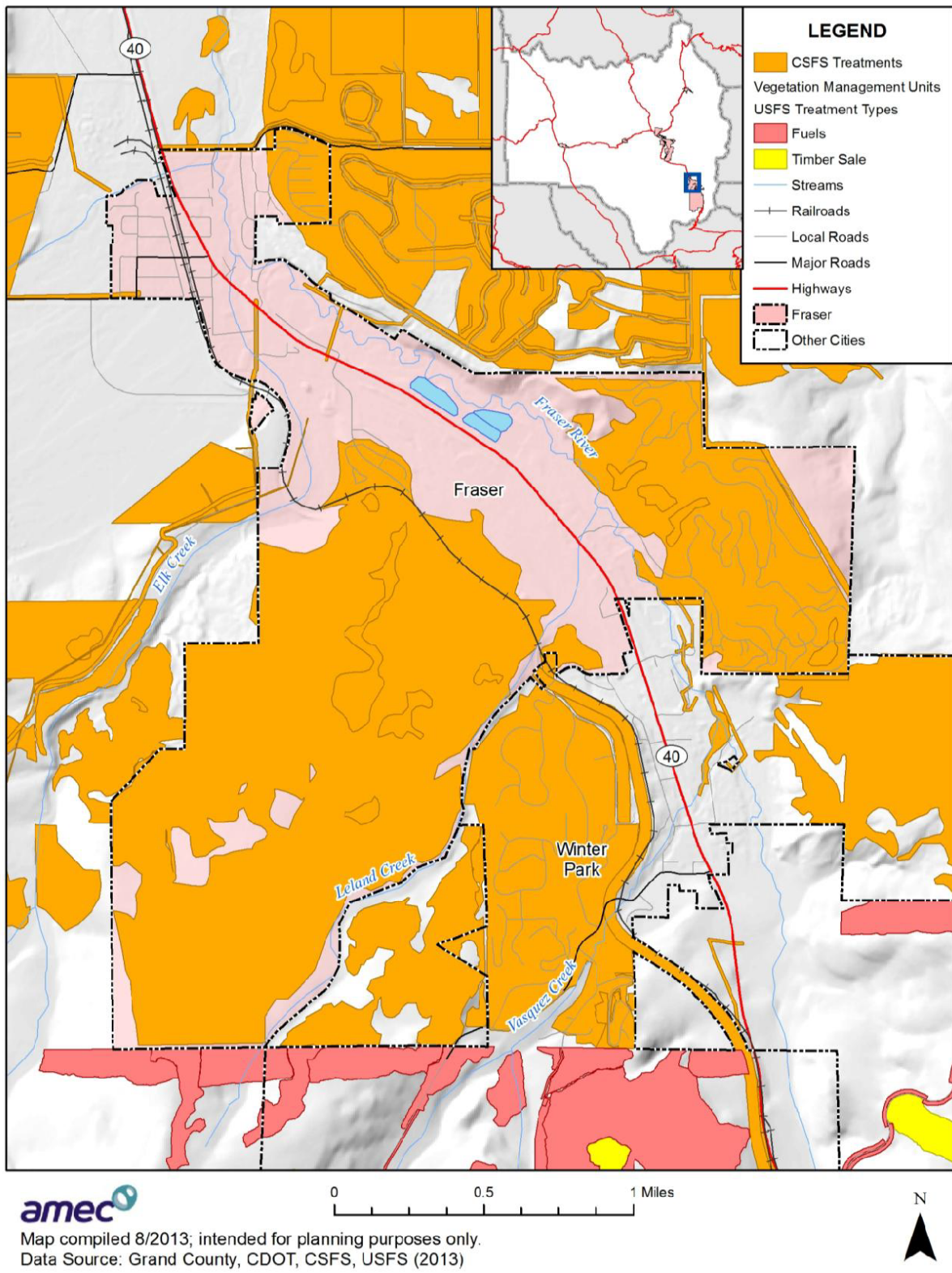
#### ***Existing Development***

The Grand County CWPP (2006) evaluated the wildfire hazards to each of the incorporated and unincorporated towns in the County. Fraser received a hazard rating of medium to high. Fraser is also covered by the Upper Fraser Valley/East Grand Fire Protection District's CWPP, which rated the wildfire hazard in 28 distinct communities. Refer to Table 3.36 in Chapter 3 for details on the community wildfire hazard ratings in the Upper Fraser Valley/East Grand Fire Protection District CWPP.

Based on the methodology described for wildfire in Section 3.3.3 Vulnerability by Hazard, the property values in Fraser were aggregated by wildfire threat zones. The majority of risk to wildfire is to residential structures, but some commercial areas are at risk as well. Two critical facilities were identified in moderate and low-moderate wildfire zones in Fraser. The Fraser Valley Library is located in Fraser's high-moderate wildfire zone. The East Grand FPD fire station is located in the Town's low-moderate wildfire zone. For additional information on property value amounts at risk, see the tables and maps under Grand County Fire Protection Districts.

The East Grand Fire Protection District, which provides fire protection services to Fraser and surrounding area, is considered an initial attack center for wildland fires on all private land and takes a joint responsibility with the U.S. Forest Service for fires on federal land.

Figure B.4. Wildfire Treatment Areas in Fraser



The East Grand Fire Protection District, which provides fire protection services to Fraser and surrounding area, is considered an initial attack center for wildland fires on all private land and takes a joint responsibility with the U.S. Forest Service for fires on federal land.

**Future Development**

The Fraser Town Code requires that development meet fire mitigation standards before it can be approved for occupancy. East Grand FPD enforces the 2006 International Fire Code. All buildings in the District’s service area are required to adhere to the International Fire Code. East Grand FPD also reviews all plats, construction plans, and site plans against the District’s Development and Review Standards. These standards are designed to help protect life safety and property from wildfire.

**Growth and Development Trends**

Table B.9 illustrates how Fraser has grown in terms of population and number of housing units between 2000 and 2019.

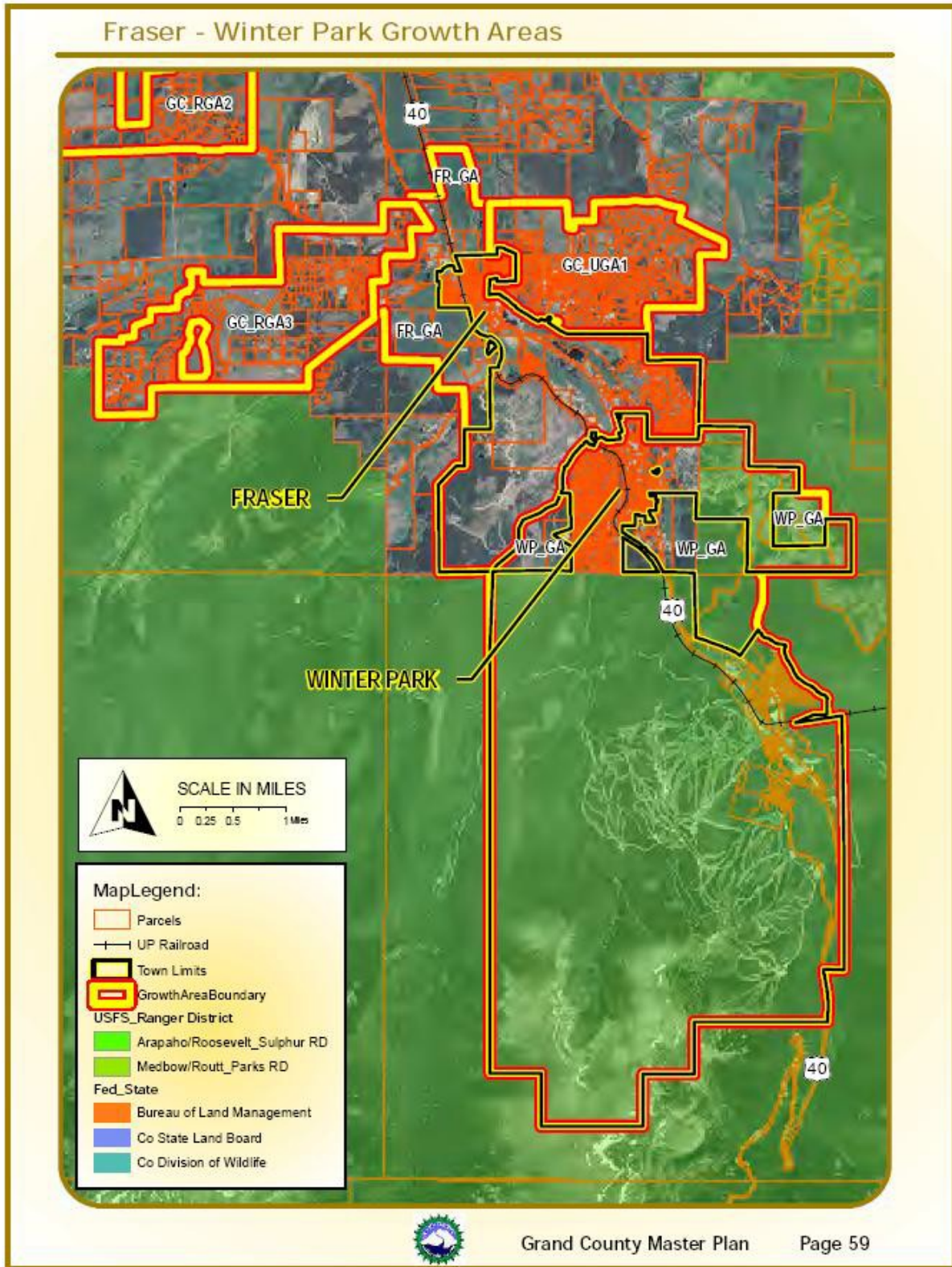
**Table B.9. Fraser—Change in Population and Housing Units, 2000-2011**

2000 Population	2011 Population	2019 Population Estimate	2000 # of Housing Units	2011 Estimated # of Housing Units	2018 Estimated # of Housing Units
910	1,216	1,326	622	950	1,135

Source: factfinder2.census.gov

Fraser’s location northwest of Winter Park provided growth circa 2008 with new condominium and other real estate developments. This trend may persist as Winter Park continues to grow. Most development and growth concerns are related to wildfire vulnerability. There has been subdivision development in the WUI in the east and west part of Fraser that has not yet been mitigated. The Town does have plans to perform wildfire mitigation around these new subdivisions. Figure B.5 depicts Fraser’s current town limits and the growth area boundary, as shown in the 2011 Grand County Master Plan.

Figure B.5. Fraser Growth Areas



## B.3 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. The capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

### Regulatory Mitigation Capabilities

Table B.10 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Fraser.

**Table B.10. Fraser—Regulatory Mitigation Capabilities**

Regulatory Tool (Ordinances, Codes, Plans)	Yes/No	Comments
General or Comprehensive plan	Yes	
Zoning ordinance	Yes	
Subdivision ordinance	Yes	
Growth management ordinance	No	
Floodplain ordinance	Yes	
Other special purpose ordinance (stormwater, steep slope, wildfire)	Yes	Water Supply Protection District
Building code	Yes	
Fire department ISO rating	Yes	Rating unknown
Erosion or sediment control program	Yes	
Stormwater management program	Yes	
Site plan review requirements	Yes	
Capital improvements plan	Yes	
Economic development plan	No	Expected completion in 2014
Local emergency operations plan	No	Pending Completion in 2014
Other special plans	Yes	Trail Plan EOP; Water and Sewer plan completed (2012)
Flood insurance study or other engineering study for streams	Yes	
Elevation certificates (for floodplain development)	Yes	
Other		

### Town of Fraser Comprehensive Plan, 2010

- **Land Use and Development**

- Land uses must also be carefully planned to provide for critical wildlife habitat areas and sensitive environmental areas, including but not limited to wetland and riparian areas, alpine meadows and tundra, steep slopes, floodplains, unstable soils, high value wildlife

habitat, unique natural vegetation, and view corridors.

- Development review and permitting should provide for water quality protection through effective erosion control, storm water management, and revegetation measures.

## **Town of Fraser Subdivision Regulations**

- **Section 17-1-30 Policy**

- (b) Land to be subdivided shall be of such character that it can be used safely for building purposes without danger to health or peril from fire, flood or other menace. Land shall not be subdivided until adequate public facilities and improvements exist and proper provisions have been made for water, sewer, stormwater drainage, schools, parks, open space, trails, recreation, transportation facilities and other improvements necessary to serve the proposed subdivision. (Ord. 322 §12-1-3, 2006; Ord. 391 Part 1.1, 2012)

- **Section 17-7-110 Natural Hazards and Conditions**

- Based on a finding by a qualified engineer, engineering geologist or other professional, no land which is held by the Planning Commission to be unsuitable for development by reason of one-hundred-year flooding frequency, high water table, mudflow, rockslide or other potential natural hazard, feature or condition likely to be harmful to the health, safety or welfare of the Town, its residents or future residents in the proposed subdivision shall be subdivided unless the natural hazards are mitigated in a manner acceptable to the Town. (Ord. 322 §12-6-3, 2006; Ord. 391 Part 1.1, 2012)

- **Section 17-7-120 Floodplains**

- Development is discouraged within the one-hundred-year floodplain. All subdivision proposals and other proposed developments which contain at least fifty (50) lots or five (5) acres (whichever is less) shall provide the Town with base flood elevation data per the Town's regulations pertaining to the prevention of flood damage. Technical data and other information requested by the Town shall be prepared by a registered professional engineer. This and other information is necessary to determine applicability to and evaluation of developments on lands subject to flooding or located in a natural drainage area. A permit shall be obtained before construction begins within any area of special flood hazard as set forth in Chapter 18, Article 4 of this Code. (Ord. 322 §12-6-3, 2006; Ord. 391 Part 1.1, 2012)

- **Section 17-7-160 Steep Slopes**

- In general, development shall not occur on slopes greater than thirty percent (30%) or on land with inadequate drainage unless a part of each lot or tract, sufficient to accommodate a building permit, is deemed buildable by a qualified engineer and all mitigation measures necessary to prevent lateral movement and/or slippage of improvements have been approved by the Town Engineer. (Ord. 322 §12-6-3, 2006; Ord. 391 Part 1.1, 2012)



- **Section 17-7-610 Water Supply**

- (c) Fire hydrants. Fire hydrants shall be required in all subdivisions and shall be located in conformity with the adopted Fire Code. Generally, fire hydrants shall be located no more than five hundred (500) feet apart. Hydrant locations and fire flow demands shall be approved by the Town and the Fire District. Fire hydrant spacing along streets where

hydrants are not needed for protection of structures and/or water system operations shall not exceed one thousand (1,000) feet. (Ord. 322 §12-6-13, 2006; Ord. 391 Part 1.1, 2012)

- **Section 17-7-700 Landscaping Requirements and Natural Features**

- (g) Wildfire defensible space. Creating a defensible space around a home and on property is an important step to take in order to protect your home and property from wildfire. Defensible space is an area around a structure where fuels and vegetation are treated, cleared or reduced to slow the spread of wildfire towards the structure. It also creates an area where fire suppression operations can occur.

## Town of Fraser Zoning Regulations

- **Section 16-4-270 Floodplains**

- For any developments located within the one-hundred-year floodplain, a plan of on-site flood prevention, control and hazard mitigation shall be prepared and implemented according to the provisions of the Town. (Ord. 392 Part 1.1, 2012)

- **Section 16-4-280 Geological Hazards**

- Developments proposed for suspected geological hazard areas should be designed or reviewed by a qualified professional geologist, and all negative impacts should be mitigated. (Ord. 392 Part 1.1, 2012)

- **Section 16-4-340 Snow Management**

- (a) Snow management is critical in the Town's mountain climate. Roofs should be designed to either hold snow or shed snow in appropriate areas. Buildings must be set back from the property line to accommodate snow shedding, or a snow storage easement from the adjacent property owner must be provided. Use of snow guards and protected entries in high risk areas may be required.

## Administrative/Technical Mitigation Capabilities

Table B.11 identifies the personnel responsible for activities related to mitigation and loss prevention in Fraser.

**Table B.11. Fraser—Administrative and Technical Mitigation Capabilities**

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Yes	Planning	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Town Engineer	

Planner/engineer/scientist with an understanding of natural hazards	Yes	Town Engineer
Personnel skilled in GIS	Yes	Town Staff
Full time building official	Yes	Building Official
Floodplain manager	Yes	Town Planner

Personnel Resources	Yes/No	Department/Position	Comments
Emergency manager	Yes	County	
Grant writer	No		
Other personnel	Yes		
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Yes		
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Yes	County	
Other	Yes		

## Fiscal Mitigation Capabilities

Table B.12 identifies financial tools or resources that Fraser could potentially use to help fund mitigation activities.

**Table B.12. Fraser—Fiscal Mitigation Capabilities**

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Community Development Block Grants	Y	
Capital Improvements Project Funding	Y	
Authority to Levy Taxes for Specific Purposes	Y	
Fees for Water, Sewer, Gas, or Electric Services	Y	
Impact Fees for New Development	Y	
Incur Debt through General Obligation Bonds	Y	
Incur Debt through Special Tax Bonds	Y	
Incur Debt through Private Activities	Y	
Withhold Spending in Hazard Prone Areas	Y	

## Mitigation Outreach and Partnerships

- The news media in Fraser has distributed information on water conservation and sewer infiltration.  
The Library District holds public education Firewise awareness workshops.  
The Town distributes a household preparedness “Get Ready for Winter” newsletter.

## Past Mitigation Efforts

The Town participates in the NFIP.  
Water system improvements  
Fuel reduction/treatment projects

## **B.4 Mitigation Goals and Objectives**

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Fraser had adopted the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 4 Mitigation Strategy.

## **B.5 Mitigation Actions**

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The planning team for Fraser identified and prioritized the following mitigation actions based on the risk assessment. Background information on how each action will be implemented and administered, such as ideas for implementation, responsible agency, potential funding, estimated cost, and timeline also are included.

### **Continued Compliance with the NFIP**

Fraser will continue participation in and compliance with the National Flood Insurance Program. Specific activities that the Town will undertake to continue compliance include the following:

- Working with FEMA and the Colorado Water Conservation Board in the review and adoption of new digital flood insurance rate maps (DFIRMs) as part of the map modernization (now RiskMAP) program
- Periodically reviewing the flood damage prevention ordinance and identifying opportunities to strengthen requirements and enforcement. The Town has reviewed and updated their ordinance to be compliant with the update State Floodplain Rule (required by January 2014).
- Promote and disperse information on the benefits of flood insurance, with assistance from partners such as the Colorado Water Conservation Board.
- Continuing strong enforcement of the floodplain ordinance and working with developers and property owners to understand the program

## Mitigation Action: Fraser 2015-2 Forest Mitigation

<b>Jurisdiction:</b>	Town of Fraser
<b>Hazard Addressed</b>	Wildfire, Pine Beetle, Windstorm
<b>Project Description, Issue &amp; Background</b>	Rendezvous and Grand Park have completed extensive hazard tree removal
<b>Lead Agency and Title of Lead Person</b>	Private
<b>Partners:</b>	None
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Private funds/effort
<b>Benefits: (Losses Avoided)</b>	Protection of property and life safety enhancement
<b>Potential Funding:</b>	
<b>Timeline:</b>	Ongoing
<b>Status:</b>	Ongoing

# ANNEX C: TOWN OF GRANBY

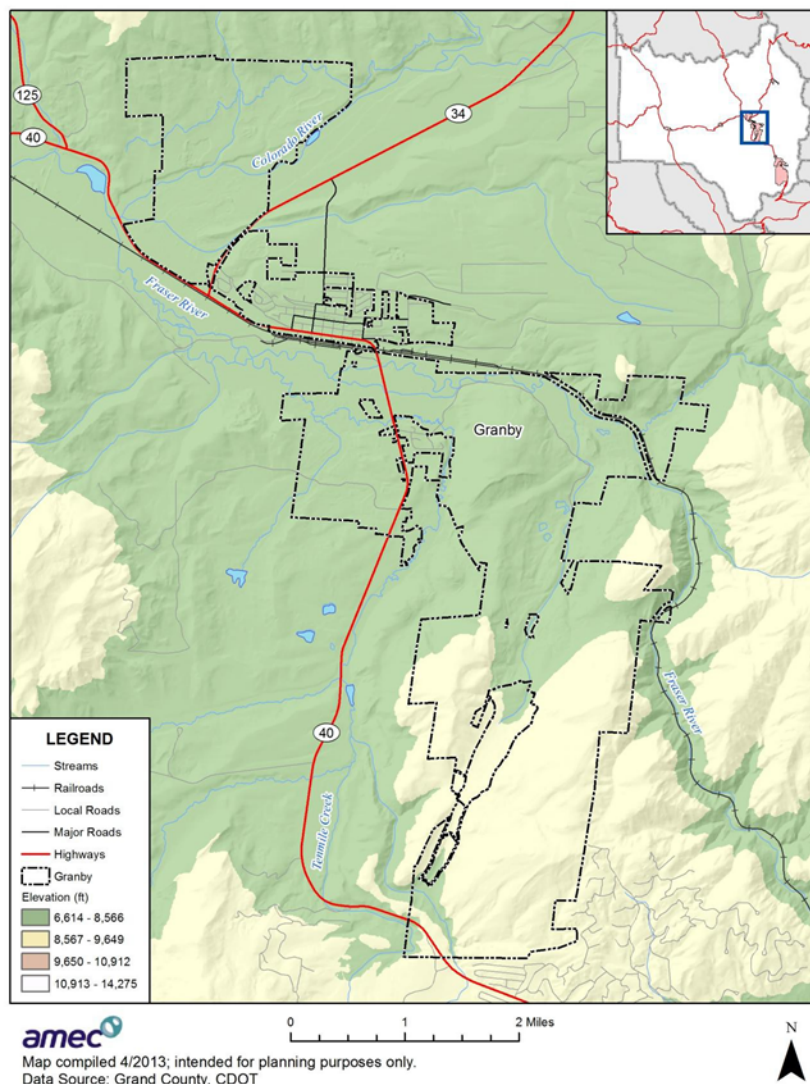
## C.1 Community Profile

### Geography

Granby lies along U.S. Highway 40 about 85 miles west of Denver, southwest of Rocky Mountain National Park. Granby is 7,935 feet above sea level, and is subject to average annual rainfall of roughly 12 inches and annual snowfall of over 128 inches. According to the U.S. Census, the town has a total area of 1.8 square miles, none of which is covered by water.

Figure C.1 shows a map of the Town of Granby and its location within Grand County. The map also shows critical facilities and landslide deposits.

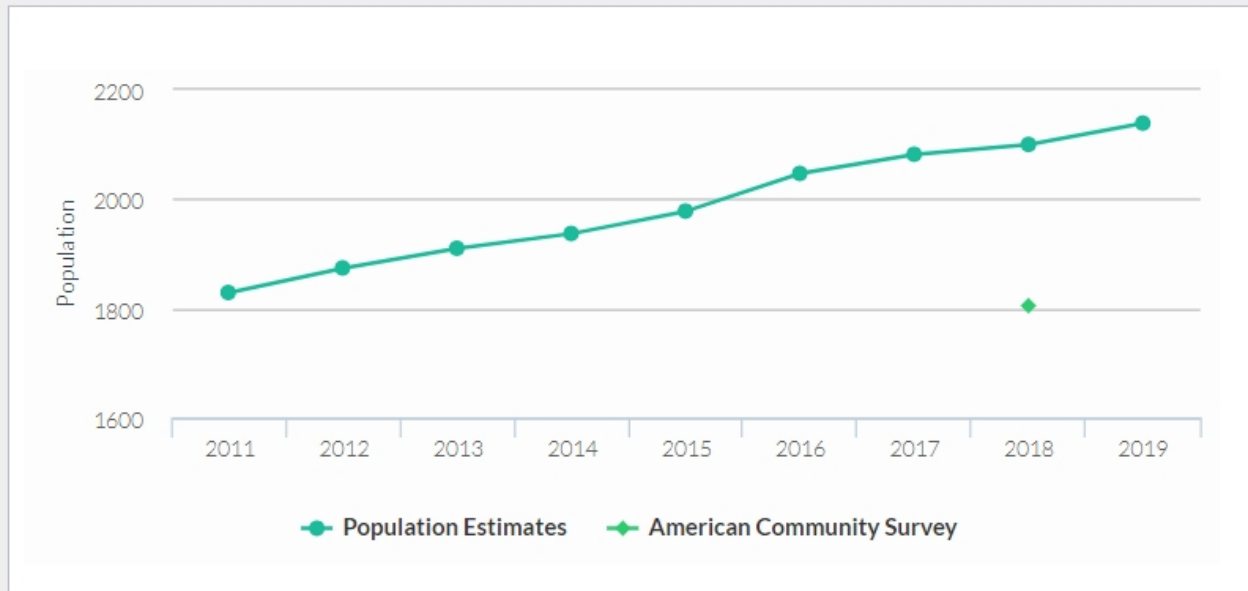
**Figure C.1. Map of Granby**



## Population

The permanent population is the number of people who reside in the town on a year-round basis and was estimated for the Town of Granby to be 2,139 in 2019. Select American Community Survey (ACS) 2011 and 2010 US Census demographic and social characteristics for Granby’s “permanent” population are shown in the table below.

### Granby Population



The population data for Granby are from the Census' American Community Survey 2018 5-year estimates and the Census' 2019 Population Estimates. The demographic data for Berkley, Leadville North, Pagosa Springs, and Weldona are the most current, comparable demographics available from the US Census Bureau, are from the American Community Survey 2018 5-year estimates, and were downloaded on 19 December 2019. [Check out our FAQ section](#) for more details.

## History

The Town of Granby was founded in 1904 along the route of the Denver, Northwestern & Pacific Railway, and incorporated one year later. It was named after Granby Hillyer, a Denver lawyer who later became a U.S. Attorney for Denver’s district.

Many Granby residents are descended from pioneer settlers who arrived before Grand County was fully surveyed. Early families established themselves under the Homestead Act of 1862, which allowed easy access to land to those who would inhabit and improve upon the territory.

## Economy

According to the ACS 2011 estimates, the industries that employed the highest percentage of Granby’s labor force were arts, entertainment, recreation, accommodation, and food services (25%); public administration (14.7%); construction (11.6%); finance, insurance, real estate, and rental and leasing (11.5%); and retail trade (9.0%).



## Hazard Identification and Profiles

Grand County’s planning team identified the hazards that affect the community and summarized their geographic location, probability of future occurrence, potential magnitude or severity, and planning significance specific to the Town (see Table C.3). In the context of the countywide planning area, there are no hazards that are unique to Granby.

**Table C.3. Granby—Hazard Summary**

Hazard Type	Geographic Location*	Probability*	Magnitude*	Hazard Rating
Avalanche	Small	Unlikely	Negligible	Low
Dam Failure	Small	Unlikely	Limited	Medium
Disease Outbreak	Large	Likely	Variable	High
Drought	Large	Highly Likely	Limited	High
Earthquake	Large	Unlikely	Critical	Low
Flood	Small	Likely	Limited	Medium
Hazardous Materials (Transportation)	Large	Highly Likely	Critical	High
Landslide, Mudflow/Debris Flow, and Rockfall	Small	Likely	Limited	Low
Lightning	Small	Highly Likely	Limited	Medium
Mountain Pine Beetle Infestation	Large	Occasional	Limited	Medium
Severe Winter Weather	Large	Highly Likely	Limited	Medium
Wildfire	Small	Highly Likely	Limited	Medium
Wildlife-Vehicle Collisions	Isolated	Highly Likely	Negligible	Medium
Windstorm	Large	Highly Likely	Limited	Medium

\*See Section 3.2 for definitions of these factors

Information on past events for each hazard can be found in Section 3.2 Hazard Profiles in the body of this document.

## C.3 Vulnerability Assessment

The intent of this section is to assess Granby’s vulnerability separately from that of the planning area as a whole, which has already been addressed in Section 3.3 Vulnerability Assessment. The following vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of moderate or high significance that may vary from other parts of the planning area. For more information about how hazards affect the County as a whole, see Chapter 3 Risk Assessment.

### Community Asset Inventory

According to the 2019 Report to the Governor (of Colorado), Granby’s assessed value was listed as \$62,515,080 with total revenue listed as \$451,609.

Table C.5 lists critical facilities and other community assets identified by Granby’s planning team as extremely important to protect in the event of a disaster.

**Table C.5. Granby—Critical Facilities and Other Community Assets**

Name of Asset	Type*	Replacement Value (\$)	Hazard Specific Info/Comments
Middle Park Medical Center	EF	\$20,000,000	Flood
Granby Fire Department	EF	\$3,000,000	Flood
South Service Area Water Wells	LL	\$2,000,000	Flood
Grand County EMS**	EF		
Granby Town Hall**	EF		
Grand County Road And Bridge – Granby**	EF		
Mountain Parks Electric**	LL		
CenturyLink Building**	LL		
Granby Transfer Station**	LL		
Granby Police**	EF		
East Grand Middle School**	EF		
Granby Elementary School**	EF		
Indian Peaks Charter School**	EF		
Middle Park High School**	EF		
Granby Sanitation District**	LL		

Sources: HMPC

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

\*\*Identified separately by Grand County OEM

The Town also needs to further evaluate the seasonal workforce to better understand their impact on the community and what needs to be done to protect them.

## **Vulnerability by Hazard**

This section examines those existing and future structures and other assets at risk to hazards ranked of moderate or high significance that vary from the risks facing the entire planning area and estimates potential losses. These hazards include drought, flood, hazmat, landslide, and wildfire.

### **Drought**

Vulnerability to drought can be difficult to quantify by jurisdiction due to the widespread nature of the hazard. Drought in the summer increases problems with dust and erosion and can cause deterioration in water quality. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding. It also increases the wildfire hazard. Drought impacts increase with the length of a drought, as carry-over supplies in reservoirs are depleted and water levels in groundwater basins decline. A portion of Grand County relies on individual ground wells and constructed water retention structures for their water resources. Ground wells service a significant portion of the population, while local ranchers rely upon ponds and ditches for livestock and crops.

The County does not own rights to most of the water in its borders, and much of the water is allocated elsewhere. Winter Park and Granby are primarily dependent on streamflow as the primary water source. Wastewater treatment plants are also dependent on streamflows; if streamflows are inadequate, this can become a public health and sanitation concern. The incidence of blue algae increases during periods of extreme heat, which often accompanies drought, and zebra mussels are also a potential issue.

### **Flood**

The Town of Granby, near the confluence of the Fraser River and the Colorado River has flood hazard mapping for both the Fraser River and its tributary Tenmile Creek. Flooding along the Fraser River and its tributaries occurs primarily in June and is largely due to snowmelt. Granby is subject to flooding from the Fraser River. Localized stormwater flooding can also cause minor problems.

## Existing Development

The effective DFIRM for Granby, dated January 2, 2008, was the best available flood hazard 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 the points were based on the assessor’s data and summed for the unincorporated county and for the municipalities. Property exposure located in flood hazard zones by land use type is shown in Table C.6. Flood zones A, and AE are variations of the 1% annual chance event. The “Shaded Zone X” represents the 0.2% annual chance hazard zone on the DFIRM. Building and estimated content values were totaled. Granby does not have a 2% annual chance flood zone. The Town’s A Zone has an exposure value of over \$5.4 million. To estimate losses a 25% loss factor was applied to the total exposure, based on FEMA depth damage functions associated with a two foot deep flood. Flood loss from the 1% annual chance event based on this method would be in the magnitude of \$1.3 million. Flooded structures for the DFIRM and HAZUS flood zones are depicted in Figure C.2. More information on the methodology used for this loss estimation can be found in Section 3.3 Vulnerability Assessment.

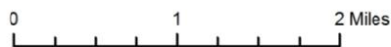
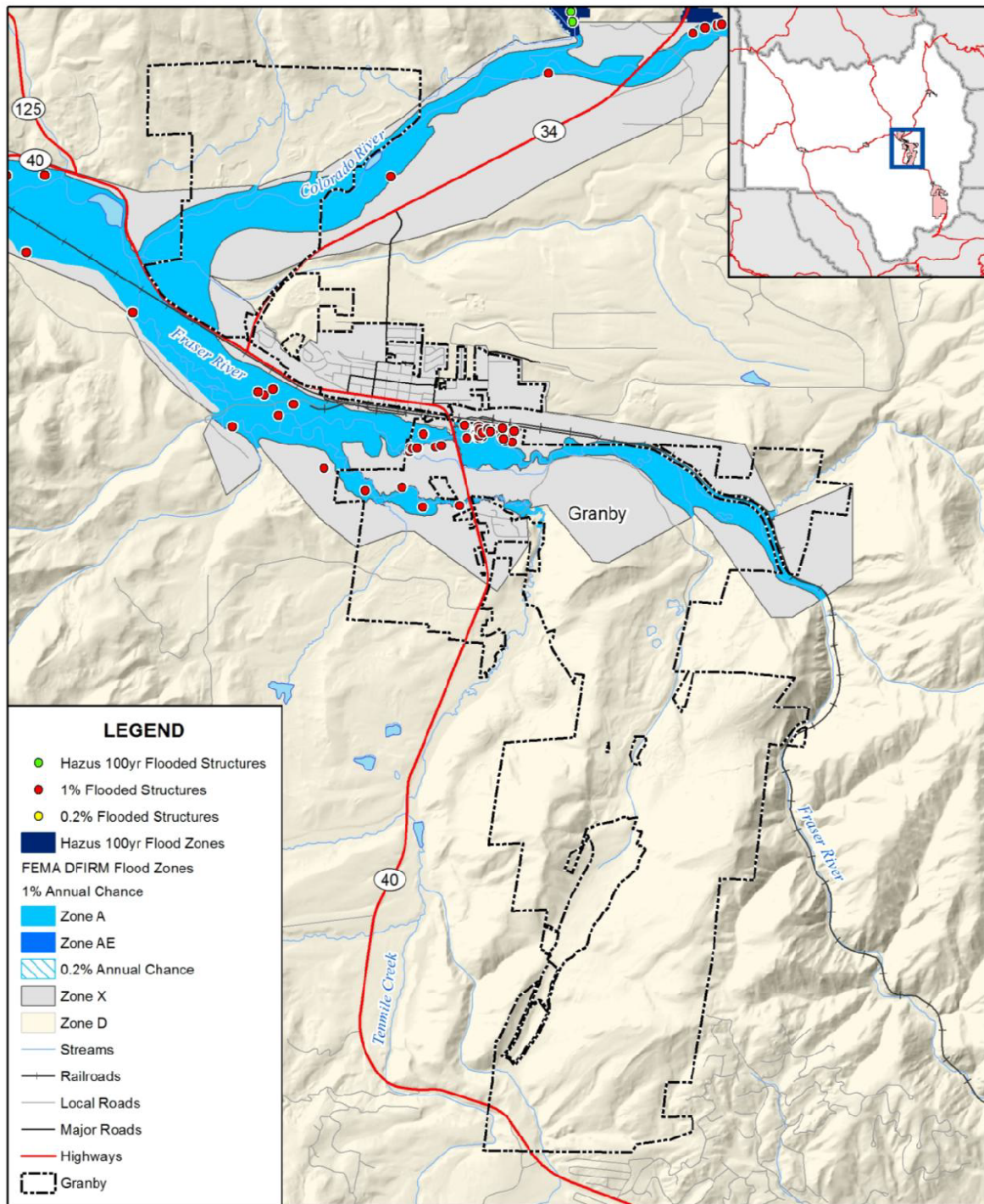
There are no critical facilities located in the floodplain in Granby.

**Table C.6. Granby—Flood Risk by Flood Zone and Property Type**

Land Use	Total Parcel Count	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Loss Estimate
<b>Zone A</b>						
Agricultural	5	0	\$0	\$0	\$0	\$0
Commercial Improved	2	2	\$204,860	\$204,860	\$409,720	\$102,430
Mixed Use	2	2	\$747,010	\$747,010	\$1,494,020	\$373,505
Land Use	Total Parcel Count	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Loss Estimate
Residential Improved	12	12	\$1,799,290	\$899,645	\$2,698,935	\$674,734
Residential Vacant	53	1	\$45,400	\$22,700	\$68,100	\$17,025
Tax Exempt	5	2	\$389,810	\$389,810	\$779,620	\$194,905
Unknown	12	0	\$0	\$0	\$0	\$0
Vacant Land	5	0	\$0	\$0	\$0	\$0
<b>Total</b>	<b>96</b>	<b>19</b>	<b>\$3,186,370</b>	<b>\$2,264,025</b>	<b>\$5,450,395</b>	<b>\$1,362,599</b>

Source: AMEC analysis of DFIRM and HAZ

Figure C.2. DFIRM and HAZUS Food Zones and Floodprone Properties in Granby



Map compiled 4/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT, Hazus-MH MR2,  
 FEMA DIFRM 1/2/2008

### ***National Flood Insurance Program***

Granby joined the National Flood Insurance Program (NFIP) on May 15, 2008. NFIP insurance data indicates that as of March 25, 2013, there were 3 flood insurance policies in force in Granby with \$980,000 of coverage. One of the policies is in Granby's A zone, and two are located outside of the Special Flood Hazard Area.

There has been one historical claim for flood losses totaling \$0. There were no repetitive or severe repetitive loss structures.

### ***Future Development***

Granby addresses floodplain management policies in its Town Code (see Regulatory Capabilities section below). These policies are consistent with flood management policies of the NFIP.

Note: NFIP was contacted twice during the 2020 Plan update to get updated information. No response was received most likely due to COVID-19 workforce reduction.

### **Hazardous Materials**

The Town of Granby is exposed to transported hazardous materials by being in proximity to Highway 40 and the railroad. U.S. Highway 40 is the alternate route to Salt Lake City and primary detour route for closures of the I-70 corridor; trucks and tankers transporting hazardous materials may often use this route. Grand County OEM also identified seven reporting Tier II facilities (for 2012 and 2013) in Granby, so the potential also exists for fixed hazmat incidents in the Town. Data from the National Response Center (NRC) between 2008 and 2012 recorded three reported hazmat events in Granby, including one railroad non-release and two fixed events.

### **Landslide, Mud Flow/Debris Flow, Rock Fall**

Possible landslide areas are identified on steep slopes with unstable soil conditions. Landslide deposits were identified in the eastern half and northwestern corner of Granby.

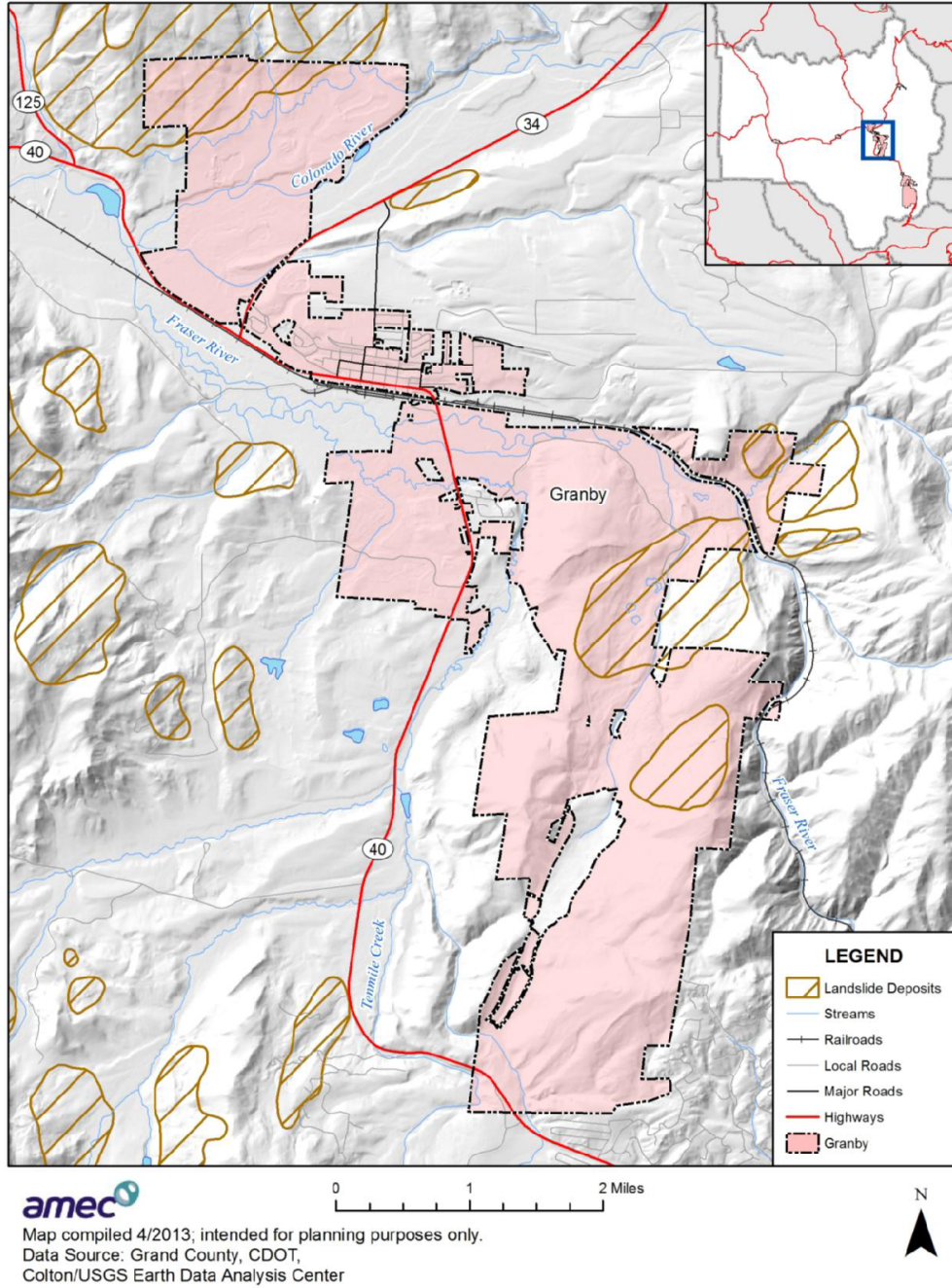
### ***Existing Development***

Potential losses for landslide areas were estimated using Grand County GIS and assessor's data and were examined in terms of values and critical facilities at risk. GIS was used to create a centroid, or point, representing the center of each parcel polygon, which was overlaid on the landslide hazard polygons. The assessor's land and improved values for each parcel are linked to the parcel centroids. For the purposes of this analysis, if the parcel's centroid intersects the landslide hazard polygon, that parcel is assumed to be at risk to the landslide. Values were summed and sorted by landslide hazard zone. Additional landslide hazard analysis was completed using the more comprehensive USGS landslide deposits layer during the 2013 update. The results of the overlay analysis for the Town of Granby are presented in Table C.7. No critical facilities were identified in landslide zones in Granby.

**Table C.7. Granby—Landslide Exposure by Land Use**

Land Use	Total Parcel Count	Improved Parcel Count	Land Value	Improved Value	Estimated Content Value	Total Value
Agricultural	3	0	\$4,870	\$0	\$0	\$0
Residential Improved	12	12	\$607,750	\$4,270,770	\$2,135,385	\$6,406,155
<b>Total</b>	<b>15</b>	<b>12</b>	<b>\$612,620</b>	<b>\$4,270,770</b>	<b>\$2,135,385</b>	<b>\$6,406,155</b>

**Figure C.3. Landslide Areas in Granby**



## Future Development

The severity of landslide problems is directly related to the extent of human activity in hazard areas. Adverse effects can be mitigated by early recognition and avoiding incompatible land uses in these areas or by corrective engineering. The mountainous topography of the County presents considerable constraints to development, most commonly in the form of steep sloped areas. These areas are vulnerable to disturbance and can become unstable. Granby’s Town Code encourages development in or near the existing towns and away from environmentally sensitive areas such as those with steep slopes. This policy can help protect future development from being built in unstable areas.

## Wildfire

### Existing Development

The Grand County CWPP (2006) evaluated the wildfire hazards to each of the incorporated and unincorporated towns in the County. Granby received a hazard rating of low to medium. Granby is also covered by Grand Fire Protection District’s CWPP, which rated the wildfire hazard in 24 distinct communities and 3 areas of special interest. Refer to Table 3.35 in Chapter 3 for details on the community wildfire hazard ratings in the Grand Fire Protection District CWPP.

Based on the methodology described for wildfire in Section 3.3.3 Vulnerability by Hazard using the SILVIS threat zones, the property values in Granby were aggregated by wildfire threat zones. The breakdown of property values in Granby by wildfire threat zone is shown in Table C.8. The majority of risk to wildfire is to residential structures, but some commercial areas are at risk as well. The Colorado State Forest Service in partnership with the Town and local residents have done or planned several forest health treatments in and around Granby. These areas are depicted on the map in Figure C.4. See Figure H.5 in *Annex H Fire Protection Districts* for wildfire intensity in the Granby area.

**Table C.8. Granby—Property Values in Wildfire Threat Zones**

Threat Zone	Land Use	Improved Parcel Count	Land Value	Improved Value	Estimated Content Value	Total Value
Moderate	Agricultural	0	\$261,110	\$0	\$0	\$0
	Commercial Improved	68	\$7,097,390	\$13,738,340	\$13,738,340	\$27,476,680
	Commercial Vacant	0	\$672,880	\$0	\$0	\$0
	Mixed Use	9	\$1,268,550	\$2,270,820	\$2,270,820	\$4,541,640
	Residential Improved	489	\$17,570,470	\$83,066,090	\$41,533,045	\$124,599,135
	Residential Vacant	7	\$11,717,030	\$1,109,690	\$554,845	\$1,664,535
	Tax Exempt	24	\$2,062,910	\$4,451,190	\$4,451,190	\$8,902,380
	Unknown	1	\$1,891,700	\$264,730	\$264,730	\$529,460

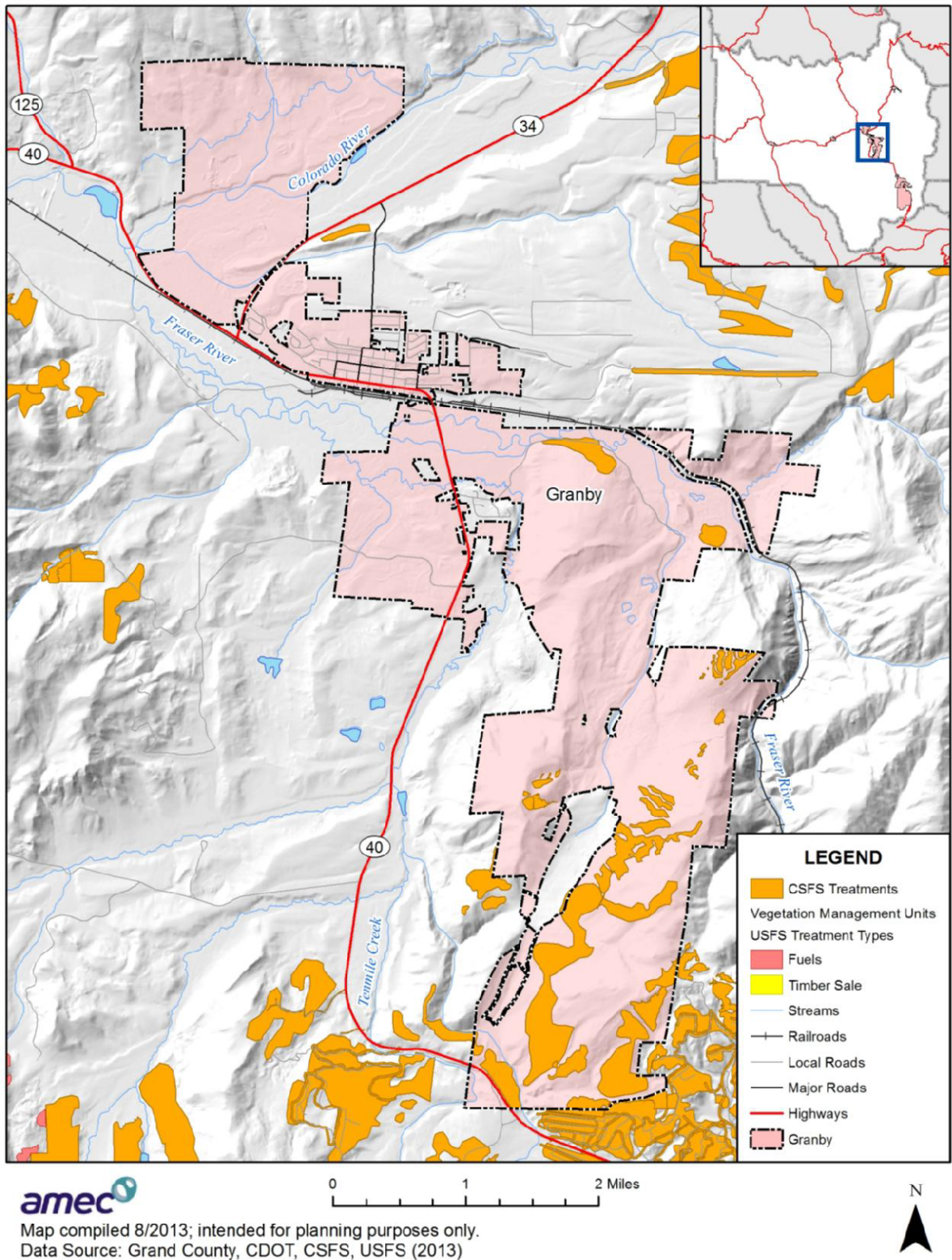


Threat Zone	Land Use	Improved Parcel Count	Land Value	Improved Value	Estimated Content Value	Total Value
	Vacant Land	1	\$1,684,980	\$830	\$0	\$830
	<b>Total</b>	<b>599</b>	<b>\$44,227,020</b>	<b>\$104,901,690</b>	<b>\$62,812,970</b>	<b>\$167,714,660</b>
<b>High</b>	Agricultural	0	\$217,370	\$0	\$0	\$0
	Commercial Improved	20	\$2,057,220	\$5,285,080	\$5,285,080	\$10,570,160
	Commercial Vacant	0	\$744,840	\$0	\$0	\$0
	Mixed Use	3	\$292,750	\$816,040	\$816,040	\$1,632,080
	Residential Improved	862	\$10,649,020	\$133,754,530	\$66,877,265	\$200,631,795
	Residential Vacant	20	\$5,017,180	\$358,950	\$179,475	\$538,425
	Tax Exempt	7	\$1,399,190	\$663,480	\$663,480	\$1,326,960
	Unknown	0	\$1,833,260	\$0	\$0	\$0
	Vacant Land	0	\$516,660	\$0	\$0	\$0
	<b>Total</b>	<b>912</b>	<b>\$22,727,490</b>	<b>\$140,878,080</b>	<b>\$73,821,340</b>	<b>\$214,699,420</b>
<b>Grand Total</b>		<b>1,511</b>	<b>\$66,954,510</b>	<b>\$245,779,770</b>	<b>\$136,634,310</b>	<b>\$382,414,080</b>

Source: AMEC analysis with SILVIS data

Five critical facilities were identified in moderate and high-moderate wildfire zones in Granby. Two communications facilities, Power World and Sol Vista Peak, are located in Granby's high-moderate wildfire zone. The three critical facilities in the Town's moderate wildfire zone include U.S. 40 ML, Grand Fire Protection District Station, and Middle Park High School.

Figure C.4. Wildfire Treatment Areas in Granby



The Grand Fire Protection District, which provides fire protection services to Granby and surrounding area, is considered an initial attack center for wildland fires on all private land and takes a joint responsibility with the U.S. Forest Service for fires on federal land.

**Future Development**

The Granby Town Code requires that development meet fire mitigation standards before it can be approved for occupancy. Grand FPD also enforces the International Fire Code. All buildings in the District’s service area are required to adhere to the International Fire Code. Grand FPD also reviews all plats, construction plans, and site plans against the District’s Development and Review Standards. These standards are designed to help protect life safety and property from wildfire.

**Growth and Development Trends**

Table C.9 illustrates how Granby has grown in terms of population and number of housing units between 2000 and 2018.

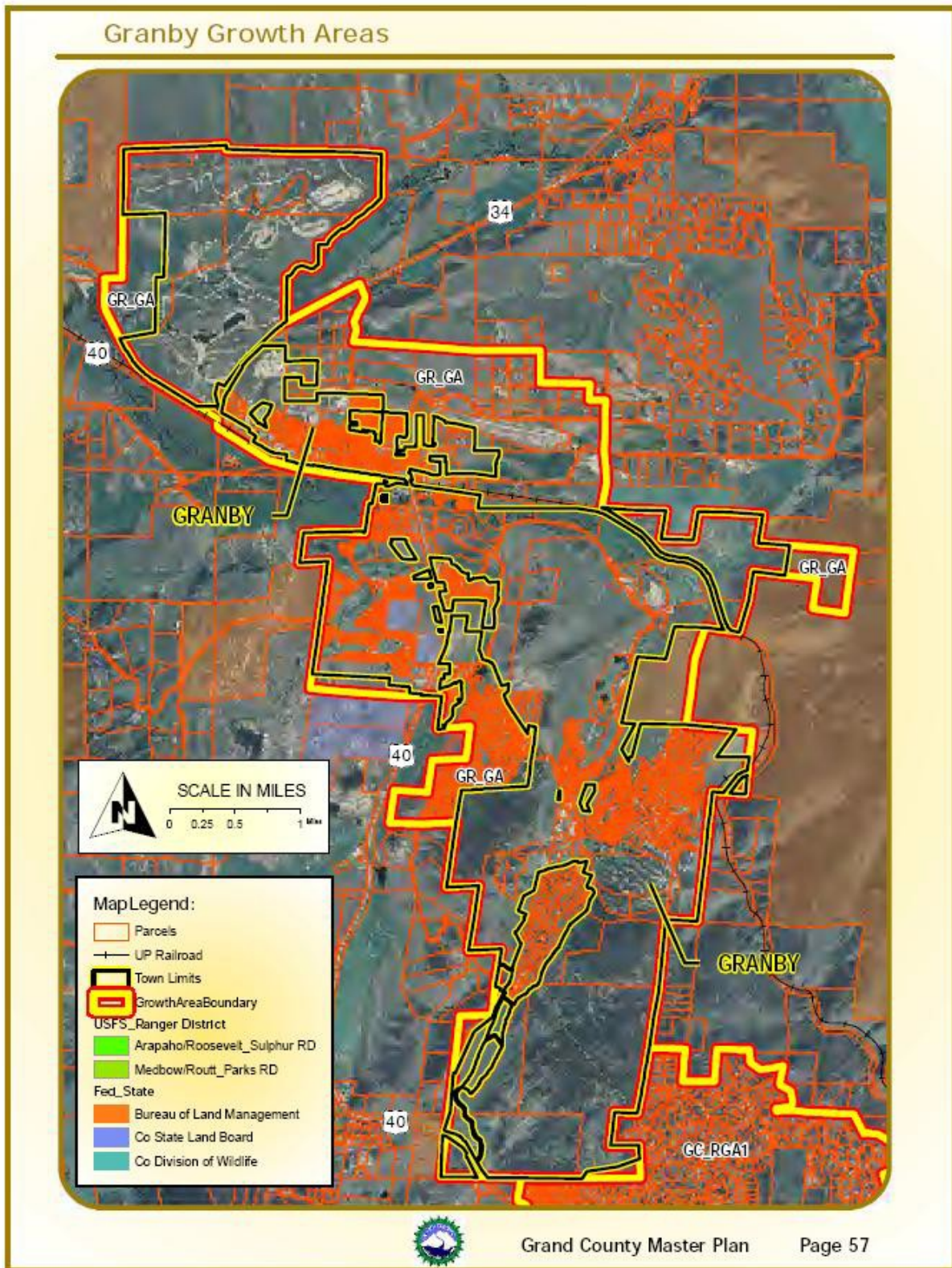
**Table C.9. Granby—Change in Population and Housing Units, 2000-2011**

2000 Population	2011 Population Estimate	2019 Population Estimate	2000 # of Housing Units	2011 Estimated # of Housing Units	2018 Estimated # of Housing Units
1,525	2,389	2,139	628	1,378	1,599

Source: factfinder2.census.gov

Development in the Town is not directed to flood hazard areas. Granby has seen some growth in the WUI, so the main growth and development concerns center around increased wildfire vulnerability. Figure C.5 depicts Granby’s current town limits and the growth area boundary, as shown in the 2011 Grand County Master Plan.

Figure C.5. Granby Growth Areas



## C.4 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. The capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

### Regulatory Mitigation Capabilities

Table C.10 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Granby.

**Table C.10. Granby—Regulatory Mitigation Capabilities**

Regulatory Tool (Ordinances, Codes, Plans)	Yes/No	Comments
General or Comprehensive plan	Yes	
Zoning ordinance	Yes	
Subdivision ordinance	Yes	
Growth management ordinance	No	
Floodplain ordinance	Yes	
Other special purpose ordinance (stormwater, steep slope, wildfire)	Yes	Well head protection ordinance
Building code	Yes	
Fire department ISO rating	Yes	Unknown rating
Erosion or sediment control program	Yes	
Stormwater management program	Yes	
Site plan review requirements	Yes	
Capital improvements plan	Yes	
Economic development plan	Yes	
Local emergency operations plan	Yes	
Other special plans		
Flood insurance study or other engineering study for streams	Yes	
Elevation certificates (for floodplain development)	Yes	
Other		

### Granby Town Code

The Granby Town Code serves as the legal framework for the Town and contains 17 titles and various subsections. Sections of the Town Code related to hazard mitigation are summarized below:

- **Chapter 8.25 Fire Restrictions**

- (a) The mayor or the town manager or their designee shall have the authority to implement, modify, and rescind restrictions on open fires within the town limits of Granby. The mayor or town manager shall consider the recommendations issued by officials from other affected governmental agencies prior to implementing, modifying, or rescinding a restriction on open fires.
  - (b) For the purposes of this chapter, “open fires” shall be defined as any outdoor fire, including, but not limited to, campfires, slash or trash burning, warming fires, charcoal or wood-burning grills, fused explosives, fireworks of any kind, sparklers, any thing or instrumentality that emits a flame or flammable sparks, any incendiary device, and disposing of ignited cigarettes, cigars, pipes, or other tobacco burning instrumentalities other than by placing them in a fireproof receptacle.
  - (c) The specific terms and conditions of the fire restrictions, as well as their applicability to various types of operations, including commercial operations, shall be determined by the mayor or town manager at the time the fire restrictions are implemented or modified.
  - (d) Any action taken by the mayor or town manager shall be subject to review by the board of trustees at its next regular or special meeting. At the meeting, the board of trustees shall modify, ratify or rescind the action.
  - (e) The penalty for violating this section shall be as follows: Any person violating this section shall be subject to a penalty assessment in the amount of \$100.00 for first offense, \$200.00 for second offense, and \$300.00 for third or subsequent offenses. Such penalty assessments shall be subject to all applicable surcharges imposed by the town or the Granby municipal court. The penalty assessment procedure provided in Section 16-2-201, C.R.S., shall be followed when enforcing the provisions of this chapter except the Granby municipal court rather than the county court shall be utilized. This chapter and any orders made pursuant to this chapter shall be enforced by the town of Granby police department. [Ord. 785 § 1, 2012].
- **Chapter 16.110 Fire Protection Services Impact Fees.** The purpose of this chapter is to:
    - (a) Provide a rational system for identifying and mitigating growth-related costs associated with growth and development and the expansion of fire protection services and facilities made necessary by land development activities, a growing population and economic activity levels.
    - (b) Ensure that the impact fees established by this chapter are based on, and do not exceed, the cost of providing additional capital improvements necessitated by new development.
    - (c) Assure that the impact fees implemented in this chapter are linked to a capital improvements program designed to provide the facilities and equipment for which the impact fees are imposed. [Ord. 594 § 1, 2003. Code 1999 § 17-6-1].

- 16.110.030 Imposition of impact fees. Any developer who seeks a development approval for a land development activity requiring additional fire protection services, who has not already dedicated land to defer anticipated impacts of the proposed development, must pay an impact fee in the manner and amount set forth in this chapter. [Ord. 594 § 1, 2003. Code 1999 § 17-6-3].

- **Chapter 16.120 Flood Damage Prevention**

- 16.120.010 (a) The flood hazard areas of the town of Granby are subject to periodic inundation which results in loss of life and property, health and safety hazards, disruption of commerce and governmental services, and extraordinary public expenditures for flood protection and relief, all of which adversely affect the public health, safety and general welfare.
- 16.120.010 (b) These flood losses are created by the cumulative effect of obstructions in floodplains which cause an increase in flood heights and velocities, and by the occupancy of flood hazard areas by uses vulnerable to floods and hazardous to other lands because they are inadequately elevated, floodproofed or otherwise protected from flood damage. [Ord. 710 § 1, 2008].
- 16.120.170 (a) Residential Construction. New construction and substantial improvement of any residential structure shall have the lowest floor (including basement) elevated above the base flood elevation. A registered professional engineer, architect, or land surveyor shall submit a certification to the floodplain administrator that the standard of this subsection as proposed in GMC 16.120.140(a) is satisfied.
- 16.120.170 (b) Nonresidential Construction. New construction and substantial improvements of any commercial, industrial or other nonresidential structure shall either have the lowest floor (including basement) elevated above the base flood level or, together with attendant utility and sanitary facilities, be designed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy. A registered professional engineer or architect shall develop and/or review structural design, specifications, and plans for the construction, and shall certify that the design and methods of construction are in accordance with accepted standards of practice as outlined in this subsection. A record of such certification which includes the specific elevation (in relation to mean sea level) to which such structures are floodproofed shall be maintained by the floodplain administrator.
- 16.120.170 (c) Manufactured Homes. The town shall require that all manufactured homes be placed within Zone A on a community's FHBM or FIRM shall be installed using methods and practices which minimize flood damage. For the purposes of this requirement, manufactured homes must be elevated and anchored to resist flotation, collapse, or lateral movement. Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable state and local anchoring requirements for resisting wind forces. [Amended during 2011 recodification; Ord. 710 § 1, 2008].

- **Chapter 17.25 Subdivision Design Standards**



- (a) Special Site Considerations (1) Steep, unstable or swampy land, and land subject to inadequate drainage, geological hazards, avalanche or rock slides, shall be identified and unless acceptable provisions are made for eliminating or controlling problems which may endanger health, life or property, such sites shall not be platted for residential occupancy.

Land not usable for residential purposes may be set aside for open land uses, such as for parks, conservation areas or various agricultural uses.

- (a) Special Site Considerations (2) Any land subject to flooding or located in a natural drainage channel or in a fire hazard area shall not be platted for occupancy until adequate provisions to eliminate or control hazards are made and approved by the commission. These provisions shall be made to protect the health, safety and welfare of the public, as well as to eliminate any flood or fire hazard resulting from the development of the area. Areas subject to flooding may be left as open space or reserved as easements.
- (a) Special Site Considerations (3) Where a residential subdivision borders a railroad or highway right-of-way, the commission may require a buffer strip of such an extent and type as may be practical, or other adequate protection against hazards and undesirable effects of the railroad or highway, such as a fence installed by the applicant prior to conveyance of the lots.

### **Edgewater Resort Flood Evacuation Plan, 2006**

This plan was developed to minimize the impacts of flooding upon the safety of residents of Edgewater Resort in Granby, Colorado. The purpose of the plan is to outline procedures for evacuation of the resort in the event of a flood or impending flood, and thresholds that trigger those procedures. Roles and responsibilities are detailed as well. The focus of this plan is to evacuate people out of harm’s way; not to protect or remove RV’s and other property in the floodplain.

### **Administrative/Technical Mitigation Capabilities**

Table C.11 identifies the personnel responsible for activities related to mitigation and loss prevention in Granby.

**Table C.11. Granby—Administrative and Technical Mitigation Capabilities**

<b>Personnel Resources</b>	<b>Yes/No</b>	<b>Department/Position</b>	<b>Comments</b>
Planner/engineer with knowledge of land development/land management practices	Yes	Administration/Town Manager	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Town Engineer	
Planner/engineer/scientist with an understanding of natural hazards	Yes	Town Engineer	
Personnel skilled in GIS	Yes	Town Engineer and Water Technician, SSA	
Full time building official	Yes	Building Official	
Floodplain manager	Yes	Town Engineer	
Emergency manager	No		
Grant writer	No		
Other personnel			

Personnel Resources	Yes/No	Department/Position	Comments
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	No		
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Yes	County/ Town capability	
Other			

## Fiscal Mitigation Capabilities

Table C.12 identifies financial tools or resources that Granby could potentially use to help fund mitigation activities.

**Table C.12. Granby—Fiscal Mitigation Capabilities**

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Community Development Block Grants		
Capital Improvements Project Funding	Y	
Authority to Levy Taxes for Specific Purposes		
Fees for Water, Sewer, Gas, or Electric Services		
Impact Fees for New Development		
Incur Debt through General Obligation Bonds		
Incur Debt through Special Tax Bonds		
Incur Debt through Private Activities		
Withhold Spending in Hazard Prone Areas		

## Mitigation Outreach and Partnerships

- The Town of Granby uses available resources to promote responsible water use and fire safety. Town ordinance restrict open burning, establish flood mitigation measures, etc.

## Past Mitigation Efforts

- The Town has a well area protection ordinance restricting certain uses and activities within a specified area around the Town water wells.

## C.5 Mitigation Goals and Objectives

Granby had adopted the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 4 Mitigation Strategy.

## C.6 Mitigation Actions

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The planning team for Granby identified and prioritized the following mitigation actions based on the risk assessment. Background information on how each action will be implemented and administered, such as ideas for implementation, responsible agency, potential funding, estimated cost, and timeline also are included.

### Continued Compliance with the NFIP

Granby will continue participation in and compliance with the National Flood Insurance Program. Specific activities that the Town will undertake to continue compliance include the following:

- Working with FEMA and the Colorado Water Conservation Board in the review and adoption of new digital flood insurance rate maps (DFIRMs) as part of the map modernization (now RiskMAP) program
- Periodically reviewing the flood damage prevention ordinance and identifying opportunities to strengthen requirements and enforcement. *The Town has reviewed their ordinance and is in the process of updating it to be compliant with the update State Floodplain Rule (required by January 2014).*
- Promote and disperse information on the benefits of flood insurance, with assistance from partners such as the Colorado Water Conservation Board.
- Continuing strong enforcement of the floodplain ordinance and working with developers and property owners to understand the program

## Mitigation Action: Granby 2015-1 Water Supply Protection for Fraser River and Val Moritz Wells

<b>Jurisdiction:</b>	Town of Granby
<b>Hazard Addressed</b>	Wildfire, Hazardous Materials Spills
<b>Project Description, Issue &amp; Background</b>	Develop a plan to 1) protect the surface water and well water sources for potable water for the Town, 2) minimize the potential event of a forest fire up-river from the Town of Granby diversion point for water extraction and well heads, 3) mitigate potential pollution issues in the event of a fire up-river from Granby, 4) advertise the importance of source water protection.
<b>Lead Agency and Title of Lead Person</b>	Town of Granby, Town Manager
<b>Partners:</b>	CDOT, USFS, Fire District
<b>Priority:</b>	High
<b>Cost Estimate:</b>	unknown
<b>Benefits: (Losses Avoided)</b>	Maintain a viable source for potable water for the Town
<b>Potential Funding:</b>	Town, CDOT, USFS
<b>Timeline:</b>	Ongoing
<b>Status:</b>	Ongoing

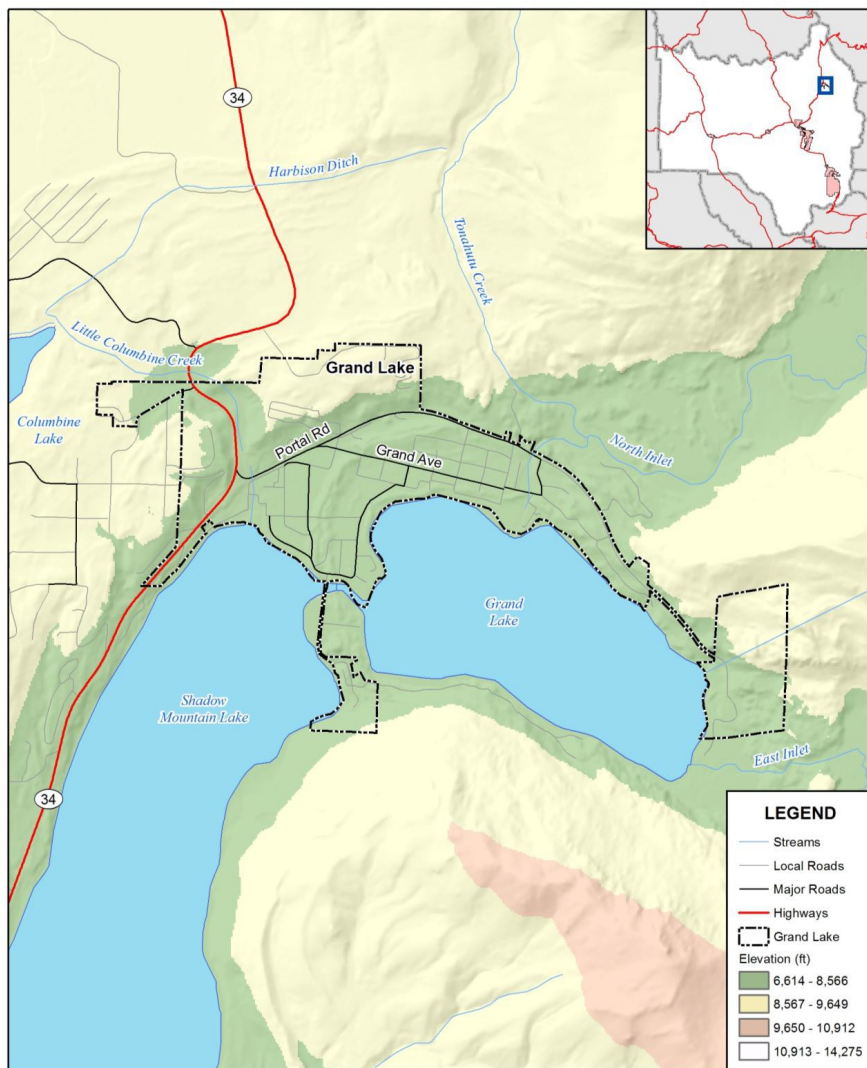
# ANNEX D: TOWN OF GRAND LAKE

## D.1 Community Profile

### Geography

Grand Lake lies at an elevation of 8,386 feet and was established in 1881 and incorporated in 1944. It derives its name from the nearby lake, the largest natural body of water in the State of Colorado. According to the US Census Bureau, the Town has an area of 0.9 square miles, none of which is covered by water (the Town does not encircle the lake). Figure D.1 shows a map of the Town of Grand Lake. The map also shows critical facilities and landslide deposits.

Figure D.1. Map of Grand Lake



Map compiled 4/2013; intended for planning purposes only.  
Data Source: Grand County, CDOT

## Population

The permanent population is the number of people who reside in the town on a year-round basis and was estimated at 506 in 2019.

## History

The Town of Grand Lake was established in 1881. The Town was originally an outfitting and supply point for the mining settlements of Lulu city, Teller City, and Gaskill, and has been a tourist destination for over 100 years. It was incorporated on June 23, 1944 and briefly held the county seat from 1882 to 1888.

## Economy

According to the ACS 2011 estimates, the industries that employed the highest percentage of Grand Lake’s labor force were arts, entertainment, recreation, accommodation, and food services (42%); retail trade (13%); construction (11.8%); wholesale trade (11.2%); and public administration (11.2%).

## D.2 Hazard Identification and Profiles

Grand County’s planning team identified the hazards that affect the community and summarized their geographic location, probability of future occurrence, potential magnitude or severity, and planning significance specific to the Town (see Table D.3). In the context of the countywide planning area, there are no hazards that are unique to Grand Lake.

**Table D.3. Grand Lake—Hazard Summary**

Hazard Type	Geographic Location*	Probability*	Magnitude*	Hazard Rating
Avalanche	Isolated	Unlikely	Limited	Medium
Dam Failure	Isolated	Unlikely	Limited	Low
Disease Outbreak	Large	Likely	Variable	High
Drought	Large	Likely	Critical	High
Earthquake	Large	Unlikely	Negligible	Low
Flood	Large	Occasional	Limited	Medium
Hazardous Materials (Transportation)	Isolated	Unlikely	Negligible	Low
Landslide, Mudflow/Debris Flow, and Rockfall	Small	Unlikely	Limited	Medium
Lightning	Isolated	Occasional	Limited	Medium
Mountain Pine Beetle Infestation	Large	Occasional	Limited	Medium
Severe Winter Weather	Large	Highly Likely	Critical	High
Wildfire	Large	Highly Likely	Catastrophic	High
Wildlife-Vehicle Collisions	Isolated	Highly Likely	Negligible	Medium
Windstorm	Medium	Occasional	Limited	Medium

\*See Section 3.2 for definitions of these factors

## D.3 Vulnerability Assessment

The intent of this section is to assess Grand Lake’s vulnerability separately from that of the planning area as a whole, which has already been addressed in Section 3.3 Vulnerability Assessment. The following vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of moderate or high significance that may vary from other parts of the planning area. For more information about how hazards affect the County as a whole, see Chapter 3 Risk Assessment.

### Community Asset Inventory

According to the 2019 Report to the Governor (of Colorado), Grand Lake’s assessed value was listed as \$48,939,250 with total revenue listed as \$333,374.

**Table D.5. Grand Lake—Critical Facilities and Other Community Assets**

Name of Asset	Type	Replacement Value (\$)	Hazard Specific Info/Comments
Grand Lake Fire Station	RF	100s of thousands	Fire/flood/winter storm
GC Sheriff’s Sub-Station	EF	100s of Thousands	Fire / Flood/ Winter Storm
Town Hall	LS	100s of Thousands	Fire / Winter Storm
Community House	LS/HCNA	100s of Thousands	Fire / Winter Storm
Grand Lake Library	LL	100s of Thousands	Fire / Winter Storm
			Fire / Flood/ Winter Storm
US Post Office	LL	100s of Thousands	Fire / Flood/ Winter Storm
GL Elementary School	LL	100s of Thousands	Fire / Flood/ Winter Storm
Town Water Plant	EF	100s of Thousands	Fire / Drought / Extreme Temp.
H2O Storage Tank (GLL)	EF	100s of Thousands	Fire / Drought / Extreme Temp.
H2O Storage Tank (SPW)	EF	100s of Thousands	Fire / Drought / Extreme Temp.
Water Wells	EF	100s of Thousands	Fire / Drought / Extreme Temp.
			Fire / Drought / Extreme Temp.
Cellular Tower (GLL)	LL	100s of Thousands	Fire/ Winter Storm / High Winds
Us Highway 34	EF	Millions	Fire/Flood/W. Storm/ Haz. Mat
Bridge – W. Portal Road	LL	100s of Thousands	Fire / Flood
Bridge – Grand Avenue	LL	100s of Thousands	Fire / Flood
Bridge – Jericho Road	LL	100s of Thousands	Fire / Flood
Connecting Channel (Grand Lake)			Flood / Levee Failure /



Grand Lake Lodge	HCNA	100s of Thousands	Fire
Kaufmen House	HCNA	100s of Thousands	Fire
Rapids Lodge	HCNA	100s of Thousands	Fire / Flood
Grand County EMS**			

The Town also needs to further evaluate the seasonal workforce to better understand their impact on the community and what needs to be done to protect them.

## Vulnerability by Hazard

This section examines those existing and future structures and other assets at risk to hazards ranked of moderate or high significance that vary from the risks facing the entire planning area and estimates potential losses. These hazards include drought, flood, wildfire, and severe winter weather.

### Drought

Vulnerability to drought can be difficult to quantify by jurisdiction due to the widespread nature of the hazard. Drought in the summer increases problems with dust and erosion and can cause deterioration in water quality. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding. It also increases the wildfire hazard. Drought impacts increase with the length of a drought, as carry-over supplies in reservoirs are depleted and water levels in groundwater basins decline. A portion of Grand County relies on individual ground wells and constructed water retention structures for their water resources. Ground wells service a significant portion of the population, while local ranchers rely upon ponds and ditches for livestock and crops.

The County does not own rights to most of the water in its borders, and much of the water is allocated elsewhere. Wastewater treatment plants are also dependent on streamflows; if streamflows are inadequate, this can become a public health and sanitation concern. The incidence of blue algae increases during periods of extreme heat, which often accompanies drought, and zebra mussels are also a potential issue. Trans-mountain water diversions may increase in times of drought, exacerbating conditions in the three-lakes region.

### Flood

The Town of Grand Lake has flood hazard mapping along Little Columbine Creek, which drains into the Shadow Mountain Reservoir, and along the North Inlet, which drains into Grand Lake. Localized storm water flooding can also cause minor problems.

## Existing Development

The effective DFIRM for Grand Lake, dated January 2, 2008, was the best available flood hazard 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 the points were based on the assessor's data and summed for the unincorporated county and for the municipalities. Property exposure located in flood hazard zones by land use type is shown in Table D.6. Flood zones A and AE are variations of the 1% annual chance event. The "Shaded Zone X" represents the 0.2% annual chance hazard zone on the DFIRM. Building and estimated content values were totaled. The Town's A Zone has an exposure value of over \$4.1 million. To estimate losses a 25% loss factor was applied to the total exposure, based on FEMA depth damage functions associated with a two foot deep flood. Flood loss from the 1% annual chance event based on this assessment would be in the magnitude of \$1 million.

Flooded structures for the DFIRM flood zones are depicted in Figure D.2. More information on the methodology used for this loss estimation can be found in Section 3.3 Vulnerability Assessment.

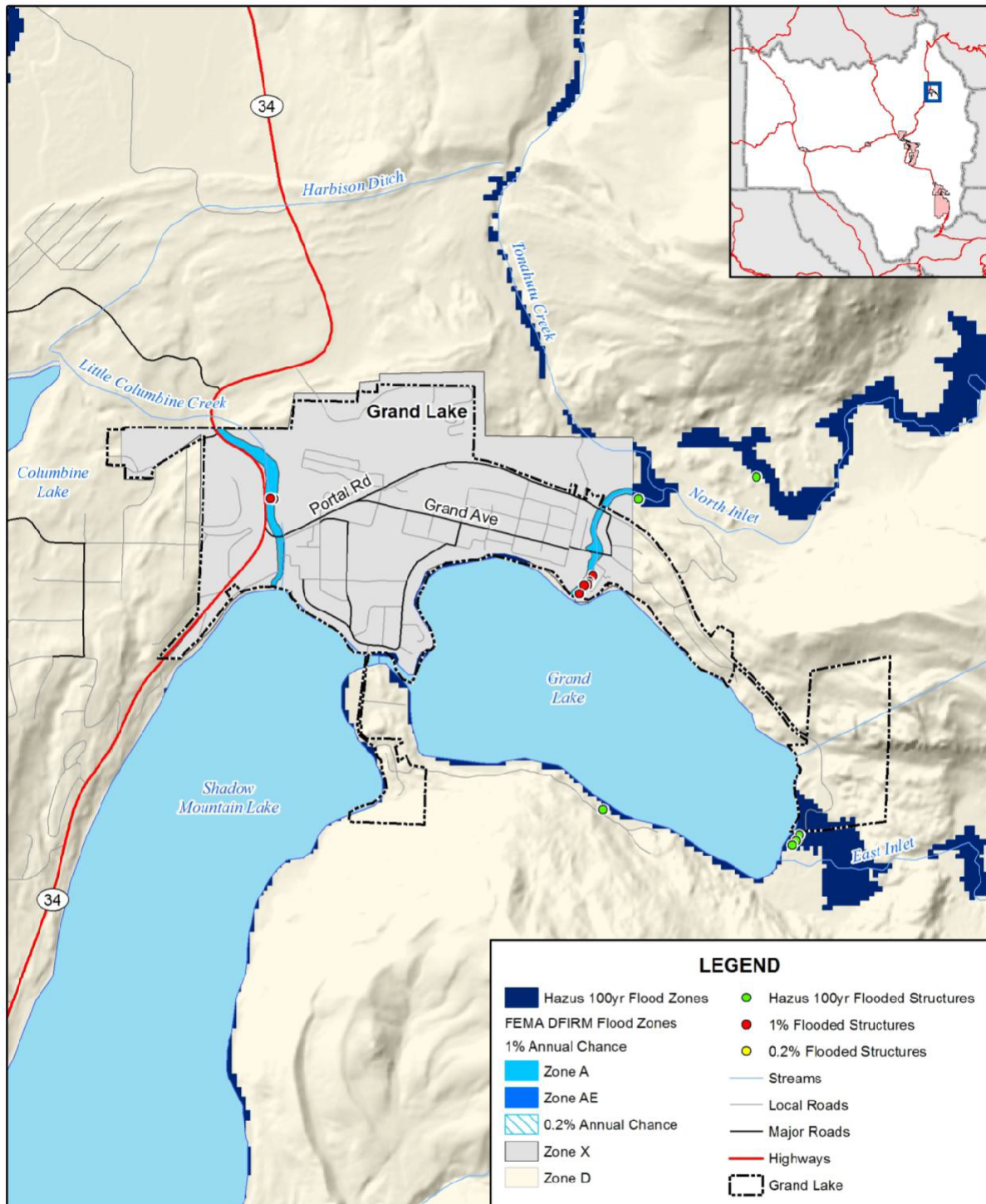
There is one critical facility, a bridge on Grand Avenue, located in the floodplain in Grand Lake.

**Table D.6. Grand Lake—Flood Risk by Flood Zone and Property Type**

Land Use	Total Parcel Count	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Loss Estimate
<b>Zone A</b>						
Commercial Improved	2	1	\$183,330	\$183,330	\$366,660	\$91,665
Residential Improved	10	10	\$2,553,840	\$1,276,920	\$3,830,760	\$957,690
Residential Vacant	2	0	\$0	\$0	\$0	\$0
Unknown	4	0	\$0	\$0	\$0	\$0
Vacant Land	1	0	\$0	\$0	\$0	\$0
<b>Total</b>	<b>19</b>	<b>11</b>	<b>\$2,737,170</b>	<b>\$1,460,250</b>	<b>\$4,197,420</b>	<b>\$1,049,355</b>

Source: AMEC analysis of DFIRM

**Figure D.2. DFIRM Flood Zones and Floodprone Properties in Grand Lake**



0 0.5 1 Miles



Map compiled 4/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT, Hazus-MH MR2,  
 FEMA DIFRM 1/2/2008

### **National Flood Insurance Program**

Grand Lake joined the National Flood Insurance Program (NFIP) on January 1, 1986. NFIP insurance data indicates that as of March 25, 2013, there were 10 flood insurance policies in force in Grand Lake with \$2,818,400 of coverage. Three of the policies are in Grand Lake’s A zone, and seven are located outside of the Special Flood Hazard Area.

There have been no historical claims for flood losses in Grand Lake. There were no repetitive or severe repetitive loss structures. NFIP was contacted twice during the 2020 Plan update with no response received.

### **Future Development**

Grand Lake addresses floodplain management policies in its Municipal Code (see Regulatory Capabilities section below). These policies are consistent with flood management policies of the NFIP.

### **Wildfire**

#### **Existing Development**

The Grand County CWPP (2006) evaluated the wildfire hazards to each of the incorporated and unincorporated towns in the County. Grand Lake received a hazard rating of very high. Grand Lake is also covered by Grand Lake Fire Protection District’s CWPP. Refer to pages 3.121-3.122 in Chapter 3 for further details on the Grand Lake Fire Protection District CWPP.

Based on the methodology described for wildfire in Section 3.3.3 Vulnerability by Hazard, the property values in Grand Lake were aggregated by wildfire threat zones. The breakdown of property values in Grand Lake by wildfire threat zone is shown in Table D.7. The majority of risk to wildfire is to residential structures, but some commercial areas are at risk as well. The Colorado State Forest Service in partnership with the Town and local residents have done or planned several forest health treatments in and around Grand Lake. These areas are depicted on the map in Figure D.3. See Figure H.6 in *Annex H Fire Protection Districts* for a map of wildfire intensity in the Grand Lake area.

**Table D.7. Grand Lake—Property Values in Wildfire Threat Zones**

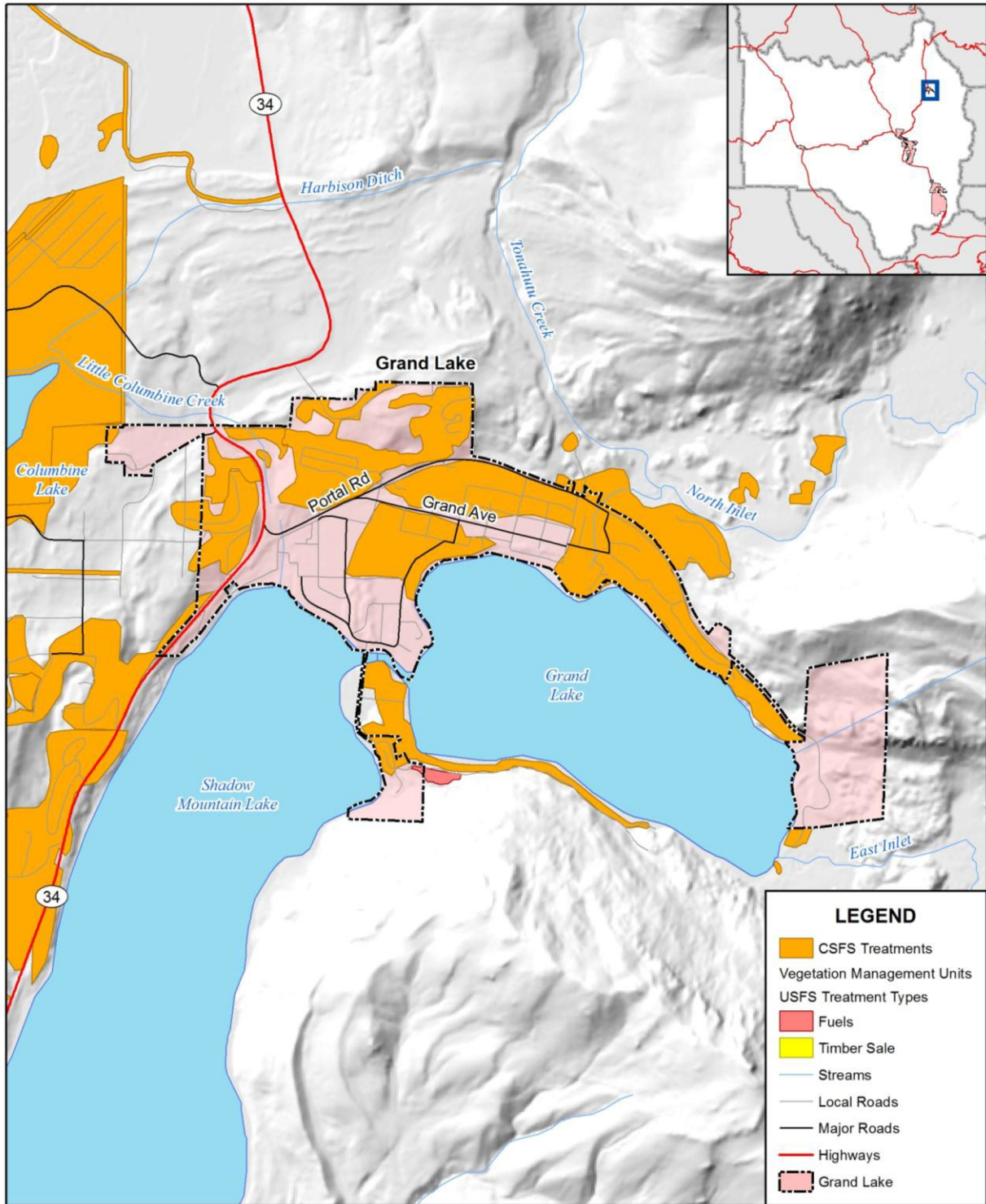
Threat Zone	Land Use	Improved Parcel Count	Land Value	Improved Value	Estimated Content Value	Total Value
Moderate	Commercial Improved	52	\$8,824,750	\$12,038,240	\$12,038,240	\$24,076,480
	Commercial Vacant	0	\$707,550	\$0	\$0	\$0
	Mixed Use	7	\$2,219,570	\$1,413,890	\$1,413,890	\$2,827,780
	Residential Improved	231	\$41,755,410	\$72,792,010	\$36,396,005	\$109,188,015
	Residential Vacant	4	\$3,973,060	\$143,520	\$71,760	\$215,280
	Tax Exempt	4	\$1,521,000	\$1,194,500	\$1,194,500	\$2,389,000

Threat Zone	Land Use	Improved Parcel Count	Land Value	Improved Value	Estimated Content Value	Total Value
	Unknown	13	\$429,100	\$1,191,570	\$1,191,570	\$2,383,140
	Vacant Land	0	\$8,150	\$0	\$0	\$0
	<b>Total</b>	<b>311</b>	<b>\$59,438,590</b>	<b>\$88,773,730</b>	<b>\$52,305,965</b>	<b>\$141,079,695</b>
<b>High</b>	Agricultural	0	\$670	\$0	\$0	\$0
	Commercial Improved	30	\$5,474,510	\$9,521,730	\$9,521,730	\$19,043,460
	Commercial Vacant	0	\$439,330	\$0	\$0	\$0
	Mixed Use	2	\$282,150	\$1,056,260	\$1,056,260	\$2,112,520
	Residential Improved	533	\$55,877,200	\$114,538,200	\$57,269,100	\$171,807,300
	Residential Vacant	3	\$13,970,460	\$274,150	\$137,075	\$411,225
	Tax Exempt	3	\$706,170	\$1,272,160	\$1,272,160	\$2,544,320
	Unknown	2	\$49,970	\$106,310	\$106,310	\$212,620
	Vacant Land	0	\$140,520	\$0	\$0	\$0
	<b>Total</b>	<b>573</b>	<b>\$76,940,980</b>	<b>\$126,768,810</b>	<b>\$69,362,635</b>	<b>\$196,131,445</b>
<b>Grand Total</b>		<b>884</b>	<b>\$136,379,570</b>	<b>\$215,542,540</b>	<b>\$121,668,600</b>	<b>\$337,211,140</b>

Source: AMEC analysis with SILVIS data

Two critical facilities were identified in low and high-moderate wildfire zones in Grand Lake. A bridge on Grand Avenue is located in the high fire intensity zone, and the Grand Lake Lodge is located in the lowest fire intensity zone.

Figure D.3. Wildfire Treatment Areas in Grand Lake



0 0.45 0.9 Miles



Map compiled 8/2013; intended for planning purposes only.  
Data Source: Grand County, CDOT, CSFS, USFS (2013)

The Grand Lake Fire Protection District, which provides fire protection services to Grand Lake and surrounding area, is considered an initial attack center for wildland fires on all private land and takes a joint responsibility with the U.S. Forest Service for fires on federal land.

### **Future Development**

The Grand Lake Municipal Code requires that development meet fire mitigation standards before it can be approved for occupancy. Grand Lake FPD also enforces the International Fire Code. All new buildings in the District’s service area are required to adhere to the International Fire Code. Grand Lake FPD also reviews all plats, construction plans, and site plans against the District’s Standards. These standards are designed to help protect life safety and property from wildfire.

### **Severe Winter Weather**

In the alpine environment of Grand County, severe winter weather occurs several times every season. This hazard has been critical in its magnitude and severity in the past, most recently during the event in December 2007. Vulnerability is high along roadways and mountain passes, particularly on Highway 40 and Highway 9, where severe winter weather conditions may cause traffic related deaths and injuries and increase avalanche risk. Road closures due to winter weather conditions also restrict or prevent the movement of people and goods and services (including food and gas), which can be crippling during the high tourism season and create the need for emergency sheltering for travelers. The County is more vulnerable to the impacts of natural hazards during the winter months due to the increased volume of people living, working, and visiting here. Winter access to Grand Lake is limited to US Highway 34 since Trail Ridge Road through Rocky Mountain National Park is closed from October through May.

### **Growth and Development Trends**

Table D.8 illustrates how Grand Lake has grown in terms of population and number of housing units between 2000 and 2011.

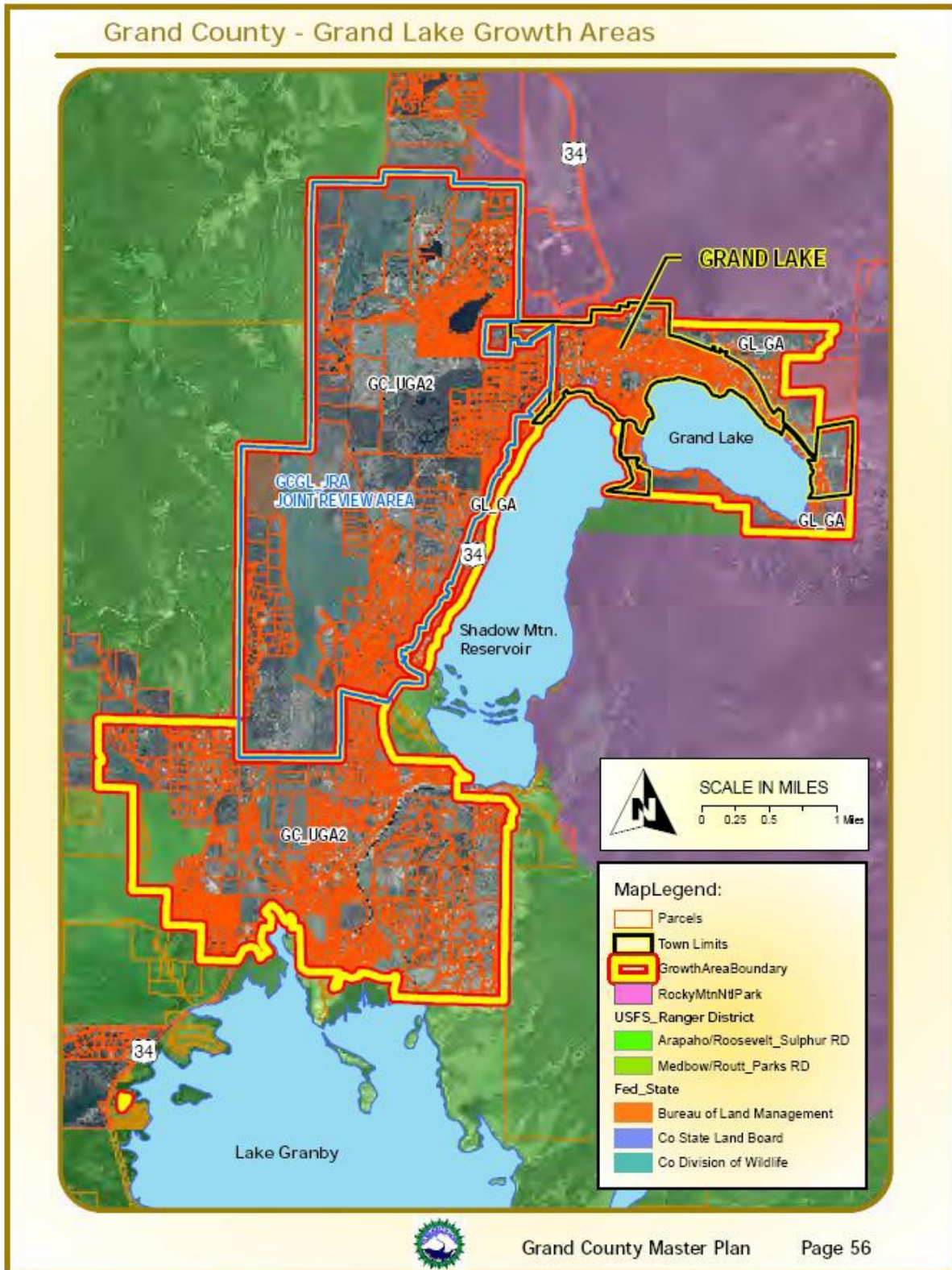
**Table D.8. Grand Lake—Change in Population and Housing Units, 2000-2011**

<b>2000 Population</b>	<b>2011 Population Estimate</b>	<b>Estimated Percent Change 2000-2011</b>	<b>2000 # of Housing Units</b>	<b>2011 Estimated # of Housing Units</b>	<b>Estimated Percent Change 2000-2011</b>
447	357	-20.1	748	1,096	+46.5

Source: ACS 2011 and US Census 2000, factfinder2.census.gov

The Town of Grand Lake has several development concerns related to hazards including steeper slopes, increased fire danger, lake-side and stream erosion, and infill of lakes. Second homeowners in the Town have limited supplies and limited communications capabilities. Access and egress in Grand Lake is also limited with only one highway, U.S. 34, out of the area. Figure D.4 depicts Grand Lake’s current town limits and the growth area boundary, as shown in the 2011 Grand County Master Plan.

Figure D.4. Grand Lake Growth Areas





## D.4 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. The capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

### Regulatory Mitigation Capabilities

Table D.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 Grand Lake.

**Table D.9. Grand Lake—Regulatory Mitigation Capabilities**

Regulatory Tool (Ordinances, Codes, Plans)	Yes/No	Comments
General or Comprehensive plan	Yes	Does not contain mitigation plan
Zoning ordinance	Yes	Tree Mitigation (Chap. 13)
Subdivision ordinance	Yes	
Growth management ordinance	No	
Floodplain ordinance	Yes	Flood Damage Prevention (Chap. 12)
Other special purpose ordinance (stormwater, steep slope, wildfire)	No	
Building code	Yes	Building Code (Chap. 9)
Fire department ISO rating	No	Rely on Grand Lake FPD
Erosion or sediment control program	Yes	Municipal Code
Stormwater management program	No	Rely on CDPS
Site plan review requirements	Yes	
Capital improvements plan	No	Limited planning through budget
Economic development plan	No	Limited planning in 2011 report and recent community engagement efforts
Local emergency operations plan	No	Rely on Grand Lake FPD
Other special plans	No	
Flood insurance study or other engineering study for streams	Yes	NFIP compliant
Elevation certificates (for floodplain development)	Yes	Administered by town staff
Other	No	

### Grand Lake Municipal Code

#### *Chapter 9 Building Regulations*

- 9-1-2 Adoption of Primary Codes: lists the codes adopted in Grand Lake

- 9-2-9 Erosion and Sedimentation Control: The applicant conducting the grading activity shall install and maintain temporary and/or permanent erosion and sedimentation control measures as required by the Town.

**Chapter 12, Article 5 Flood Damage Prevention**

Establishes methods of reducing flood losses  
 Names Town Manager as the floodplain administrator, and establishes floodplain administrator duties

**Chapter 13 Urban Forestry Management**

- 13-1-5 Fire Mitigation Regulations: Public Nuisance – The spread of the mountain pine beetle has posed an immediate threat to the pine trees located within the Town. Trees infested with the mountain pine beetle, as well as trees that have died or are in the process of dying as the result of such infestation, and trees that have died of other causes increase the risk of uncontrolled fires within the Town. In order to contain the spread of the mountain pine beetle, to reduce the risk of uncontrolled fires, and to protect the health, safety, and welfare of the inhabitants of the Town, the Board of Trustees does hereby declare pine trees infected with the mountain pine beetle, as well as pine trees that have died or are in the process of dying as a result of such infestation, and other dead trees a public nuisance to be abated by the owner of the land on which such trees are found, or if not so abated, to be destroyed by the Town.

**Administrative/Technical Mitigation Capabilities**

Table D.10 identifies the personnel responsible for activities related to mitigation and loss prevention in Grand Lake.

**Table D.10. Grand Lake—Administrative and Technical Mitigation Capabilities**

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Yes	Town Manager/Town Planner	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Town Manager/Town Planner	
Planner/engineer/scientist with an understanding of natural hazards	Yes	Town Planner	
Personnel skilled in GIS	Yes	Town Planner	
Full time building official	No	Rely on Grand County Building Dept.	As needed
Floodplain manager	Yes	Town Manager	
Emergency manager	No	Rely on Grand County resources	

Grant writer	Yes	Town Manager/Town Planner	Limited Experience
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Personnel Resources	Yes/No	Department/Position	Comments
Other personnel	Yes	Water Supervisor Public Works Director	
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Yes	Town Planner	Limited Data
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	No	Rely on Grand County resources	
Other	Yes	Public Works	On Call

## Fiscal Mitigation Capabilities

Table D.11 identifies financial tools or resources that Grand Lake could potentially use to help fund mitigation activities. Other funding sources include general fund revenues and reserves, and water utility reserves.

**Table D.11. Grand Lake—Fiscal Mitigation Capabilities**

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Community Development Block Grants	Y	
Capital Improvements Project Funding	N	
Authority to Levy Taxes for Specific Purposes	Y	
Fees for Water, Sewer, Gas, or Electric Services	Y	
Impact Fees for New Development	N	
Incur Debt through General Obligation Bonds	Y	
Incur Debt through Special Tax Bonds	Y	
Incur Debt through Private Activities	N	
Withhold Spending in Hazard Prone Areas	Y	

## Mitigation Outreach and Partnerships

The Town is covered by the Grand Lake FPD CWPP

The Town of Grand Lake holds fire mitigation meetings headed by the Grand Lake FPD and USFS with the community.

## Past Mitigation Efforts

- Several mitigation projects were identified in the Grand Lake CWPP.

## D.5 Mitigation Goals and Objectives

Grand Lake had adopted the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 4 Mitigation Strategy.

## D.6 Mitigation Actions

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The planning team for Grand Lake identified and prioritized the following mitigation actions based on the risk assessment. Background information on how each action will be implemented and administered, such as ideas for implementation, responsible agency, potential funding, estimated cost, and timeline also are included.

### Continued Compliance with the NFIP

Grand Lake will continue participation in and compliance with the National Flood Insurance Program. Specific activities that the Town will undertake to continue compliance include the following:

- Working with FEMA and the Colorado Water Conservation Board in the review and adoption of new digital flood insurance rate maps (DFIRMs) as part of the map modernization (now RiskMAP) program
- Periodically reviewing the flood damage prevention ordinance and identifying opportunities to strengthen requirements and enforcement. *The Town is in the process of reviewing and updating their ordinance to be compliant with the update State Floodplain Rule (required by January 2014).*
- Promote and disperse information on the benefits of flood insurance, with assistance from partners such as the Colorado Water Conservation Board.
- Continuing strong enforcement of the floodplain ordinance and working with developers and property owners to understand the program

## Mitigation Action: Grand Lake 2015-1 Grand Lake Fire Protection District CWPP Implementation Support and Outreach

<b>Jurisdiction:</b>	Town of Grand Lake
<b>Hazard Addressed</b>	Wildfire
<b>Project Description, Issue &amp; Background</b>	The Town of Grand Lake will support Grand Lake Fire Protection District in obtaining final approval of the CWPP at the state level. This will include a cooperative effort for public outreach and education to promote and raise awareness of the CWPP and its associated wildfire mitigation projects. Outreach efforts may include attending meetings, distributing information to the public, etc.
<b>Lead Agency and Title of Lead Person</b>	Grand Lake Fire Protection District, Town of Grand Lake (joint effort)
<b>Partners:</b>	Property owners
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Staff time
<b>Benefits: (Losses Avoided)</b>	Improve public awareness of wildfire risk and mitigation efforts in Grand Lake area; reduce wildfire risk to life and property
<b>Potential Funding:</b>	CSFS
<b>Timeline:</b>	Ongoing
<b>Status:</b>	Ongoing

## Mitigation Action: Grand Lake Fire PD 2020-1 Grand Lake Fire Protection District CWPP Implementation Support and Outreach

<b>Jurisdiction:</b>	Grand Lake Fire Protection District
<b>Hazard Addressed</b>	Wildfire, Source Water Contamination, Flooding
<b>Project Description, Issue &amp; Background</b>	Wildfires remove all natural foliage securing the surface products and duff which are then susceptible to mild rainfall events, causing significant runoff and flooding.
<b>Lead Agency and Title of Lead Person</b>	GLFPD
<b>Partners:</b>	Water agencies, DNR, USFS, BLM
<b>Priority:</b>	High
<b>Cost Estimate:</b>	\$250,000.00
<b>Benefits: (Losses Avoided)</b>	By implementing a green space buffer around each water source, also a mitigated fire break between the buffer and contiguous fuels, there would be a reduction in source water contamination and flooding.
<b>Potential Funding:</b>	End user water consumer fee, Federal, Water agencies, Wildfire Council.
<b>Timeline:</b>	5-10 years, depending on the scope.
<b>Status:</b>	New in 2020.

# ANNEX E: TOWN OF HOT SULPHUR SPRINGS

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## E.1 Community Profile

### Geography

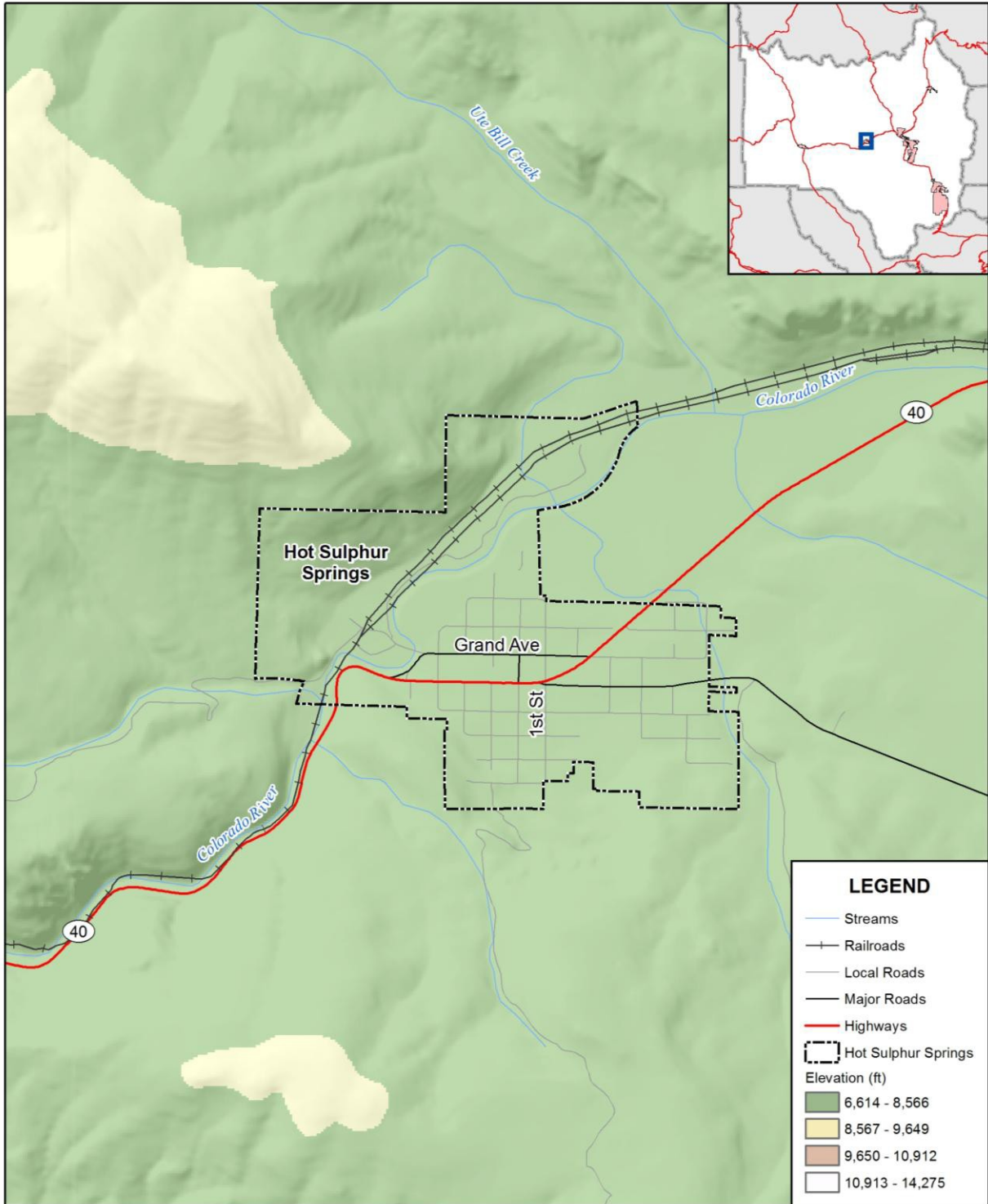
Hot Sulphur Springs is the county seat of Grand County. The Town lies at an elevation of 7,680 feet. According to the U.S. Census Bureau, the Town has a total area of 0.8 square miles, all of it land. The Hot Sulphur Springs Resort and Spa is located in the Town. The natural hot springs are heated from geothermal activity.

The Hot Sulphur Springs/Parshall FPD (HSSPPFD) CWPP included climate data recorded at the Williams Fork Dam. Based on over 37 years of records (1982-2009) recorded at a weather station at the Williams Fork Dam, which is located southwest of Parshall, the annual average day time temperature is 57.3° F. The average temperature range during that period of time varies from a high of 79.3° F in July to an average minimum temperature of -2.1° F in January. Average annual precipitation is 14.6 inches. The wettest month is July, which receives on average 1.76 inches of precipitation, and the driest month is December, which averages less than an inch (0.8”). The area in the vicinity of Williams Fork Dam receives 74 inches of snow a year, on average.

Figure E.1 shows a map of the Town of Hot Sulphur Springs and its location within Grand County.



Figure E.1. Map of Hot Sulphur Springs



Map compiled 4/2013; intended for planning purposes only.  
Data Source: Grand County, CDOT



## Population

The permanent population is the number of people who reside in the town on a year-round basis and was estimated at 733 in 2019.

## History

Hot Sulphur Springs was originally a summer campground for Native Americans who came for the hot springs. When Grand County was formed, it was the first county seat from 1874 to 1882, after which it moved to Grand Lake. The county seat returned to Hot Sulphur Springs in 1888 and has remained there since. The Town was established in 1860, making it the oldest town in the County. It was originally named Saratoga West and sometimes called Warm Springs. In 1863, the name was changed to reflect the local hot springs that were used for medicinal purposes. The town site was bought by William Newton Byers, founder of the Rocky Mountain News, in 1864. He wished to make it a spa and resort. He surveyed, platted, and named the streets. The Town was incorporated on April 1, 1903.

## Economy

According to the ACS 2011 estimates, the industries that employed the highest percentage of Hot Sulphur Springs's labor force were retail trade (21.8%); construction (17.5%); public administration (11.6%); and finance, insurance, real estate, and rental and leasing (10.7%).

## E.2 Hazard Identification and Profiles

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Hot Sulphur Springs's planning team identified the hazards that affect the community and summarized their geographic location, probability of future occurrence, potential magnitude or severity, and planning significance specific to the Town (see Table E.3). In the context of the countywide planning area, there are no hazards that are unique to Hot Sulphur Springs.

**Table E.3. Hot Sulphur Springs—Hazard Summary**

<b>Hazard Type</b>	<b>Geographic Location*</b>	<b>Probability*</b>	<b>Magnitude*</b>	<b>Hazard Rating</b>
Avalanche	Isolated	Likely	Limited	Low
Dam Failure	Medium	Occasional	Critical	Medium
Disease Outbreak	Large	Likely	Variable	High
Drought	Large	Highly likely	Critical	Medium
Earthquake	Isolated	Occasional	Limited/ Negligible	Low
Flood	Medium	Occasional/ Likely	Critical	Medium
Hazardous Materials (Transportation)	Isolated	Likely	Limited	Low
Landslide, Mudflow/Debris Flow, and Rockfall	Isolated	Likely	Limited	Medium
Lightning	Isolated	Occasional	Limited	Low
Mountain Pine Beetle Infestation	Large	Occasional	Limited	Medium
Severe Winter Weather	Large	Highly likely	Critical	High
Wildfire	Large	Highly likely	Catastrophic	High
Wildlife-Vehicle Collisions	Isolated	Highly Likely	Negligible	Medium
Windstorm	Large	Likely	Limited	Low

\*See Section 3.2 for definitions of these factors

Information on past events for each hazard can be found in Section 3.2 Hazard Profiles in the body of this document.

## E.3 Vulnerability Assessment

The intent of this section is to assess Hot Sulphur Springs’s vulnerability separately from that of the planning area as a whole, which has already been addressed in Section 3.3 Vulnerability Assessment. The following vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of moderate or high significance that may vary from other parts of the planning area. For more information about how hazards affect the County as a whole, see Chapter 3 Risk Assessment.

### Community Asset Inventory

According to the 2019 Report to the Governor (of Colorado), Hot Sulphur Springs’ assessed value was listed as \$9,474,770 with total revenue listed as \$113,224.

Table E.5 lists critical facilities and other community assets identified by Hot Sulphur Springs’s planning team as extremely important to protect in the event of a disaster.

**Table E.5. Hot Sulphur Springs—Critical Facilities and Other Community Assets**

Name of Asset	Type*	Replacement Value (\$)	Hazard Specific Info/Comments
Grand County Sheriff’s Dept.	LS	\$8,900,000	
Hot Sulphur Springs Fire Dept.	LS	\$1,000,000	
Hot Sulphur Springs Water Plant	LL	\$2,200,000	
Hot Sulphur Springs Water Storage Tanks	LL	\$500,000	
Grand County Administrative Blvd.	EF	\$11,500,000	
Grand County Judicial Center	EF	\$9,500,000	
Grand County Public & Home Health Offices	EF	\$355,000	
Grand County Rural Health Non-Profit	EF	\$334,000	
Grand County Public Health Nurse Office	EF	\$240,000	
Heart of the Mountains Hospice	EF	\$240,000	
Grand County Dept. of Social Services	EF	\$389,000	
Mountain Family Center	EF	\$238,000	
Hot Sulphur Springs Town Hall**			
Grand County Courthouse**			

Sources: HMPC

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

\*\*Identified separately by Grand County OEM

The Town also needs to further evaluate the seasonal workforce to better understand their impact on the community and what needs to be done to protect them.

## **Vulnerability by Hazard**

This section examines those existing and future structures and other assets at risk to hazards ranked of moderate or high significance that vary from the risks facing the entire planning area and estimates potential losses. These hazards include flood, landslide, wildfire, and winter storms.

### **Flood**

The Town of Hot Sulphur Springs has flood hazard mapping for the Colorado River. Specific flood concerns exist for the Town's water treatment plant. Localized storm water flooding can also cause minor problems.

#### ***Existing Development***

The effective DFIRM for Hot Sulphur Springs, dated January 2, 2008, was the best available flood hazard 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 the points were based on the assessor's data and summed for the unincorporated county and for the municipalities.

Property exposure located in flood hazard zones by land use type is shown in Table E.6. Flood zones A and AE are variations of the 1% annual chance event. The "Shaded Zone X" represents the 0.2% annual chance hazard zone on the DFIRM. Building and estimated content values were totaled. The Town's A Zone has an exposure value of over \$526,000. To estimate losses a 25% loss factor was applied to the total exposure, based on FEMA depth damage functions associated with a two foot deep flood. Flood loss from the 1% annual chance event based on this assessment would be approximately \$131,000. Flooded structures for the DFIRM flood zones are depicted in Figure E.2. More information on the methodology used for this loss estimation can be found in Section 3.3 Vulnerability Assessment.

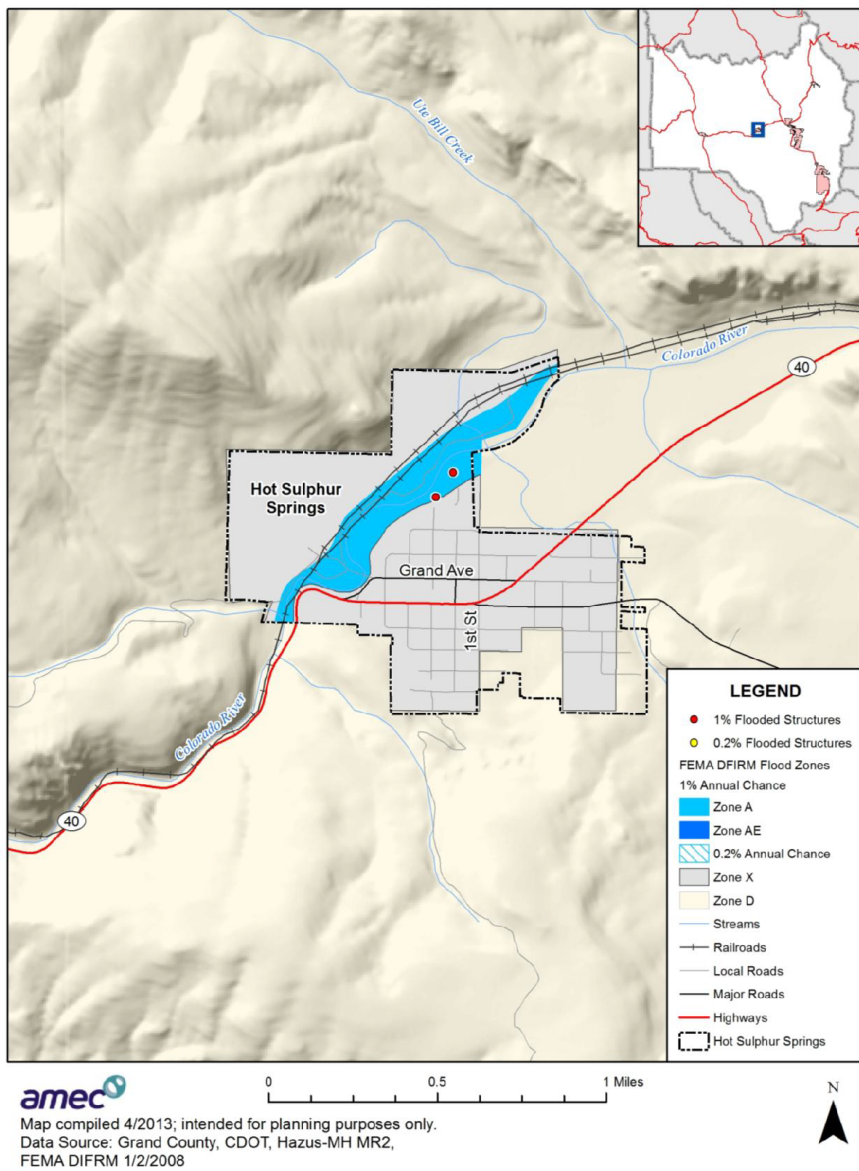
There are no critical facilities located in the floodplain in Hot Sulphur Springs.

**Table E.6. Hot Sulphur Springs—Flood Risk by Flood Zone and Property Type**

Land Use	Total Parcel Count	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Loss Estimate
<b>Zone A</b>						
Residential Improved	2	2	\$351,090	\$175,545	\$526,635	\$131,659
Tax Exempt	1	0	\$0	\$0	\$0	\$0
Unknown	5	0	\$0	\$0	\$0	\$0
<b>Total</b>	<b>8</b>	<b>2</b>	<b>\$351,090</b>	<b>\$175,545</b>	<b>\$526,635</b>	<b>\$131,659</b>

Source: AMEC analysis of DFIRM

**Figure E.2. DFIRM Flood Zones and Flood-prone Properties in Hot Sulphur Springs**



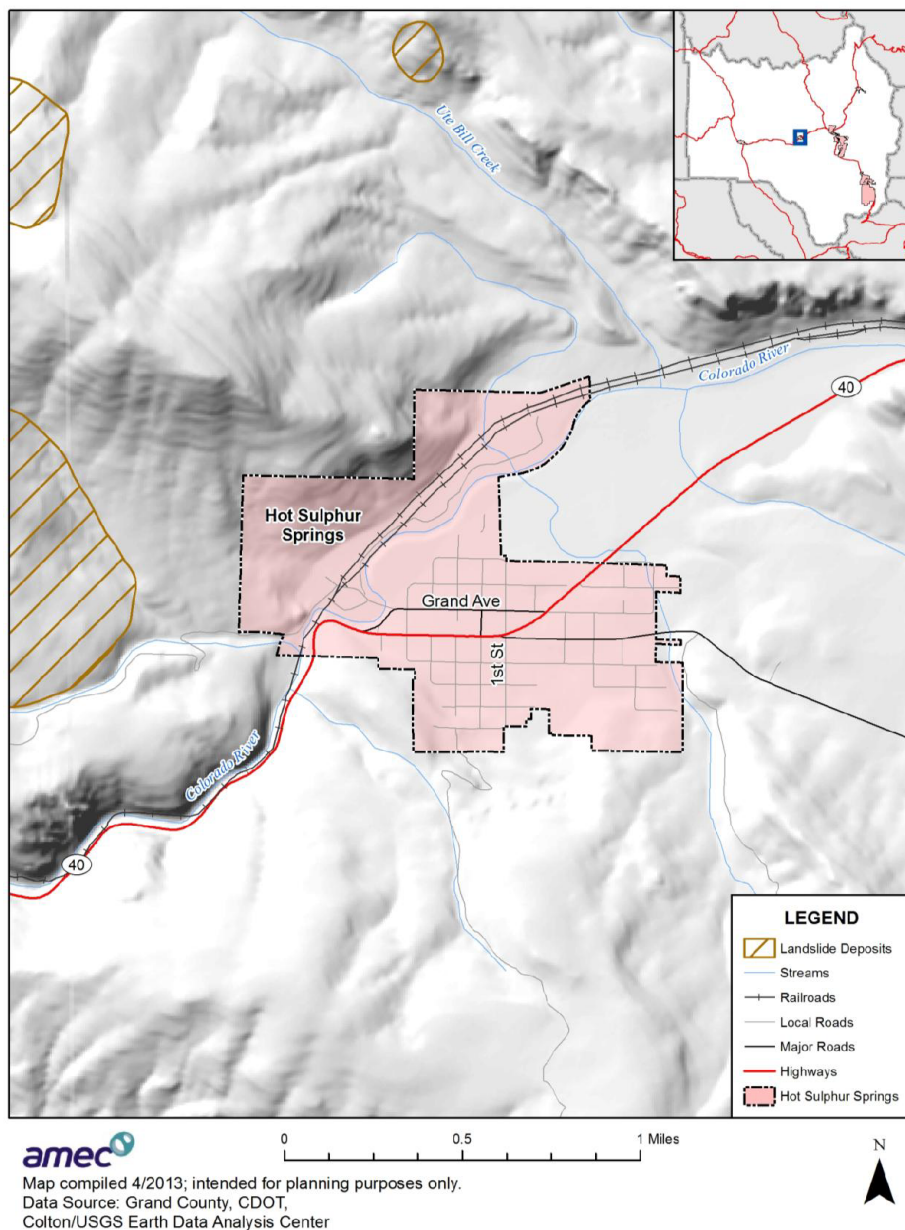
### Future Development

The Town of Hot Sulphur Springs addresses floodplain management policies in its Municipal Code, but does not participate in the NFIP.

### Landslide, Mud Flow/Debris Flow, Rock Fall

Possible landslide areas are identified on steep slopes with unstable soil conditions. No landslide deposits were identified in Hot Sulphur Springs, though there are deposits to the west and north of the Town. Figure E.3 depicts the location of landslide deposits near Hot Sulphur Springs.

Figure E.3. Landslide Areas in Hot Sulphur Springs



### ***Future Development***

The severity of landslide problems is directly related to the extent of human activity in hazard areas. Adverse effects can be mitigated by early recognition and avoiding incompatible land uses in these areas or by corrective engineering. The mountainous topography of the County presents considerable constraints to development, most commonly in the form of steep sloped areas. These areas are vulnerable to disturbance and can become unstable.

### **Wildfire**

#### ***Existing Development***

The Grand County CWPP (2006) evaluated the wildfire hazards to each of the incorporated and unincorporated towns in the County. Hot Sulphur Springs received a hazard rating of low to medium, and is also covered by the HSSPPFD CWPP. Refer to pages 3.120-3.121 in Chapter 3 for further details on the HSSPPFD CWPP.

Based on the methodology described for wildfire in Section 3.3.3 Vulnerability by Hazard using the SILVIS threat zones, the property values in Hot Sulphur Springs were aggregated by wildfire threat zones. The breakdown of property values in Hot Sulphur Springs by wildfire threat zone is shown in Table E.7. The majority of risk to wildfire is to residential structures, but some commercial areas are at risk as well. The Colorado State Forest Service have done or planned some forest health treatments in and around Hot Sulphur Springs.

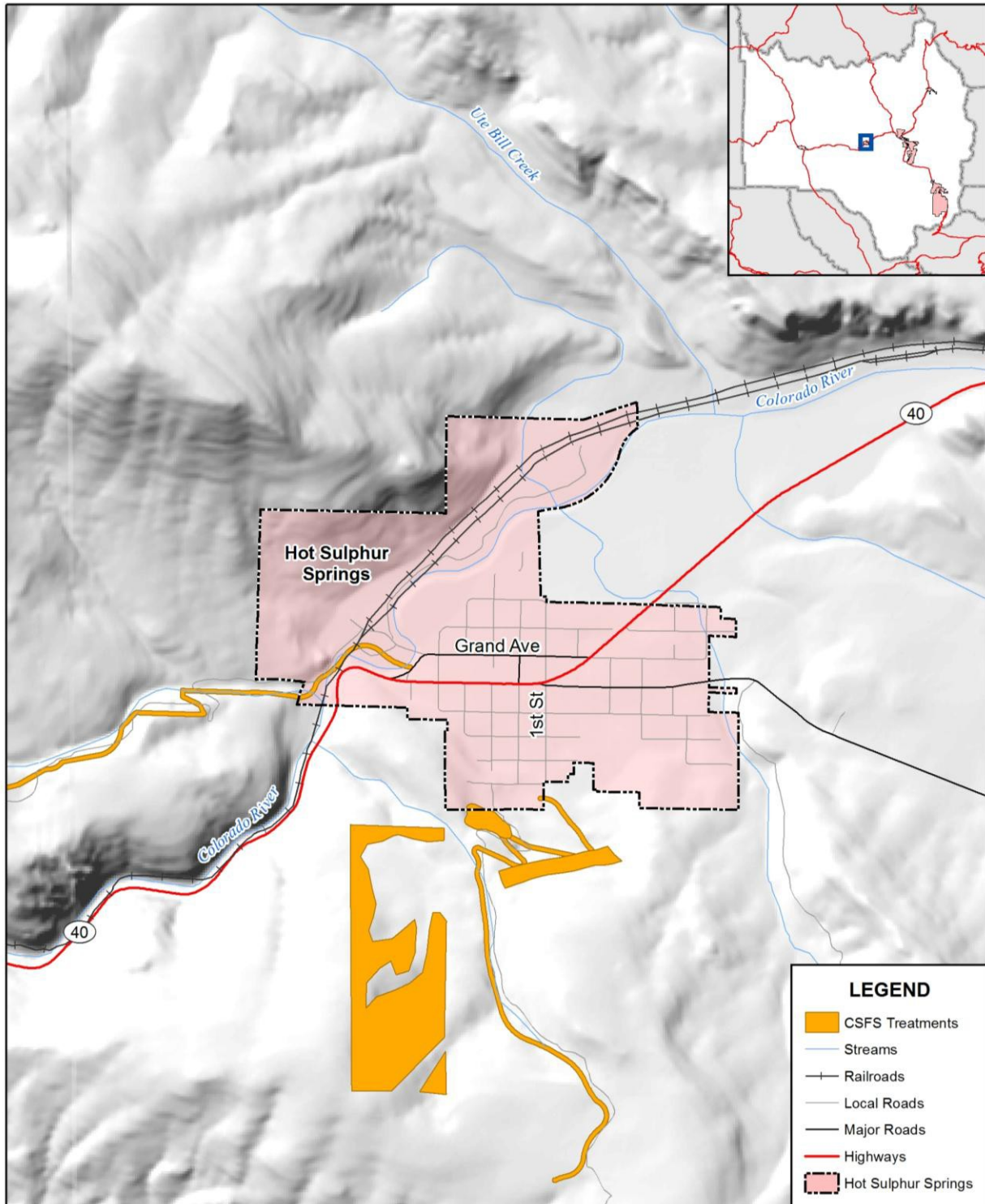
Two critical facilities were identified in the moderate fire intensity zone in Hot Sulphur Springs: the bridge on Grand Avenue and the HSSPPFD fire station. No other critical facilities were identified in wildfire intensity zones in Hot Sulphur Springs.

Wildfire intensity mapping can be referenced in the Fire Protection District annex.

For property values in wildfire threat zones, please refer to the Wildfire section in this Plan.



**Figure E.4. Wildfire Treatment Areas in Hot Sulphur Springs**



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT, CSFS, USFS (2013)

The HSSPPFD, which provides fire protection services to Hot Sulphur Springs and surrounding area, is considered an initial attack center for wildland fires on all private land and takes a joint responsibility with the U.S. Forest Service for fires on federal land.

### ***Future Development***

The Hot Sulphur Springs Town Code requires that development meet fire mitigation standards before it can be approved for occupancy. HSSPPFD enforces the International Fire Code. All buildings in the District's service area are required to adhere to the International Fire Code. HSSPPFD also reviews all plats, construction plans, and site plans against the District's Development and Review Standards. These standards are designed to help protect life safety and property from wildfire.

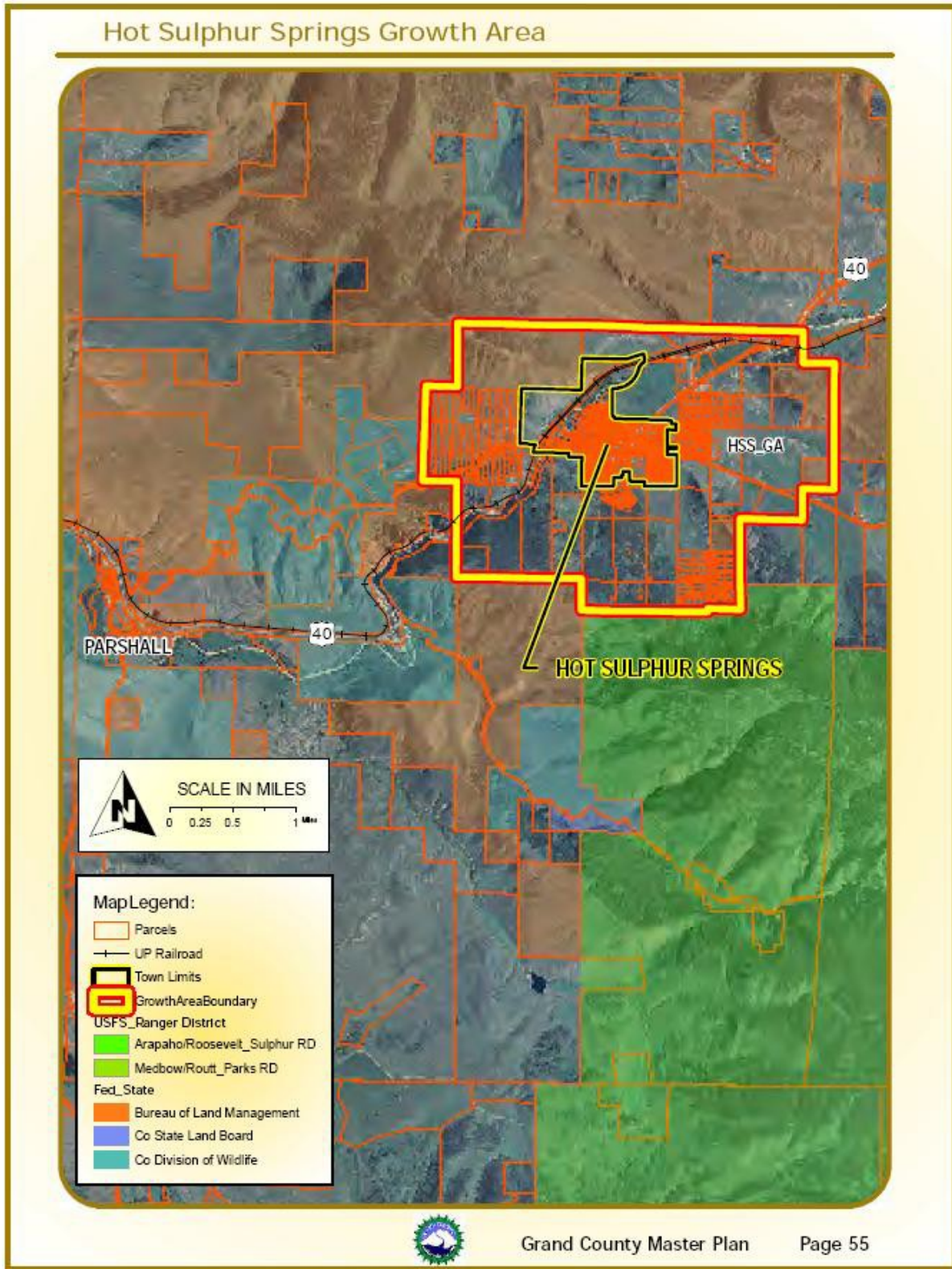
### **Severe Winter Weather**

In the alpine environment of Grand County, severe winter weather occurs several times every season. This hazard has been critical in its magnitude and severity in the past, most recently during the event in December 2007. Vulnerability is high along roadways and mountain passes, particularly on Highway 40 and Highway 9, where severe winter weather conditions may cause traffic related deaths and injuries and increase avalanche risk. Road closures due to winter weather conditions also restrict or prevent the movement of people and goods and services (including food and gas), which can be crippling during the high tourism season and create the need for emergency sheltering for travelers. The County is more vulnerable to the impacts of natural hazards during the winter months due to the increased volume of people living, working, and visiting here.

### **Growth and Development Trends**

As Hot Sulphur Springs continues to grow, more people and structures may be at risk to hazards. In 2011, the estimated number of housing units in Hot Sulphur Springs was 379. The 2014-2018 American Community 5-year survey estimates 298 total housing units.

Figure E.5. Hot Sulphur Springs Growth Areas



## E.4 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. The capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

### Regulatory Mitigation Capabilities

Table E.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 Hot Sulphur Springs. The Town of Hot Sulphur Springs has an identified Special Flood Hazard Area but does not participate in the NFIP and has been sanctioned since 11/27/1975. The community addresses floodplain management policies in its Municipal Code,

**Table E.9. Hot Sulphur Springs—Regulatory Mitigation Capabilities**

<b>Regulatory Tool (Ordinances, Codes, Plans)</b>	<b>Yes/No</b>	<b>Comments</b>
General or Comprehensive plan	Yes	
Zoning ordinance	Yes	
Subdivision ordinance	No	
Growth management ordinance	No	
Floodplain ordinance	Yes	
Other special purpose ordinance (storm water, steep slope, wildfire)	Yes	
Building code	Yes	
Fire department ISO rating	Yes	
Erosion or sediment control program	No	
Storm water management program	No	
Site plan review requirements	Yes	
Capital improvements plan	Yes	
Economic development plan	No	
Local emergency operations plan	Yes	
Other special plans	Yes	All Hazards Plan – countywide
Flood insurance study or other engineering study for streams	No	
Elevation certificates (for floodplain development)	No	
Other		

## **Administrative/Technical Mitigation Capabilities**

### **E.5 Mitigation Goals and Objectives**

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Hot Sulphur Springs had adopted the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 4 Mitigation Strategy.

### **E.6 Mitigation Actions**

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The planning team for Hot Sulphur Springs identified and prioritized the following mitigation actions based on the risk assessment. Background information on how each action will be implemented and administered, such as ideas for implementation, responsible agency, potential funding, estimated cost, and timeline also are included.

## Mitigation Action: Hot Sulphur Springs 2015-1 Develop and Implement Fuel Reduction Projects

<b>Jurisdiction:</b>	Multi-Jurisdictional, Town of Hot Sulphur Springs
<b>Hazard Addressed</b>	Wildfire
<b>Project Description, Issue &amp; Background</b>	Fuel reduction projects are needed to reduce the wildfire vulnerability in wildland urban interface areas. Specific actions have been incorporated in the countywide and local CWPPs. Examine feasibility of combining and coordinating CWPPs into one working document.
<b>Lead Agency and Title of Lead Person</b>	Grand County Wildfire Council, Schelly Olson
<b>Partners:</b>	Fire Districts, Department of Natural Resources, CSFS, USFS, CDOT,
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Variable, create a county-level position to coordinate all mitigation, education, and funding efforts
<b>Benefits: (Losses Avoided)</b>	Protect life, property, wildlife, watersheds, and infrastructure from wildfire, create and maintain healthy forests, create a Fire-Adapted Community
<b>Potential Funding:</b>	Grants, federal funding
<b>Timeline:</b>	Ongoing
<b>Status:</b>	Associated actions have been incorporated in the CWPPs, HOAs are applying for grants.

## Mitigation Action: Hot Sulphur Springs 2015-4 Street Repairs

<b>Jurisdiction:</b>	Town of Hot Sulphur Springs
<b>Hazard Addressed</b>	Multi-Hazard
<b>Project Description, Issue &amp; Background</b>	Streets in the Town of Hot Sulphur Springs have been deteriorating for some years. This presents a safety issues to pedestrians, bicyclists, and vehicles, and can impact snow removal and access for emergency response vehicles. Funding is now available to perform the necessary repair/replacement of Town roads.
<b>Lead Agency and Title of Lead Person</b>	Acord Asphalt, Inc. (rotomilling/paving), Harms & Sons (street repairs)
<b>Partners:</b>	Jack Zielinski, Town of Hot Sulphur Springs
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Acord Asphalt, Inc. - \$94,000 Harms & Sons - \$13,000
<b>Benefits: (Losses Avoided)</b>	Improve access for emergency response vehicles; snow removal; and safety for pedestrians, bicyclists, and vehicles.
<b>Potential Funding:</b>	
<b>Timeline:</b>	Ongoing
<b>Status:</b>	Ongoing

## Mitigation Action: Hot Sulphur Springs 2020-1 Major Power Outage

<b>Jurisdiction:</b>	Town of Hot Sulphur Springs
<b>Hazard Addressed</b>	Loss of drinking water throughout the town.
<b>Project Description, Issue &amp; Background</b>	The Town's water treatment plant relies on electricity to function; pumps, valves, and process control instruments all run on electricity. In the event of a major power outage, the Town has approximately 48 hours of water storage to rely on. After that, the residents would not have treated water in their homes.
<b>Lead Agency and Title of Lead Person</b>	Lucas Ackerman, Public Works Director, Town of Hot Sulphur Springs
<b>Partners:</b>	Hot Sulphur Springs Public Works, Mountain Parks Electric
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Permanent generator: \$200,000.00 Portable generator: 80,000.00 Potential source of funding: DOLA
<b>Benefits: (Losses Avoided)</b>	The loss of drinking water throughout Hot Sulphur Springs. Not having to rely on a rented generator if a power outage were to occur.
<b>Timeline:</b>	Ongoing
<b>Status:</b>	New in 2020



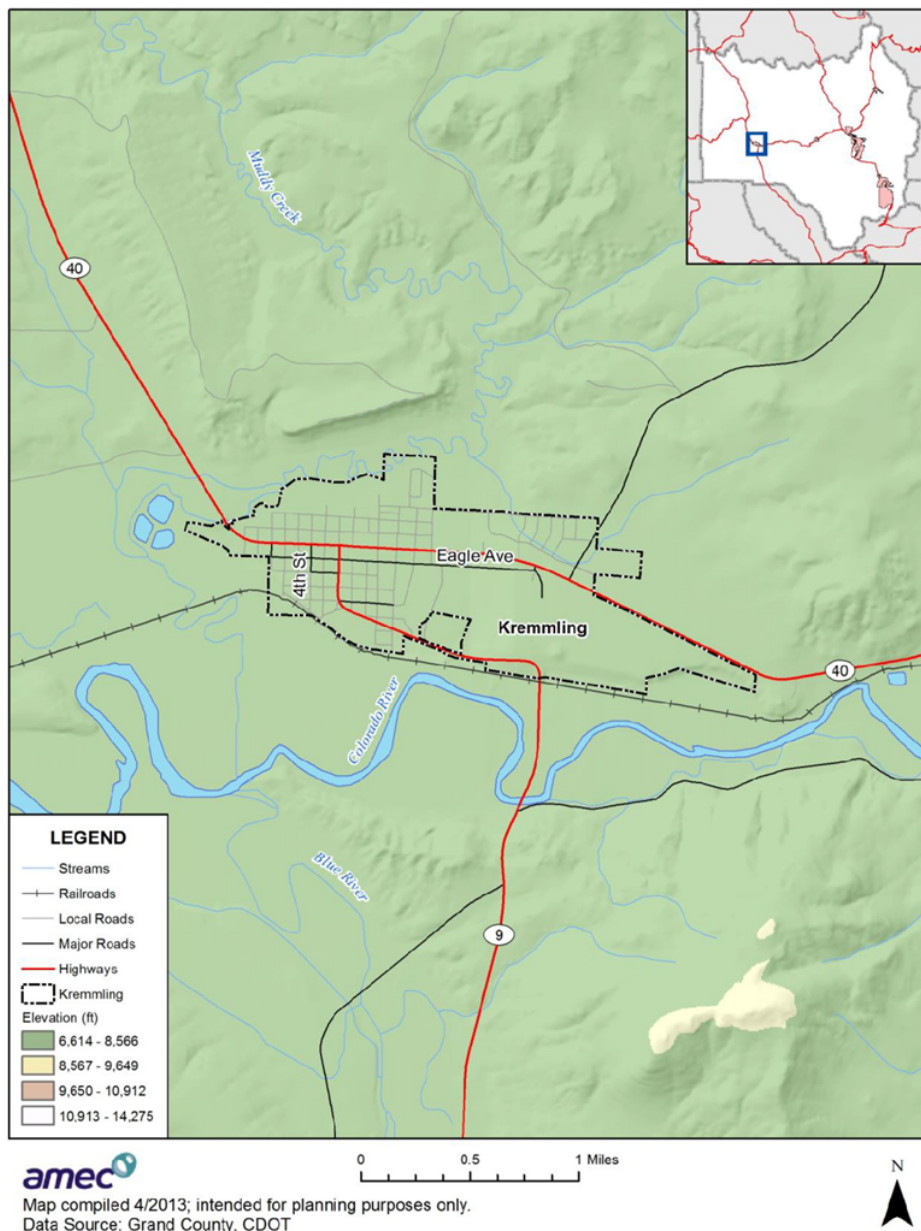
# ANNEX F: TOWN OF KREMMLING

## F.1 Community Profile

### Geography

Kremmling sits along the upper Colorado River in the lower arid section of Middle Park between Byers Canyon and Gore Canyon, at an elevation of 7,364 feet. The Town is located approximately at the mouth of both the Blue River and Muddy Creek, which descend respectively from the south and north, providing valley access to Dillon and Steamboat Springs. Figure F.1 shows a map of the Town of Kremmling and its location within Grand County.

Figure F.1. Map of Kremmling



## Population

The permanent population is the number of people who reside in the town on a year-round basis and was estimated at 1,024 in 2019.

## History

The Town was founded in 1881 during the Colorado Silver Boom days, but the lack of mineral resources in the nearby mountains made the Town grow very slowly in the early days. The area started as a general store run by Rudolph “Kare” Kremmling. His store was on the north side of Muddy Creek, but in 1881 two brothers, Aaron and John Kinsey, made part of their ranch into a town and called it Kinsey City. Kare Kremmling moved his store across the river to the new site and soon people were calling the place Kremmling. The original post office was called Kinsey City and ran from 1881 to 1885 with Kare Kremmling acting as the first Post Master. The name Kremmling was not officially recognized until 1895. After the Moffat railroad, Northwestern & Pacific arrived in 1906; Kremmling became the County’s central shipping point. It was incorporated May 14, 1904 and as the 20<sup>th</sup> century progressed, ranching became the main industry in the valley in the vicinity of the Town.

## Economy

According to the ACS 2011 estimates, the industries that employed the highest percentage of Kremmling’s labor force were retail trade (18.6%); construction (15.9%); arts, entertainment, and recreation (13.8%); educational services and healthcare (13.5%); and public administration (9.0%).

## F.2 Hazard Identification and Profiles

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Grand County’s planning team identified the hazards that affect the community and summarized their geographic location, probability of future occurrence, potential magnitude or severity, and planning significance specific to the Town (see Table F.3). In the context of the countywide planning area, there are no hazards that are unique to Kremmling, but drought, dam failure, hazardous materials and severe winter weather are the greatest concerns.

## F.3 Hazard Identification and Profiles

Kremmling’s planning team identified the hazards that affect the community and summarized their geographic location, probability of future occurrence, potential magnitude or severity, and planning significance specific to the Town (see Table F.3). In the context of the countywide planning area, there are no hazards that are unique to Kremmling, but drought, dam failure, hazardous materials and severe winter weather are the greatest concerns.

**Table F.3. Kremmling—Hazard Summary**

Hazard Type	Geographic Location*	Probability*	Magnitude*	Hazard Rating
Avalanche	Isolated	Unlikely	Negligible	Low
Dam Failure	Large	Unlikely	Catastrophic	High
Disease Outbreak	Large	Likely	Variable	High
Drought	Large	Occasional	Limited	High
Earthquake	Large	Unlikely	Limited	Medium
Flood	Isolated	Likely	Limited	Medium
Hazardous Materials (Transportation)	Large	Occasional	Critical	High
Landslide, Mudflow/Debris Flow, and Rockfall	Isolated	Unlikely	Negligible	Low
Lightning	Medium	Likely	Critical	Medium
Mountain Pine Beetle Infestation	Large	Occasional	Limited	Medium
Severe Winter Weather	Large	Highly Likely	Limited	High
Wildfire	Small	Highly Likely	Limited	Medium
Wildlife-Vehicle Collisions	Isolated	Highly Likely	Variable	High
Windstorm	Large	Occasional	Limited	Medium

\*See Section 3.2 for definitions of these factors

Information on past events for each hazard can be found in Section 3.2 Hazard Profiles in the body of this document.

## F.4 Vulnerability Assessment

The intent of this section is to assess Kremmling’s vulnerability separately from that of the planning area as a whole, which has already been addressed in Section 3.3 Vulnerability Assessment. The following vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of moderate or high significance that may vary from other parts of the planning area. For more information about how hazards affect the County as a whole, see Chapter 3 Risk Assessment.

### Community Assets

According to the 2019 Report to the Governor (of Colorado), Kremmling’s assessed value was listed as \$17,052,970 with total revenue listed as \$164,595.

Table F.5 lists critical facilities and other community assets identified by Kremmling’s planning team as extremely important to protect in the event of a disaster.

**Table F.5. Kremmling—Critical Facilities and Other Community Assets**

Name of Asset	Type*	Replacement Value (\$)	Hazard Specific Info/Comments
Water Plant	LL	\$4 million	Chlorine in storage
Water Storage Tanks	LL	\$2.5 million	
Maintenance Shop and Equipment	EF	\$3 million	Diesel fuel, acetylene tanks
Police Station	EF	\$1 million	
Fire Station	EF	\$5 million	
Wastewater Plant	EF	\$4 million	
Middle Park Hospital	EF	\$10 million	
West Grand Elementary School	EF	\$10 million	
West Grand High School	EF	\$10 million	
Airport	LL	\$30 million	Jet fuel tanks
Colorado River Pumping Station	LL	\$5 million	
Silver Spruce Senior Apartments	LL	\$5 million	
Cliff View Assisted Living	LL	\$5 million	
Grand County EMS**			
Faith in Action Christian School**			
Galloway Inc.**			

Sources: HMPC

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

\*\*Identified separately by Grand County OEM

## Vulnerability by Hazard

This section examines those existing and future structures and other assets at risk to hazards ranked of moderate or high significance that vary from the risks facing the entire planning area and estimates potential losses. These hazards include dam failure, drought, hazmat, landslide, wildfire, and winter storms.

### Dam Failure

The Ritschard dam (a.k.a Wolford Mountain Reservoir) upstream of Kremmling and the Williams Fork dam upstream of Parshall have storage capacities of 84,639 cubic feet and 101,600 cubic feet respectively. There is potential for future issues with the Ritschard Dam (a.k.a. Wolford Mountain Reservoir), an earthen dam that is settling twice as fast as the expected rate. In the summer of 2012 water levels in the dam were low due to the drought and water demands along the Western Slope. This afforded the Colorado River District, who owns and operates Wolford Reservoir, to study why the dam was settling so much faster than expected. The chief engineer for the River District stated, “The dam is safe. There is no reason for concern over dam failure. There are no leaks, the dam is solid.”

<https://www.steamboatpilot.com/news/engineers-study-dam-settling-at-wolford-mountain-reservoir-between-steamboat-and-kremmling/>

The Colorado River District will continue to monitor the dam to determine the cause of the increased settling. A failure of the Dillon Dam or Green Mountain dam in Summit County would have catastrophic, cascading impacts that could reach Grand County, including Kremmling. Failure of the Dillon Dam could cause other dams downstream, such as Green Mountain, to fail, essentially creating a domino effect.

### Drought

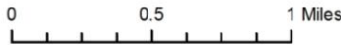
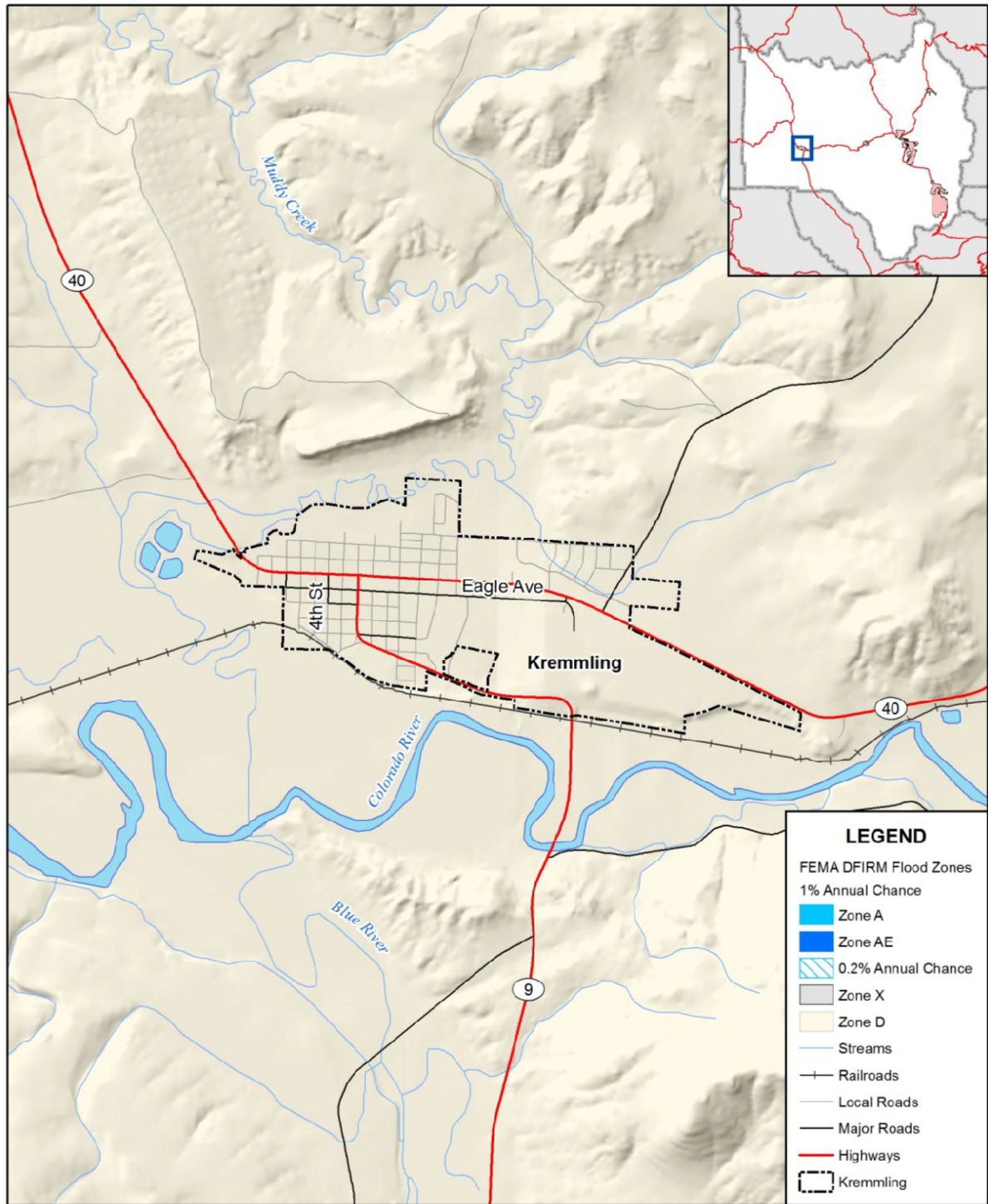
Vulnerability to drought can be difficult to quantify by jurisdiction due to the widespread nature of the hazard. Drought in the summer increases problems with dust and erosion and can cause deterioration in water quality. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding. It also increases the wildfire hazard. Drought impacts increase with the length of a drought, as carry-over supplies in reservoirs are depleted and water levels in groundwater basins decline. A portion of Grand County relies on individual ground wells and constructed water retention structures for their water resources. Ground wells service a significant portion of the population, while local ranchers rely upon ponds and ditches for livestock and crops. The County does not own rights to most of the water in its borders, and much of the water is allocated elsewhere. Wastewater treatment plants are also dependent on streamflows; if streamflows are inadequate, this can become a public health and sanitation concern. The incidence of blue algae increases during periods of extreme heat, which often accompanies drought, and zebra mussels are also a potential issue.

## **Flood**

The 2008 Flood Insurance Study for Grand County notes that the Town of Kremmling is non-floodprone and has no Special Flood Hazard Area identified, but the Town of Kremmling is downstream from the following dams: Binco, Jones #1, Matheson, McMahon #2, Musgrave, Ritschard, Scholl, and Whiteley Peak. Ritschard and Whiteley Peak are now listed as high-hazard dams, with Ritschard having a storage capacity of 84,639 cubic feet.

No flood hazard areas are shown for the Town of Kremmling in Figure F.2 (from 2015 Plan). Accordingly, Kremmling is not expected to suffer any losses from a 100-year flood. A residential area in the northeast part of Kremmling periodically experiences surface flow from snow melt. An existing (road-paving project) action item is being pushed forward – “Four of the streets running north to south are on a slight gradient. The two streets running east to west, specifically Central Avenue, carry the burden of the water before it goes into a drainage ditch.” The project is to pave the roads and have drainage pans in various areas to move flow away from affected houses at the bottom of the four streets on Central Avenue. This will be ongoing.

**Figure F.2. DFIRM Flood Zones in Kremmling**



Map compiled 4/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT, FEMA DFIRM 1/2/2008



## **Hazardous Materials**

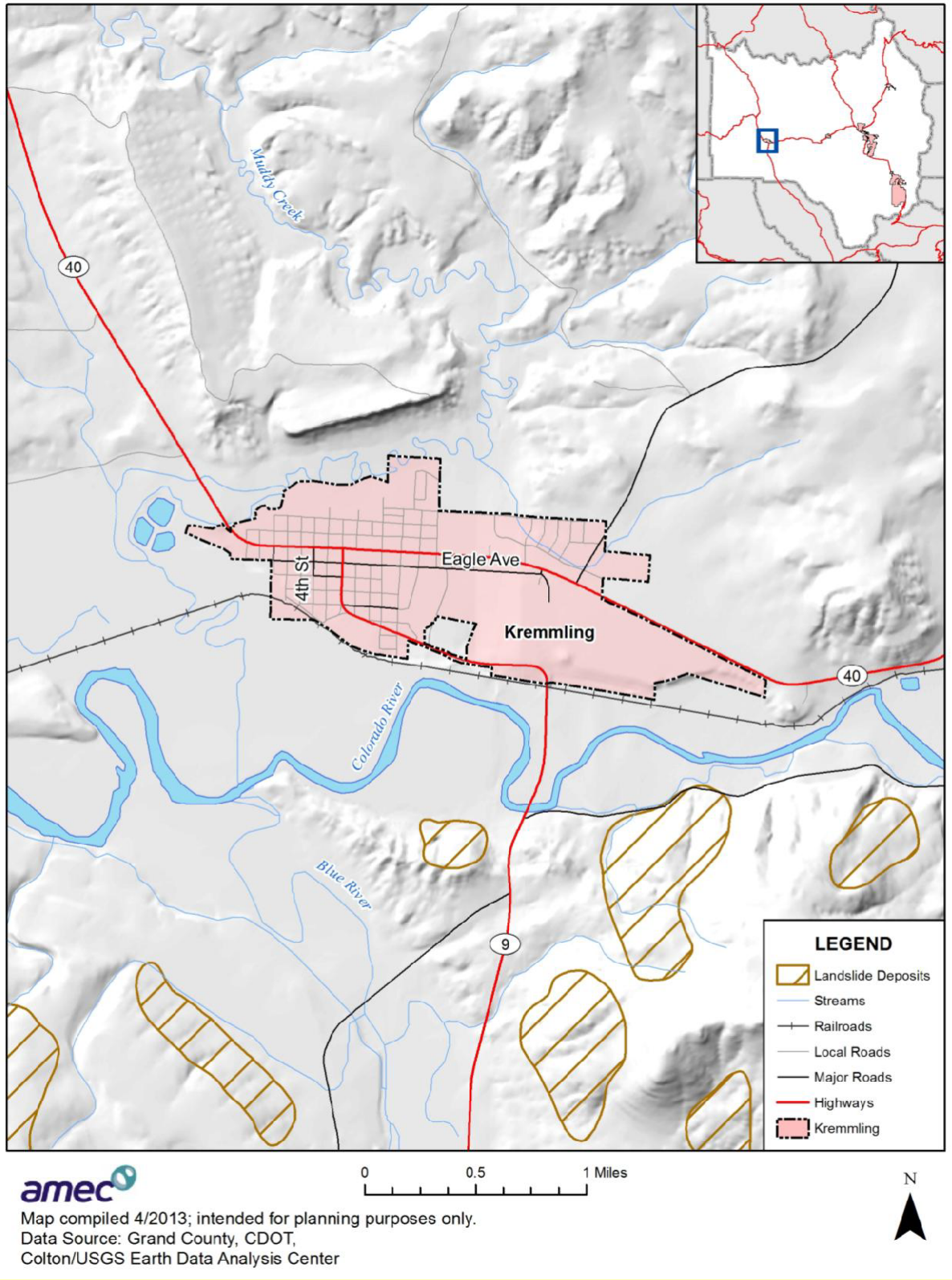
The Town of Kremmling is exposed to transported hazardous materials by being in proximity to Highway 40 and the railroad. U.S. Highway 40 is the alternate route to Salt Lake City and primary detour route for closures of the I-70 corridor; trucks and tankers transporting hazardous materials may often use this route. Grand County OEM also identified four reporting Tier II facilities (for 2012 and 2013) in Kremmling, so the potential also exists for fixed hazmat incidents in the Town. Data from the National Response Center (NRC) between 2008 and 2012 showed five reported hazmat events in Kremmling, including one railroad event and four mobile events.

## **Landslide, Mud Flow/Debris Flow, Rock Fall**

Possible landslide areas are identified on steep slopes with unstable soil conditions. No landslide deposits were identified in Kremmling, though there are deposits to the south of the Town. Figure F.3 depicts the location of landslide deposits near Kremmling.



**Figure F.3. Landslide Areas in Kremmling**



### ***Future Development***

The severity of landslide problems is directly related to the extent of human activity in hazard areas. Adverse effects can be mitigated by early recognition and avoiding incompatible land uses in these areas or by corrective engineering. The mountainous topography of the County presents considerable constraints to development, most commonly in the form of steep sloped areas. These areas are vulnerable to disturbance and can become unstable.

### **Wildfire**

#### ***Existing Development***

The Grand County CWPP (2006) evaluated the wildfire hazards to each of the incorporated and unincorporated towns in the County. Kremmling received a hazard rating of low. Kremmling is also covered by the Kremmling FPD CWPP. Refer to Table 3.34 for further details on the community wildfire hazard ratings in the Kremmling FPD CWPP.

Wildfire intensity mapping can be referenced in the Fire Protection District annex.

Based on the methodology described for wildfire in Section 3.3.3 Vulnerability by Hazard using the SILVIS threat zones, the property values in Kremmling were aggregated by wildfire threat zones.

Three critical facilities were identified in the moderate fire intensity zone in Kremmling: the Kremmling Airport, Kremmling Fire Department, and West Grand Elementary School. No other critical facilities were identified in wildfire intensity zones in Kremmling.

The Kremmling FPD, which provides fire protection services to Kremmling and surrounding area, is considered an initial attack center for wildland fires on all private land and takes a joint responsibility with the U.S. Forest Service for fires on federal land.

For property values in wildfire threat zones, please refer to the Wildfire section in this Plan.

### ***Future Development***

Kremmling FPD enforces the 2006 International Fire Code. All buildings in the District's service area are required to adhere to the International Fire Code. Kremmling FPD also reviews all plats, construction plans, and site plans against the District's Development and Review Standards. These standards are designed to help protect life safety and property from wildfire.

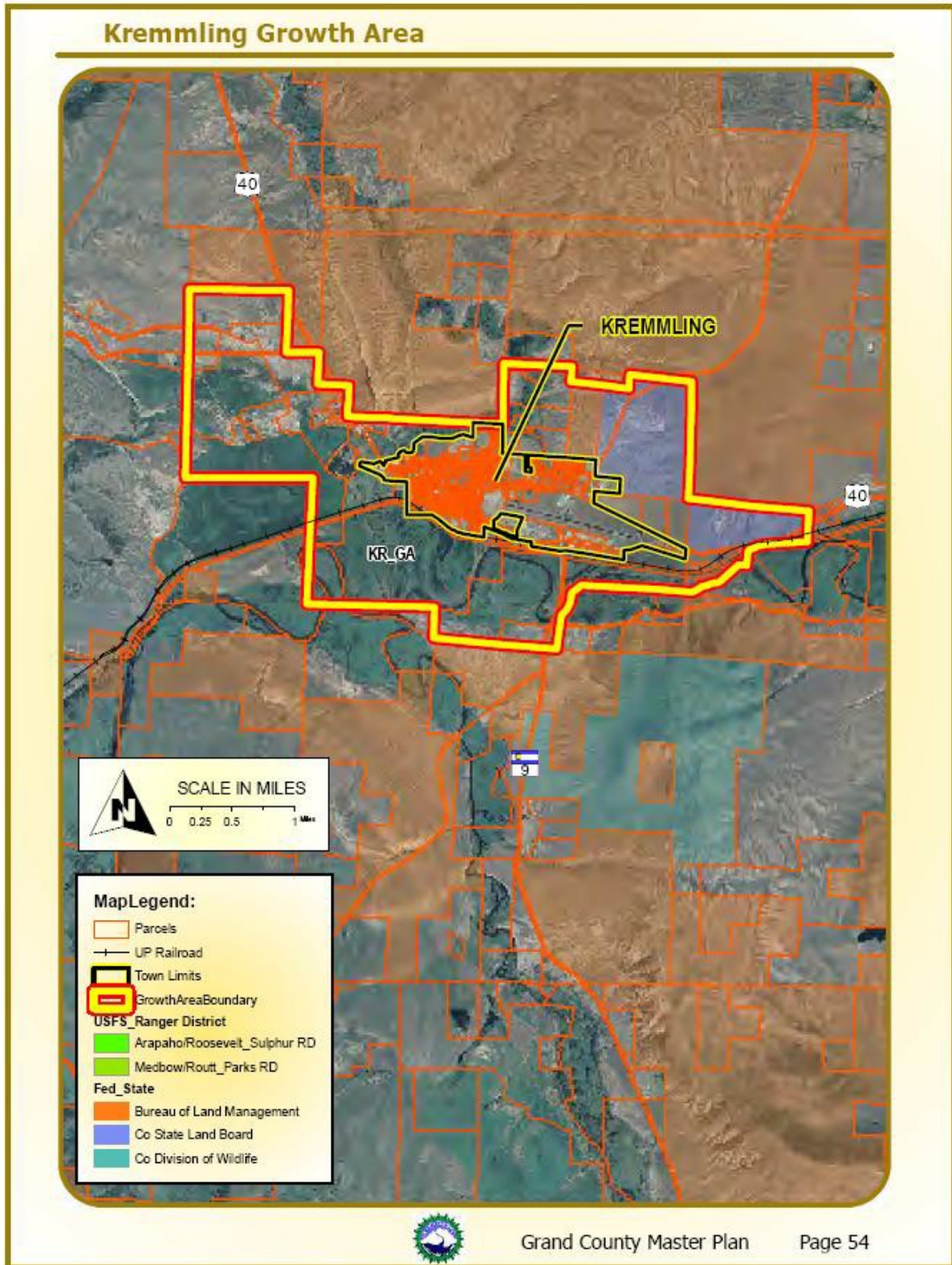
### **Severe Winter Weather**

In the alpine environment of Grand County, severe winter weather occurs several times every season. This hazard has been critical in its magnitude and severity in the past, most recently during the event in December 2007. Vulnerability is high along roadways and mountain passes, particularly on Highway 40 and Highway 9, where severe winter weather conditions may cause traffic related deaths and injuries and increase avalanche risk. Road closures due to winter weather conditions also restrict or prevent the movement of people and goods and services (including food and gas), which can be crippling during the high tourism season and create the need for emergency sheltering for travelers. The County is more vulnerable to the impacts of natural hazards during the winter months due to the increased volume of people living, working, and visiting here. If power and heating were lost in the area, the impacts to the Town could be serious due to its isolation and the occurrence of extreme cold temperatures in the winter (~30°F).

### **Growth and Development Trends**

Table F.7 illustrates how Kremmling has grown in terms of population and number of housing units between 2000 and 2011. Growth has not been occurring within any identified hazard zone. The estimated number of housing units in 2011 was 722. It is currently growing at a rate of 0.66% annually and its population has increased by 5.47% since the 2010 census. Spanning over 1 miles, Kremmling has a population density of 1,164 people per square mile.

Figure F.4. Kremmling Growth Areas



## F.5 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. The capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

### Regulatory Mitigation Capabilities

Table F.8 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Kremmling.

**Table F.8. Kremmling—Regulatory Mitigation Capabilities**

Regulatory Tool (Ordinances, Codes, Plans)	Yes/No	Comments
General or Comprehensive plan	Yes	
Zoning ordinance	Yes	
Subdivision ordinance	Yes	
Growth management ordinance	No	
Floodplain ordinance	N/A	Non-floodprone, not mapped in NFIP
Other special purpose ordinance (stormwater, steep slope, wildfire)	No	
Building code	Yes	
Fire department ISO rating	Yes	5 in Town/ 9 and 10 outside of Town of Kremmling
Erosion or sediment control program	No	
Stormwater management program	No	
Site plan review requirements	Yes	
Capital improvements plan	Yes	
Economic development plan	Yes	
Local emergency operations plan	Yes	
Other special plans	No	
Flood insurance study or other engineering study for streams	N/A	
Elevation certificates (for floodplain development)	N/A	
Other		

### Town of Kremmling Comprehensive Plan

- The plan was scheduled to be adopted in 2014.

## Administrative/Technical Mitigation Capabilities

### Fiscal Mitigation Capabilities

Table F.10 identifies financial tools or resources that Kremmling could potentially use to help fund mitigation activities.

**Table F.10. Kremmling—Fiscal Mitigation Capabilities**

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Community Development Block Grants	Y	
Capital Improvements Project Funding	Y	
Authority to Levy Taxes for Specific Purposes	Y	
Fees for Water, Sewer, Gas, or Electric Services	Y	
Impact Fees for New Development	Y	
Incur Debt through General Obligation Bonds	Y	
Incur Debt through Special Tax Bonds	Y	
Incur Debt through Private Activities	Y	
Withhold Spending in Hazard Prone Areas	Y	

### Mitigation Outreach and Partnerships

- Fire safety programs are given at Kremmling schools
- Kremmling FPD participated in the development of the Kremmling FPD Community Wildfire Protection Plan.

## F.6 Mitigation Goals and Objectives

Kremmling had adopted the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 4 Mitigation Strategy.

## F.7 Mitigation Actions

The planning team for Kremmling identified and prioritized the following mitigation actions based on the risk assessment. Background information on how each action will be implemented and administered, such as ideas for implementation, responsible agency, potential funding, estimated cost, and timeline also are included.

## Mitigation Action: Kremmling 2015-1 Citizens for a Safe Highway 9

<b>Jurisdiction:</b>	County and Town of Kremmling
<b>Hazard Addressed</b>	Wildlife
<b>Project Description, Issue &amp; Background</b>	Wildlife-vehicle collisions are increasingly common along Highway 9 between Green Mountain Reservoir and the Colorado River. 600 accidents have occurred in the past 20 years, often causing injuries or fatalities to humans and animals. The Highway 9 Safety Project was initiated in 2011 and will include wildlife crossings and fencing, the addition of 8-ft shoulders, and re-alignment to improve site distances.
<b>Lead Agency and Title of Lead Person</b>	Grand County and Town of Kremmling - Town Manager
<b>Partners:</b>	Citizens for a Safe Highway 9, CDOT Responsible Acceleration of Maintenance and Partnerships (RAMP) Program
<b>Priority:</b>	Medium
<b>Cost Estimate:</b>	\$9.2 million to qualify for RAMP consideration for funding. Blue Valley Ranch has offered \$4 million, leaving \$4.2 million to be raised
<b>Benefits: (Losses Avoided)</b>	Protect life safety of people and animals in Grand County
<b>Potential Funding:</b>	Donations
<b>Timeline:</b>	Funding deadline (\$4.2 million) of July 1, 2013
<b>Status:</b>	Ongoing

## Mitigation Action: Kremmling 2015-2 Pedestrian Road Crossing or Crosswalk

<b>Jurisdiction:</b>	Grand County/Kremmling
<b>Hazard Addressed</b>	Multi-Hazard, Winter Weather
<b>Project Description, Issue &amp; Background</b>	<p>This project will address the unsafe pedestrian crossing for school age children, town residents and visitors, elderly, special needs. The pedestrian crosswalk indicators at many locations throughout the County are not visually adequate for oncoming traffic. Some identified locations give pedestrians access to the school, library, hospital, health care clinic and parks. This is especially dangerous during severe winter storms with low visibility.</p> <p>This project will complete a flow study of pedestrian and vehicle traffic through indicated crosswalk locations. This project will result in the installation of better crosswalk signage that can be seen coming from both directions with either LED lighting or permanent base plate signs that are placed in the road.</p>
<b>Lead Agency and Title of Lead Person</b>	Grand County OEM and Kremmling Town Manager
<b>Partners:</b>	Town of Kremmling, Town of Grand Lake, Town of Fraser, Town of Winter Park
<b>Priority:</b>	High
<b>Cost Estimate:</b>	\$60,000
<b>Benefits: (Losses Avoided)</b>	Protect life safety
<b>Potential Funding:</b>	EMPG, DOLA or CDOT grant
<b>Timeline:</b>	2013-2014
<b>Status:</b>	Ongoing



## Mitigation Action: Kremmling 2015-3 Road Paving Project

<b>Jurisdiction:</b>	Kremmling
<b>Hazard Addressed</b>	Flood (surface flow of snow melt)
<b>Project Description, Issue &amp; Background</b>	<p>This covers about 6 streets impacted occasionally by snowmelt run off. The area is residential in the very north east part of the town. Four of the streets running north to south are on a slight gradient. The two streets running east to west especially, Central Avenue carry the burden of the water before it goes into a drainage ditch.</p> <p>The project is to pave the roads and have drainage pans in various areas to move flow away from affected houses at the bottom of the four streets on Central Avenue.</p>
<b>Lead Agency and Title of Lead Person</b>	<p>Town Of Kremmling</p> <p>Mark Campbell</p>
<b>Partners:</b>	Dept. of Local Affairs
<b>Priority:</b>	Medium
<b>Cost Estimate:</b>	\$460,000
<b>Benefits: (Losses Avoided)</b>	Reduce damage to residential property.
<b>Potential Funding:</b>	\$210,000 DOLA, \$250,000 Town of Kremmling
<b>Timeline:</b>	May-June 2014.
<b>Status:</b>	Ongoing

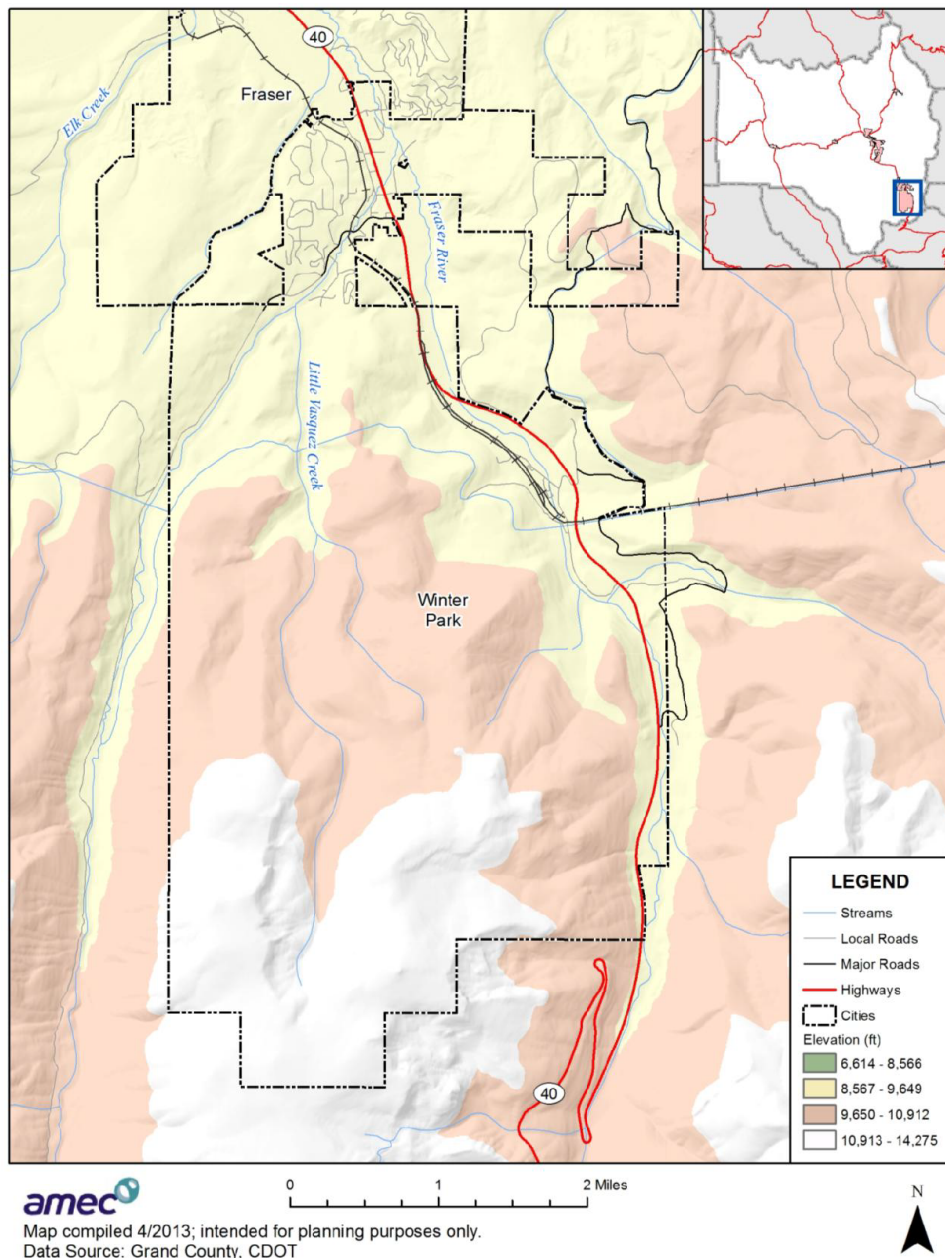
# ANNEX G: TOWN OF WINTER PARK

## G.1 Community Profile

### Geography

Winter Park is located at an elevation of 9,100 feet and is considered alpine country. According to the U.S. Census Bureau, the Town has a total area of 8.1 square miles, none of which is covered by water. The Winter Park Resort is located about two miles south of the Town. It averages 350 inches of snowfall annually.

**Figure G.1. Map of Winter Park**



## Population

The permanent population is the number of people who reside in the town on a year-round basis and was estimated at 1,090 in 2019.

## History

The land that became Winter Park was purchased by Linus Oliver “Doc” Graves and his wife Helen in 1932. The couple built ten small cabins on the land, mostly rented out to hunters and fishermen. The Town built up around these cabins, adding business and increasing the resident population. The area was originally named Hideaway Park, but was renamed Winter Park and incorporated in 1978. Though much has changed since the town’s founding, Winter Park still retains its small town charm. <https://winterparkescapes.com/guest-information/winter-park-history/>

## Economy

According to the ACS 2011 estimates, the industries that employed the highest percentage of Winter Park’s labor force were arts, entertainment, recreation, accommodation, and food services (38.5%); professional, scientific, and technical services (12.7%); manufacturing (11.4%); educational services and health care (9.9%); and retail trade (9.4%).

## G.2 Hazard Identification and Profiles

Grand County’s planning team identified the hazards that affect the community and summarized their geographic location, probability of future occurrence, potential magnitude or severity, and planning significance specific to the Town (see Table G.3). In the context of the countywide planning area, there are no hazards that are unique to Winter Park.

**Table G.3. Winter Park—Hazard Summary**

Hazard Type	Geographic Location*	Probability*	Magnitude*	Hazard Rating
Avalanche	Large	Highly Likely	Critical	High
Dam Failure	Small	Occasional	Limited	Medium
Disease Outbreak	Large	Likely	Variable	High
Drought	Large	Likely	Negligible	Low
Earthquake	Small	Unlikely	Catastrophic	Low
Flood	Medium	Likely	Critical	Medium
Hazardous Materials (Transportation)	Large	Highly Likely	Catastrophic	High
Landslide, Mudflow/Debris Flow, and Rockfall	Medium	Highly Likely	Limited	Medium
Lightning	Large	Highly Likely	Limited	Low
Mountain Pine Beetle Infestation	Large	Occasional	Limited	Medium
Severe Winter Weather	Large	Highly Likely	Critical	High
Wildfire	Large	Likely	Catastrophic	High
Wildlife-Vehicle Collisions	Isolated	Highly Likely	Negligible	Medium
Windstorm	Large	Highly Likely	Critical	Medium

\*See Section 3.2 for definitions of these factors

Information on past events for each hazard can be found in Section 3.2 Hazard Profiles in the body of this document.

## G.3 Vulnerability Assessment

The intent of this section is to assess Winter Park’s vulnerability separately from that of the planning area as a whole, which has already been addressed in Section 3.3 Vulnerability Assessment. The following vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of moderate or high significance that may vary from other parts of the planning area. For more information about how hazards affect the County as a whole, see Chapter 3 Risk Assessment.

### Community Asset Inventory

According to the 2019 Report to the Governor (of Colorado), Winter Park’s assessed value was listed as \$136,556,280 with total revenue listed as \$469,480. Table G.5 lists critical facilities and other community assets identified by Grand County’s planning team as extremely important to protect in the event of a disaster.

**Table G.5. Winter Park—Critical Facilities and Other Community Assets**

Name of Asset	Type*	Replacement Value (\$)	Hazard Specific Info/Comments
Winter Park Ski Area	EA	>500 Million	Wildfire/Winter Storm
Fraser/Winter Park Police Dept.	EF	3.5 Million	
Union Pacific Railway	LL	300 Million	Haz Mat
US Hwy 40	LL	Unknown	Haz Mat
Arapahoe National Forest	HCNA	Unknown	
Denver Water Board Diversion/Moffat Tunnel Project	LL	Unknown	
Town of Winter Park (Town Hall/Public Works)	HPL	15 mil	
Grand One Water District	LL	100 mil	
Winter Park Water/San District	LL	100 mil	
Excel Energy Natural Gas Line	LL	100 mil	
East Grand Fire Protection District #4**			
Administration Building**			
Visitors Center**			
Booster Pumphouse**			
Pumphouse Building**			
Sunspot Water Pumpstation**			
Winter Park Water And Sanitation Treatment Plant**			

Sources: HMPC

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

\*\*Identified separately by Grand County OEM

The Town also needs to further evaluate the seasonal workforce to better understand their impact on the community and what needs to be done to protect them.

## **Vulnerability by Hazard**

This section examines those existing and future structures and other assets at risk to hazards ranked of moderate or high significance that vary from the risks facing the entire planning area and estimates potential losses. These hazards include avalanche, flood, hazardous materials, landslide, wildfire, and severe winter weather.

### **Avalanche**

The Town of Winter Park deals with avalanches every year. The Town estimated that road closures occur roughly four times a year due to avalanches. The Town's economy is impacted whenever Highway 40 is shut down, losing roughly \$100,000 for each 24-hour period the road is closed. Avalanches can cause injury or death to motorists along the roadways or skiers, snowboarders, snowmobilers, etc. CDOT has been considering using automated avalanche control measures on Berthoud Pass. Current methods include preemptively triggering avalanches using WWII howitzers to launch missiles or using helicopters to drop explosives. The new program would utilize Gazex pipes to direct hot gases at avalanche zones at risk. This would trigger controlled, lower-intensity avalanches and may help to reduce the occurrence of natural and accidentally triggered avalanches.

### **Flood**

The Town of Winter Park has flood hazard mapping for the Fraser River and its tributaries, Leland Creek, Vasquez Creek, and Jim Creek. North of Winter Park, insufficient capacity of the culvert under Hwy 40 restricts flood flows from Leland Creek, on the west side of the Hwy, from entering the Fraser River. Localized storm water flooding also causes minor problems.

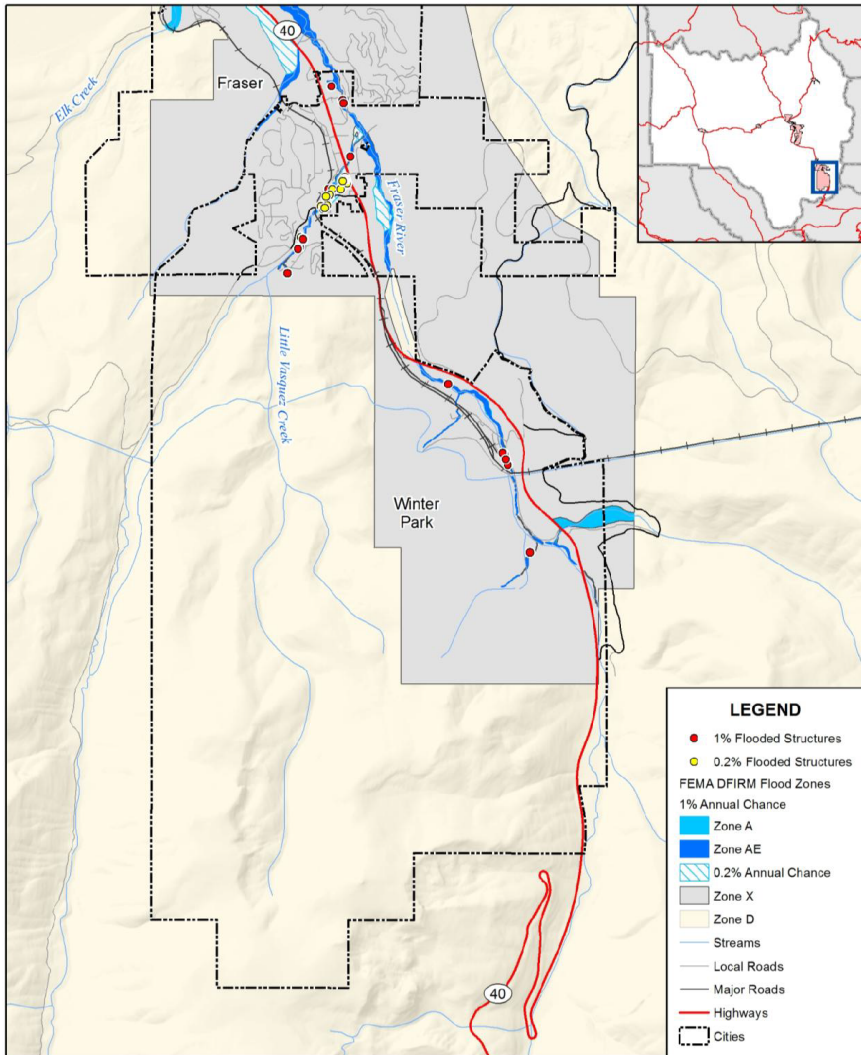
### ***Existing Development***

The effective DFIRM for Winter Park, dated January 2, 2008, was the best available flood hazard 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 the points were based on the assessor's data and summed for the unincorporated county and for the municipalities. Property exposure located in flood hazard zones by land use type is shown in Table G.6. Flood zones A and AE are variations of the 1% annual chance event. The "Shaded Zone X" represents the 0.2% annual chance hazard zone on the DFIRM. Building and estimated content values were totaled. The Town's A Zone has an exposure value of over \$13.9 million. To estimate losses a 25% loss factor was applied to the total exposure, based on FEMA depth damage functions associated with a two foot deep flood. Flood loss from the 1% annual chance event based on this assessment would be in the magnitude of nearly \$3.5 million.

The total exposure value in Winter Park’s 0.2% annual chance flood zone is \$9.1 million, with a loss estimate of nearly \$2.3 million. The grand total exposure is over \$23 million with a combined loss estimate of over \$5.7 million. Flooded structures for the DFIRM flood zones are depicted in Figure G.2. More information on the methodology used for this loss estimation can be found in Section 3.3 Vulnerability Assessment.

There is one critical facility, the Lodge at Sunspot, located in the floodplain in Winter Park.

**Figure G.2. DFIRM Flood Zones and Flood-prone Properties in Winter Park**



0 1 2 Miles



Map compiled 4/2013; intended for planning purposes only.  
Data Source: Grand County, CDOT, FEMA DFIRM 1/2/2008



### ***National Flood Insurance Program***

Winter Park joined the National Flood Insurance Program (NFIP) on November 15, 1985. NFIP insurance data indicates that as of March 25, 2013, there were 115 flood insurance policies in force in Winter Park with \$19,528,100 of coverage. Ninety-eight of the policies are in Winter Park's A zone, and seventeen are located outside of the Special Flood Hazard Area.

There has been one historical claim for flood losses in Winter Park, for a claim total of \$5,960. There were no repetitive or severe repetitive loss structures.

During the 2020 update of this Plan, Grand County OEM reached out to NFIP twice to get updated information. Due to the COVID-19 Pandemic, OEM received no replies from NFIP.

### ***Future Development***

The Town of Winter Park addresses floodplain management policies in its Town Code (see Regulatory Capabilities section below).

### **Hazardous Materials**

The Town of Winter Park is exposed to transported hazardous materials by being in proximity to Highway 40 and the railroad. U.S. Highway 40 is the alternate route to Salt Lake City and the primary detour route for closures of the I-70 corridor; trucks and tankers transporting hazardous materials may often use this route. Grand County OEM also identified one reporting Tier II facility (for 2012 and 2013) in Winter Park, so the potential also exists for fixed hazmat incidents in the Town. Data from the National Response Center (NRC) between 2008 and 2012 showed two reported incidents in Winter Park; one event was a railroad non-release and the second was a fixed event.

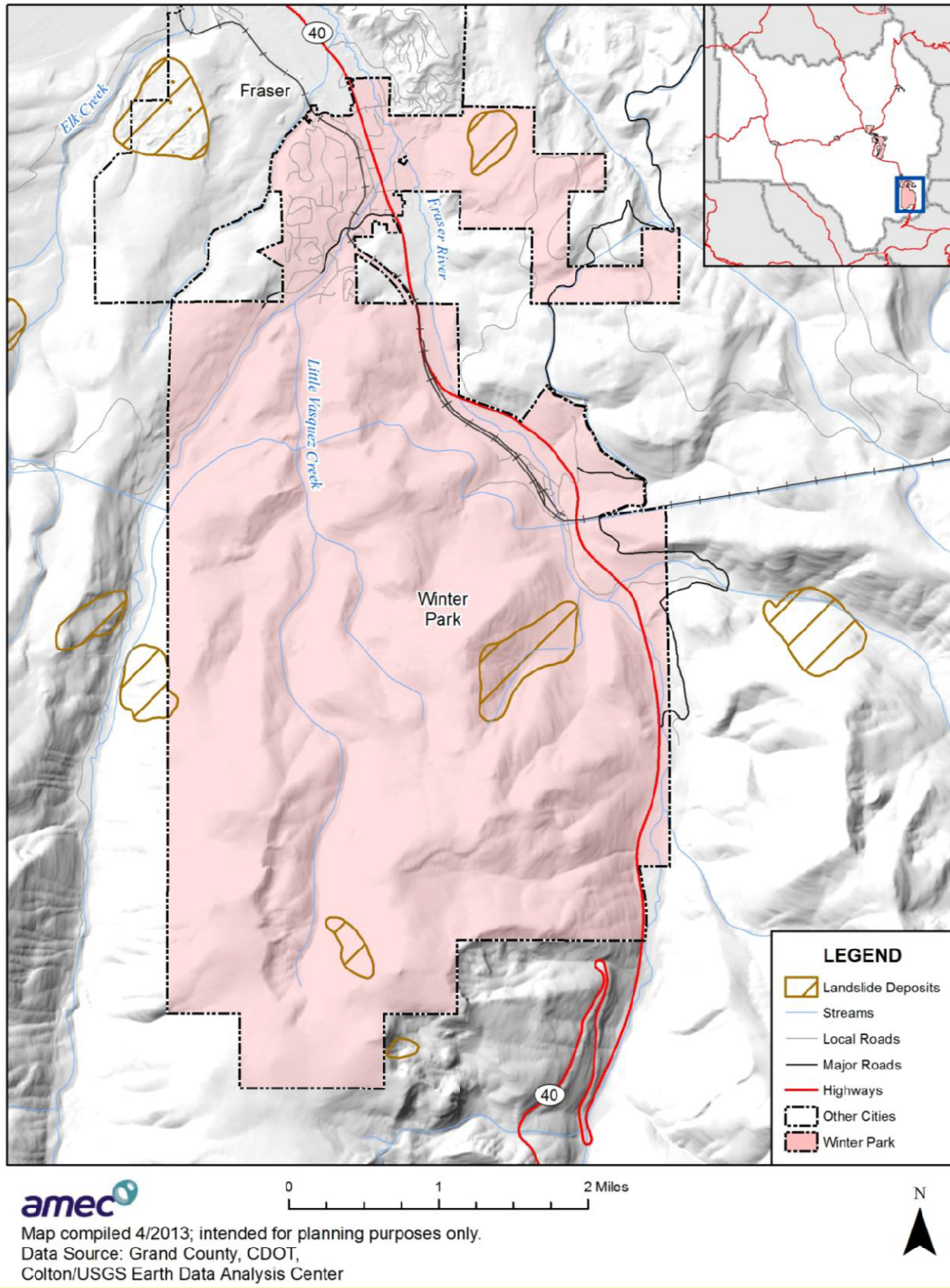
### **Landslide, Mud Flow/Debris Flow, Rock Fall**

Possible landslide areas are identified on steep slopes with unstable soil conditions. Landslide deposits are shown in Figure G.3.

### ***Existing Development***

Potential losses for landslide areas were estimated using Grand County GIS and assessor's data and were examined in terms of values and critical facilities at risk. GIS was used to create a centroid, or point, representing the center of each parcel polygon, which was overlaid on the landslide hazard polygons. The assessor's land and improved values for each parcel are linked to the parcel centroids. For the purposes of this analysis, if the parcel's centroid intersects the landslide hazard polygon, that parcel is assumed to be at risk to the landslide. Values were summed and sorted by landslide hazard zone. Additional landslide hazard analysis was completed using the more comprehensive USGS landslide deposits layer during the 2013 update. The results of the overlay analysis for the Town of Winter Park are presented in Table G.7. No critical facilities were identified in landslide zones in Winter Park.

Figure G.3. Landslide Areas in Winter Park



### ***Future Development***

The severity of landslide problems is directly related to the extent of human activity in hazard areas. Adverse effects can be mitigated by early recognition and avoiding incompatible land uses in these areas or by corrective engineering. The mountainous topography of the County presents considerable constraints to development, most commonly in the form of steep sloped areas. These areas are vulnerable to disturbance and can become unstable. Winter Park's Town Code encourages development in or near the existing towns and away from environmentally sensitive areas such as those with steep slopes. This policy can help protect future development from being built in unstable areas.

### **Wildfire**

#### ***Existing Development***

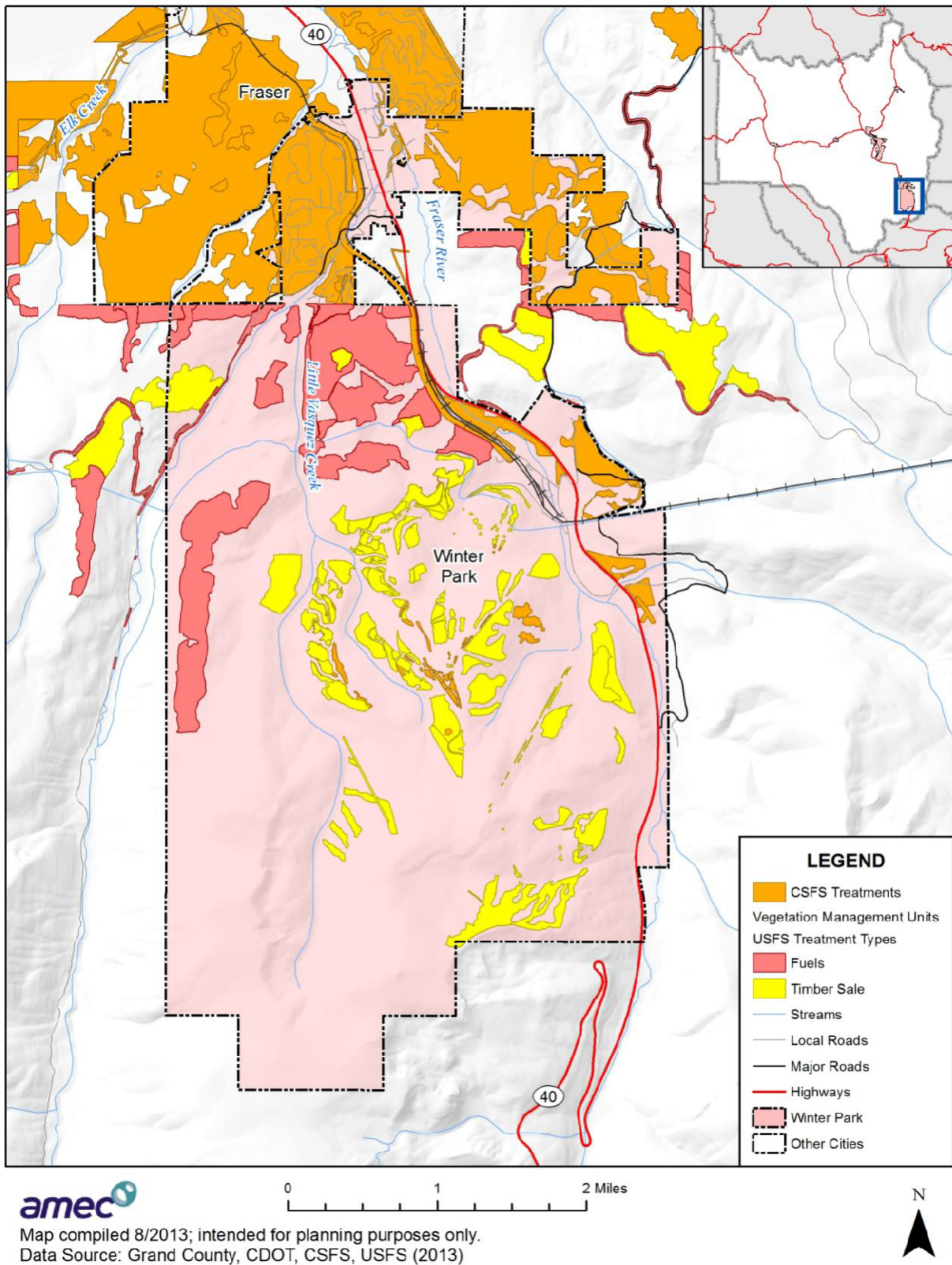
The Grand County CWPP (2006) evaluated the wildfire hazards to each of the incorporated and unincorporated towns in the County. Winter Park received a hazard rating of high to very high. Winter Park is also covered by the Upper Fraser Valley/East Grand Fire Protection District's CWPP, which rated the wildfire hazard in 28 distinct communities.

Eleven critical facilities were identified in low-moderate, moderate, and high-moderate wildfire zones in Winter Park. The Sunspot Water Pumpstation and Winter Park Water and Sanitation Treatment Plant are located in Winter Park's high-moderate wildfire zone. The seven facilities in the Town's moderate wildfire zone include a bridge on Winter Park Drive, the Lodge at Sunspot, Moffat Station, a Winter Park communications facility owned by Denver Water, the Administration Building, the Town Hall, and the Booster Pumphouse. The two facilities in Winter Park's low-moderate fire intensity zone include U.S. 40 ML and the Pumphouse Building.

For property values in wildfire threat zones, please refer to the Wildfire section in this Plan.

Wildfire intensity mapping can be referenced in the Fire Protection District annex in this Plan.

Figure G.4. Wildfire Treatment Areas in Winter Park



The East Grand Fire Protection District, which provides fire protection services to Winter Park and surrounding area, is considered an initial attack center for wildland fires on all private land and takes a joint responsibility with the U.S. Forest Service for fires on federal land.

**Future Development**

The Winter Park Town Code requires that development meet fire mitigation standards before it can be approved for occupancy. East Grand FPD enforces the 2015 International Fire Code. All buildings in the District’s service area are required to adhere to the International Fire Code. East Grand FPD also reviews all plats, construction plans, and site plans against the District’s Development and Review Standards. These standards are designed to help protect life safety and property from wildfire.

**Severe Winter Weather**

In the alpine environment of Grand County, severe winter weather occurs several times every season. This hazard has been critical in its magnitude and severity in the past, most recently during the event in December 2007. Vulnerability is high along roadways and mountain passes, particularly on Highway 40 and Highway 9, where severe winter weather conditions may cause traffic related deaths and injuries and increase avalanche risk. Road closures due to winter weather conditions also restrict or prevent the movement of people and goods and services (including food and gas), which can be crippling during the high tourism season and create the need for emergency sheltering for travelers. The County is more vulnerable to the impacts of natural hazards during the winter months due to the increased volume of people living, working, and visiting here.

**Growth and Development Trends**

Table G.9 illustrates how Winter Park has grown in terms of population and number of housing units between 2000 and 2011.

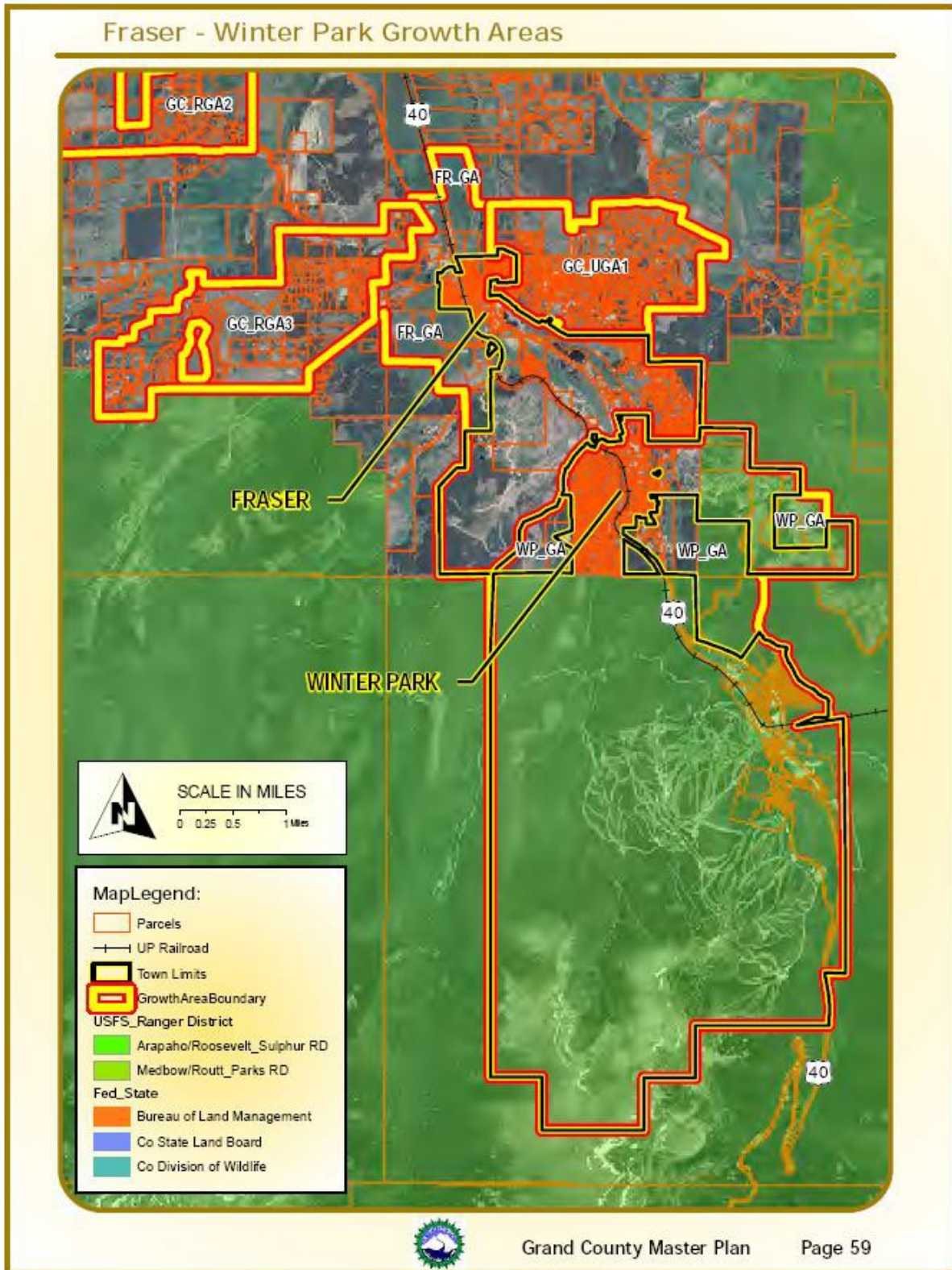
**Table G.9. Winter Park—Change in Population and Housing Units, 2000-2011**

2000 Population	2011 Population Estimate	2019 Population Estimate	2000 # of Housing Units	2011 Estimated # of Housing Units	2018 Estimated # of Housing Units
662	536	1,090	1,231	2,158	2,575

Source: Censusreporter.org

Proposed growth areas (2013) on the east and south side of the Town have high vulnerability to wildfire. Figure G.5 depicts Winter Park’s current town limits and the growth area boundary, as shown in the 2011 Grand County Master Plan.

Figure G.5. Winter Park Growth Areas



## G.4 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. The capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

### Regulatory Mitigation Capabilities

Table G.10 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Winter Park.

**Table G.10. Winter Park—Regulatory Mitigation Capabilities**

Regulatory Tool (Ordinances, Codes, Plans)	Yes/No	Comments
General or Comprehensive plan	Yes	
Zoning ordinance	Yes	
Subdivision ordinance	Yes	
Growth management ordinance	No	
Floodplain ordinance	Yes	
Other special purpose ordinance (stormwater, steep slope, wildfire)	Yes	
Building code	Yes	
Fire department ISO rating	No	
Erosion or sediment control program	No	
Stormwater management program	No	
Site plan review requirements	Yes	
Capital improvements plan	Yes	
Economic development plan	No	
Local emergency operations plan	No	
Other special plans	No	
Flood insurance study or other engineering study for streams	Yes	
Elevation certificates (for floodplain development)	Yes	
Other		

### Winter Park Town Code

#### *Title 6 Building Regulations*

- **6-1-6 Residential Code Amendments**

- R102.7 Existing Structures: The legal occupancy of any structure existing on the date of adoption of this code shall be permitted to continue without change, except as is

specifically covered in this code, the international fire code, or as is deemed necessary by the building official for the general safety and welfare of the occupants and the public.

### ***Title 6 Building Regulations, Chapter 7 Flood Damage Prevention***

- **6-7-3 General Provisions**

- C. Establishment of Floodplain Development Permit: A development permit shall be required to ensure conformance with the provisions of this chapter.
- D. Compliance: No structure or land shall hereafter be located, altered, or have its use changed without full compliance with the terms of this chapter and other applicable regulations.

- **6-7-4 Administration**

- A. Designation of Floodplain Administrator: The town engineer is hereby appointed the floodplain administrator to administer and implement the provisions of this chapter and other appropriate sections of 44 CFR (national flood insurance program regulations) pertaining to floodplain management.

- **6-7-5 Provisions for Flood Hazard Reduction**

- Establishes general and specific standards for all new construction and substantial improvements

### ***Title 8 Subdivision Regulations, Chapter 3 Design Standards***

- **8-3-6 Storm Drainage**

- The subdivider shall provide a drainage and erosion control plan. The plan shall conform to the “Town of Winter Park Standards and Specifications for Design and Construction.”

### **Town of Winter Park Master Plan**

- **6.3 Residential Design Guidelines**

- Includes a section on Forest Thinning and Fuels Management.

- **Section 7.3.4 Forest Management**

- Town citizens recently approved a ballot questioning creating a fund for forest management. The Town anticipates a multi-pronged effort: work with homeowners to remove dead and dying trees, work with USFS and others to thin and otherwise preserve healthy forests.



## **Town of Winter Park Residential Architectural Guidelines and Design Regulations**

- Guideline 13 Forest Thinning and Fuels Management

### **Administrative/Technical Mitigation Capabilities**

Table G.11 identifies the personnel responsible for activities related to mitigation and loss prevention in Winter Park.

**Table G.11. Winter Park—Administrative and Technical Mitigation Capabilities**

<b>Personnel Resources</b>	<b>Yes/No</b>	<b>Department/Position</b>	<b>Comments</b>
Planner/engineer with knowledge of land development/land management practices	Yes	TOWP Planning & Building Dept.	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	TOWP Planning & Building Dept.	
Planner/engineer/scientist with an understanding of natural hazards	Yes	TOWP Planning & Building Dept.	
Personnel skilled in GIS	Yes	TOWP Planning & Building Dept.	
Full time building official	Yes	TOWP Planning & Building Dept.	
Floodplain manager	Yes	TOWP Planning & Building Dept.	
Emergency manager	Yes	Fraser/Winter Park Chief of Police	
Grant writer	Yes	TOWP Planning & Building Dept.	
Other personnel			
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Yes	TOWP Planning & Building Dept.	
Warning Systems - CodeRED	Yes	Grand County OEM	

### **Fiscal Mitigation Capabilities**

Table G.12 identifies financial tools or resources that Winter Park could potentially use to help fund mitigation activities. In addition, the General Revenue Fund is utilized on as an-needed basis for mitigation projects. For example, the Town devoted significant resources to hazard tree removal in the past. Grants are sought as needed as well.

**Table G.12. Winter Park—Fiscal Mitigation Capabilities**

<b>Financial Resources</b>	<b>Accessible/Eligible to Use (Yes/No)</b>	<b>Comments</b>
Community Development Block Grants		
Capital Improvements Project Funding		
Authority to Levy Taxes for Specific Purposes	Y	
Fees for Water, Sewer, Gas, or Electric Services		
Impact Fees for New Development		
Incur Debt through General Obligation Bonds		
Incur Debt through Special Tax Bonds		
Incur Debt through Private Activities		
Withhold Spending in Hazard Prone Areas		

## Mitigation Outreach and Partnerships

- The Town works with USFS and CSFS to have community meetings on fire safety as well as pre-flood preparations.

## Past Mitigation Efforts

- Winter Park has engaged in large-scale forestry to remove beetle kill trees in the Town. As part of that project, ordinances were passed requiring that dead trees be removed from private and public property.
- The Town participates in the NFIP.

## G.5 Mitigation Goals and Objectives

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Winter Park had adopted the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 4 Mitigation Strategy.

## G.6 Mitigation Actions

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The planning team for Winter Park identified and prioritized the following mitigation actions based on the risk assessment. Background information on how each action will be implemented and administered, such as ideas for implementation, responsible agency, potential funding, estimated cost, and timeline also are included.

### Continued Compliance with the NFIP

Winter Park will continue participation in and compliance with the National Flood Insurance Program. Activities the Town will undertake to continue compliance include the following:

- Working with FEMA and the Colorado Water Conservation Board in the review and adoption of new digital flood insurance rate maps (DFIRMs) as part of the map modernization (now RiskMAP) program
- Periodically reviewing the flood damage prevention ordinance and identifying opportunities to strengthen requirements and enforcement, including compliance with the updated State Floodplain Rule (required by January 2014).
- Promote and disperse information on the benefits of flood insurance, with assistance from partners such as the Colorado Water Conservation Board.
- Continuing strong enforcement of the floodplain ordinance and working with developers and property owners to understand the program

## Mitigation Action: Winter Park 2015-1 Develop and Implement Fuel Reduction Projects

<b>Jurisdiction:</b>	Town of Winter Park
<b>Hazard Addressed</b>	Wildfire
<b>Project Description, Issue &amp; Background</b>	Fuel reduction projects are needed to reduce the wildfire vulnerability in wildland urban interface areas. Specific actions have been incorporated in the countywide and local CWPPs.
<b>Lead Agency and Title of Lead Person</b>	Town administration; Grand County Wildfire Council, Schelly Olson
<b>Partners:</b>	Fire Districts, Department of Natural Resources, CSFS, USFS, CDOT,
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Variable, create a county-level position to coordinate all mitigation, education, and funding efforts
<b>Benefits: (Losses Avoided)</b>	Protect life, property, wildlife, watersheds, and infrastructure from wildfire, create and maintain healthy forests, create a Fire-Adapted Community
<b>Potential Funding:</b>	Winter Park levy (area-specific to Winter Park), grants, federal funding
<b>Timeline:</b>	Ongoing
<b>Status:</b>	Winter Park has a mill levy for funding natural resources projects that includes fuels reduction/forest health initiatives. Associated actions have been incorporated in the CWPPs, HOAs are applying for grants, see success stories from Pole Creek Meadows, Homestead Hills, and Winter Park Highlands

# ANNEX H: FIRE PROTECTION DISTRICTS

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## H.1 District Profiles

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The material presented in this annex applies to five fire protection districts in Grand County: East Grand FPD, Grand FPD, Grand Lake FPD, Hot Sulphur Springs/Parshall FPD, and Kremmling FPD. Figures H.1-H.5 show maps of the Districts' boundaries based upon best available data from Grand County GIS. The base maps also show DFIRM flood hazards, where available for the incorporated areas, and landslide deposits.

### East Grand Fire Protection District

East Grand County Fire Protection District # 4 is a Fire Protection Special District organized under Title 32 of the Colorado Revised Statutes funded by property tax dollars. The governing body of the East Grand Fire District consists of a Board of 5 Directors elected by the District's registered voters and property owners. EGFPD serves a 208 square mile area including the municipalities of Fraser and Winter Park, unincorporated portions of Grand County and part of the Sulphur Ranger District of the Arapaho/Roosevelt National Forest. Within our District is unincorporated Tabernash, Winter Park Resort, Snow Mountain YMCA, Devil's Thumb Ranch and Resort, and Young Life Crooked Creek Ranch.

The Fire District was formed in 1969 by the consolidation of the Tabernash, Fraser, and Hideaway Park Volunteer Fire Departments. In 2019 we celebrated our 50<sup>th</sup> Anniversary.

As of 2020, we serve an estimated 5,500 full time residents and approximately 20,000 visitors and part time residents at peak periods. The District provides Structural and Wildland Firefighting, Technical Rescue, and Hazardous Material response. Our Firefighters also assist Grand County EMS as requested. We have 40 Firefighters and Officers responding from 3 Stations, East Grand Headquarters, Station 2 in Tabernash, and Red Dirt Station near the Snow Mountain YMCA that is shared with Grand Fire District. In 2019 there were 399 calls for service. The Fire Marshal's Office provides preventive services such as fire safety/code inspections of both residential and commercial properties, technical plan reviews, wildfire defensible space inspections, and fire and environmental safety education. The District participates in Grand County Mutual/Automatic Aid with the other 4 County Fire Districts and in the Mountain Area Mutual Aid. This includes agencies along I-70 and in the Northwest Region, as well as providing closest forces response to Federal wildfires.

## **Grand Fire Protection District**

The District was originally established as the Granby Volunteer Fire Department in 1939. GFDP was formed in 1951 and provides service to an area comprising 150 square miles in Grand County. GFDP is staffed by volunteer and resident firefighters responding out of two stations operating twelve apparatus. GFDP has 26 firefighters and 2 administrative staff. GFDP is governed by an elected Board of Directors consisting of five people. GFDP has two stations: the headquarters fire station located at 60500 U.S. Highway 40 in Granby and the Red Dirt Fire Station at 85 County Road 5301 in Granby. GFDP also has a Resident Program that provides living accommodations in exchange for filling two 24-hour shifts per week, including two 8-hour station duty day shifts. ([www.grandfire.org](http://www.grandfire.org))

## **Grand Lake Fire Protection District**

The GLFPD is a small combination fire and rescue agency serving the greater Grand Lake area from County Road 4 North to Rocky Mountain National Park. It was formed in 1952 following a devastating fire at the Pine Cone Restaurant. As of 2005 GLFPD has employed staff members in support of 22 volunteer firefighters. The Fire Chief focuses on administrative duties while the Captain focuses on operational duties. A Lieutenant and Technician support the Captain and assist with public education, apparatus and facilities maintenance, and emergency response. The firehouse is staffed seven days a week by five full-time and two part-time staff. Volunteers average 260 training hours per year. GLFPD is comprised of three stations and twelve apparatus, including two boats and two snowmobiles. GLFPD also offers a Resident Program, providing living accommodations in exchange for apparatus and station maintenance, two 10-hour day shift duty per week, etc. ([www.grandlakefire.org](http://www.grandlakefire.org))

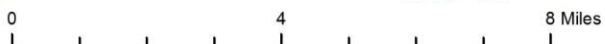
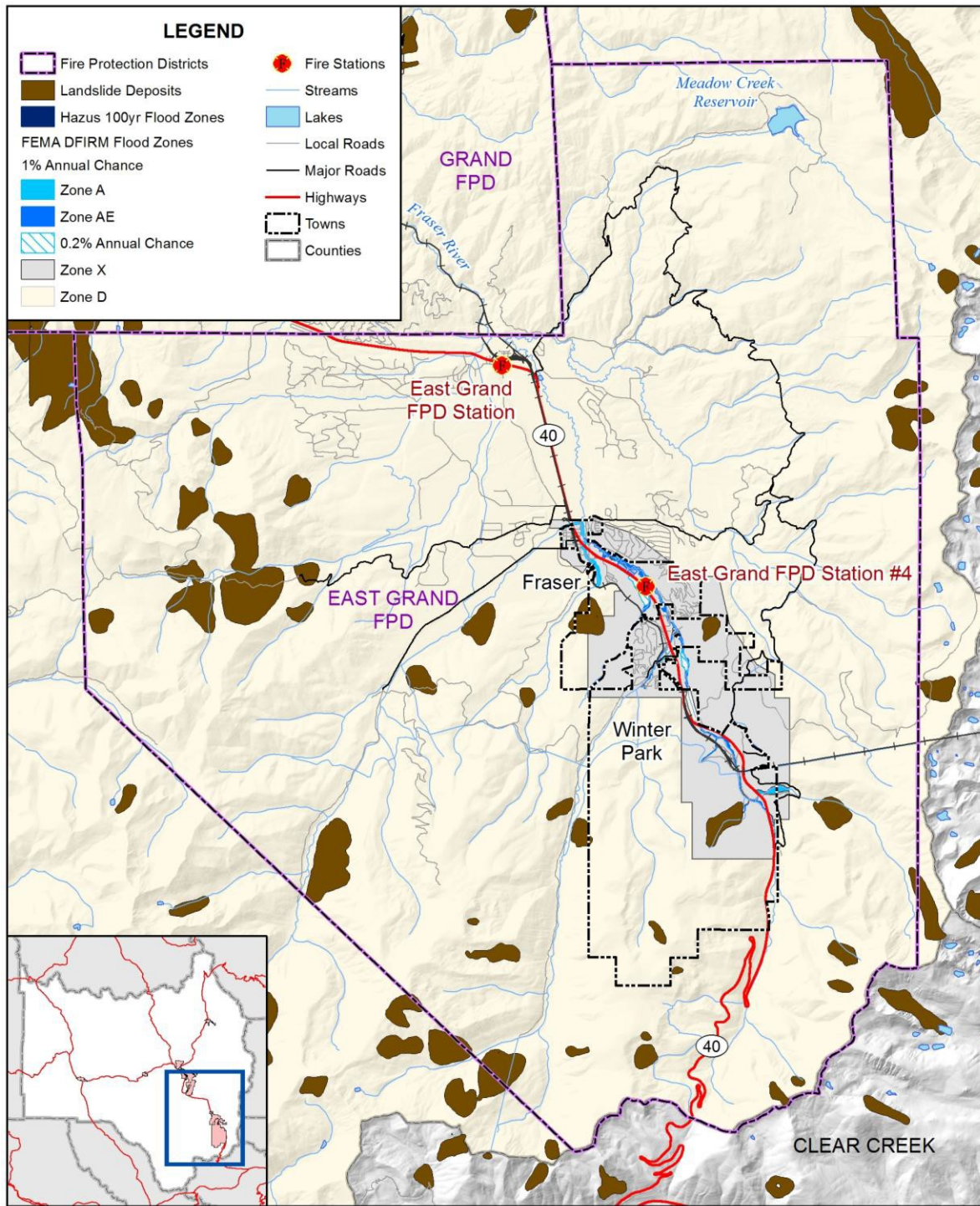
## **Hot Sulphur Springs/Parshall Fire Protection District**

The Hot Sulphur Springs/Parshall Fire Protection District (HSSPPFD) is located in the south-central portion of Grand County. It serves the towns of Hot Sulphur Springs and Parshall. The District's CWPP covers a broader planning area that also includes the northern portion of Copper Creek Subdivision, Aspen Canyon Ranch, Valentine, and the southern portion of the Copper Creek Estates. Since the previous Plan update, the entire Williams Fork Valley, including the Henderson Mill, was added to this District, so an updated map has been added (new area is in yellow).

## **Kremmling Fire Protection District**

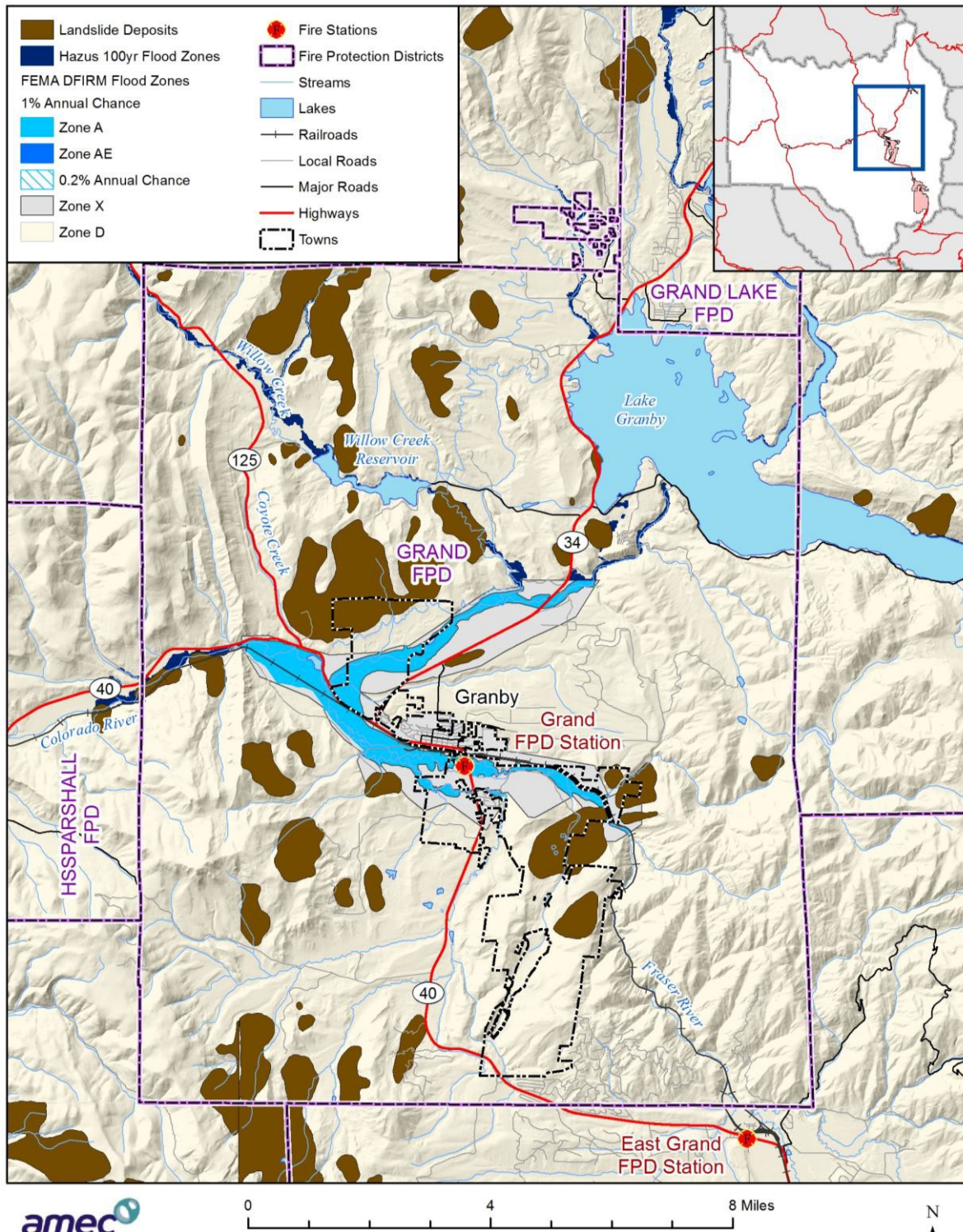
The Kremmling Fire Protection District (Kremmling FPD) is located on Eagle Avenue. There are roughly 15 firefighters in the Kremmling Fire Department at any given time, and the Department is recruiting. Kremmling FPD no longer uses a second fire station.

**Figure H.1. Map of East Grand Fire Protection District**



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT, Hazus-MH MR2,  
 FEMA DIFRM 1/2/2008, Colton/USGS Earth Data Analysis Center

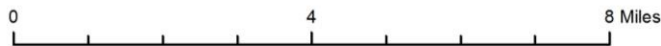
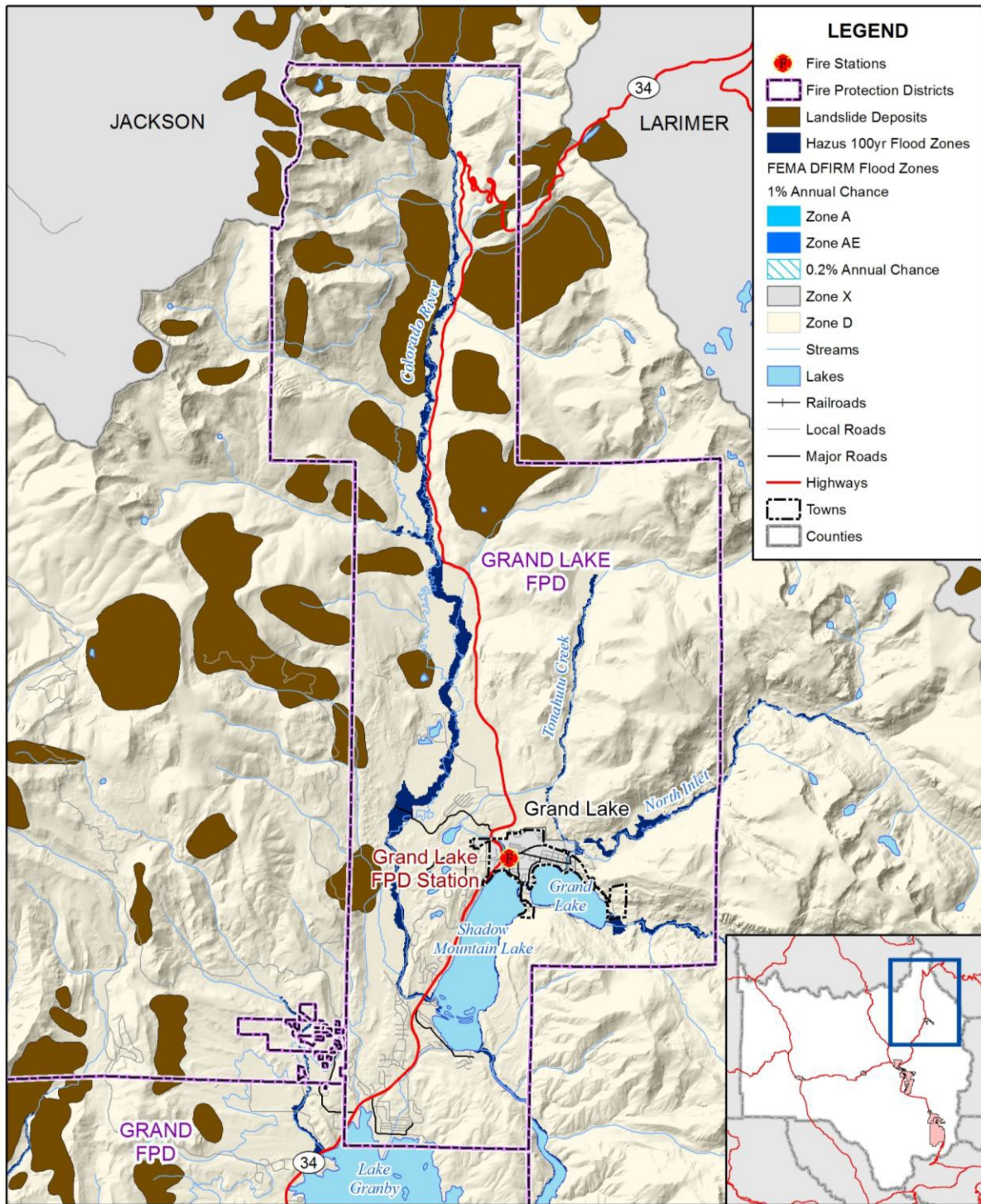
**Figure H.2. Map of Grand Fire Protection District**



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT, Hazus-MH MR2,  
 FEMA DIFRM 1/2/2008, Colton/USGS Earth Data Analysis Center

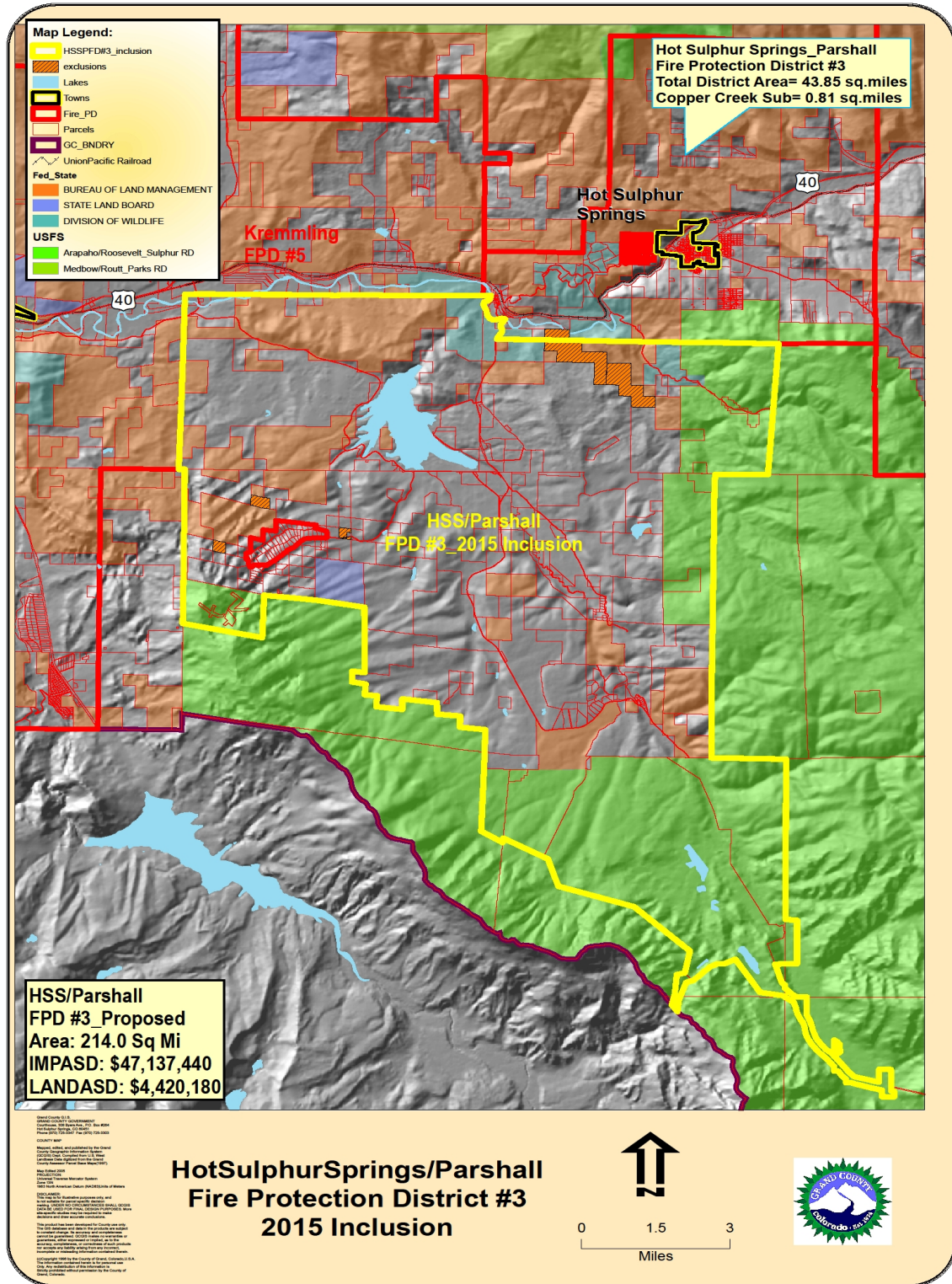


Figure H.3. Map of Grand Lake Fire Protection District



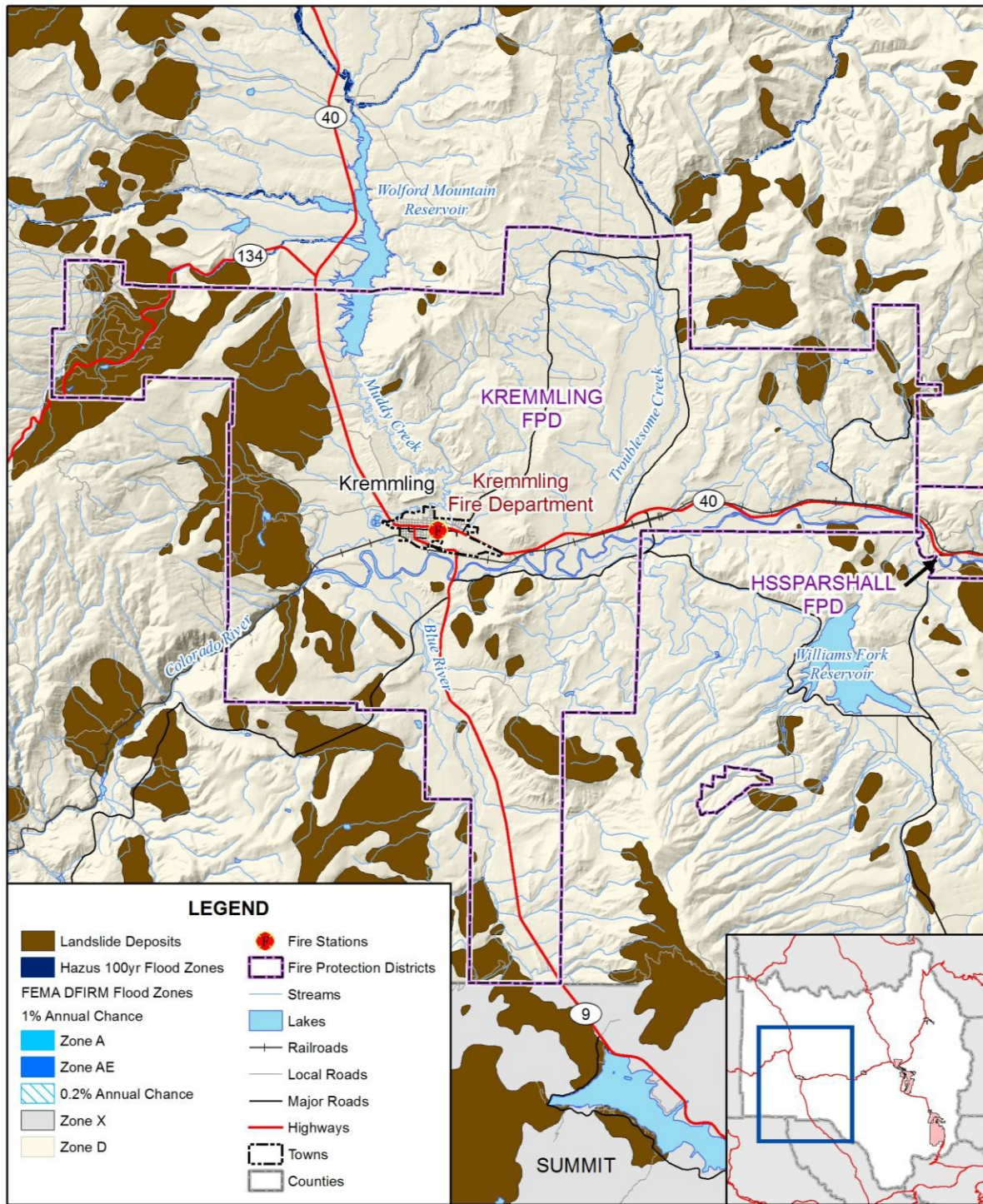
Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT, Hazus-MH MR2,  
 FEMA DIFRM 1/2/2008, Colton/USGS Earth Data Analysis Center

Figure H.4. Map of Hot Sulphur Springs/Parshall Fire Protection District



Map compiled by Grand County GIS Department

**Figure H.5. Map of Kremmling Fire Protection District**



0 5 10 Miles



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT, Hazus-MH MR2,  
 FEMA DIFRM 1/2/2008, Colton/USGS Earth Data Analysis Center

## H.2 Hazard Identification and Profiles

Representatives from each district identified the hazards that affect the districts and summarized their geographic location, probability of future occurrence, potential magnitude or severity, and planning significance (see Table H.1). Magnitude and overall hazard rating are assessed in terms of impacts to the fire protection districts. The five districts profiled in this annex all rated wildfire as their most significant hazard. East Grand FPD and Grand FPD also rated hazardous materials as high.

**Table H.1. Grand County Fire Protection Districts—Hazard Summary**

Hazard Type	Geographic Extent*	Probability*	Magnitude*	Hazard Rating
<b>East Grand FPD</b>				
Avalanche	Isolated	Highly Likely	Critical	Medium
Dam Failure	Small	Unlikely	Limited	Low
Drought	Large	Likely	Limited	Medium
Earthquake	Large	Occasional	Critical	Low
Extreme Temperatures	Large	Highly Likely	Limited	Medium
Flood	Small	Likely	Negligible	Low
Hazardous Materials Release (Transportation)	Medium	Highly Likely	Critical	High
Landslide, Mudflow/Debris Flow, Rock Fall	Small	Likely	Critical	Medium
Lightning	Large	Highly Likely	Limited	Low
Mountain Pine Beetle Infestation				
Severe Winter Weather	Large	Highly Likely	Limited	Medium
Wildfire	Medium	Highly Likely	Critical	High
Wildlife-Vehicle Collisions				
Windstorm	Large	Likely	Limited	Low
<b>Grand FPD</b>				
Avalanche	Isolated	Unlikely	Negligible	Low
Dam Failure	Isolated	Unlikely	Catastrophic	Medium
Drought	Large	Occasional	Limited	Medium
Earthquake	Large	Unlikely	Catastrophic	Low
Extreme Temperatures	Large	Likely	Limited	Medium
Flood	Small	Likely	Limited	Low
Hazardous Materials Release (Transportation)	Medium	Highly Likely	Critical	High
Landslide, Mudflow/Debris Flow, Rock Fall	Isolated	Occasional	Negligible	Low
Lightning	Large	Likely	Limited	Low
Mountain Pine Beetle Infestation				
Severe Winter Weather	Large	Highly Likely	Limited	Medium
Wildfire	Large	Highly Likely	Catastrophic	High
Wildlife-Vehicle Collisions				
Windstorm	Large	Highly Likely	Limited	Medium

Hazard Type	Geographic Extent*	Probability*	Magnitude*	Hazard Rating
<b>Grand Lake FPD</b>				
Avalanche	Isolated	Likely	Limited	Medium
Dam Failure	Isolated	Unlikely	Negligible	Low
Drought	Large	Occasional	Limited	Low
Earthquake	Large	Unlikely	Catastrophic	Low
Extreme Temperatures	Large	Likely	Limited	Medium
Flood	Small	Likely	Limited	Medium
Hazardous Materials Release (Transportation)	Isolated	Occasional	Negligible	Low
Landslide, Mudflow/Debris Flow, Rock Fall	Small	Occasional	Negligible	Low
Lightning	Large	Likely	Limited	Low
Mountain Pine Beetle Infestation				
Severe Winter Weather	Large	Highly Likely	Critical	Medium
Wildfire	Large	Highly Likely	Catastrophic	High
Wildlife-Vehicle Collisions				
Windstorm	Large	Highly Likely	Negligible	Medium
<b>HSSFPD</b>				
Avalanche	Isolated	Likely	Limited	Low
Dam Failure	Medium	Occasional	Critical	Medium
Disease Outbreak	Large	Likely	Variable	High
Drought	Large	Highly likely	Critical	Medium
Earthquake	Isolated	Occasional	Limited/ Negligible	Low
Flood	Medium	Occasional/ Likely	Critical	Medium
Hazardous Materials (Transportation)	Isolated	Likely	Limited	Low
Landslide, Mudflow/Debris Flow, and Rockfall	Isolated	Likely	Limited	Medium
Lightning	Isolated	Occasional	Limited	Low
Mountain Pine Beetle Infestation	Large	Occasional	Limited	Medium
Severe Winter Weather	Large	Highly likely	Critical	High
Wildfire	Large	Highly likely	Catastrophic	High
Wildlife-Vehicle Collisions	Isolated	Highly Likely	Negligible	Medium
Windstorm	Large	Likely	Limited	Low
<b>Kremmling FPD</b>				
Avalanche	Isolated	Unlikely	Negligible	Low
Dam Failure	Large	Unlikely	Catastrophic	High
Disease Outbreak	Large	Likely	Variable	High
Drought	Large	Occasional	Limited	High
Earthquake	Large	Unlikely	Limited	Medium
Flood	Isolated	Likely	Limited	Medium
Hazardous Materials (Transportation)	Large	Occasional	Critical	High
Landslide, Mudflow/Debris Flow, and Rockfall	Isolated	Unlikely	Negligible	Low
Lightning	Medium	Likely	Critical	Medium

Hazard Type	Geographic Extent*	Probability*	Magnitude*	Hazard Rating
Mountain Pine Beetle Infestation	Large	Occasional	Limited	Medium
Severe Winter Weather	Large	Highly Likely	Limited	High
Wildfire	Small	Highly Likely	Limited	Medium
Wildlife-Vehicle Collisions	Isolated	Highly Likely	Variable	High
Windstorm	Large	Occasional	Limited	Medium

\*See Section 3.2 for definitions of these factors

Information on past events for each hazard can be found in Section 3.2 Hazard Profiles of the main plan.

### H.3 Vulnerability Assessment

The intent of this section is to assess the vulnerability of the fire protection districts separate from that of the planning area as a whole, which has already been assessed in Section 3.3 Vulnerability Assessment in the main plan. For the Districts' purposes, wildfire is the hazard that varies from other parts of the planning area, and for which the Districts have responsibilities. For more information on property values in wildfire threat zones, please refer to the Property in Wildfire Threat Zones by District section below.

#### District Asset Inventory

Table H.2 shows the number of structures and assessed values to parcels in the 5 fire protection districts. Land values have been purposely excluded from the Total Value 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 H.2. Building Exposure Abstract by Fire Protection District**

East Grand FPD				
Land Use	Occurs	Taxable	Actual	Acres
Agricultural	520	\$1,056,440	\$3,638,710	21,105.52
Commercial Property	611	\$50,992,820	\$175,837,260	368.554
Industrial	3	\$96,820	\$333,880	10.97
Natural Resources	6	\$236,970	\$817,120	794.73
Residential Property	11,006	\$256,907,320	3,593,062,370	5,968.82
Tax Exempt	595	\$53,631,260	\$194,318,090	112,935.21
Vacant Land	1,392	\$37,797,890	\$130,335,280	3602.748
<b>Total</b>	<b>14133</b>	<b>\$400,719,520</b>	<b>\$4,098,342,710</b>	<b>144,786.54</b>

Figures in these 5 tables courtesy of Grand County Assessor June, 2020

<b>Grand FPD</b>				
Land Use	Occurs	Taxable	Actual	Acres
Agricultural	849	\$1,949,330	\$6,721,080	36,104.27
Commercial Property	665	\$25,257,170	\$87,093,660	666.298
Industrial	4	\$251,860	\$868,490	122.09
Natural Resources	20	\$243,590	\$839,900	1,973.94
Residential Property	7,143	\$102,425,880	1,432,513,250	6,818.42
Tax Exempt	581	\$18,499,980	\$66,445,960	36,182.03
Vacant Land	2,450	\$25,910,280	\$89,343,070	6,120,458
<b>Total</b>	<b>11712</b>	<b>\$174,538,090</b>	<b>\$1,683,825,410</b>	<b>6,202,325.06</b>

<b>Grand Lake FPD</b>				
Land Use	Occurs	Taxable	Actual	Acres
Agricultural	108	\$288,750	\$995,710	2,452.51
Commercial Property	376	\$15,657,770	\$53,991,600	87.536
Industrial	0	\$0	\$0	0
Natural Resources	0	\$0	\$0	0.00
Residential Property	6,584	\$114,505,780	1,601,450,920	2,859.39
Tax Exempt	170	\$5,373,700	\$18,612,580	26,672.75
Vacant Land	936	\$21,590,590	\$74,446,770	1,098
<b>Total</b>	<b>8174</b>	<b>\$157,416,590</b>	<b>\$1,749,497,580</b>	<b>33,170.03</b>

<b>Hot Sulphur Springs/Parshall FPD</b>				
Land Use	Occurs	Taxable	Actual	Acres
Agricultural	450	\$1,680,640	\$5,794,980	43,047.23
Commercial Property	88	\$3,813,720	\$13,150,610	313.299
Industrial	2	\$15,942,810	\$54,975,230	0
Natural Resources	3	\$5,900	\$20,330	216.05
Residential Property	1,006	\$10,318,870	144,316,100	2,862.59
Tax Exempt	236	\$3,872,190	\$14,054,460	54,351.92
Vacant Land	256	\$2,630,780	\$9,071,570	1,498
<b>Total</b>	<b>2041</b>	<b>\$38,264,910</b>	<b>\$241,383,280</b>	<b>102,288.73</b>

<b>Kremmling FPD</b>				
Land Use	Occurs	Taxable	Actual	Acres
Agricultural	396	\$2,531,050	\$8,727,610	43,958.69
Commercial Property	244	\$7,635,740	\$26,330,070	127.22
Industrial	10	\$545,920	\$1,882,420	54.96
Natural Resources	11	\$68,420	\$235,920	1,489.70
Residential Property	2,260	\$22,948,770	320,946,050	2,735.19
Tax Exempt	174	\$3,705,400	\$13,209,160	53,320.50
Vacant Land	409	\$5,631,430	\$19,417,600	1,739
<b>Total</b>	<b>3504</b>	<b>\$43,066,730</b>	<b>\$390,748,830</b>	<b>103,425.44</b>

Source: Grand County Assessor 2020

\*Content Value estimated; \*\* Improvements and Contents

Table H.3 lists critical facilities and other community assets identified by the five fire protection districts as important to protect in the event of a disaster.

**Table H.3. Critical Facilities and Other Community Assets**

Name of Asset	Type	Replacement Value (\$)	Hazard Specific Issues
<b>East Grand FPD</b>			
Winter Park Resort	EA	Unknown	Drought, wildfire, wind
Fraser Safeway	EA/EF	Unknown	Flooding
East Grand School	LS	Unknown	Extreme temperatures
Fraser Substation	EF	Unknown	High winds
Union Pacific Railroad	EA	Unknown	Landslides, flooding
Gas Transmission Line	LL	Unknown	Landslides
DWB Water Collection	EA	Unknown	Flooding, wildfire
<b>Grand FPD</b>			
Granby Fire	EF	\$5 million	Fire, flood
Town Hall	EF	\$3 million	
Water Treatment Plant	LL	\$6-7 million	Flood, hazmat
Sewer Plant	LL	\$6 million	Flood
Windy Gap Power Substation	LL	\$4 million	Fire
Cell and Radio Towers (fire, police)	EF	\$2 million	Fire
<b>Grand Lake FPD</b>			
Grand Lake Fire Station	EF	\$4 million	
Town Hall	EF	\$2 million	Wildfire
Water Treatment Plant	LL	\$1 million	Wildfire
McKenzie Substation	LL	\$2 million	Wildfire
Verizon Cell Tower	LL	\$1 million	Wildfire



Name of Asset	Type	Replacement Value (\$)	Hazard Specific Issues
Rocky Mountain National Park Visitors Center	EA	\$3 million	Wildfire
<b>HSSPPD</b>			
Grand County Sheriff's Dept.	LS	\$8,900,000	
Hot Sulphur Springs Fire Dept.	LS	\$1,000,000	
Hot Sulphur Springs Water Plant	LL	\$2,200,000	
Hot Sulphur Springs Water Storage Tanks	LL	\$500,000	
Grand County Administrative Blvd.	EF	\$11,500,000	
Grand County Judicial Center	EF	\$9,500,000	
Grand County Public & Home Health Offices	EF	\$355,000	
Grand County Rural Health Non-Profit	EF	\$334,000	
Grand County Public Health Nurse Office	EF	\$240,000	
Heart of the Mountains Hospice	EF	\$240,000	
Grand County Dept. of Social Services	EF	\$389,000	
Mountain Family Center	EF	\$238,000	
Hot Sulphur Springs Town Hall**			
Grand County Courthouse**			
<b>Kremmling FPD</b>			
Water Plant	LL	\$4 million	Chlorine in storage
Water Storage Tanks	LL	\$2.5 million	
Maintenance Shop and Equipment	EF	\$3 million	Diesel fuel, acetylene tanks
Police Station	EF	\$1 million	
Fire Station	EF	\$5 million	
Wastewater Plant	EF	\$4 million	
Middle Park Hospital	EF	\$10 million	
West Grand Elementary School	EF	\$10 million	
West Grand High School	EF	\$10 million	
Airport	LL	\$30 million	Jet fuel tanks
Colorado River Pumping Station	LL	\$5 million	
Silver Spruce Senior Apartments	LL	\$5 million	
Cliff View Assisted Living	LL	\$5 million	
Grand County EMS**			
Faith in Action Christian School**			
Galloway Inc.**			

Source: East Grand FPD, Grand FPD, Grand Lake FPD, Town of Hot Sulphur Springs, Town of Kremmling

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

\*\*Identified separately by Grand County OEM

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Other areas of concern include the protection of critical watershed areas for the Upper Colorado River. The *Upper Colorado Headwaters Wildfire/Watershed Assessment* identifies several “Zones of Concern” in the watershed that fall within the fire protection district boundaries. The report “is designed to identify and prioritize sixth-level watersheds based upon their hazards of generating flooding, debris flows, and increased sediment yields following wildfires that could have impacts on water supplies. It is intended to expand upon current wildfire hazard reduction efforts by including water supply watersheds as a community value” (pg. 1). While the fire protection districts were not specifically identified as stakeholders in this report, their fuels treatments and wildfire mitigation activities are related to the goals of the assessment.

## **Vulnerability by Hazard**

This section analyzes existing and future structures and other assets at risk to hazards ranked of moderate or high significance that vary from the risks facing the entire planning area and estimates potential losses. For the Districts’ purposes, wildfire is the hazard that varies from other parts of the planning area, and for which the Districts have responsibility.

### **Wildfire**

#### ***Existing Development***

Based on the methodology described for wildfire in Section 3.3.3 Vulnerability by Hazard using the SILVIS threat zones, the property at risk within the fire protection districts were aggregated by wildfire threat zones. The breakdown of property types and values in each District by wildfire threat zone is shown in Table H.4. Figures H.6 through H.10 show the wildfire intensity in East Grand FPD, Grand FPD, Grand Lake BFPD, HSSPPFD, and Kremmling FPD respectively. Figures H.11 through H.15 show the wildfire treatment areas in the five fire protection districts.

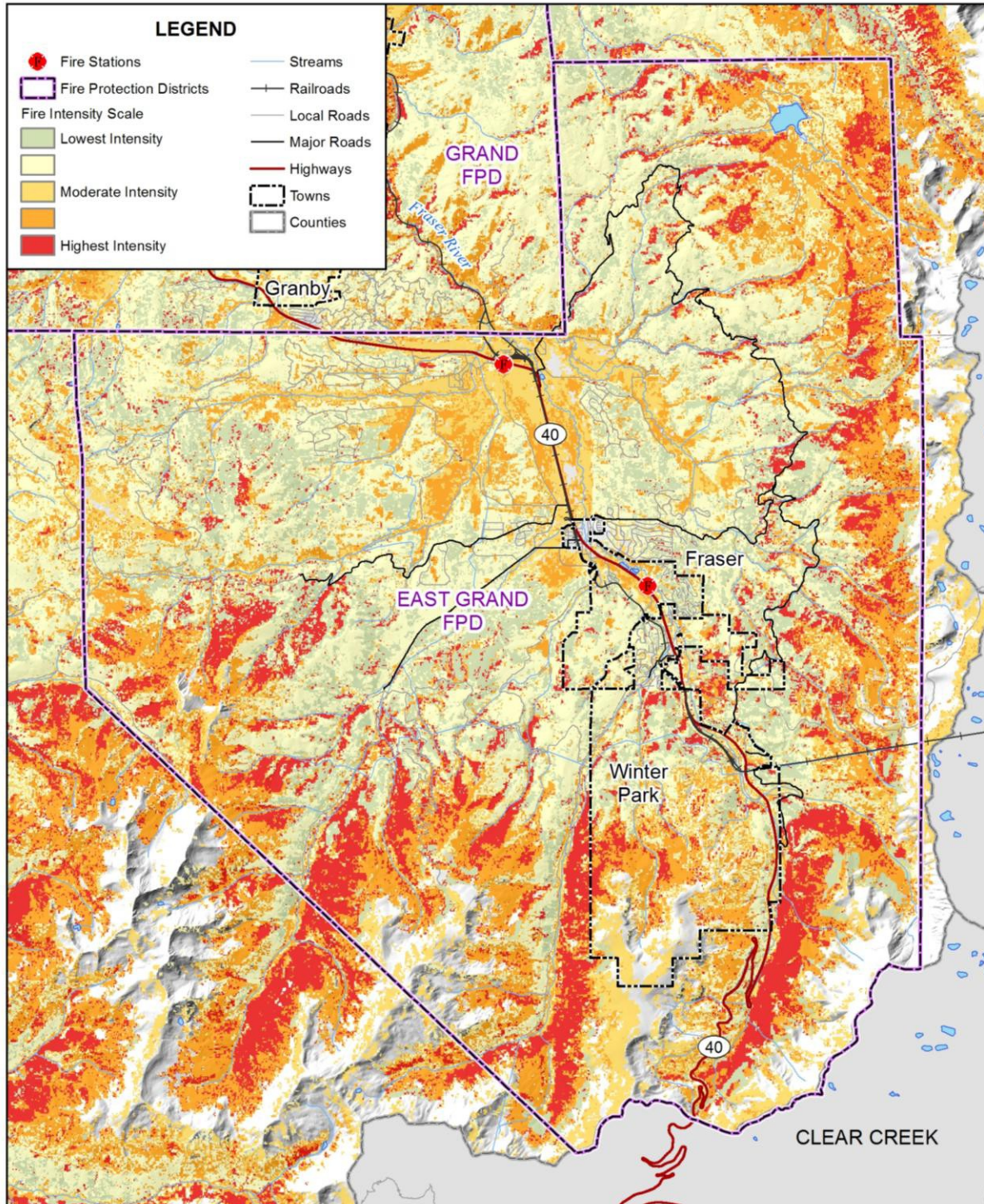
#### **Property in Wildfire Threat Zones by District**

Currently Grand County has approximately 202.7 square miles of areas designated as medium risk or higher by the various CWPP’s. Of that over 145 is designated as high risk or higher and constitutes 2.1 billion in built property values threatened. Total built property value of the areas designated medium or higher is 4.8 billion. The built property value consists of 7347 structures in the medium risk areas and 5493 structures in the High risk and above zones.

East Grand FPD has the most total exposure in medium and high wildfire threat areas, followed by Grand Lake FPD. In all five fire districts, residential improved parcels make up the majority of total exposure. East Grand FPD also has the most people at risk with an estimated 2019 combined population of Fraser and Winter Park being 2,416. Keep in mind that a good portion of these homes are seasonal or second homes.

So as not to duplicate pages in this Plan, values and maps can be found in the **Fire** section under County Fire Risk Zones and Critical Infrastructure.

**Figure H.6. Wildfire Intensity in East Grand FPD**

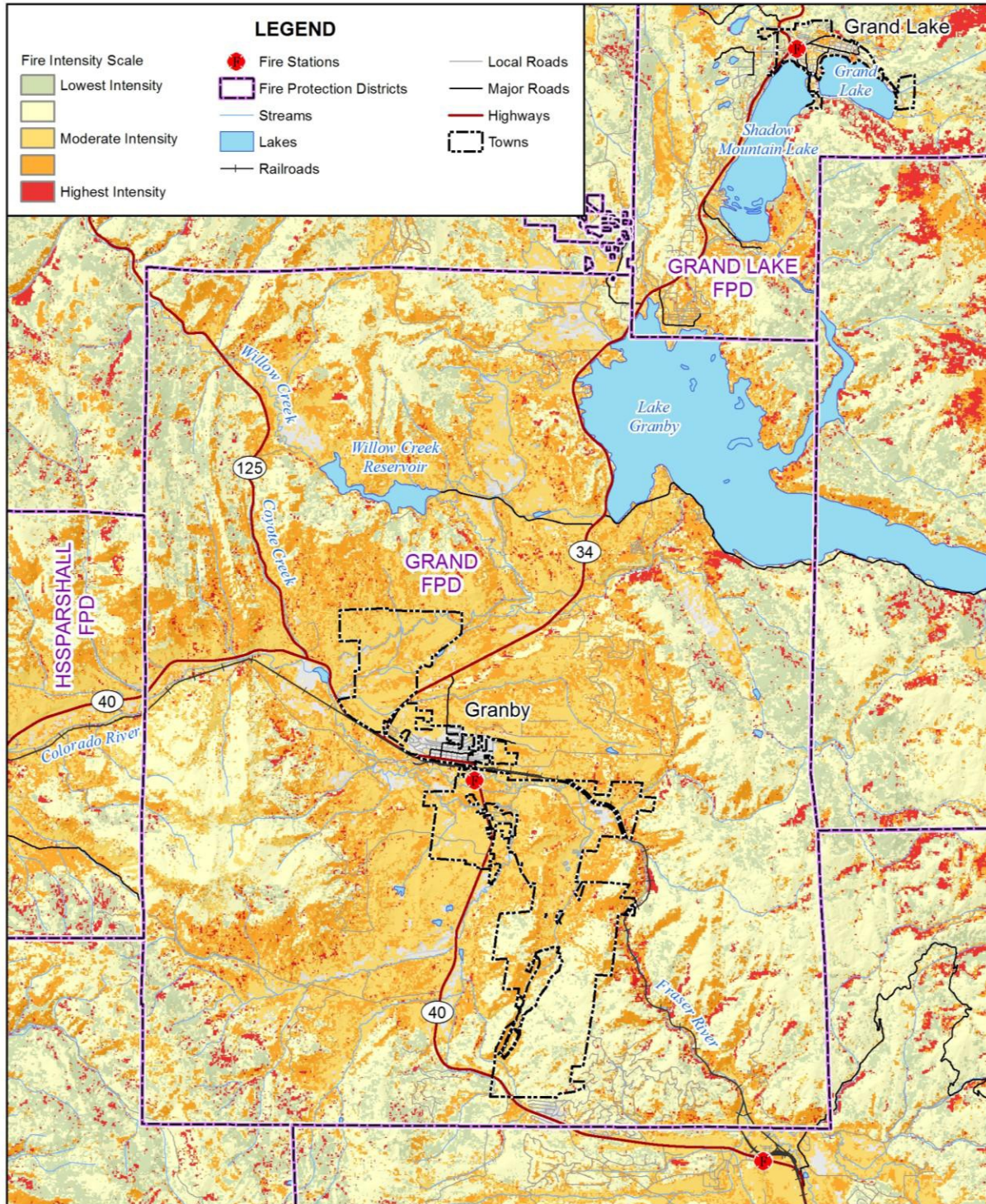


0 4 8 Miles



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT,  
 Colorado State Forest Service: CO-WRAP

**Figure H.7. Wildfire Intensity in Grand FPD**

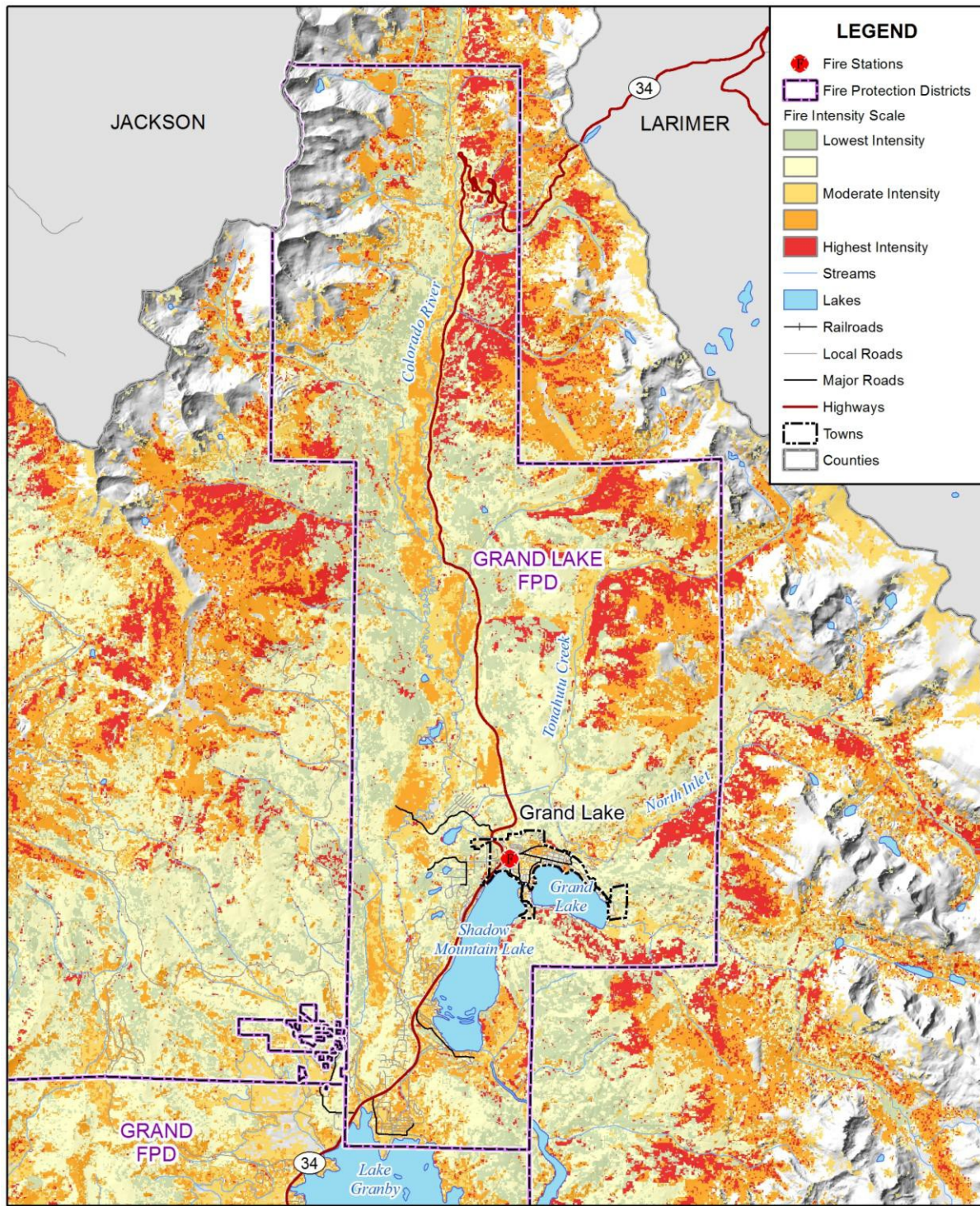


0 4 8 Miles



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT,  
 Colorado State Forest Service: CO-WRAP

**Figure H.8. Wildfire Intensity in Grand Lake FPD**

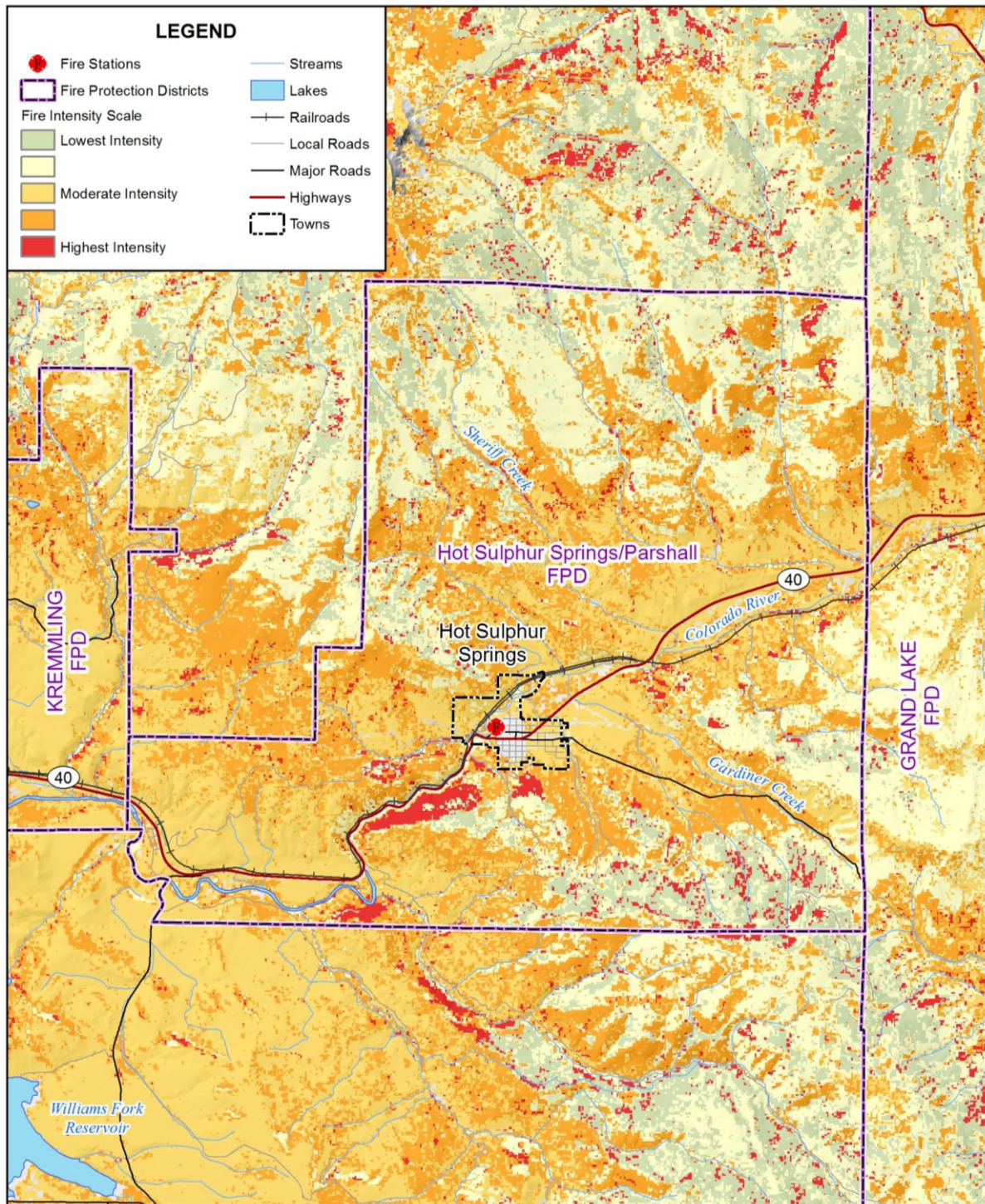


0 4 8 Miles



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT,  
 Colorado State Forest Service: CO-WRAP

**Figure H.9. Wildfire Intensity in HSSPFPD**

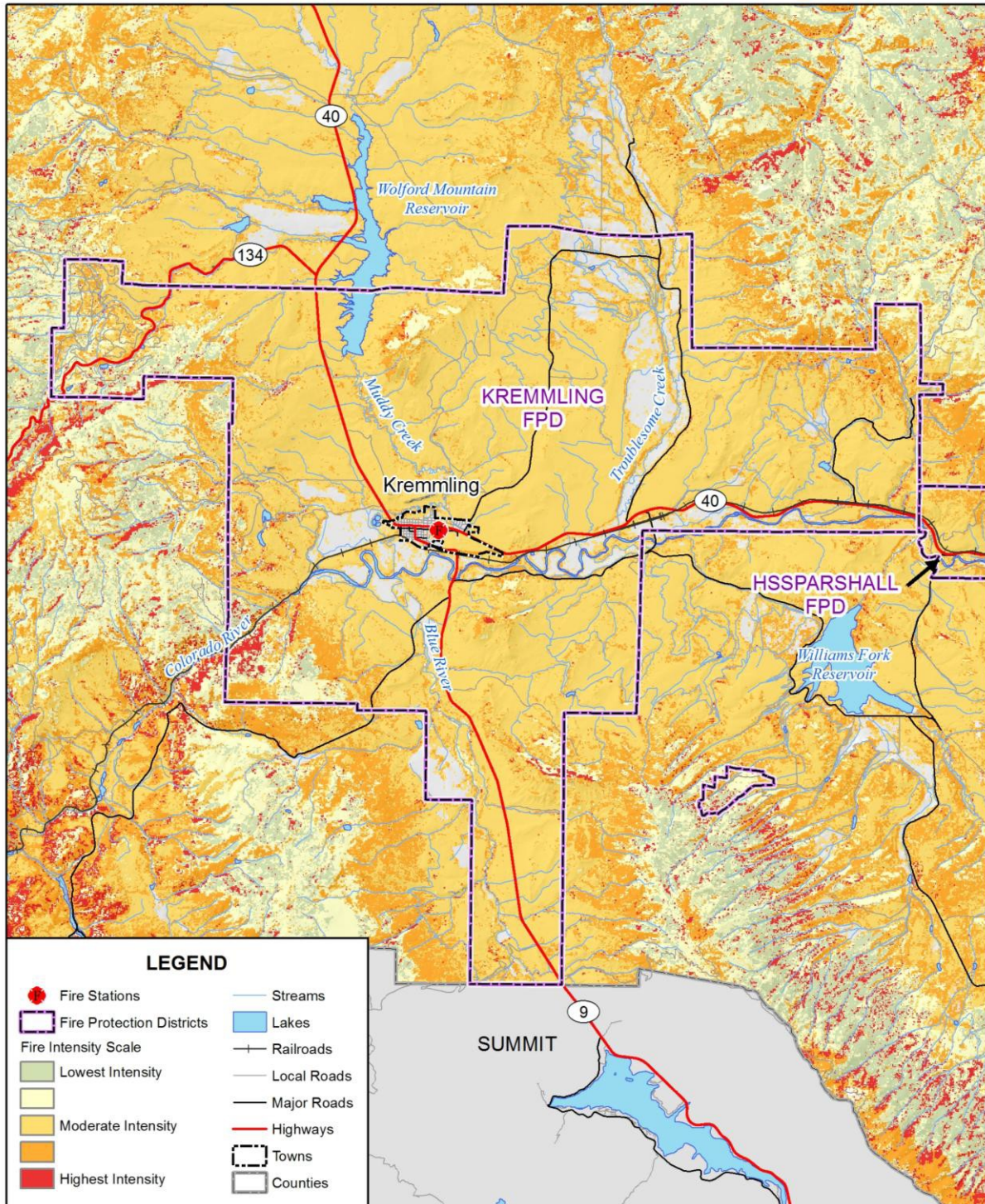


0 2.5 5 Miles



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT,  
 Colorado State Forest Service: CO-WRAP

Figure H.10. Wildfire Intensity in Kremmling FPD

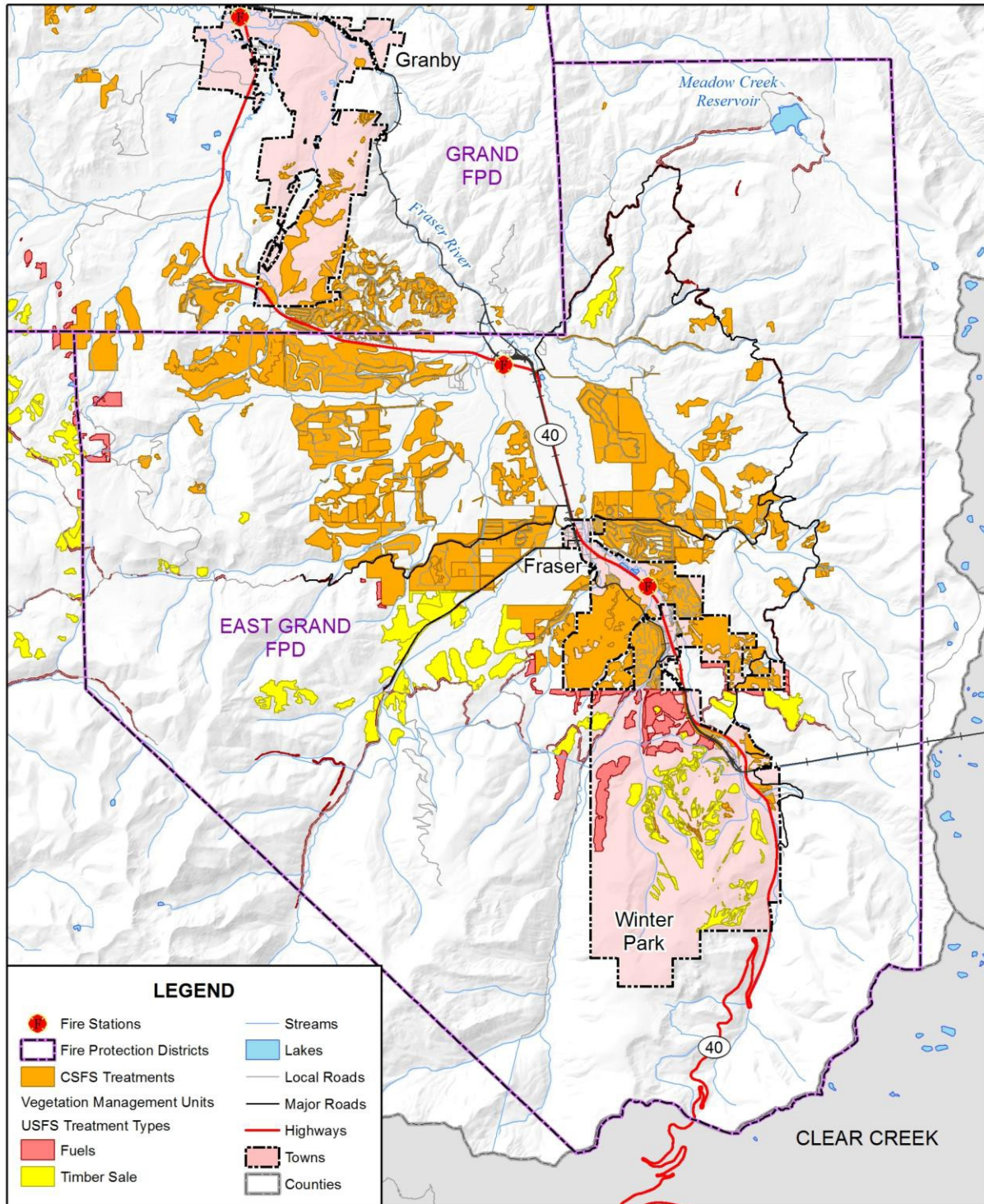


0 5 10 Miles



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT,  
 Colorado State Forest Service: CO-WRAP

**Figure H.11. Wildfire Treatment Areas in East Grand FPD**



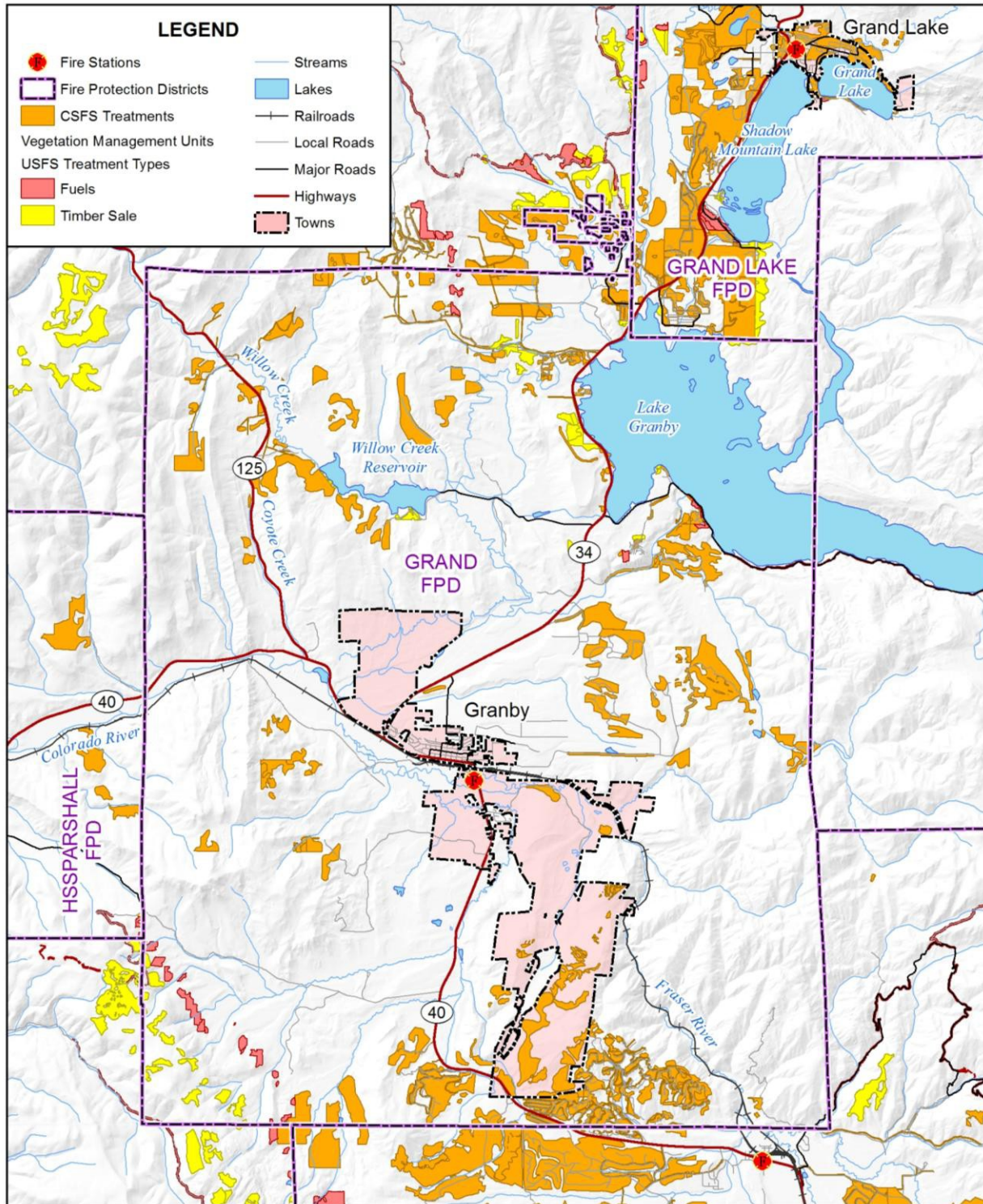
0 4 8 Miles



Map compiled 8/2013; intended for planning purposes only.  
Data Source: Grand County, CDOT, CSFS, USFS (2013)



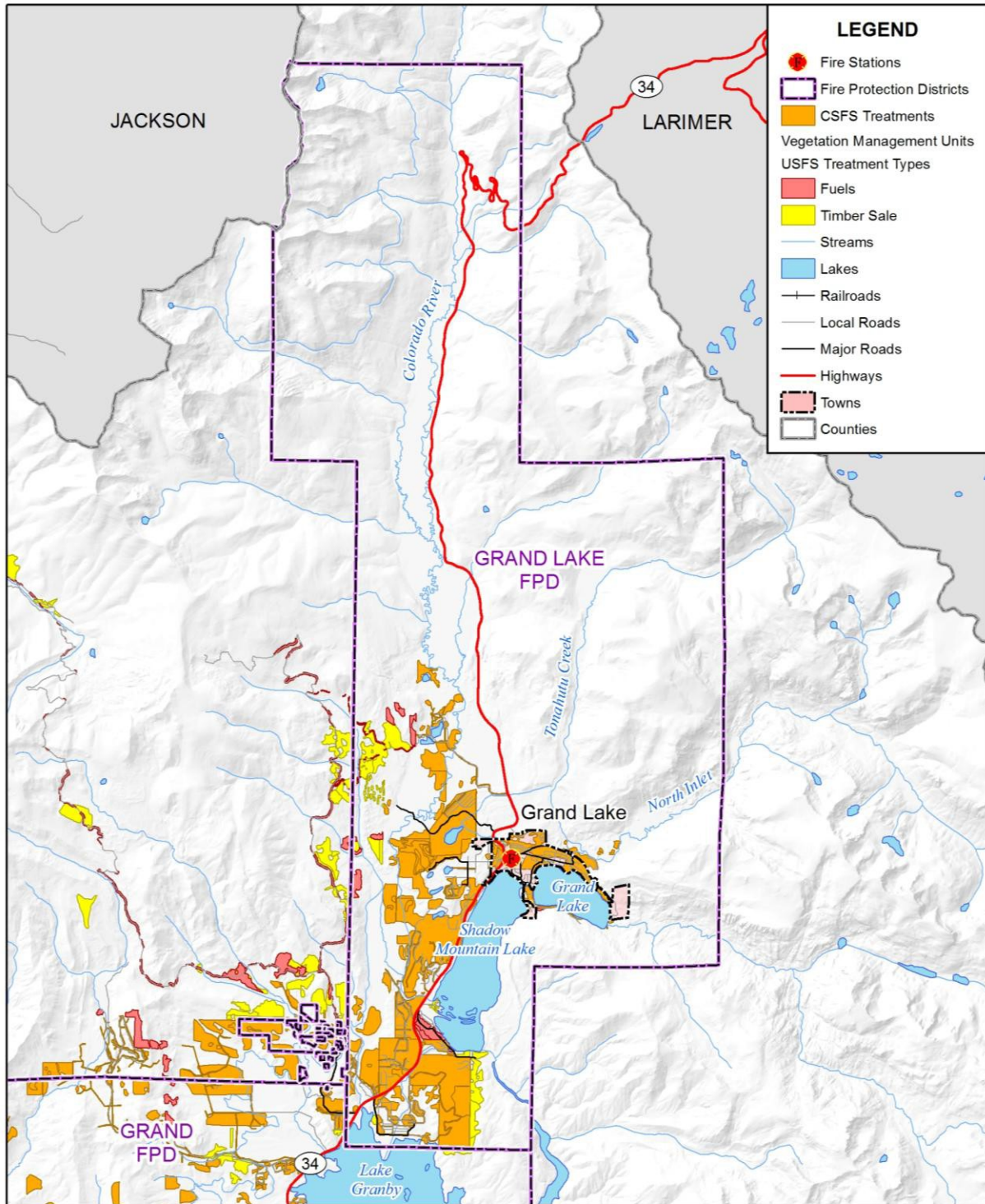
**Figure H.12. Wildfire Treatment Areas in Grand FPD**



Map compiled 8/2013; intended for planning purposes only.  
Data Source: Grand County, CDOT, CSFS, USFS (2013)



**Figure H.13. Wildfire Treatment Areas in Grand Lake FPD**

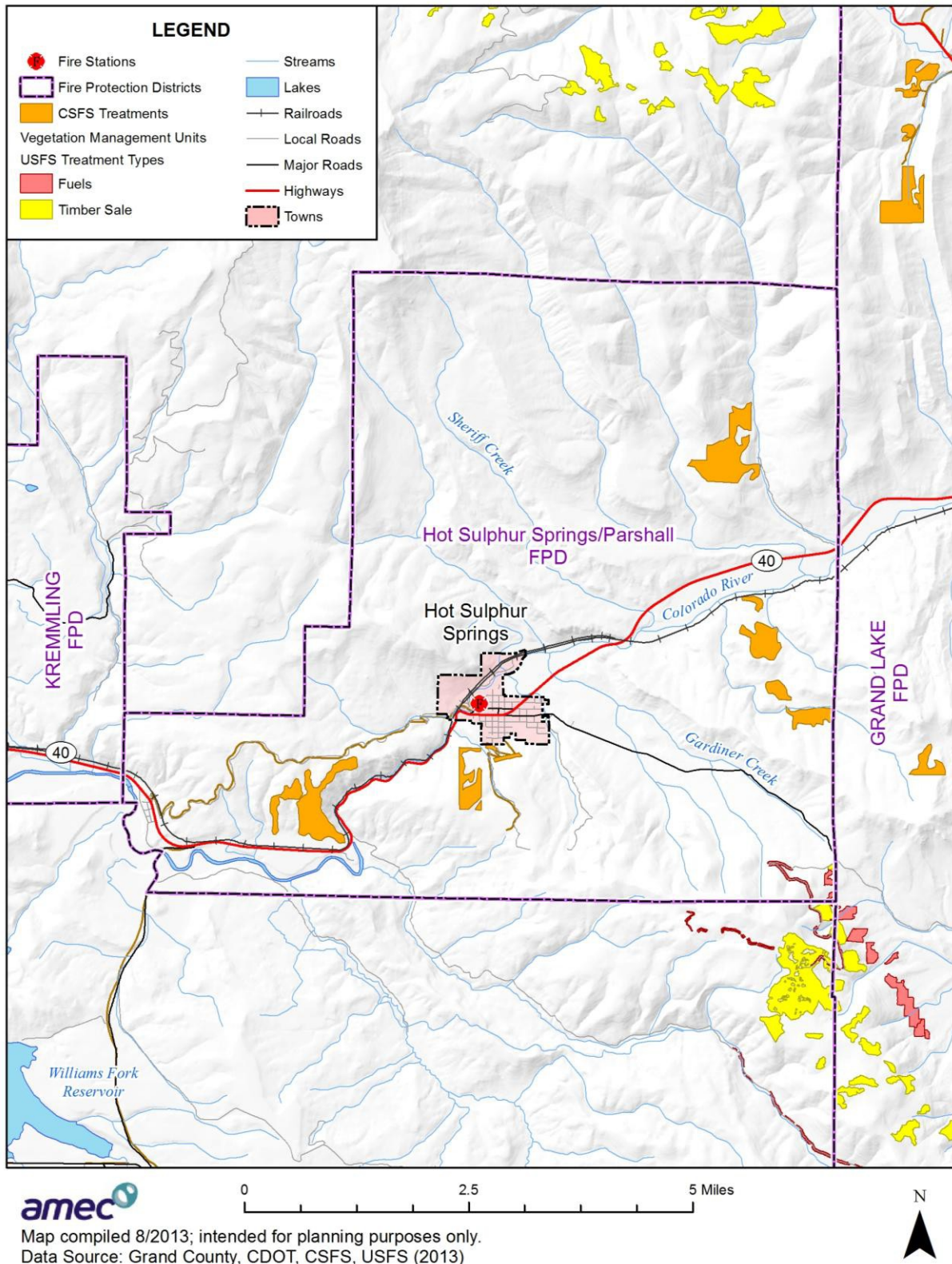


0 4 8 Miles

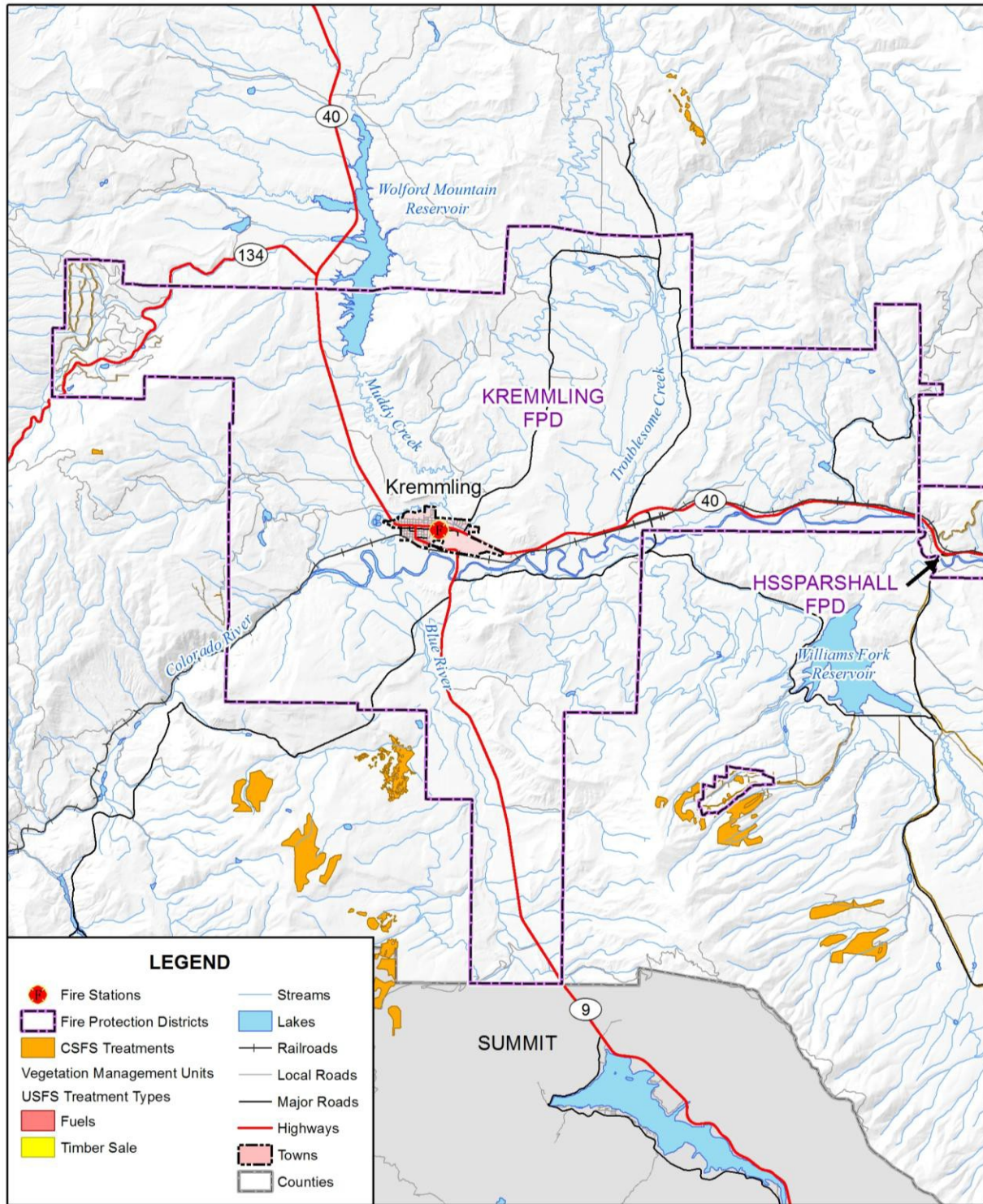


Map compiled 8/2013; intended for planning purposes only.  
Data Source: Grand County, CDOT, CSFS, USFS (2013)

**Figure H.14. Wildfire Treatment Areas in HSSPFPD**



**Figure H.15. Wildfire Treatment Areas in Kremmling FPD**



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT, CSFS, USFS (2013)



### ***Future Development***

Residential development continues to occur in the wildland-urban interface where limited access, lack of a central water supply with fire hydrants, and longer response times elevate the risk associated with the a wildfire event. Development in wildland-urban interface areas is regulated through the building code and land use planning policies of the jurisdiction in which the development is located.

### **Other Hazards**

The Districts are also affected by other hazards that exacerbate wildfire hazard conditions, such as drought, lightning, and windstorms. In addition, lands damaged by wildfire are subject to increased runoff and erosion as well as landslides, mudslides/debris flows, and rock fall.

### **Growth and Development Trends**

Residential development is likely to continue to occur in the wildland-urban interface in both districts. Increasing population also increases the likelihood of a human-caused fire or natural fire forcing the community to evacuate. In the East Grand FPD service area, development is mostly occurring on the Fraser Valley floor (private). All development on the Valley floor is susceptible to wildfire, high winds, winter storms, and extreme temperatures. Some areas outside of the Valley floor are susceptible to flooding and landslides. People who live in more isolated areas of the County can be difficult to locate and assist.

## **H.4 Capability Assessment**

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Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. The capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, and mitigation outreach and partnerships.

### **Regulatory Mitigation Capabilities**

Regulatory mitigation capabilities include the planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities. The fire protection districts are governed under the policies and programs of Grand County, including its building codes and land use planning. In 2018, the Grand County Fire Chiefs and Grand County adopted the 2015 International Fire Code. It was also adopted among the towns, except for Kremmling. The fire districts support programs such as Firewise, Ready, Set, Go, and Community Chipping Days.

East Grand FPD has an Insurance Services Office (ISO) rating of 3 for areas with credible water supplies and class 4 for areas where the fire department has to supply the water. Also, an ISO rating of 10 for rural areas outside of the five mile radius.

Grand FPD has an ISO Class 3/5 rating within 5 miles of a station and 1000 feet of water, and within 5 miles but no water.

Grand Lake FPD has an ISO Class 4 designation district-wide.

Hot Sulphur Springs Parshall FPD has an ISO rating of 4 in the town of Hot Sulphur, a rating of 8 in the Town of Parshall, and an 8b outside of the 5-mile radius of their fire stations.

Kremmling FPD has an ISO 4 rating in the Town of Kremmling, and a 4X for areas beyond 5 miles out of the Town.

For other regulatory mitigation capabilities, all five FPDs primarily rely on the County or the Towns within their districts.

## **Administrative/Technical Mitigation Capabilities**

The Districts work with Grand County departments of engineering, emergency management, and GIS on activities related to hazard mitigation and loss prevention. The FPDs rely on the County or towns within their districts for other administrative/technical mitigation capabilities.

## **Fiscal Mitigation Capabilities**

The fire protection districts are funded through property taxes. Fiscal mitigation capabilities are financial tools or resources that the fire protection districts could or already do use to help fund mitigation activities. These include the following:

- IGA Impact Fees
- Community assistance grants administered by BLM
- CSFS grants

## Mitigation Outreach and Partnerships

Mitigation related activities for each district include the following:

### East Grand Fire Protection District

- Auto Aid Agreement with Granby Fire Protection District #1
- Mutual Aid Agreement with all Grand County fire protection districts, Clear Creek CO Emerg. Service District, and NW Colorado I-70 Corridor
- Intergovernmental Agreement with Grand County Emerg. Telephone Service Authority
- IGA with Grand County Dispatch Center, EMS and Search and Rescue
- IGA Mechanics Agreement with Snake River Fire Department
- East Grand FPD puts on various school programs on fire safety/smoke/CO detectors.
- Pole Creek Meadows is a certified FireWise community. Also, Fairways at Pole Creek Homeowners Association, Reserve at Elkhorn Ridge, and the Valley at Winter Park.
- East Grand FPD participated in the development of the Upper Fraser Valley Community Wildfire Protection Plan (2007).

### Grand Fire Protection District

- Received funding from BLM to form the Grand County Wildfire Council.
- Certified Winter Park Highlands HOA and CSFS as a FireWise community. Also, Ten Mile Creek HOA, Homestead Hills HOA, and Shadow Mountain Ranch.
- Ongoing wildfire education
- Annual open house for general fire safety
- Promoting National Fire Prevention Week each October at schools and day cares
- Commercial fire safety inspections
- Grand FPD participated in the development of the Grand FPD Community Wildfire Protection Plan (2009).

### Grand Lake Fire Protection District

- Community Wildfire Readiness
- Ongoing wildfire education workshops
- Open house/BBQ each October as part of National Fire Prevention Week
- Fire prevention business inspections
- Defensible space site surveys (free)
- Wildland Deployment Program to assist other districts
- Mountain Shadow Estates is a certified FireWise community.
- Grand Lake FPD participated in the development of the Grand Lake FPD Community Wildfire Protection Plan (2006).

## Hot Sulphur Springs/Parshall Fire Protection District

The following education and outreach actions are listed in the HSSP FPD CWPP:

- Issue press releases in the spring and fall to be carried in the local paper informing their readers about the importance of making their properties fire safe and promoting FireWise.
- Send direct mailings to all residents in Copper Creek Estates, the Williams Fork Valley, Sheriff Creek, and other remote areas about the importance of signing up for CodeRed. Include information about FireWise in the mailing, as well.
- As part of Fire Prevention Week activities in schools, distribute FireWise promotional materials. This activity could take on an interagency flavor and involve the BLM, CSFS, USFS, and other local fire protection districts.
- Utilizes a large highway message board during hunting season to inform area visitors of the fire danger and/or to call attention to CodeRed.

## Kremmling Fire Protection District

- Fire safety programs are given at Kremmling schools
- Gorewood is a certified FireWise community.
- Kremmling FPD participated in the development of the Kremmling FPD Community Wildfire Protection Plan.

The following education and outreach actions are listed in the Kremmling CWPP:

- Establish a fire safe council or fire mitigation group.
- Educate citizens on the proper escape routes and evacuation centers to use in the event of an evacuation. This also applies to animal rescue.
- Create an evacuation plan that is presented and distributed to residents.
- Develop fire safety brochures that can be distributed and made available to guests in the summer months.
- Participate in the Ready, Set, Go! Program

## H.5 Mitigation Goals and Objectives

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Each of the fire protection districts adopts the hazard mitigation goals and objectives developed by the Hazard Mitigation Planning Committee and described in Chapter 4 Mitigation Strategy.

## H.6 Mitigation Actions

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Each of the fire protection districts identified and prioritized the following mitigation actions based on the risk assessment. The districts also participate in several multi-jurisdictional mitigation actions detailed in Chapter 4 Mitigation Strategy, including *‘Develop and implement fuel-reduction projects’* and *‘Complete defensible space projects around all built-up areas.’* Many of the details on these projects are listed in the CWPPs. Background information on how each action will be implemented and administered, such as ideas for implementation, responsible agency, potential funding, estimated cost, and timeline also are included.

**Mitigation Action: Fire Protection Districts 2015-1 Develop and Implement Wildfire Protection Program for Residents in WUI**

<b>Jurisdiction:</b>	Fire Protection Districts
<b>Hazard Addressed</b>	Wildfire
<b>Project Description, Issue &amp; Background</b>	Develop and implement a voluntary wildfire protection program for residents within wildfire/urban interface.
<b>Lead Agency and Title of Lead Person</b>	Fire Protection Districts- Fire Chiefs, municipalities
<b>Partners:</b>	Grand County OEM
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Staff time
<b>Benefits: (Losses Avoided)</b>	Protect life safety and property from wildfire
<b>Potential Funding:</b>	Staff time
<b>Timeline:</b>	Ongoing
<b>Status:</b>	Ongoing – wildfire safety week, websites, lots of media options for outreach are utilized.

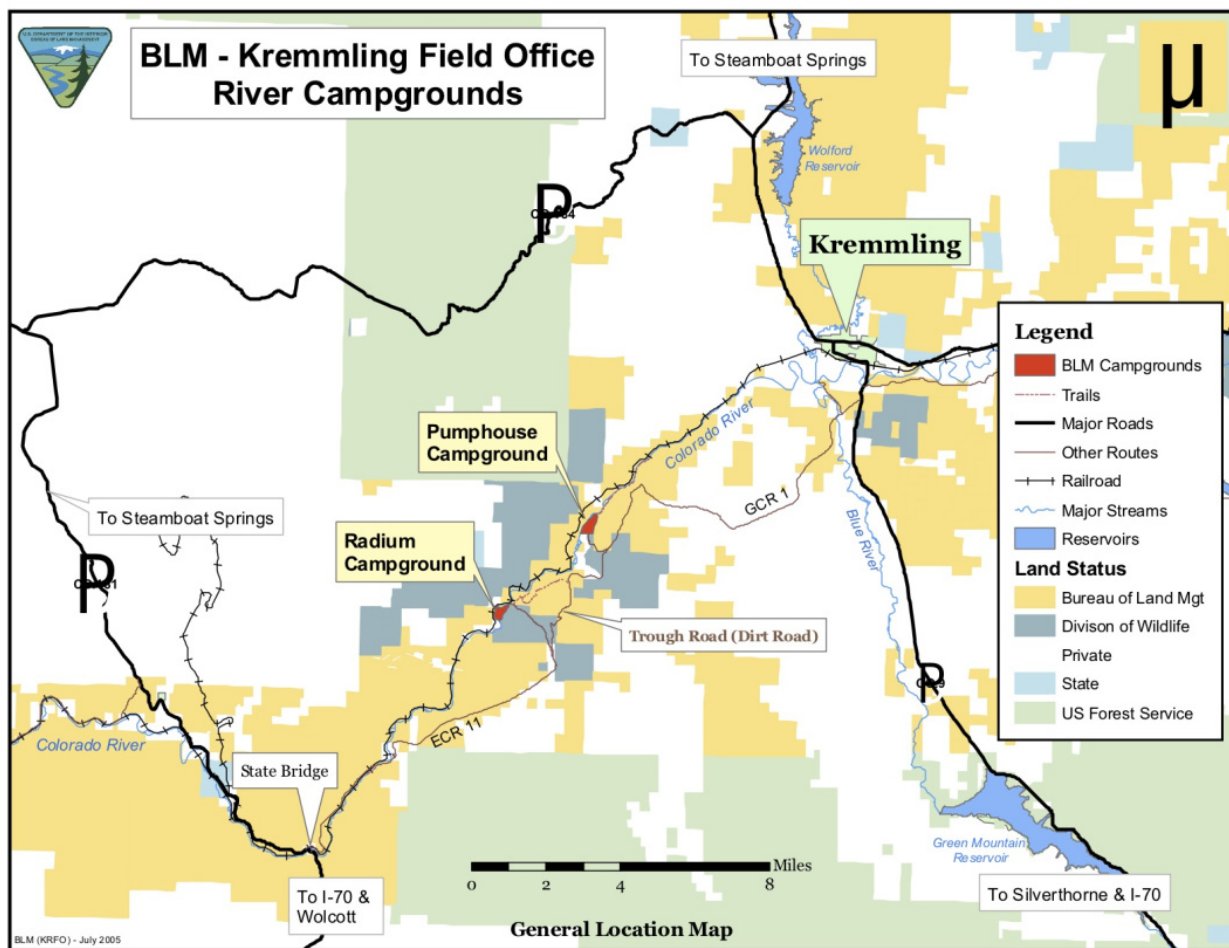
## Mitigation Action: Fire Protection Districts 2020-1 Alternate Route Improvements

<b>Jurisdiction:</b>	Fire Protection Districts
<b>Hazard Addressed</b>	Emergency Access
<b>Project Description, Issue &amp; Background</b>	Grand County has many roads that if blocked, have no reasonable alternate routes. There is a need to allocate resources to improve connections to bypass traffic during closures from accidents or rock falls.
<b>Lead Agency and Title of Lead Person</b>	Fire Protection Districts- Fire Chiefs
<b>Partners:</b>	Grand County Road & Bridge, OEM, Town's public works, CDOT
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Depends on scope.
<b>Benefits: (Losses Avoided)</b>	Alternate routes during emergencies.
<b>Potential Funding:</b>	Taxes
<b>Timeline:</b>	1 year to 10 years, depending on the areas.
<b>Status:</b>	New in 2020

# ANNEX I: BLM-Kremmling

## I.1 Profile

The Kremmling Field Office manages 377,900 acres of land in north-central Colorado, including BLM-managed lands in the Laramie River Valley, North Park, Middle Park, Fraser Valley, and the Upper Colorado River Valley. The varied landscape encompasses high mountain peaks, sand dunes, canyons, the Colorado River and open sage-brush parks. The area offers a wide variety of recreation opportunities including rafting, hunting, fishing, camping, watchable wildlife, scenic driving, equestrian, and OHV use.



## Mitigation Action: BLM Kremmling Field Office 2020-1 Sheep Mountain Fuel Break and Sanitation

<b>Jurisdiction:</b>	BLM KFO
<b>Hazard Addressed</b>	Fuel Load, Diseased Trees
<b>Project Description, Issue &amp; Background</b>	Create a 200-foot fuel break on BLM land that is adjacent to private property and forestry sanitation to reduce potential future fuel load and keep the public safe. An issue has been a rise in the fuel loads surrounded by private property.
<b>Lead Agency and Title of Lead Person</b>	BLM-Kremmling Field Office
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Unknown at this time
<b>Benefits:</b>	Fuel load reduction and removal of diseased trees.
<b>Potential Funding:</b>	Unknown at this time.
<b>Timeline:</b>	3 plus years
<b>Status:</b>	New in 2020.

## Mitigation Action: BLM Kremmling Field Office 2020-2 10-Mile Hand Thinning and Piling

<b>Jurisdiction:</b>	BLM KFO
<b>Hazard Addressed</b>	Mountain Pine Beetle Trees
<b>Project Description, Issue &amp; Background</b>	<p>A portion of some BLM land that crosses US40 and is adjacent to private property was mechanically logged ten years ago. A portion that was too steep for machinery was left unlogged. This remaining 4 acres, located on a slope near the creek, continued to see an increase in surface fuel loads from fallen Mountain Pine Beetle affected trees.</p> <p>The proposed treatment for the 4 acres will be to use chainsaws to buck, cut, and pile the remaining affected trees. The piles will be burned at a later time following an appropriate burn plan and with permits.</p>
<b>Lead Agency and Title of Lead Person</b>	BLM-Kremmling Field Office
<b>Priority:</b>	Low
<b>Cost Estimate:</b>	Unknown at this time
<b>Benefits: (Losses Avoided)</b>	Reduction of diseased Mountain Pine Beetle trees which are a hazard to people and firefighters (tree fall).
<b>Potential Funding:</b>	Unknown at this time.
<b>Timeline:</b>	2-3 years
<b>Status:</b>	New in 2020.

# ANNEX J: DENVER WATER

## I.2 Profile

Denver Water is an independent, autonomous and non-political agency of the City and County of Denver, organized and existing under the home rule charter of the City. Denver Water is the State's oldest and largest water utility, established in 1918. It is funded by water rates and new tap fees, as opposed to taxes. Denver Water is run by a five-member Board of Water Commissioners. A designated CEO/Manager is appointed by the Board to execute its policies and orders.

Denver Water owns property and operates water collection facilities in Grand County. Refer to the countywide maps in Chapter 3 and in Grand County's annex.

## I.3 Hazard Identification and Profiles

Representatives of Denver Water identified the hazards that affect Denver Water and summarized their geographic location, probability of future occurrence, potential magnitude or severity, and planning significance specific to Denver Water and its facilities (see Table I.1). In the context of the countywide planning area, there are no hazards that are unique to Denver Water.

**Table I.1. Denver Water—Hazard Summary**

Hazard Type	Geographic Location*	Probability*	Magnitude*	Hazard Rating
Avalanche	Isolated	Likely	Limited	High
Dam & Levee Failure	Small	Unlikely	Critical	High
Disease Outbreak	Large	Likely	Variable	Low
Drought	Large	Likely	Limited	Moderate
Earthquake	Large	Occasional	Limited	Low
Flood	Small	Likely	Critical	High
Hazardous Materials	Isolated	Unlikely	Catastrophic	Moderate
Landslide, Debris Flow/Mudflow and Rockfall	Isolated	Occasional	Limited	Moderate
Lightning	Isolated	Likely	Limited	Moderate
Mountain Pine Beetle Infestation	Large	Occasional	Limited	Medium
Severe Winter Storm and Blizzards	Large	Highly Likely	Critical	Moderate
Wildland fires	Large	Highly Likely	Critical	High
Wildlife-Vehicle Collisions	Isolated	Highly Likely	Negligible	Low
Windstorm	Large	Likely	Limited	Low

\*See Section 3.2 for definitions of these factors

Information on past events for each hazard can be found in Section 3.2 Hazard Profiles in the body of this document.

## I.4 Vulnerability Assessment

The intent of this section is to assess Denver Water’s vulnerability separately from that of the planning area as a whole, which has already been addressed in Section 3.3 Vulnerability Assessment in the main plan. For more information about how hazards affect the County as a whole, see Chapter 3 Risk Assessment.

### District Asset Inventory

Table I.2 lists critical facilities and other community assets identified by Denver Water as important to protect in the event of a disaster.

**Table I.2. Denver Water—Critical Facilities and Other Community Assets**

Name of Asset	Type*	Replacement Value (\$)	Hazard Specific Info/Comments
Capital Lease interest in Wolford Mountain reservoir			
Williams Fork Dam	EF	\$300M	Dam Failure (loss of life, property, recreation in Grand County Water Supply for Western Region.
Winter Park Facilities	EF		Land subsidence –
- Moffat Tunnel		\$100M	underground tunnel
- Vasquez Tunnel		\$50M	system that transports
- Gumlick Tunnel		\$50M	water from western
- Jones Pass			slope to the Denver metro area. Impact if damages occurred would be to Denver Water customers.

Sources: Denver Water

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

### Vulnerability by Hazard

This section examines those existing and future structures and other assets at risk to hazards ranked of moderate or high significance that vary from the risks facing the entire planning area and estimates potential losses. This section focuses on wildfire impacts to watersheds.

#### Wildfire

##### *Existing Development*

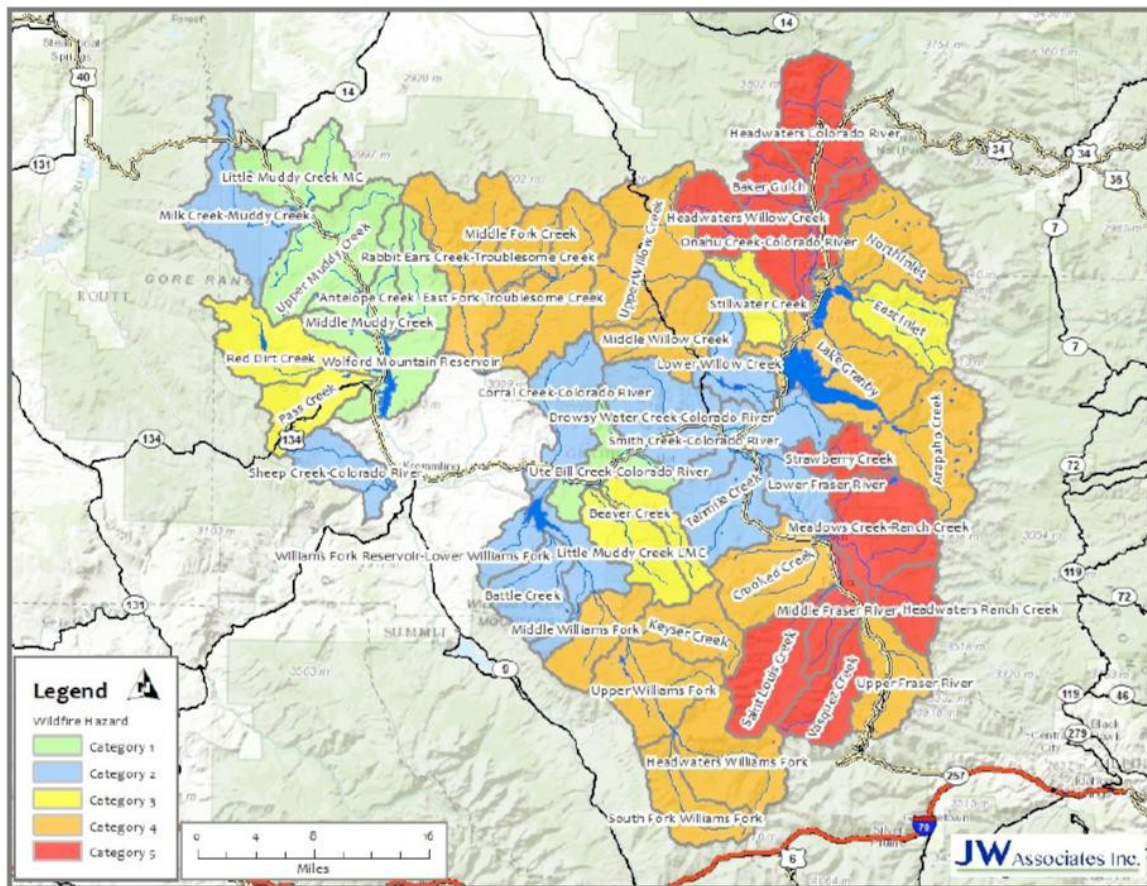
Watersheds and the numerous associated reservoirs in the county could be significantly impacted by high severity wildfire, especially in the wake of the mountain pine beetle epidemic. For

example, the damage to Strontia Springs Reservoir caused by siltation from the 1996 Buffalo Creek Fire took fifteen years to complete and cost Denver Water over \$30 million. The Williams Fork Fire, currently at 12,000 acres burned during this Plan’s 2020 update, could cost Denver Water if the watersheds and reservoirs are impacted in the years to come. Note: Denver Water was an active participant, engaging with EOC personnel during the fire.

Watersheds on the steep western slope of the Front Range feed directly into reservoirs and are of highest concern for wildfire impacts. The Upper Colorado Headwaters Wildfire/Watershed Assessment (JW Associates, Inc. 2013) “identifies and prioritizes sixth-level watersheds based on their hazards of generating flooding, debris flows, and increased sediment yields following wildfires that could have impacts on water supplies” (pg. 1). Figure I.1 shows the Upper Colorado headwaters watershed wildfire hazard ranking.

Watersheds can be considered as assets in their own right. Consultation with those water supply agencies with facilities, reservoirs, and properties should be included in mitigation discussions, and are in fact required to take part since the passage of Colorado House Bill 09-1162. Further consultation with members of a Burned Area Emergency Response Team may provide further guidance in mitigating and preparing for the effects of wildfire in a watershed.

**Figure I.1. Upper Colorado Headwaters Watershed Wildfire Hazard Ranking**



Source: JW Associates, Inc., Upper Colorado Headwaters Wildfire/Watershed Assessment 2013



## **Future Development**

Continued growth of Grand County’s population will generally mean an expanded WUI and potential exposure of buildings and people. It is important that CWPPs, EOPs, and other planning documents and regulations remain current to ensure improved community adaptation to the fire prone environment in which they are being built. Denver Water has already begun to work with local offices of emergency management, including Grand County, to address wildfire hazards.

## **Growth and Development Trends**

Denver Water does not have authority to manage growth or development within its district.

## **I.5 Capability Assessment**

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Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. The capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

### **Regulatory Mitigation Capabilities**

Regulatory mitigation capabilities include the planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities. Table I.3 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Denver Water. Many of the regulatory capabilities used by local jurisdictions are not applicable to Denver Water.

**Table I.3. Denver Water—Regulatory Mitigation Capabilities**

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<b>Regulatory Tool (ordinances, codes, plans)</b>	<b>Yes/No</b>	<b>Comments</b>
General or Comprehensive plan	N/A	
Zoning ordinance	N/A	
Subdivision ordinance	N/A	
Growth management ordinance	N/A	
Floodplain ordinance	N/A	
Other special purpose ordinance (stormwater, steep slope, wildfire)	N/A	
Building code	N/A	
Fire department ISO rating	N/A	
Erosion or sediment control program	N/A	

<b>Regulatory Tool (ordinances, codes, plans)</b>	<b>Yes/No</b>	<b>Comments</b>
Stormwater management program	N/A	
Site plan review requirements	N/A	
Capital improvements plan	Yes	
Economic development plan	N/A	
Local emergency operations plan	Yes	Denver Water Emergency Management began developing an EOP in August 2012. Emergency manager brought on board to implement a comprehensive emergency management program that will interface with local jurisdictions
Other special plans		Drought Response Plan FERC requires Emergency Action Plans (EAPs) on all dams. Also have treatment and distribution plans.
Flood insurance study or other engineering study for streams	N/A	
Elevation certificates (for floodplain development)	N/A	
Other		

## Administrative/Technical Mitigation Capabilities

Table I.4 identifies the personnel responsible for activities related to mitigation and loss prevention in Denver Water.

**Table I.4. Denver Water—Administrative and Technical Mitigation Capabilities**

<b>Personnel Resources</b>	<b>Yes/No</b>	<b>Department/Position</b>	<b>Comments</b>
Planner/engineer with knowledge of land development/land management practices	N/A	Planning	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Engineering	
Planner/engineer/scientist with an understanding of natural hazards	Yes		Drought planners
Personnel skilled in GIS	Yes	IT/GIS	
Full time building official	N/A		
Floodplain manager	N/A		
Emergency manager	Yes	Operations & Maintenance – Manager of Emergency Response	
		Grant writer	
		Other personnel	
GIS Data Resources (Hazard areas, critical facilities, land	Yes	IT/GIS	

Personnel Resources	Yes/No	Department/Position	Comments
use, building footprints, etc.)			
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Yes	IT	Everbridge
Other			

## Fiscal Mitigation Capabilities

Fiscal mitigation capabilities are financial tools or resources that Denver Water could or already does use to help fund mitigation activities. Denver Water has received funding for watershed improvements from the Colorado State Forest Service.

## Mitigation Outreach and Partnerships

Denver Water has public education programs related to water conservation, drought response, water quality, and a very active youth education program focusing on a variety of water-related topics. Additionally, Denver Water has a public affairs division that provides media relations, social media, marketing, publications, internal communication, stakeholder relations, government relations, community outreach, and website communications for both our combined service area of 1.3 million people and for the communities where Denver Water’s watersheds and facilities are located.

## Past Mitigation Efforts

Denver Water has partnered with USFS to improve forest and watershed conditions in parts of Colorado by implementing hazardous fuels treatments and removing hazardous biomass. Forests play a role in protecting areas important to surface drinking water. USFS maps these areas using GIS before working with Denver Water on fuels treatment projects. This effort is part of the Forests to Faucets program. The projected outcome of this project is 943 acres of hazardous fuels treatments with 54,795 tons of biomass removed or dispersed in the Colorado River headwaters. This project is detailed as a multi-jurisdictional mitigation action item in Chapter 4.

## I.6 Mitigation Goals and Objectives

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Denver Water has adopted the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 4 Mitigation Strategy.

## I.7 Mitigation Actions

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Denver Water identified and prioritized the following mitigation actions based on the risk assessment. Background information on how each action will be implemented and administered, such as ideas for implementation, responsible agency, potential funding, estimated cost, and timeline also are included.

## Mitigation Action: Denver Water 2015-4 Public Outreach in Grand County

**Jurisdiction:** Denver Water

**Action Title:** Public outreach efforts in Grand County

**Priority:** Low

**Issue/Background:** The Denver Water government stakeholder group would like to partner with Grand County stakeholders and rebuild relationships, and provide networking and education for the public. Denver Water OEM has additional ideas and information on public education efforts as they related to FERC requirements.

### **Ideas for Implementation:**

**Responsible Agency:** Denver Water Emergency Management

**Partners:** Grand County OEM, participating jurisdictions

**Potential Funding:** Denver Water

**Cost Estimate:** Staff time, developing and printing public information materials

**Benefits:  
(Losses Avoided)** Strengthen partnership between Denver Water and Grand County; keep public informed

**Timeline:** Ongoing

**Status:** Ongoing

## Mitigation Action: Denver Water 2020-1 Proactive Right-of-way Vegetation Maintenance

**Jurisdiction:** Denver Water

**Action Title:** Continue Proactive Right-of-way Vegetation Maintenance

**Priority:** Low

**Issue/Background:** Fuel load in and around Denver Water ROW can be characterized as dry standing and downed timber. Vegetation maintenance to Denver Water utility ROW through both public and privately owned lands could enhance existing/add fire breaks in the event of wildland fire to protect the watershed of Headwaters of the Colorado River.

**Ideas for Implementation:** Work with public land holders and private land holders to:  
Identify existing high combustion areas.  
Prioritize work to remove threats to existing water collection system  
Prioritize work to existing resources available DW Staff, Youth Corps, USFS Staff

**Responsible Agency:** Denver Water – Winter Park Office

**Partners:** USFS

**Potential Funding Cost Estimate:** Denver Water Staff time  
Youth Corps Time 12,000 dollars per week.  
Estimated time needed 12 weeks.

**Benefits:  
(Losses Avoided)** Protecting the Colorado River watershed.

**Timeline:** Ongoing

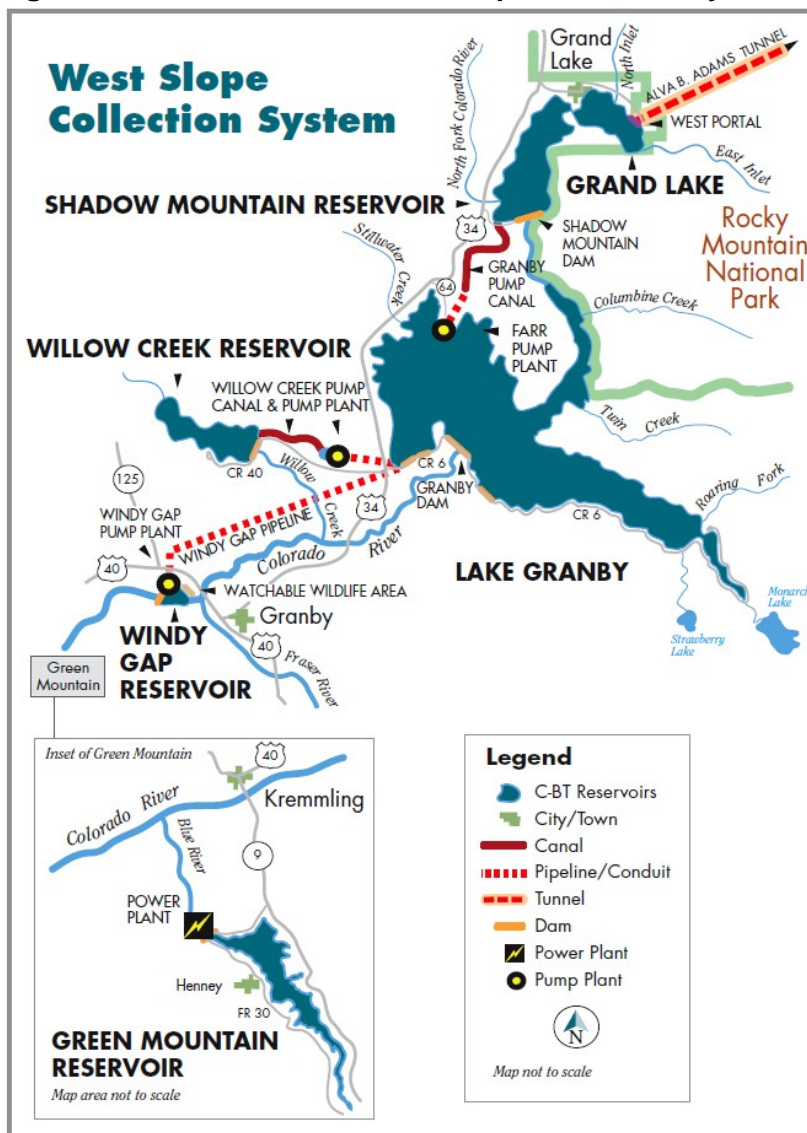
**Status:** Ongoing

# ANNEX K: NORTHERN COLORADO WATER CONSERVANCY DISTRICT

## K.1 Profile

The Northern Colorado Water Conservancy District and its Municipal Sub district (collectively Northern Water) provide water to Northeastern Colorado from the Colorado-Big Thompson (C-BT) and Windy Gap projects. The West Slope Collection System for C-BT and Windy Gap include Grand Lake, Shadow Mountain Reservoir, Lake Granby, and Willow Creek Reservoir (see Figure J.1). Northern Water and the U.S. Bureau of Reclamation jointly operate and maintain C-BT; Northern Water owns, operates and maintains Windy Gap.

Figure K.1 Northern Water West Slope Collection System



Source: Northern Water (<http://www.northernwater.org/WaterProjects/C-BTWestRecreation.aspx>)

## K.1 Hazard Identification and Profiles

Representatives of Northern Water identified the hazards that affect C-BT and Windy Gap, and summarized their geographic location, probability of future occurrence, potential magnitude or severity, and planning significance specific to Grand County (see Table J.1). In the context of the countywide planning area, there are no hazards that are unique to Northern Water, however wildfire damage to the watersheds in Grand County and impacts to C-BT and Windy Gap infrastructure and water supplies is the primary concern to Northern Water.

**Table K.1 Northern Water—Hazard Summary**

Hazard Type	Geographic Location*	Probability*	Magnitude*	Hazard Rating
Avalanche	Isolated	Likely	Limited	Low
Dam & Levee Failure	Small	Unlikely	Catastrophic	Low
Disease Outbreak	Isolated	Occasional	Limited	Low
Drought	Large	Likely	Limited	High
Earthquake	Large	Occasional	Limited	Low
Flood	Small	Likely	Critical	Low
Hazardous Materials	Isolated	Likely	Negligible	Low
Landslide, Debris Flow/Mudflow and Rockfall	Isolated	Occasional	Limited	Low
Lightning	Isolated	Likely	Limited	Low
Mountain Pine Beetle Infestation	Large	Occasional	Limited	High
Severe Winter Storm and Blizzards	Large	Highly Likely	Limited	Low
Wildland fires	Small	Likely	Critical	High
Wildlife-Vehicle Collisions	Isolated	Highly Likely	Negligible	Low
Windstorm	Large	Likely	Limited	Low

\*See Section 3.2 for definitions of these factors

Information on past events for each hazard can be found in Section 3.2 Hazard Profiles in the body of this document.

## K.1 Vulnerability Assessment

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The intent of this section is to assess Northern Water’s vulnerability separately from that of the planning area as a whole, which has already been addressed in Section 3.3 Vulnerability Assessment in the main plan. For more information about how hazards affect the County as a whole, see Chapter 3 Risk Assessment.

### District Asset Inventory

Table J.2 lists critical facilities and other community assets identified by the District as important to protect in the event of a disaster.

**Table K.2 Northern Water—Critical Facilities and Other Community Assets**

---

Name of Asset	Type*	Replacement Value (\$)	Hazard Specific Info/Comments
Colorado Big-Thompson Project	LL	Unknown	Infrastructure and water quality
Windy Gap Project	LL	Unknown	Infrastructure and water quality

Sources: Northern Water

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

## Vulnerability by Hazard

This section examines those existing and future structures and other assets at risk to hazards that vary from the risks facing the entire planning area and estimates potential losses. This section describes all hazards within Northern Water jurisdiction, but focuses on wildfire impacts to watersheds.

### Avalanche

Risk of avalanche to Northern Water, C-BT and Windy Gap facilities is isolated and minimal, and similar to the Severe Winter Storm and Blizzard section below.

### Dam & Levee Failure

The Windy Gap Dam, Granby Dams, Shadow Mountain Dam, Willow Creek Dam, and appurtenant C-BT and Windy Gap facilities are regularly inspected by U.S. Bureau of Reclamation and Northern Water personnel to ensure that these facilities meet federal dam safety standards. Northern Water also participates in standard operating procedure layout and dam emergency table top exercises. Coupled with the low probability of occurrence the hazard rating of a dam or levee failure is considered low.



## **Disease Outbreak**

Disease outbreak primarily has the potential to affect Northern Water staff, rendering key personnel unavailable to operate and/or maintain project facilities. Northern Water staff have an “unlimited” number of sick days available annually, and encourage staff to use sick time as needed to get healthy and avoid spreading disease to other staff. Additionally, Northern Water has multiple personnel trained to perform all key tasks, and can operate many key facilities remotely. Thus, the hazard rating of disease outbreak is considered low.

## **Drought**

Drought has the potential to affect Northern Water via two primary methods: drought conditions result in decreased water availability to fill C-BT reservoirs, resulting in decreased water supply for the projects; and, prolonged drought increases the probability of wildfire. Northern Water’s water allocation methods to water users on the East Slope account for water supply availability and makes adjustments to the amount of water available for delivery to water users based on the amount of water available in the system. Storage facilities in both Grand County and on the East Slope allow C-BT and Windy Gap to store water in wetter times for use during drought conditions. Most major water users on the East Slope have their own drought contingency plans that are implemented in times of severe drought conditions. Thus, the hazard rating from a water supply perspective is low. The risk of wildfires is described below.

## **Earthquake**

The hazard rating for earthquakes is negligible. All buildings and facilities are constructed to code. As with Dam & Levee Failure, Bureau of Reclamation and Northern Water personnel regularly inspect all C-BT and Windy Gap facilities to ensure that these facilities meet federal safety standards, including stability during earthquake events. The Bureau of Reclamation performs dam risk analyses that include earthquake analyses.

## **Flood**

C-BT storage facilities are not authorized for Flood control purposes. During times when storage in C-BT reservoirs is not at capacity, reservoirs can provide incidental flood control benefits to downstream areas. During times when C-BT reservoirs are at capacity, water is released from the reservoirs in a controlled manner over spillways designed to convey flood events. Northern Water plans and coordinates these releases with the U.S. Bureau of Reclamation, Grand County and the Colorado Division of Water Resources during high flow releases. Thus, the hazard rating for flooding is low.

## **Hazardous Materials**

Northern Water personnel periodically transport hazardous materials as part of its operation and maintenance of C-BT and Windy Gap facilities. Northern Water personnel follow all applicable federal, state and local regulations when transporting these materials, and have response plans in place in case the integrity of these materials is compromised. Thus, the hazard rating for hazardous materials is low.

## **Landslide, Debris Flow/Mudflow and Rockfall**

There are isolated areas adjacent to C-BT and Windy Gap facilities that could be susceptible to landslides, debris flows and rockfalls. These areas would be especially vulnerable following a wildfire coupled with extreme precipitation events. As part of its routine inspection and monitoring of project facilities, Northern Water regularly monitors areas that may be susceptible to these hazards. In the event of a wildfire, Northern Water would enact wildfire mitigation projects that are currently being developed as part of the C-BT Headwaters Partnership (see below). Thus, the hazard rating for landslides, debris flow/mudflow and rockfall is low.

## **Lightning**

Concerns with lightning include increased risk of wildfire, and disruption of power or communication facilities used to operate C-BT facilities. All critical C-BT facilities maintain backup power systems (generators) that are fully maintained and exercised frequently to serve as emergency power systems for operations. All facilities maintain the ability to operate in manual mode if necessary. Northern Water also maintains full time staffing (24 hours per day, 7 days per week) at its Farr Pump Station control room. Thus, the hazard rating for lightning is considered low. Wildfire hazard is discussed below.

## **Mountain Pine Beetle Infestation**

Mountain pine beetle has essentially killed vast swaths of forests adjacent to and upstream of key C-BT and Windy Gap water supply facilities. The death and subsequent decay of these forests increases wildfire hazard for many years following the infestation, which is why the hazard rating is considered high. Wildfire hazard is discussed below.

## **Severe Winter Storm and Blizzards**

The primary concern for severe winter storms and blizzards is access to C-BT and Windy Gap facilities by operations and maintenance personnel, and operations of the facilities themselves. Northern Water maintains a fleet of four-wheel drive vehicles and heavy equipment, including a snowcat, that can be used to clear access roads and infrastructure of heavy snow accumulations. Northern Water also maintains full time staffing (24 hours per day, 7 days per week) at its Farr Pump Station control room. Thus, the hazard rating for severe winter storm and blizzards is low.

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### **Wildfire**

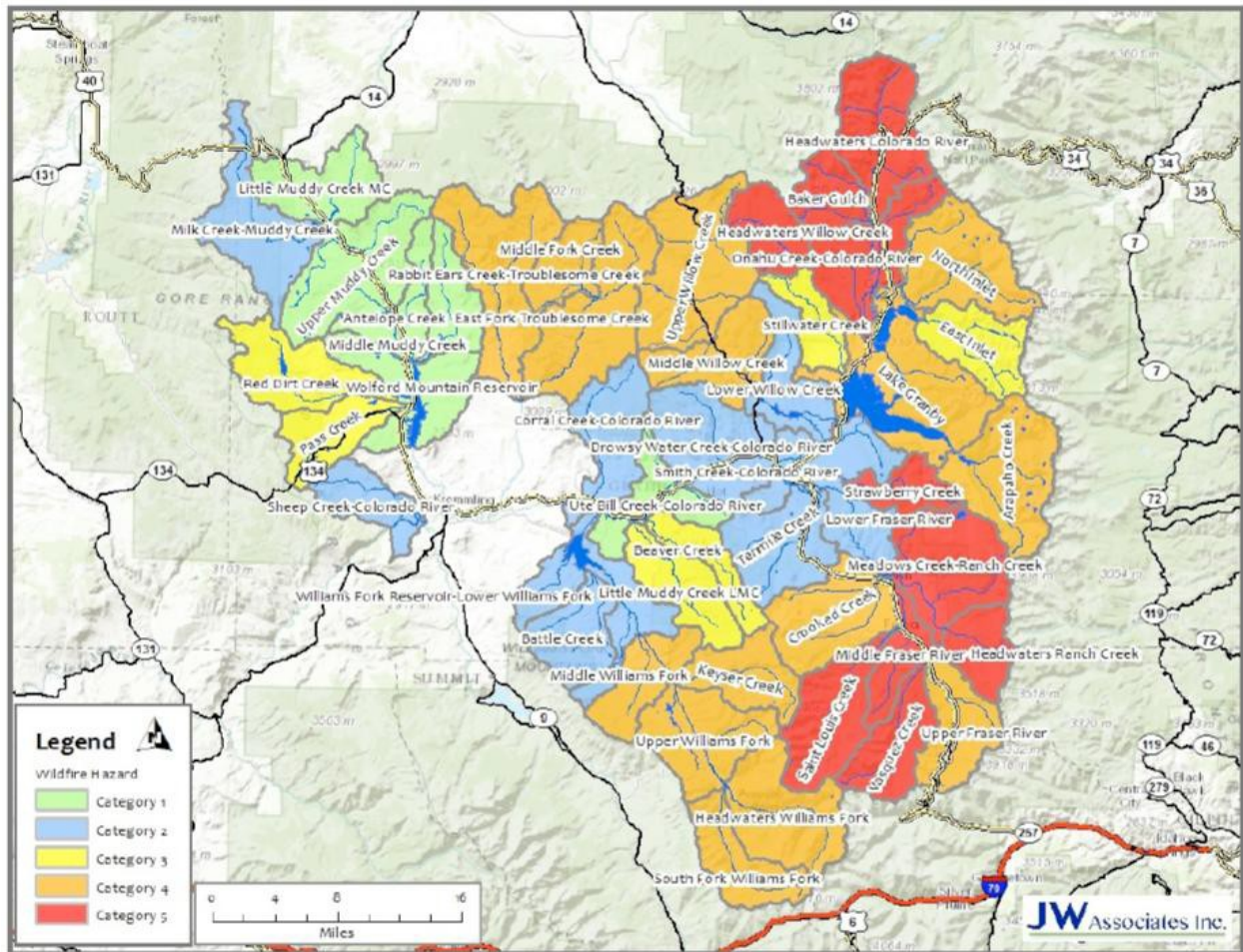
#### ***Existing Development***

Watersheds and the numerous associated reservoirs in the county could be significantly impacted by high severity wildfire, especially in the wake of the mountain pine beetle epidemic. Watersheds on the western slope feed directly into reservoirs and are of highest concern for wildfire impacts. In addition to the direct threat to C-BT infrastructure, fire in C-BT watersheds could affect the water quality of inflows to C-BT and Windy Gap facilities, possibly causing these facilities to become inoperable for short or extended periods of time. Disruptions to C-BT could affect the quantity and quality of water that can be diverted to the East Slope for municipal and agricultural use, and affect the amount of power that can be generated through C-BT hydropower facilities.

The Upper Colorado Headwaters Wildfire/Watershed Assessment (JW Associates, Inc. 2013) “identifies and prioritizes sixth-level watersheds based on their hazards of generating flooding, debris flows, and increased sediment yields following wildfires that could have impacts on water supplies” (pg. 1). Figure J.2 shows the Upper Colorado headwaters watershed wildfire hazard ranking.

Watersheds can be considered as assets in their own right. Consultation with those water supply agencies with facilities, reservoirs, and properties should be included in mitigation discussions, and are in fact required to take part since the passage of Colorado House Bill 09-1162. Further consultation with members of a Burned Area Emergency Response Team may provide further guidance in mitigating and preparing for the effects of wildfire in a watershed.

**Figure K.2 Upper Colorado Headwaters Watershed Wildfire Hazard Ranking**



Source: JW Associates, Inc., Upper Colorado Headwaters Wildfire/Watershed Assessment 2013

**Future Development**

Continued growth of Grand County’s population will generally mean an expanded Watershed-Urban Interface (WUI) and potential exposure of buildings and people. It is important that CWPPs, EOPs, and other planning documents and regulations remain current to ensure improved community adaptation to the fire prone environment in which they are being built. Northern Water has already begun to work with local offices of emergency management, including Grand County, to address wildfire hazards.

**Wildlife-Vehicle Collisions**

Northern Water staff routinely travel to project sites via highways and local roads in which wildlife-vehicle collisions are possible. These represent a life and property hazard to Northern Water. Northern Water staff are routinely trained in safe automobile and equipment operation, and maintain vehicles in top working condition. Furthermore, most vehicles operated by Northern Water staff in Grand County are full-size pickups, sport utility vehicles, and trucks that

that have a better ability to survive wildlife collisions without serious injury to the driver. Although the likelihood of these types of collisions occurring is high, the magnitude of these collisions is negligible given the equipment and driver training, and the overall hazard rating is low.

## Windstorm

Windstorms could affect Northern Water and C-BT facilities by knocking down power lines and increasing fire danger. The Western Area Power Administration, the federal agency in charge of electrical transmission to and from C-BT facilities, routinely monitors and maintains power line right-of-way throughout the C-BT project, including clearing trees that could potentially threaten power lines and communication facilities. Thus, the hazard rating for windstorms is low. Wildland Fires are discussed above.

## Growth and Development Trends

Northern Water does not have authority to manage growth or development within Grand County.

## K.1 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. The capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

### Regulatory Mitigation Capabilities

Regulatory mitigation capabilities include the planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities. Table J.3 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Northern Water. Many of the regulatory capabilities used by local jurisdictions are not applicable to Northern Water.

**Table K.3 Northern Water—Regulatory Mitigation Capabilities**

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
General or Comprehensive plan	N/A	
Zoning ordinance	N/A	
Subdivision ordinance	N/A	
Growth management ordinance	N/A	
Floodplain ordinance	N/A	

<b>Regulatory Tool (ordinances, codes, plans)</b>	<b>Yes/No</b>	<b>Comments</b>
Other special purpose ordinance (stormwater, steep slope, wildfire)	N/A	
Building code	N/A	
Fire department ISO rating	N/A	
Erosion or sediment control program	N/A	
Stormwater management program	N/A	
Site plan review requirements	N/A	
Capital improvements plan	N/A	
Economic development plan	N/A	
Local emergency operations plan	N/A	Standing Operations procedures (SOP), Emergency Action plans (EAP) for each facility
Other special plans		Water resources planning documents
Flood insurance study or other engineering study for streams	N/A	
Elevation certificates (for floodplain development)	N/A	
		Other

## **Administrative/Technical Mitigation Capabilities**

Table J.4 identifies the personnel responsible for activities related to mitigation and loss prevention in Northern Water.

**Table K.4 Northern Water—Administrative and Technical Mitigation Capabilities**

<b>Personnel Resources</b>	<b>Yes/No</b>	<b>Department/Position</b>	<b>Comments</b>
Planner/engineer with knowledge of land development/land management practices	No		
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Project Management, Collection Systems, Distribution Systems Departments	
Planner/engineer/scientist with an understanding of natural hazards	Yes	Project Management, Collection Systems Departments	
Personnel skilled in GIS	Yes	IT Department	
Full time building official	No		
Floodplain manager	No		
Emergency manager	Yes	Real Estate Manager	
Grant writer	No		

<b>Personnel Resources</b>	<b>Yes/No</b>	<b>Department/Position</b>	<b>Comments</b>
Other personnel	Yes	Multiple Departments	
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Yes	IT Department	
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	No		
Other	No		

## **Fiscal Mitigation Capabilities**

Fiscal mitigation capabilities are financial tools or resources that Northern Water could or already does use to help fund mitigation activities. Northern Water has received funding from the Colorado-Big Thompson Headwaters Partnership and state-level grants.

## **Mitigation Outreach and Partnerships**

The C-BT Headwaters Partnership was created through an MOU between the US Forest Service, Colorado State Forest Service, Bureau of Reclamation and Northern Water. The goal of the partnership is to proactively restore forest and watershed health, and to pre-plan post-wildfire response to protect C-BT infrastructure and water supplies on the West Slope in Grand County and the East Slope primarily in Larimer County.

## **Past Mitigation Efforts**

Northern Water has developed an internal crises plan. They are currently developing a more detailed fire preparedness and response plan, and planning and implementing forest health treatments to reduce the effects of wildfire.

Northern Water also participates in Bureau of Reclamation table top exercises in preparation for emergencies related to flood, including communications and reservoir control.

## **K.1 Mitigation Goals and Objectives**

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Northern Water has adopted the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 4 Mitigation Strategy.

## **K.1 Mitigation Actions**

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Northern Water identified and prioritized the following mitigation actions based on the risk assessment. Background information on how each action will be implemented and administered, such as ideas for implementation, responsible agency, potential funding, estimated cost, and timeline also are included.

## Mitigation Action: Northern Water 2015-1 Colorado-Big Thompson Headwaters Partnership for Watershed Protection

**Jurisdiction:** Northern Water

**Hazard Addressed** Wildfire, Mountain Pine Beetle, Drought, Landslide, Debris Flow/Mudflow and Rockfall

**Project:** The C-BT Headwaters Partnership was created through an MOU between the US Forest Service, Colorado State Forest Service, Bureau of Reclamation and Northern Water. The goal of the partnership is to restore health and resiliency of forests and watersheds and preplan wildfire response to protect C-BT infrastructure and water supplies. C-BT delivers about 215,000 acre-feet of water annually to supplement water supplies for 860,000 people and 640,000 acres of irrigated land in northeastern Colo. Watersheds include the Upper Colorado and Big Thompson rivers in Grand and Larimer counties. C-BT water supplies are nearly entirely dependent upon snowmelt from high elevation watersheds along the Continental Divide in Northern Colorado. Forest health and fires within these watersheds can have dramatic effects on the quality of watershed runoff and the ability of C-BT water supplies to meet municipal, industrial and agricultural water uses. Catastrophic wildfires that occurred in Northern Colorado during 2012-2013 drought conditions highlighted the risk that C-BT water supplies face given deteriorated forest health conditions, drought, and urbanization at the wildland-urban interface. Northern Water, in conjunction with its partner local, State and Federal agencies is taking a pro-active approach to addressing these conditions.

The following efforts will be conducted by the partnership:

- Conduct forest and watershed health treatments; pre-plan post-wildfire response
- Develop a 5-year operating plan specifying treatment zones and activities
- Support creation and refinement of watershed assessments
- Coordinate to provide education, technical and financial incentives
- Engage other partners
- Develop a shared communications and media campaign

The C-BT Headwaters Partnership meets on a monthly basis to plan and coordinate activities, review on-going projects, and perform field investigations of new projects. The partnership is currently developing its 5-year operating plan.

**Lead Agency:** Northern Water Project Manager

**Partners:** U.S.F.S., CO State Forest Service, U.S. Bureau of Reclamation (signatories). Western Area Power Administration, National Park Service (participants)

**Priority:** High

**Cost Estimate:** Unknown, to be developed as part of operating plan.

**Benefits:** Protection of water supplies in Grand Lake, Shadow Mtn Reservoir, Lake Granby, Willow Creek Reservoir, Windy Gap Reservoir, Upper Colorado, numerous other tributaries. Additional benefits to neighboring private/public land, homes, structures, utilities, etc.

Potential

**Funding:** Partnering/participating agencies, coupled with State grants and private funding.

**Timeline &**

**Status:** Ongoing



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# APPENDIX B: PLANNING PROCESS MATERIALS

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## Grand County 2020 Hazard Mitigation Plan Kickoff Meeting



Grand County Office of Emergency Management is hosting a **Hazard Mitigation Planning Kickoff Meeting** on **January 23, 2020, at 6:00 pm**, to begin the process of updating the County's Hazard Mitigation Plan. The purpose of this plan is to identify natural hazards that affect the communities within Grand County, as well as the unincorporated areas of Grand County.

Hazard mitigation planning is a process for state and local governments to identify community-level policies and actions to mitigate and reduce the impacts of natural hazards. The Kickoff Meeting is an opportunity to learn about resilient mitigation activities and identify new opportunities to mitigate natural hazards. During the meeting, we will define the scope of the project, timelines, and roles and responsibilities.

County, town, and agency participation is a requirement of an approved plan. Your participation is important and encouraged, as your input will be critical to the success of this project. If you cannot make the kick-off meeting, please delegate someone from your organization to attend. If you represent a town or municipality within Grand County, please bring along someone from your public works department.

What's in it for you? By participating in the updated plan, your entity will be eligible for FEMA pre- and post-disaster mitigation funding, and Grand County will become a more resilient community in the event of a disaster.

Date/Time: **Thursday, January 23, 6:00 pm**

Location: **Grand County EOC at Fraser Road & Bridge**  
350 CR 5103, Fraser CO 80442

**EMAIL FOR KICKOFF MEETING**

**REDACTED**

**REDACTED**

**REDACTED**



As part of the initial hazard identification process (at 1<sup>st</sup> meeting), members of the HMPC used a whiteboard to identify and rate the significance of a variety of possible hazards. Significance was measured in general terms, focusing on key criteria such as the geographic extent of the hazard, the probability of an event occurring, and the likely magnitude and severity levels. A data collection guide was passed out to the municipalities and special districts. We asked that they fill it out and return it to the HMPC.

### **Email Invite to HMPC meeting of June 4, 2020 (2<sup>nd</sup> meeting)**

The second HMP meeting will be next Thursday, June 4<sup>th</sup>, at 6:00 pm in the EOC. Everyone is welcome, but if you do not feel comfortable attending in person due to Covid-19, this will be a Web-ex call which we will take a screenshot of to show attendance. You will receive a Web-ex invite that you can add to your calendar.

I will email documents out beforehand for those that cannot attend in person. Look over the plan again, particularly anything about your town or special district; the wording, maps, etc.

<https://www.co.grand.co.us/DocumentCenter/View/4832/Grand-County-Mitigation-Plan-2013?bidId=>

During the meeting we will identify hazards and risks, go over the submitted Action Items, and set goals. Thank you!

Kathleen Conrad, OEM Director  
Grand County Office of Emergency Management

## **Grand County 2020 HMP Committee Meeting**

June 4, 2020

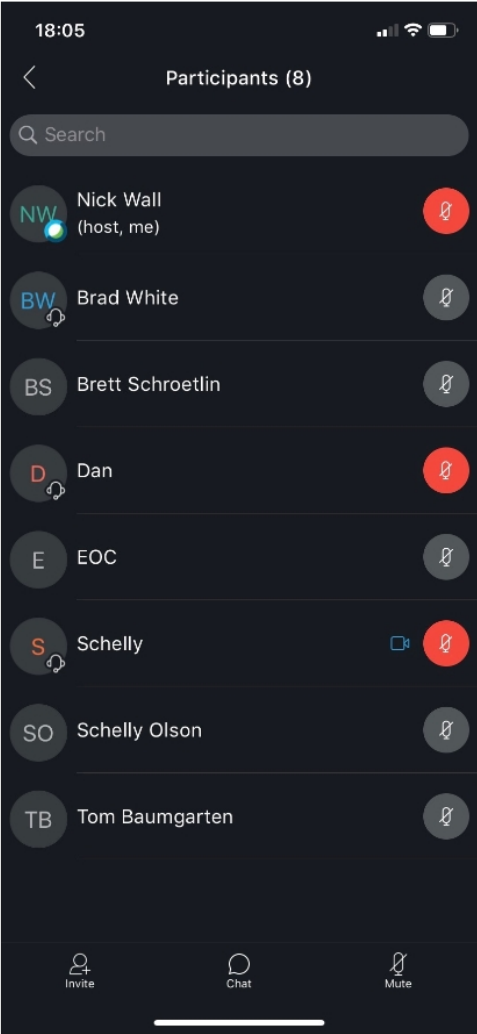


### **Agenda**

**Introductions**  
**Hazards and Risks**  
**Action Items**  
**Set Goals/Timeline**

**Screenshot of the June 4, 2020 Web-ex HMPC meeting in Grand County's EOC.**

Due to Covid-19, the (7) people below attended remotely.  
Present in the EOC were Chief Todd Holzwarth of East Grand FPD and Kathleen Conrad, Grand County OEM, running the Web-ex meeting.



- East Grand FPD
- Grand FPD Chief
- Grand County Sheriff
- Town of Kremmling
- Todd Holzwarth/Kat Conrad
- Grand FPD Assist. Chief
- HSSP FPD Chief

**PUBLIC COMMENT RESULTS GO HERE:**

## APPENDIX C: MITIGATION HISTORY COMPLETED ACTION ITEMS

### Completed Mitigation Action Items

<b>Jurisdiction</b>		
<b>Multi-Jurisdictional</b>		
2015-4	Conduct commodity flow studies of main highways and railroads throughout County.	To mitigate hazmat incidents, the studies were completed.
2015-10	Implement warning and alert systems with specific coverage of the hazard areas.	This project was completed – systems were set up in Byers Canyon; also avalanche warnings and closure systems in Berthoud Pass.
2015-14	Update and validate previously completed assessments of the quantity and frequency for transported petroleum products in incorporated areas within the County.	This project was completed with 2015-15 to mitigate hazmat incidents throughout the county.
2015-15	Distribute results of the petroleum assessments to all relevant stakeholders & FPDs.	This project was completed and the results were distributed.
2015-16	Coordinate countywide hazmat response resources.	To assist in hazmat response, this project was completed and is updated by EGFPD annually.
<b>Grand County</b>		
2015-2	Prioritize wildfire mitigation in landslide hazard areas to improve secondary impact of landslide following a wildfire.	This project was completed as of the 2015 HMP update.
2015-26	Expand radio coverage within the County to better support the all- hazard warning/alert system (NOAA weather alert system).	This project was completed 2013-2015. Transmitter installed and functioning in N. Cottonwood.
<b>Fraser</b>		
2015-1	Fraser/St. Louis Creek bank stabilization to keep waters within banks during high water events.	To mitigate floods, this project was completed per the Town of Fraser.

## Completed Mitigation Action Items

Town of Hot Sulphur Springs		
2015-2	Repair Town fire hydrants.	This project, to mitigate wildfire, was completed by Dana Kepner Company per Town of HSS.
2015-3	Sewer collection system maintenance	To mitigate disease outbreak and flooding, Anderson Services completed the project.
Fire Protection Districts		
2015-2	Identify high-risk critical structures within the WUI; develop fire protection strategies appropriate for those structures.	This project was completed in CWPPS to mitigate wildfires.
2015-3	Acquire 4-wheel drive pumper trucks.	To mitigate wildland fires, this project was completed among the fire protection districts. The County now has (7) type-1 tactical tenders, (9) type-6, (5) type-4, and (5) type-3.
Northern Water		
2015-2	Upper Colorado and Colorado-Big Thompson Watershed Analyses	Updated post-fire sediment reports were completed in 2016.
2015-3	Colorado-Big Thompson Headwaters Partnership, Post- Wildfire Planning	This Wildfire planning project was completed per Northern Water..
2015-4	Willow Creek Timber Sale	Project was completed – per Northern Water, all timber was sold.
2015-5	Colorado Department of Natural Resources Wildfire Risk Reduction Grant	To reduce wildfire risk, this project was completed - all funds were handed out.
2015-6	Supply Creek Watershed Fuels Reduction Project	To mitigate fuel loads, this project was completed - \$90,000 (50%) of the project was funded.
Denver Water		
2015-1	Update drought management plan	This project was completed. Per Denver Water, it is reviewed annually.
2015-2	Develop IGA with Grand County	Completed. Update procedures with fire agencies and have an agreement w/State EM.
2015-3	Update Annual Operating Plan for Property Owners	To mitigate drought, this project was completed. AOPs are updated and reviewed annually. Denver Water is included in these plans.
2015-5	GIS Mapping Coordination Project	To mitigate dam failure, this mapping project was completed. Flood inundation maps were updated.

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# APPENDIX D: HAZARD MITIGATION PLANNING COMMITTEE

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Table D.1

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REDACTED

# APPENDIX E: PLAN ADOPTION

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Note: a County resolution, municipalities records of adoption, FEMA Approval Letter, etc. will be incorporated below after this Plan is approved.

Copies of all adoption resolutions will be kept on file with Grand County Office of Emergency Management. A sample adoption resolution is provided here.

## Multi-Hazard Mitigation Plan Adoption Sample Resolution

Resolution # \_\_\_\_\_

### **Adopting the Grand County Multi-Hazard Mitigation Plan 2013**

*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 Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and*

*Whereas, (name of county or community) resides within the Planning Area, and fully participated in the mitigation planning process to prepare this Multi-Hazard Mitigation Plan; and*

*Whereas, the Colorado Office of Emergency Management and Federal Emergency Management Agency, Region VIII officials have reviewed the Grand County Multi-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 Grand County Multi-Hazard Mitigation Plan, as an official plan; and*

*Be it further resolved, Grand 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

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA’s evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan’s strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

<b>Jurisdiction:</b> Grand County	<b>Title of Plan:</b> Hazard Mitigation Plan	<b>Date of Plan:</b> 2020
<b>Local Point of Contact:</b> Kathleen Conrad	<b>Address:</b>	
<b>Title:</b> Emergency Manager		
<b>Agency:</b> Grand County Emergency Mgmt		
<b>Phone Number:</b>		

<b>State Reviewer:</b>	<b>Title:</b>	<b>Date:</b>

<b>FEMA Reviewer:</b>	<b>Title:</b>	<b>Date:</b>
<b>Date Received in FEMA Region (insert #)</b>		
<b>Plan Not Approved</b>		
<b>Plan Approvable Pending Adoption</b>		
<b>Plan Approved</b>		



**SECTION 1:  
REGULATION CHECKLIST**

**INSTRUCTIONS:** The Regulation Checklist must be completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been ‘Met’ or ‘Not Met.’ The ‘Required Revisions’ summary at the bottom of each Element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is ‘Not Met.’ Sub-elements should be referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each Element and sub-element are described in detail in this *Plan Review Guide* in Section 4, Regulation Checklist.

<b>1. REGULATION CHECKLIST</b>		<b>Location in Plan</b> (section and/or page number)	<b>Met</b>	<b>Not Met</b>
<b>Regulation (44 CFR 201.6 Local Mitigation Plans)</b>				
<b>ELEMENT A. PLANNING PROCESS</b>				
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))				
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))				
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))				
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))				
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))				
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))				
<b>ELEMENT A: REQUIRED REVISIONS</b>				

<b>1. REGULATION CHECKLIST</b>		<b>Location in Plan</b> (section and/or page number)	<b>Met</b>	<b>Not Met</b>
<b>Regulation</b> (44 CFR 201.6 Local Mitigation Plans)				
<b>ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT</b>				
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))				
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))				
B3. Is there a description of each identified hazard’s impact on the community as well as an overall summary of the community’s vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))				
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))				
<b>ELEMENT B: REQUIRED REVISIONS</b>				
<b>ELEMENT C. MITIGATION STRATEGY</b>				
C1. Does the plan document each jurisdiction’s existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))				
C2. Does the Plan address each jurisdiction’s participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))				
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))				
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))				
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))				
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))				
<b>ELEMENT C: REQUIRED REVISIONS</b>				

<b>1. REGULATION CHECKLIST</b>		<b>Location in Plan</b> (section and/or page number)	<b>Met</b>	<b>Not Met</b>
<b>Regulation</b> (44 CFR 201.6 Local Mitigation Plans)				
<b>ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION</b> (applicable to plan updates only)				
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))				
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))				
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))				
<b><u>ELEMENT D: REQUIRED REVISIONS</u></b>				
<b>ELEMENT E. PLAN ADOPTION</b>				
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))				
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))				
<b><u>ELEMENT E: REQUIRED REVISIONS</u></b>				
<b>OPTIONAL: HIGH HAZARD POTENTIAL DAM RISKS</b>				
HHPD1. Did Element A4 (planning process) describe the incorporation of existing plans, studies, reports, and technical information for high hazard potential dams?				
HHPD2. Did Element B3 (risk assessment) address HHPDs?				
HHPD3. Did Element C3 (mitigation goals) include mitigation goals to reduce long-term vulnerabilities from high hazard potential dams that pose an unacceptable risk to the public?				
HHPD4. Did Element C4-C5 (mitigation actions) address HHPDs prioritize mitigation actions to reduce vulnerabilities from high hazard potential dams that pose an unacceptable risk to the public?				
<b><u>REQUIRED REVISIONS</u></b>				
<b>ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)</b>				
F1.				
F2.				
<b><u>ELEMENT F: REQUIRED REVISIONS</u></b>				

## SECTION 2: PLAN ASSESSMENT

**INSTRUCTIONS:** The purpose of the Plan Assessment is to offer the local community more comprehensive feedback to the community on the quality and utility of the plan in a narrative format. The audience for the Plan Assessment is not only the plan developer/local community planner, but also elected officials, local departments and agencies, and others involved in implementing the Local Mitigation Plan. The Plan Assessment must be completed by FEMA. The Assessment is an opportunity for FEMA to provide feedback and information to the community on: 1) suggested improvements to the Plan; 2) specific sections in the Plan where the community has gone above and beyond minimum requirements; 3) recommendations for plan implementation; and 4) ongoing partnership(s) and information on other FEMA programs, specifically RiskMAP and Hazard Mitigation Assistance programs. The Plan Assessment is divided into two sections:

1. Plan Strengths and Opportunities for Improvement
2. Resources for Implementing Your Approved Plan

***Plan Strengths and Opportunities for Improvement*** is organized according to the plan Elements listed in the Regulation Checklist. Each Element includes a series of italicized bulleted items that are suggested topics for consideration while evaluating plans, but it is not intended to be a comprehensive list. FEMA Mitigation Planners are not required to answer each bullet item and should use them as a guide to paraphrase their own written assessment (2-3 sentences) of each Element.

The Plan Assessment must not reiterate the required revisions from the Regulation Checklist or be regulatory in nature and should be open-ended and to provide the community with suggestions for improvements or recommended revisions. The recommended revisions are suggestions for improvement and are not required to be made for the Plan to meet Federal regulatory requirements. The italicized text should be deleted once FEMA has added comments regarding strengths of the plan and potential improvements for future plan revisions. It is recommended that the Plan Assessment be a short synopsis of the overall strengths and weaknesses of the Plan (no longer than two pages), rather than a complete recap section by section.

***Resources for Implementing Your Approved Plan*** provides a place for FEMA to offer information, data sources and general suggestions on the plan implementation and maintenance process. Information on other possible sources of assistance including, but not limited to, existing publications, grant funding or training opportunities, can be provided. States may add state and local resources, if available.

## **A. Plan Strengths and Opportunities for Improvement**

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

### **Element A: Planning Process**

*How does the Plan go above and beyond minimum requirements to document the planning process with respect to:*

- *Involvement of stakeholders (elected officials/decision makers, plan implementers, business owners, academic institutions, utility companies, water/sanitation districts, etc.);*
- *Involvement of Planning, Emergency Management, Public Works Departments or other planning agencies (i.e., regional planning councils);*
- *Diverse methods of participation (meetings, surveys, online, etc.); and*
- *Reflective of an open and inclusive public involvement process.*

### **Element B: Hazard Identification and Risk Assessment**

*In addition to the requirements listed in the Regulation Checklist, 44 CFR 201.6 Local Mitigation Plans identifies additional elements that should be included as part of a plan's risk assessment. The plan should describe vulnerability in terms of:*

- 1) *A general description of land uses and future development trends within the community so that mitigation options can be considered in future land use decisions;*
- 2) *The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; and*
- 3) *A description of potential dollar losses to vulnerable structures, and a description of the methodology used to prepare the estimate.*

*How does the Plan go above and beyond minimum requirements to document the Hazard Identification and Risk Assessment with respect to:*

- *Use of best available data (flood maps, HAZUS, flood studies) to describe significant hazards;*
- *Communication of risk on people, property, and infrastructure to the public (through tables, charts, maps, photos, etc.);*
- *Incorporation of techniques and methodologies to estimate dollar losses to vulnerable structures;*
- *Incorporation of Risk MAP products (i.e., depth grids, Flood Risk Report, Changes Since Last FIRM, Areas of Mitigation Interest, etc.); and*
- *Identification of any data gaps that can be filled as new data became available.*

### **Element C: Mitigation Strategy**

*How does the Plan go above and beyond minimum requirements to document the Mitigation Strategy with respect to:*

- *Key problems identified in, and linkages to, the vulnerability assessment;*
- *Serving as a blueprint for reducing potential losses identified in the Hazard Identification and Risk Assessment;*
- *Plan content flow from the risk assessment (problem identification) to goal setting to mitigation action development;*
- *An understanding of mitigation principles (diversity of actions that include structural projects, preventative measures, outreach activities, property protection measures, post-disaster actions, etc);*
- *Specific mitigation actions for each participating jurisdiction that reflects their unique risks and capabilities;*
- *Integration of mitigation actions with existing local authorities, policies, programs, and resources; and*
- *Discussion of existing programs (including the NFIP), plans, and policies that could be used to implement mitigation, as well as document past projects.*

### **Element D: Plan Update, Evaluation, and Implementation (Plan Updates Only)**

*How does the Plan go above and beyond minimum requirements to document the 5-year Evaluation and Implementation measures with respect to:*

- *Status of previously recommended mitigation actions;*
- *Identification of barriers or obstacles to successful implementation or completion of mitigation actions, along with possible solutions for overcoming risk;*
- *Documentation of annual reviews and committee involvement;*
- *Identification of a lead person to take ownership of, and champion the Plan;*
- *Reducing risks from natural hazards and serving as a guide for decisions makers as they commit resources to reducing the effects of natural hazards;*
- *An approach to evaluating future conditions (i.e. socio-economic, environmental, demographic, change in built environment etc.);*
- *Discussion of how changing conditions and opportunities could impact community resilience in the long term; and*
- *Discussion of how the mitigation goals and actions support the long-term community vision for increased resilience.*

## **B. Resources for Implementing Your Approved Plan**

*Ideas may be offered on moving the mitigation plan forward and continuing the relationship with key mitigation stakeholders such as the following:*

- *What FEMA assistance (funding) programs are available (for example, Hazard Mitigation Assistance (HMA)) to the jurisdiction(s) to assist with implementing the mitigation actions?*
- *What other Federal programs (National Flood Insurance Program (NFIP), Community Rating System (CRS), Risk MAP, etc.) may provide assistance for mitigation activities?*
- *What publications, technical guidance or other resources are available to the jurisdiction(s) relevant to the identified mitigation actions?*
- *Are there upcoming trainings/workshops (Benefit-Cost Analysis (BCA), HMA, etc.) to assist the jurisdictions(s)?*
- *What mitigation actions can be funded by other Federal agencies (for example, U.S. Forest Service, National Oceanic and Atmospheric Administration (NOAA), Environmental Protection Agency (EPA) Smart Growth, Housing and Urban Development (HUD) Sustainable Communities, etc.) and/or state and local agencies?*

**SECTION 3:  
MULTI-JURISDICTION SUMMARY SHEET (OPTIONAL)**

**INSTRUCTIONS:** For multi-jurisdictional plans, a Multi-jurisdiction Summary Spreadsheet may be completed by listing each participating jurisdiction, which required Elements for each jurisdiction were ‘Met’ or ‘Not Met,’ and when the adoption resolutions were received. This Summary Sheet does not imply that a mini-plan be developed for each jurisdiction; it should be used as an optional worksheet to ensure that each jurisdiction participating in the Plan has been documented and has met the requirements for those Elements (A through E).

#	Jurisdiction Name	Jurisdiction Type (town, FPD)	Plan POC Email	Address Phone	Requirements Met (Y/N)					
					A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Requirements
1					y	y	y			

**REDACTED**



