

# Grand County Multi-Hazard Mitigation Plan

2020



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

2020

Updated by Grand County Office of Emergency Management

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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
  - Grand Fire Protection District
  - East Grand Fire Protection District
  - Grand Lake Fire Protection District
  - Kremmling Fire Department
  - Hot Sulphur Springs/Parshall Fire Protection District
- Denver Water
- Northern Water

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:

### **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 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 (FACE) was used. Through the FACE 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

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

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 \$6 in avoided future losses in addition to saving lives and preventing injuries (National Institute of Building Science Multi-Hazard Mitigation Council 2019).

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
  - Grand Fire Protection District

- East Grand Fire Protection District
- Grand Lake Fire Protection District
- Kremmling Fire Department
- Hot Sulphur Springs/Parshall Fire Protection District
- Northern Water
- Denver Water

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.

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

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**

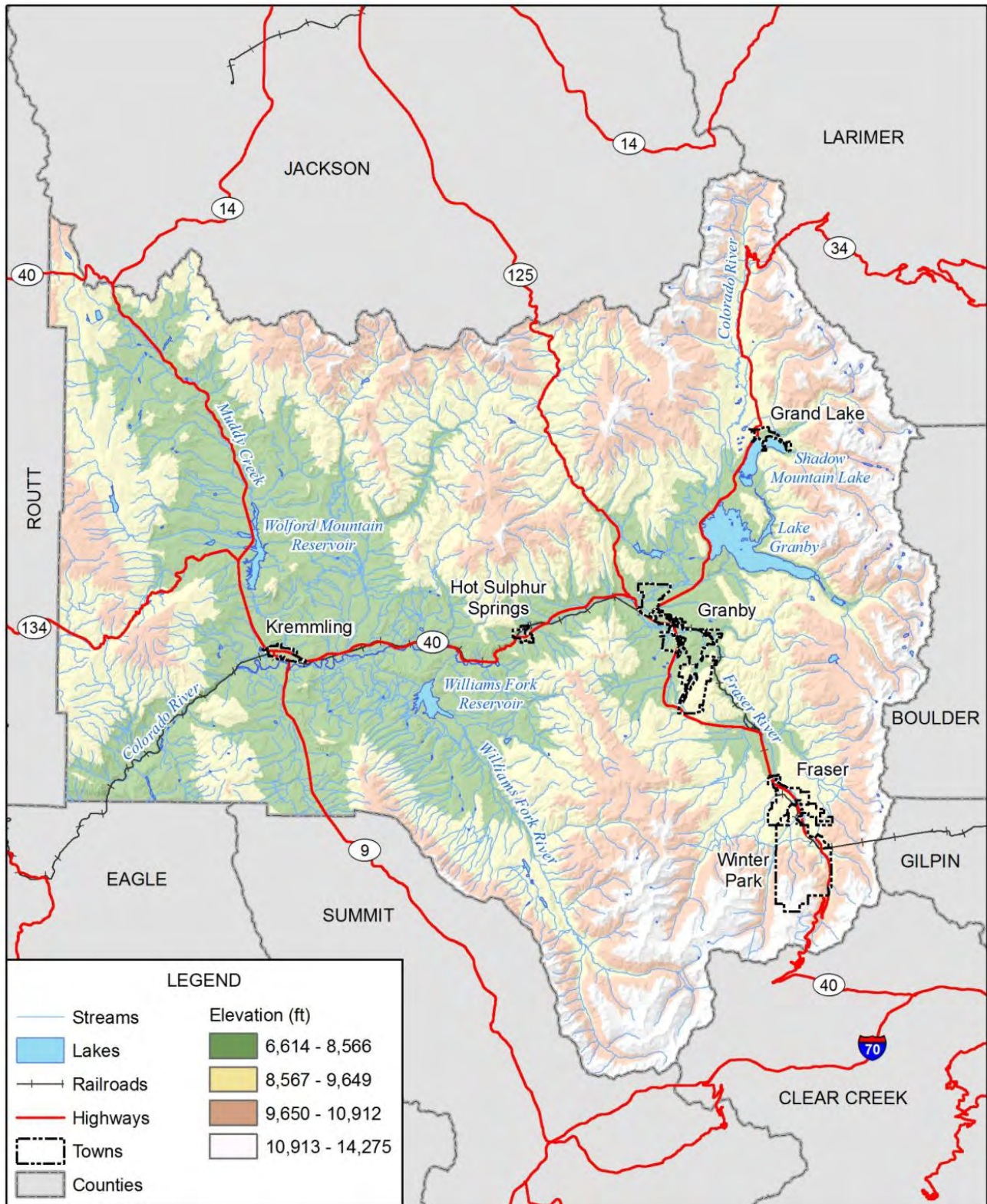
The Grand County Multi-Hazard Mitigation Plan is organized as follows:

- 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
- 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**

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

## 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).

## 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.

### Impacts on Forest Pest Infestation

Changing climate conditions are expected to influence future pest infestation events. According to the Fourth National Climate Assessment, climate change is aiding in the spread of invasive species and often the changing climate favors the nonnative invading species over native ones. Specific impacts in Colorado are identified in subsection 3.2.10 Insect Disease Infestation hazard profile.

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>

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. The population estimates for 2019 show the total population at 15,718. As shown in Table 1-1, the majority of the County's population is in unincorporated areas.

**Table 1-1 Grand County Population**

Jurisdiction	2000	2010	2019
Town of Fraser	910	1,224	1,335
Town of Granby	1,525	1,864	2,167
Town of Grand Lake	447	471	514
Town of Hot Sulphur Springs	521	663	719
Town of Kremmling	1,578	1,444	1,444
Town of Winter Park	662	999	1,077
Unincorporated Grand County	6,799	8,178	8,462
Total Grand County	12,442	14,843	15,718

Source: United States Census, Colorado State Demography Office 2019 Estimates

The American Community Survey (ACS) 2019 demographic and social characteristics estimates for Grand County are shown in Table 1-2.

**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 (%)	52.8	56.5	51.3	53.3	50.8	57.3	62.2
Female (%)	47.2	43.5	48.7	46.7	49.2	42.7	37.8
Under 5 Years (%)	3.8	7.2	6.7	3.2	8.1	4.5	0.8
65 Years and Over (%)	16.7	3.7	7.4	14.6	6	11.1	17.6
<b>Race/Ethnicity (one race)</b>							
White (%)	87.3	71.5	91.5	96.1	73.1	76.2	95.0
Black (%)	1.0	6.2	0.7	1.4	1.3	0.0	2.3
American Indian and Alaska Native (%)	0.0	0.0	0.0	0.0	0.9	0.0	0.0
Asian (%)	1.4	2.0	0.0	0.0	14.9	3.2	0.0
Native Hawaiian and Other Pacific Islander (%)	0.1	1.1	0.0	0.0	0.0	0.0	0.0
Other (%)	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Hispanic/Latino (Any)	8.8	19.3	7.4	2.5	10.0	20.6	2.7
High School Grad or Higher (%)	94.6	89.9	90.5	100	96.1	92.5	100

Source: U.S. Census Bureau, American Community Survey five-year estimates 2019

### 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 2019 ACS estimates the industries that employed the highest percentages of Grand County's labor force were arts, entertainment, recreation, accommodation, and food services (23.8%); education services, health cares, and social assistance (15.3%); construction (12.5%); professional, scientific, management, administrative and waste management services (9.2%); and retail trade (8.2%). Select economic characteristics for Grand County from the 2019 ACS are shown in Table 1-3. Characteristics for Grand County are for the entire County.

**Table 1-3 Grand County Economic Characteristics**

Characteristic	Grand County	Fraser	Granby	Grand Lake	Hot Sulphur Springs	Kremmling	Winter Park
Families below Poverty	2.6%	0.0%	1.1%	0.0%	1.8%	15.2%	14.9%
Individuals below Poverty	9.5%	7.3%	3.7%	9.2%	3.6%	20.8%	7.3%
Median Home Value (\$)	308,200	287,000	238,000	293,600	222,500	212,500	435,700
Median Household Income (\$)	\$71,198	\$56,083	\$64,792	\$69,176	\$52,639	\$56,621	\$75,375
Per Capita Income (\$)	\$37,876	\$31,670	\$36,211	\$62,408	\$30,735	\$28,919	\$55,561
Population in Labor Force	69.2%	90.4%	70.7%	68.6%	58.9%	70.5%	75.7%

Source: U.S. Census Bureau, American Community Survey five-year estimates 2019

## 2 PLANNING PROCESS

*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

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, 2014 and the 2020 update processes. The first version of this plan was approved by FEMA in 2008. Since the original development of the plan, the County contracted with Wood Environment and Infrastructure Solutions, Inc. (Wood), formerly Amec, in 2013 to facilitate the update of a multi-jurisdictional, multi-hazard mitigation plan. The plan underwent an update in 2020 led by County Emergency Management. The planning process followed during the update was similar to what was used in the 2013 plan update. This planning process utilized the input from a multi-jurisdictional Hazard Mitigation Planning Committee (HMPC). The process is described further in this section and documented in Appendix B. The 2020 update process was originally initiated by Grand County staff, and Wood was procured to assist with finalizing the update in November of 2020. 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 – 2020 Update

During the 2020 update process, the HMPC updated each section of the previously approved plan to include new information and improve the organization and formatting of the plan’s contents. The HMPC analyzed each section using FEMA’s local plan update guidance (2011 Local Mitigation Plan Review Tool) to ensure that the plan met the latest requirements. Upon review, the HMPC 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 2020 plan has been significantly revised from the 2013 version with relevant information carried over to the updated document.

The 2020 update revised the list of profiled hazards slightly, eliminating Mountain Pine Beetle Infestation and instead focusing on Insect Disease Infestation. 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 2020 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 2020 plan update replaced the original planning process discussion in the 2008 plan and the 2013 update. The step-by-step process used in the 2020 plan update is similar to that of the 2013 plan update, though the 2020 process is organized to be more closely aligned with FEMA guidance. Notes of how various sections of the 2013 plan update 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

*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. The 2020 update includes the same participating jurisdictions that previously participated in the plan, including the fire protection districts and two water districts (Denver Water and Northern Water). 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
- 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

An effort was made during the 2020 update to keep up the multi-jurisdictional participation. Updating the plan during 2020 was especially challenging due to the COVID 19 Pandemic, East Troublesome Fire, and the Williams Fork Fire. These multiple disasters necessitated alternative means of meetings (remote/web based) and more reliance on email and phone for multi-jurisdictional coordination. The primary points of contact for each participating jurisdiction are noted in Table 2-1 below. The names and contacts of these and other individuals who comprised the HMPC are in Appendix D: Hazard Mitigation Planning Committee. During the update process representatives for each jurisdiction attended meetings, helped collect data, identified mitigation actions and implementation strategies, and reviewed annex drafts. Meeting sign-in sheets and other planning process documentation 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 Representation in 2020 Planning Process**

Jurisdiction	Representative Title
Grand County	Director of Grand County EM
Town of Fraser	Public Works Director
Town of Granby	Water Superintendent
Town of Grand Lake	Fire Marshall
Town of Hot Sulphur Springs	Trustee
Town of Kremmling	Town Manager
Town of Winter Park	Public Works Director
East Grand FPD	Fire Chief
Grand FPD	Fire Chief
Grand Lake FPD	Fire Chief
Hot Sulphur Springs/Parshall FPD	Fire Chief
Kremmling FPD	Fire Chief
Northern Water	Emergency Management Specialist
Denver Water	Manager of Emergency Management

## 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 Mitigation Planning Handbook (March 2013)*. 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, Wood 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 (HMGP), Flood Mitigation Assistance (FMA), and Building Resilient Infrastructure and Communities (BRIC)), 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**

DMA Process	Modified CRS Process
1) Organize Resources	
201.6(c)(1)	1) Organize the Planning Effort
201.6(b)(1)	2) Involve the Public
201.6(b)(2) and (3)	3) Coordinate with Other Departments and Agencies
2) Assess Risks	
201.6(c)(2)(i)	4) Identify the Hazards
201.6(c)(2)(ii)	5) Assess the Risks
3) Develop the Mitigation Plan	
201.6(c)(3)(i)	6) Set Goals
201.6(c)(3)(ii)	7) Review Possible Activities
201.6(c)(3)(iii)	8) Draft an Action Plan
4) Implement the Plan and Monitor Progress	
201.6(c)(5)	9) Adopt the Plan
201.6(c)(4)	10) Implement, Evaluate, and Revise the Plan

**2.4.1 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:

**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
- Kremmling Fire Department
- Northern Water
- Denver Water

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 following the update process. 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 three times during the planning period (January 23, 2020 to December 15, 2020). The sign-in sheets and agendas for each of the meetings are included in Appendix B. Note: due to the Coronavirus Pandemic, HMPC meeting #2 and #3 was held in several locations, with participants joining in virtually by WebEx or Microsoft Teams.

**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
HMPC # 3 Plan Finalization Web meeting	Review final revisions to risk assessment; Review of mitigation alternatives and final multi-jurisdictional input needed	December 3, 2020

Note: the original schedule of meetings was altered due to the Coronavirus Pandemic.

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.

During the second HMPC meeting, 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 provided. New and former participants completed and returned the worksheets and data collection guides to Grand County OEM or provided information to incorporate.

The third meeting was a web meeting convened to discuss final input needs on the mitigation strategy and capability assessment. This meeting was facilitated by Wood prior to the plan being submitted to CO DHSEM (Division of Homeland Security and Emergency Management) and FEMA for the final review by those agencies.

### **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 plan was also discussed at other ongoing meetings, including an LEPC meeting held on January 16, 2020, in Granby. The LEPC includes representation of local business and industry, in addition to local governments and special districts in the county. The HMPC provided a link to a draft of the updated plan which was posted on the County website in September 2020. The public was given the opportunity to answer questions and offer their input through a comment link on the County webpage. These questions asked participants a series of four questions to gauge their perception of hazards and mitigation in their community. Participants were asked to rank the top 3 hazards for Grand County and indicate what mitigation strategies they felt should be given the highest priority. Participants were also asked how many times in the past 5 years that their lives were disrupted by a natural hazard. The webpage questionnaire resulted in five responses that were sent to the County Emergency Manager for collection. The results indicated that wildlife was largely perceived as the most present hazard risk in Grand County and that wildfire fuels treatment projects and public education and awareness mitigation actions should be given the highest priority. Detailed summaries of the information collected from the survey and copies of the answers can be found in Appendix B. The plan was also made available in hardcopy form in the local library with a comment form, but no comments were received. This provided another opportunity for public input during the planning process, prior to finalization of the plan update.

**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.

In addition, the HMPC developed a list of neighboring communities and local and regional agencies involved in hazard mitigation activities, as well as other interested parties to keep informed on the plan update process. Neighboring jurisdictions that participated in the plan update process include Denver Water and Northern Water Conservancy District. Other stakeholders include local and regional agencies involved in hazard mitigation activities or those beyond the County and local government that have the authority to regulate development. Stakeholders could participate in various ways, either by contributing input at HMPC meetings, being aware of planning activities through an email group, providing information to support the effort, or reviewing and commenting on the draft plan. Based on their involvement in other hazard mitigation planning efforts, and status in the County, representatives from the following agencies and organizations were invited to participate as stakeholders in the process; an asterisk indicates they participated in HMPC meetings:

**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
- Three Lakes Watershed Association\*
- Grandy County Water Information Network\*
- Snow Mountain Ranch YMCA\*

**Neighboring Communities**

- Boulder County
- Gilpin County
- Clear Creek County
- Summit County
- Eagle County
- Routt County
- Jackson County
- Larimer County

As noted by the asterisks (\*) next to the above names, many of these groups found it beneficial to participate on the HMPC or attend public meetings. This input was solicited both through membership on the HMPC and by direct emails to key groups and associations to review and comment on the plan. As part of this targeted outreach, these key stakeholders were also specifically invited to attend the HMPC and public meeting to discuss any outstanding issues and to provide input on the draft document and final mitigation strategies. As an example of an outcome of this collaboration the BLM provided input on a multi-jurisdictional wildfire mitigation action. This stakeholder involvement process was accomplished as part of planning steps two and three in the FEMA Local Mitigation Planning Handbook.

As part of a final comment period for the draft plan while the plan was under review at CO DHSEM, neighboring counties were specifically solicited to provide any final input to the draft plan document prior to the submittal to FEMA. Documentation of this outreach is provided in Appendix B. Results of neighboring jurisdiction comment period included an email response from a Larimer County representative indicating no comments or concerns on the plan document. No other comments were received.

### **Incorporation of Existing Plans and Other Information**

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.

### **Integration of 2015 Hazard Mitigation Plan into Other Planning Mechanisms**

While the jurisdictions did not integrate the 2015 Hazard Mitigation Plan into existing planning mechanisms, each has identified integration of the 2020 Plan Updated as an opportunity to enhance their existing capabilities. Refer to Section 5.3 for specific examples of potential opportunities to incorporate the 2020 Hazard Mitigation Plan Update into future jurisdictional plans and reports.

#### **2.4.2 Phase 2 Assess Risk**

##### **Step 4: Identify the Hazards**

During the original 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 National Flood Hazard Layer (NFHL) 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.

### **2.4.3 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 Division of Homeland Security and Emergency Management and FEMA Region VIII.

### **2.4.4 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 D – 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 2020.

## 3 RISK ASSESSMENT

*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 *Local Mitigation Planning Handbook (March 2013)*, which includes a four-step process:

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

This chapter is divided into four 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.
- **Section 3.4** Risk Assessment Summary provides highlights on the updated risk and vulnerability assessment.

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

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.

The HMPC identified 14 hazards that significantly affect the planning area and organized these hazards to be consistent with the 2018-2023 Colorado Hazard Mitigation Plan.

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	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Landslide, Mudflow/ Debris Flow, Rock Fall	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lightning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Insect Disease Infestation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Severe Winter Weather	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wildfire	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wildlife-Vehicle Collisions Hazards	✓	✓	✓	✓	✓	✓	✓	✓		✓
Windstorm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Source: Grand County Hazard Mitigation Planning Committee, 2020

\*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
- 2018-2023 Colorado Hazard Mitigation Plan
- 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 Centers for Environmental Information (NCEI) Storm Events Database
- 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 (1953-2020)**

Date Declared	Disaster Name	Declaration Type	Disaster Number	Cost (\$)
3/28/2020	COVID-19 Pandemic	Presidential	4498	Unk at this time
3/13/2020	COVID-19 Pandemic	Presidential	9994	Unk at this time
3/13/2020	COVID-19 Pandemic	Emergency	3436	Unk at this time
5/30/2019	Drought	USDA	S4481	Unk at this time
10/2/2018	Drought	USDA	S4408	Unk at this time
9/12/2018	Drought	USDA	S4386	Unk at this time

Date Declared	Disaster Name	Declaration Type	Disaster Number	Cost (\$)
8/1/2018	Severe Hail and High Winds	USDA	S4365	Unk at this time
7/2/2013	Drought	USDA	S3575	Unk at this time
5/1/2013	Drought	USDA	S3548	Unk at this time
2013	Wildfire	State	2013-012	
7/3/2012	Drought, high winds, excessive heat	USDA (contiguous)	S3260	Unk at this time
2006	Drought	USDA (contiguous)		
9/5/2005	Hurricane Katrina Evacuation	Presidential	3224	15,279,405
2004	Drought, Freeze, Hail	USDA	S1947	Unk at this time
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	4,873,8381

Source: 2018-2023 Colorado Hazard Mitigation Plan; State of Colorado Drought Mitigation and Response Plan (2018); 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. East Troublesome Fire federal disaster declaration pending as of 12/21/2020

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, 2004, 2012, 2013, 2018 and 2019. 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. At the time of this update, Grand County had also received a Fire Management Assistance Grant (FMAG) declaration for the East Troublesome Fire on October 17, 2020. This form of assistance is part of a presidential declaration request.

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.

### 3.2 Hazard Profiles

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

*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
- 2018-2023 Colorado Hazard Mitigation Plan
- State of Colorado Drought Mitigation and Response Plan (2018)
- Grand County Community Wildfire Protection Plan (2006)
- Grand County Master Plan (2011)
- Internet resources on past hazard events, such as the SHELVDUS database created by the University of South Carolina Hazards Research Lab and the National Centers for Environmental Information (NCEI) 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

## Hazard Significance Rating

- **Low** – Minimal potential impact
- **Medium** – Moderate potential impact
- **High** – Widespread potential impact

### 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 to 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.

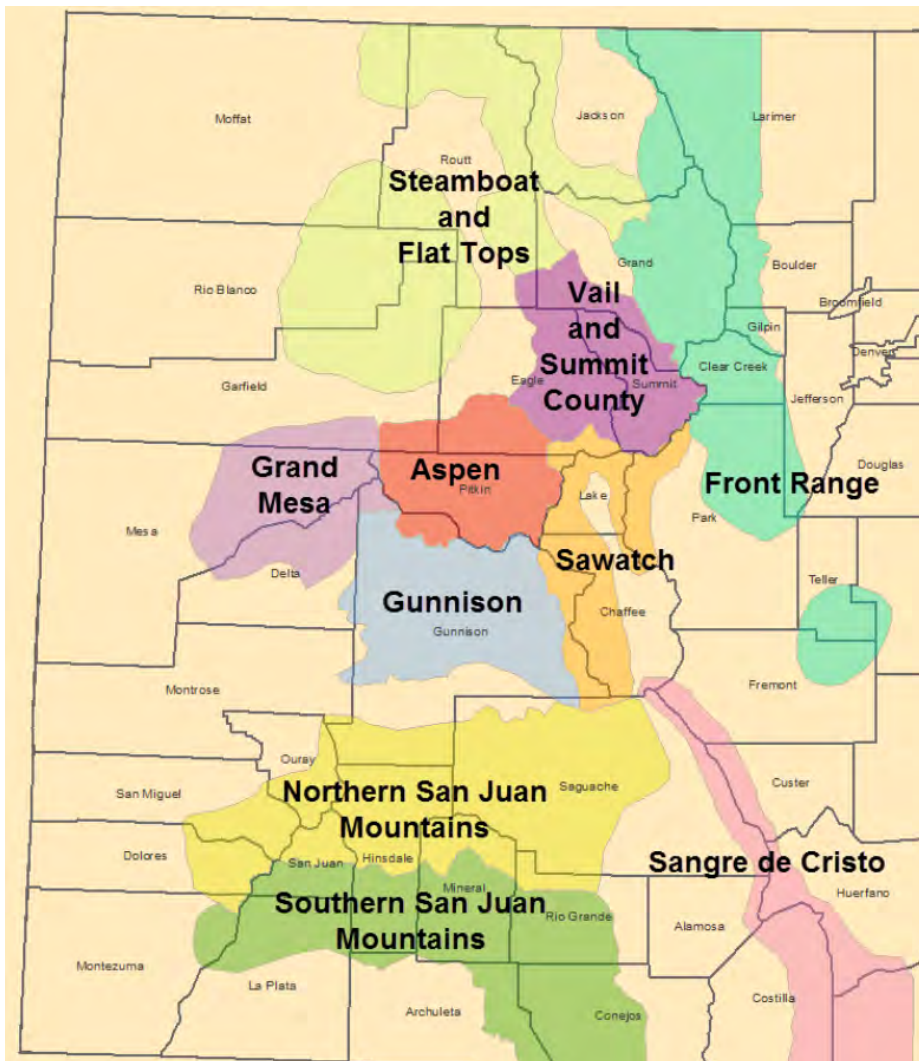
This hazard generally affects a small number of people, such as the participants in backcountry recreation discussed above. Motorists traveling along steep mountain highways are also at risk of injury and death due to avalanches. Road and highway closures, damaged structures, and destruction of forests 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 (CAIC) 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 (Refer to Figure 3-1 below of the Forecast Zones). The HMPC named Chicken Hill and Gravel Mountain as particular areas of concerns for avalanche events.

**Figure 3-1 Colorado Avalanche Forecasts Zones**



Source: CAIC

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.

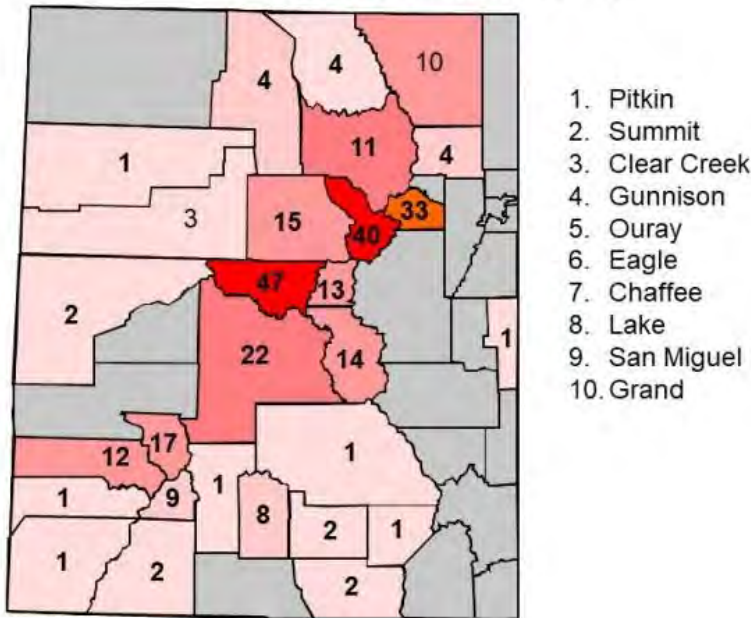
**Table 3-4 Grand County Avalanche History (2005-2010)**

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
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			

The CAIC tracks avalanches fatalities by county, since 1950. According to CAIC there have been 11 fatalities in Grand County between the 1950-51 season and 2018-19 season. Grand County ranks 10<sup>th</sup> in state for Colorado fatalities.

**Figure 3-2 Colorado Avalanche Fatalities by County (1950-51 – 2018-19)**

**Colorado Avalanche Fatalities by County  
1950-51 to 2018-19**



Source: CAIC

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 Centers for Environmental Information Storm Events Database and the CAIC have information on 21 notable avalanches (e.g., avalanches that involved people) that occurred in Grand County between 2008 and 2018. Details of these and other events from the 2008 County Hazard Mitigation Plan, NCEI and CAIC databases are summarized below.

- February 11, 2018**— A solo skier unintentionally triggered and was carried in an avalanche in the area locally known as the Fingers just west of the summit of Berthoud Pass. The avalanche was a soft slab avalanche and occurred on a northwest aspect near treeline. It was small relative to the path, but large enough to bury, injure, or kill a person. The skier entered into the farthest north of the fingers and made a cut across the top of the gully. He did not like what he saw, so he traversed across and into the next gully to the south. Upon entering this gully, he triggered the avalanche and was carried to the bottom of the path. He lost his equipment during the avalanche. When he came to rest, he was face down with his arm in front of his face. He was able to self-extricate and then was assisted to the road by a bystander who was skiing in the area.
- January 23, 2016**—At the bottom of a slope commonly called "Postage Stamp" along Berthoud Pass, a backcountry snowboarder planned to "dig a pit between two tree groves to check stability levels". As the snowboarder crossed under the slope, he heard multiple whumpfs as the slope collapsed. The avalanche crown broke near the top of the slope over 100 vertical feet above. The avalanche caught and carried the snowboarder approximately 100 feet. The snowboarder then deployed his avalanche airbag. The balloon was punctured by a "tree in the debris field and deflated." The snowboarder was partially buried and uninjured when the avalanche stopped.
- May 10, 2015** —A skier was injured when he was caught in an avalanche on Berthoud Pass. The slide happened in the Currant Creek area, on the Grand County side of Berthoud Pass. Three skiers were caught in the slide, two made it safely; the third skier suffered a knee injury and had to be carried out.

- **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**—A skier inbound in Winter Parks, Trestle Trees, was caught and fully buried in a small avalanche potentially triggered by another skier. Rescuers were not able to reach to the skier 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 20, 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.
- **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 26, 2008**—4 snowmobilers were riding in the bowl between Gravel Mountain and Little Gravel Mountain near Grand Lake. An avalanche triggered, partially burying one snowmobiler, and fully burying and killing two others.
- **December 6, 2008**—A second avalanche struck a skier on Berthoud Pass. The person was caught and carried for some distance, but was not injured.
- **December 5, 2008**—An avalanche partially buried a skier on Berthoud Pass. The skier suffered minor injuries.
- **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, 2007**—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 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**—Nearly 50 percent chance of occurrence next year or happens every year.

Between 2008 and 2018, there were 21 notable avalanches in Grand County (e.g., avalanches that involved people). This suggests that at least 2 notable avalanches 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. According the CAIC, 11 people have died in avalanches in Grand County between 1950 and 2019. The County also noted that several individuals were caught by avalanches on Berthoud Pass in April 2009. The Town of Winter Park's 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 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 3-3. The high and significant hazard dams all have emergency action plans in place.

**Table 3-5 Grand County Dams**

Dam ID	Name	Stream	Town Downstream	Norm Storage	Hazard Class	EAP
510108	GRANBY	N. FORK COLORADO RIVER	HOT SULPHUR SPRINGS	539,800	High	Yes
500115	MCPAHON #2	RED DIRT CREEK	KREMMLING	3,460	High	Yes
510118	MEADOW CREEK	MEADOW CREEK	TABERNASH	5,370	High	Yes
500133	RITSCHARD	MUDDY CREEK	KREMMLING	65,985	High	Yes
510123	SHADOW MOUNTAIN	N. FORK COLORADO RIVER	HOT SULPHUR SPRINGS	18,400	High	Yes
510125	SYLVAN	LITTLE MUDDY CREEK	PARSHALL	835	High	Yes

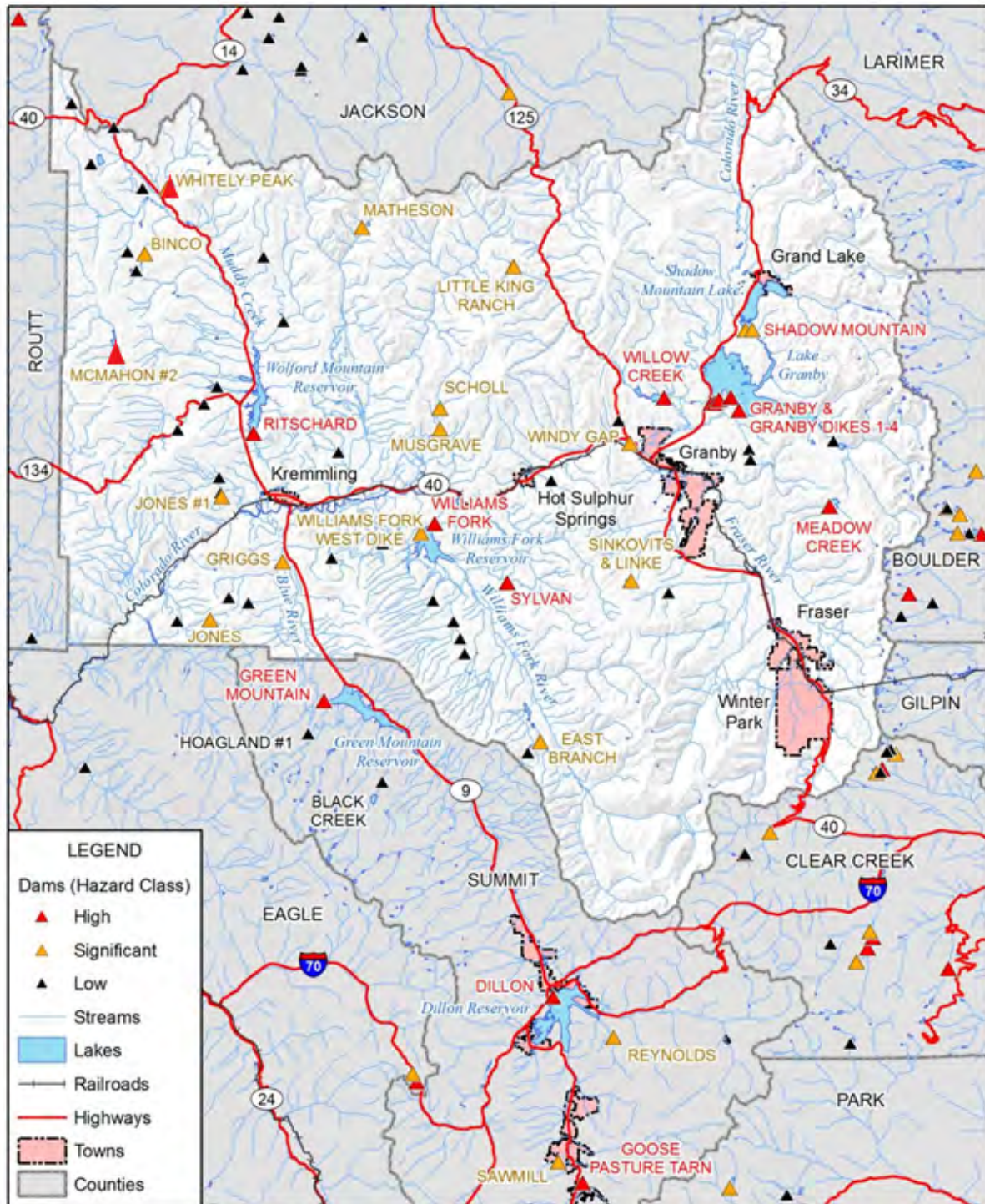
Dam ID	Name	Stream	Town Downstream	Norm Storage	Hazard Class	EAP
500121	WHITELEY PEAK	DIAMOND CR	KREMMLING	773	High	Yes
510127	WILLIAMS FORK	WILLIAMS FORK RIVER	PARSHALL	90,640	High	Yes
510128	WILLOW CREEK	WILLOW CREEK	HOT SULPHUR SPRINGS	10,600	High	Yes
500124	BINCO	ALBERT CREEK	KREMMLING	312	Significant	Yes
510104	DALE	SOUTH BATTLE CR	PARSHALL	48	Significant	Yes
510105	EAST BRANCH	UTE CREEK	PARSHALL	2,000	Significant	Yes
520107	JONES	HENRY CREEK	STATE BRIDGE	75	Significant	Yes
530115	JONES #1	SHEEP CREEK	KREMMLING	241	Significant	Yes
510114	LITTLE KING RANCH	BUFFALO CREEK	HOT SULPHUR SPRINGS	1,090	Significant	Yes
500113	MATHESON	TROUBLESOME CREEK	KREMMLING	1,074	Significant	Yes
510121	MUSGRAVE	ROCK CREEK	Kremmling	199	Significant	Yes
510124	SCHOLL	CORRAL CREEK	KREMMLING	353	Significant	Yes
510132	WINDY GAP	COLORADO RIVER	HOT SULPHUR SPRINGS	445	Significant	Yes

Source: Colorado Division of Water Resources 11/10/2020, Dam Safety Branch

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.

Figure 3-3 Grand County Dams



Map updated June 2020 by Grand County OEM

## 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 to be developed this year to address materials settlement***

*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.*

*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>

### 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.

On September 3, 2020, a Grand County resident tested positive for the plague. The single case came from exposure to a sick animal and was the second case of plague reported in the State of Colorado in 2020.

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

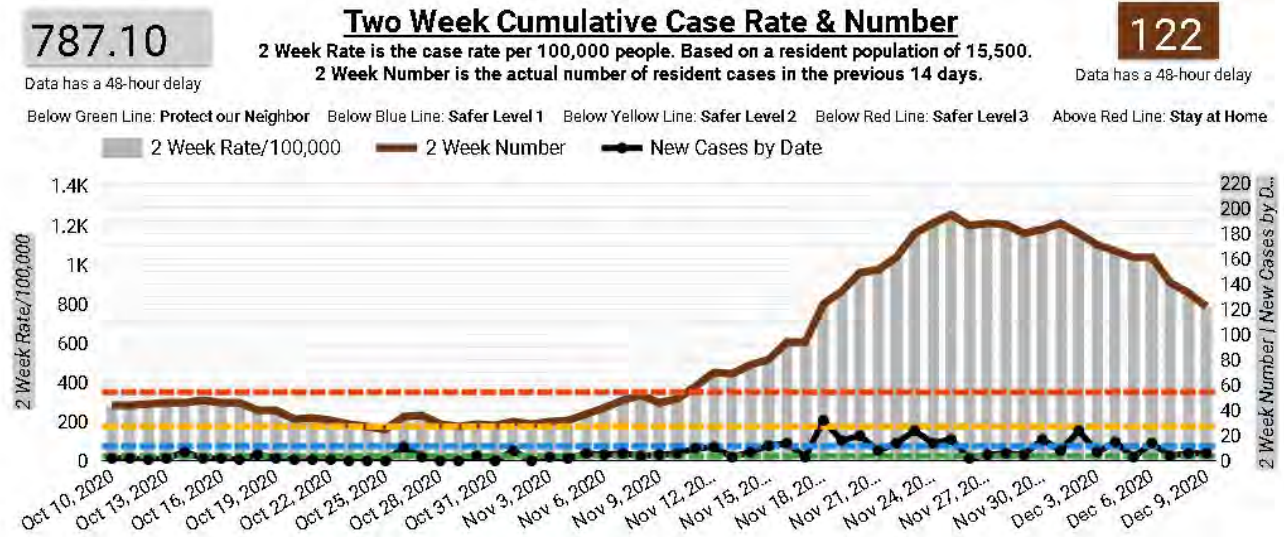
**Table 3-6 Grand County Disease Occurrences (2010-2019)**

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- inva	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>

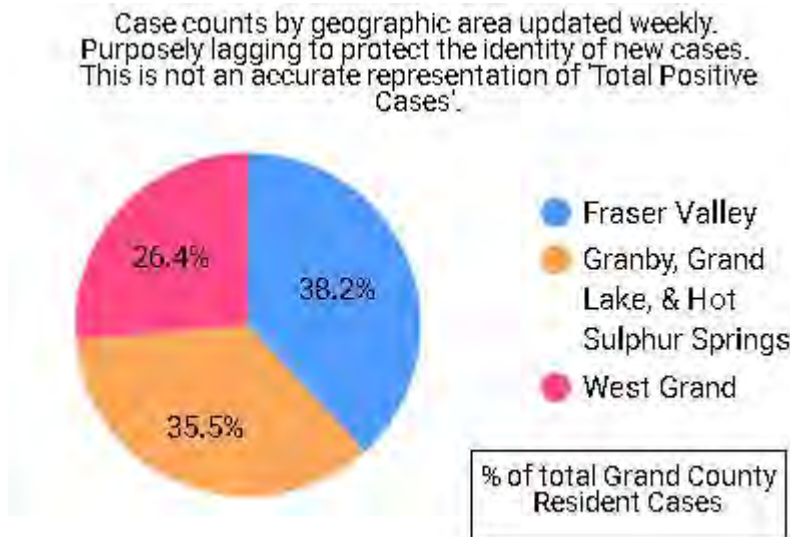
Source: Grand County Public Health

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 December 11, 2020, Grand County had 531 resident positive cases of COVID-19.

**Figure 3-4 Grand County Two Week Cumulative Case Rates and Numbers**



**Figure 3-5 COVID Cases by Geographic Area in Grand County**



**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. and around the world during the H1N1 pandemic in 2009-2010 and the COVID-19 Pandemic in 2020. Several illnesses and possibly deaths could occur.

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 that continue to be valid in 2020 with the COVID-19 pandemic. 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.

### 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.

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 impacts are wide-reaching and may be economic, environmental, and/or societal. The most significant impacts associated with drought in Colorado are those related to water intensive activities such as agriculture, wildland fire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. An ongoing drought may leave an area more prone to beetle kill and associated wildland fires. Drought conditions can also cause soil to compact, increasing an area's susceptibility to flooding, and reduce vegetation cover, which exposes soil to wind and erosion. A reduction of electric power generation and water quality deterioration are also potential problems. Drought impacts increase with the length of a drought, as carry-over supplies in reservoirs are depleted and water levels in groundwater basins decline. 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 August is the month with the most average precipitation. Table 3-7 contains precipitation summaries for the three stations, and Figure 3-6 through Figure 3-8 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>**

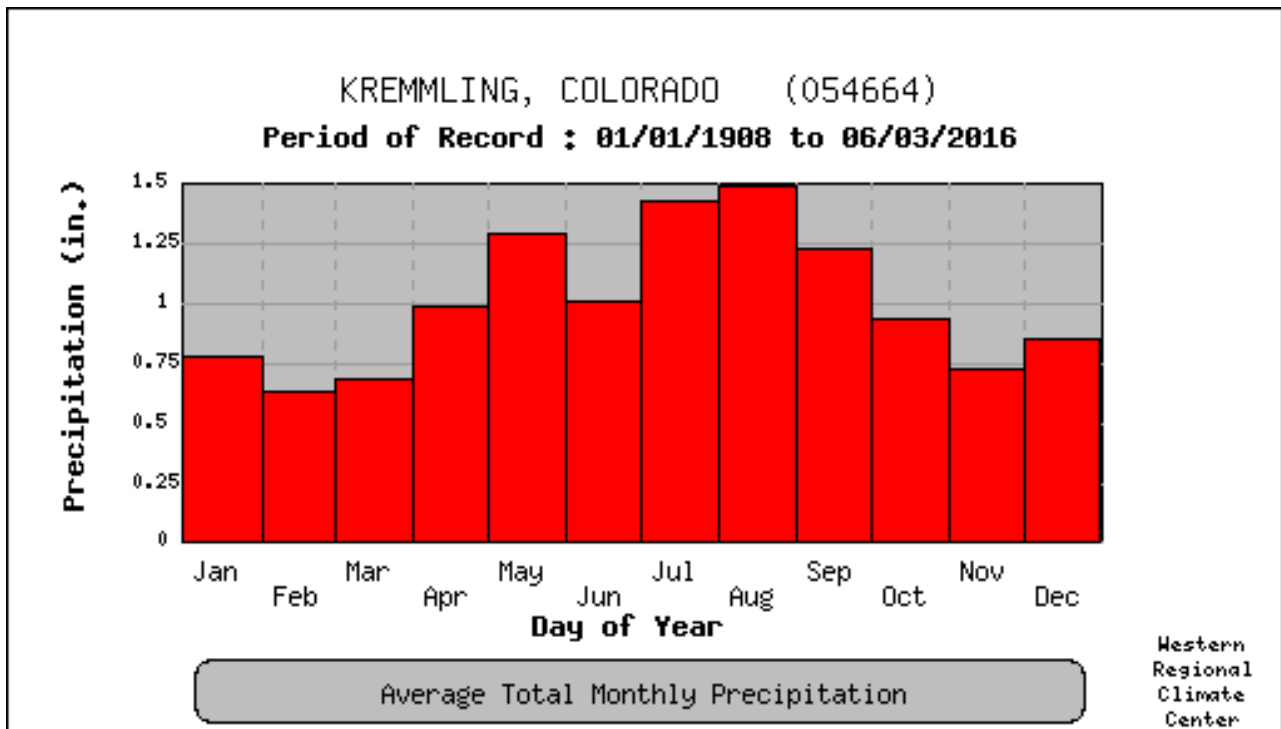
Station	Average Annual Precipitation	Month with Most Precipitation/Average Precipitation	Highest Monthly Precipitation	Highest Annual Precipitation
Kremmling <sup>2</sup>	11.89	Aug./1.44	4.32/June 1969	14.74/1908
Grand Lake <sup>3</sup>	18.90	July./2.02	6.44/June 1969	22.40/1996
Winter Park <sup>4</sup>	26.79	April/3.06	7.14/Sept. 1961	30.68/2000

Source: SCENIC Western Regional Climate Center, [www.wrcc.dri.edu/csc/scenic/analysis/station\\_finder/](http://www.wrcc.dri.edu/csc/scenic/analysis/station_finder/)

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

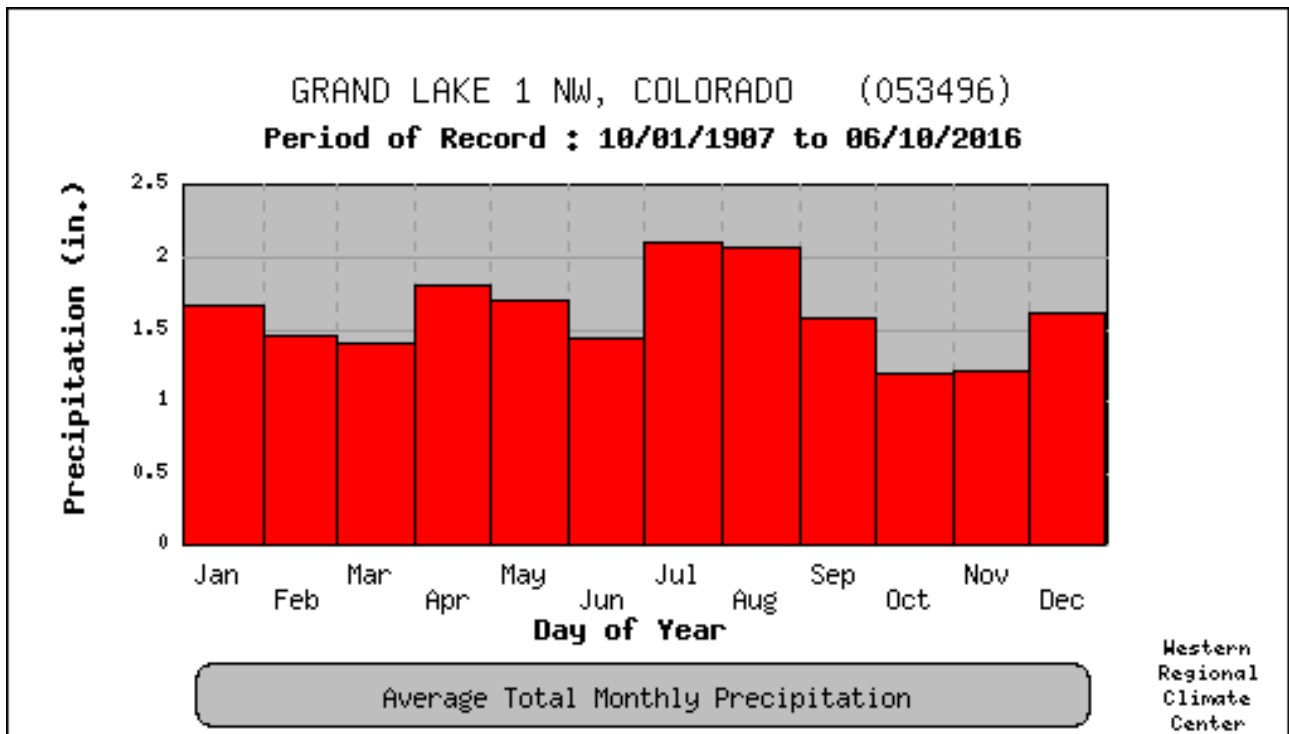
<sup>2</sup>Period of Record: 1/1/1908-10/31/2020; <sup>3</sup>Period of Record: 10/1/1907-11/29/2020; <sup>4</sup>Period of Record: 3/1/1942-11/30/2020

**Figure 3-6 Kremmling Station Monthly Average Total Precipitation**



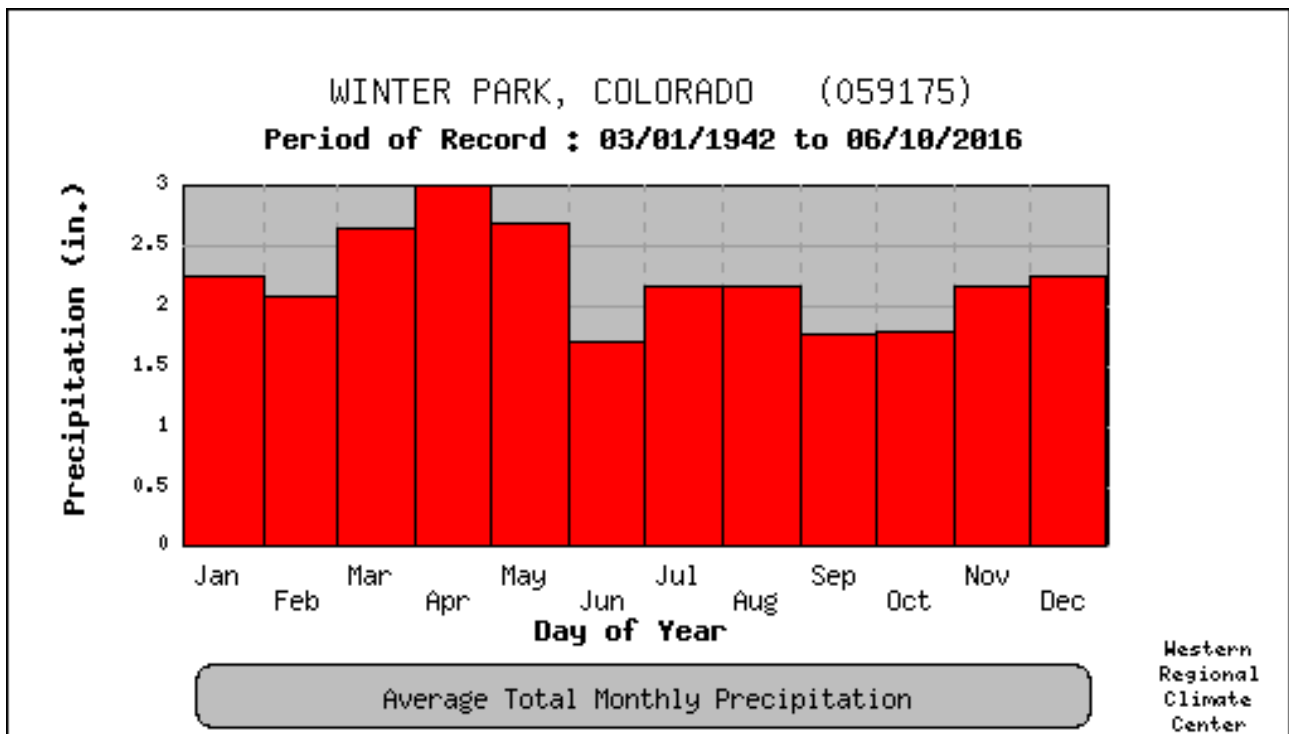
Source: Western Regional Climate Center [www.wrcc.dri.edu](http://www.wrcc.dri.edu)

**Figure 3-7 Grand Lake 1 NW Station Monthly Average Total Precipitation**



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

**Figure 3-8 Winter Park Station Monthly Average Total Precipitation**



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

**Previous Occurrences**

Colorado has experienced multiple severe droughts. Colorado has experienced drought in 2018, 2011- 2013, 2004-2000, 1996, 1994, 1990, 1989, 1979-1975, 1965-1963, 1957-1951, 1941-1931, and 1905-1893 (Colorado Water Conservation Board, 2018). 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.

**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
2007-2010		X	3
2011-2013	X		2
2018	X		1

Source: McKee, et al.

\*Modified for the Colorado Drought Mitigation and Response Plan in 2018 and Grand County Mitigation Plan 2020 based on input from the Colorado Climate Center

The following droughts were significant to Grand County:

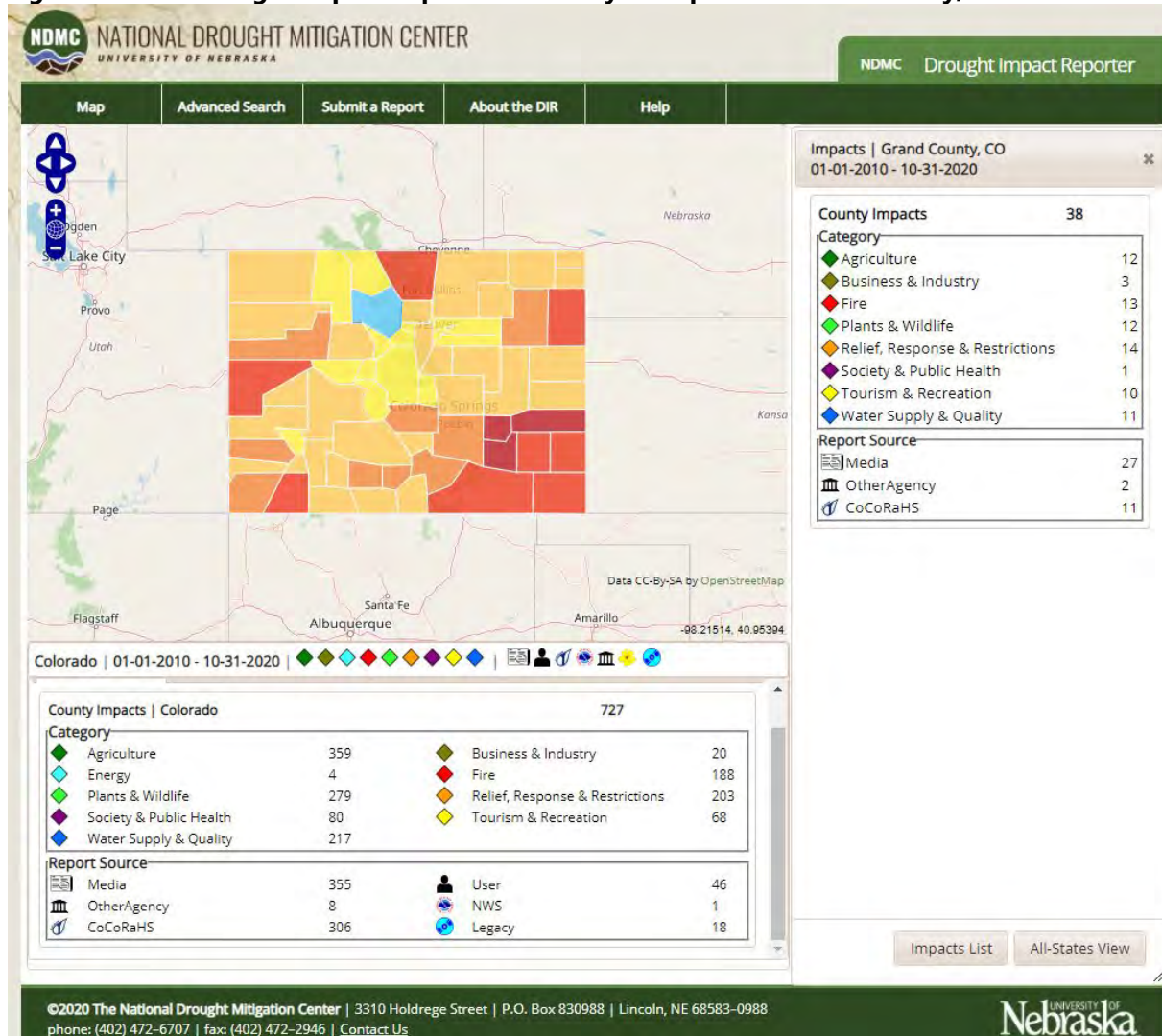
- **2019**— Grand County was included as a contiguous county in USDA drought declaration S4481.
- **2018**—Grand County was included as a contiguous county in USDA drought declarations S4386 and S4408.
- **2013**—Grand County was included as a contiguous county in USDA drought declarations S3474 and S3548.
- **2011-2012**—Colorado’s ski industry suffered economic losses due to the low snowpack and drought conditions in 2011 and 2012. Colorado Ski County USA (CSCUSA) reported a decrease of 11.4 % in skier visits during the 2011-12 season as compared to the previous ski season. Climate data indicates that precipitation on Colorado’s Western Slope for the 2011-12 winter was 43% below average, with the second warmest March on record. Statewide, the snowpack was 54% of average in April 2012. Skier visits continued to decrease between opening day of the 2012-13 ski season and December 31, 2012. Grand County received a USDA Disaster Declaration (S3260) in 2012 due to drought.
- **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 727 drought impacts from droughts that affected Colorado between 2010 and October 2020, 38 of which impacted Grand County. The list is not comprehensive, but only captures reported impacts. These impacts are shown in Figure 3-9 and described in the text below, along with the number of impacts for that category reported in Grand County during that time period.

**Figure 3-9 Drought Impact Reporter Summary of Impacts in Grand County, 2010 – October 2020**

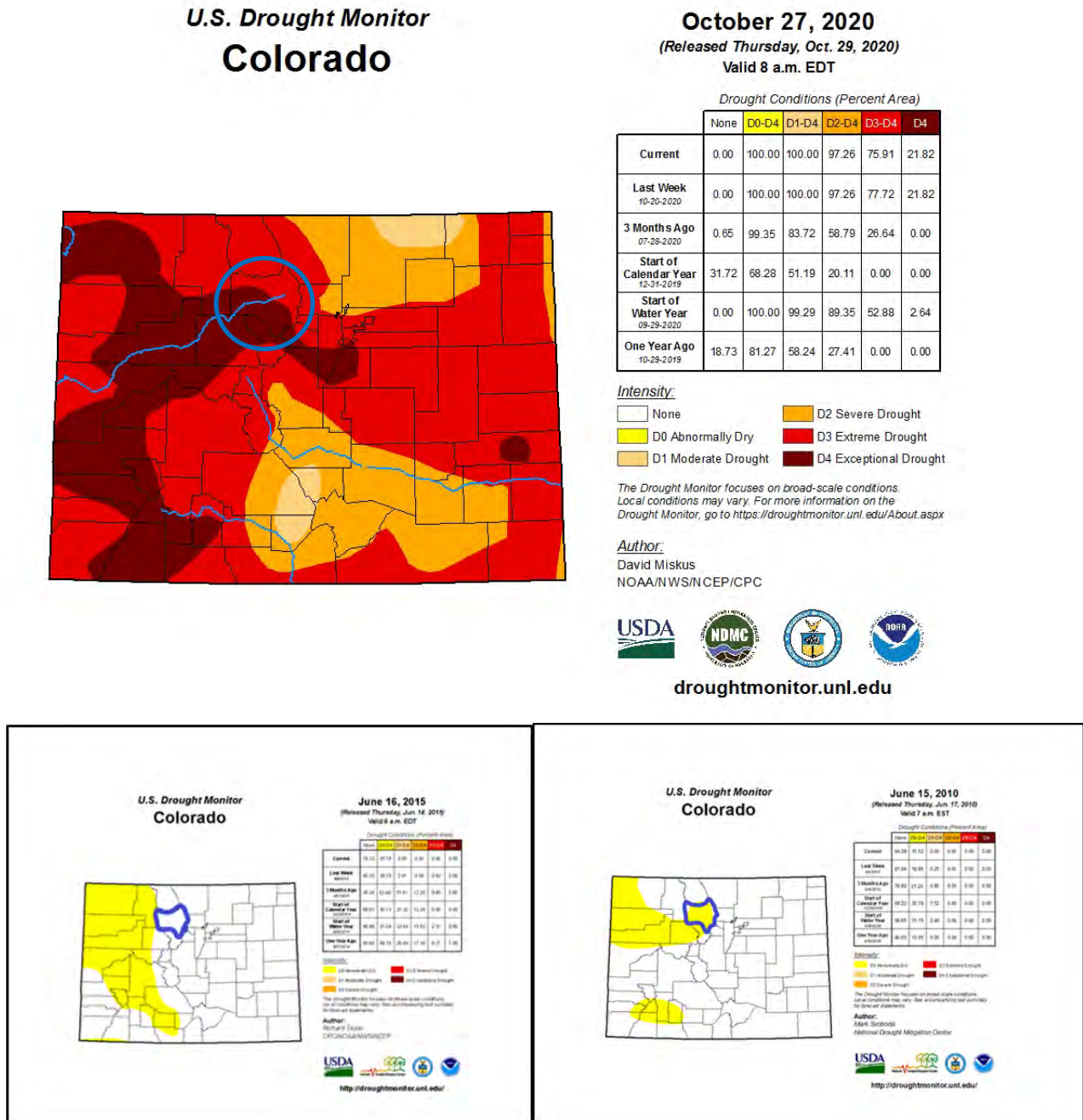


- Agriculture(12)**—Drought effects associated with agriculture, farming, aquaculture, horticulture, forestry, or ranching. Examples of drought-induced agricultural impacts include damage to crop quality; income loss for farmers due to reduced crop yields; reduced productivity of cropland; insect infestation; 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(3)**—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(0)**—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(13)**—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(12)**—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(14)**—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(1)**—Drought effects associated with human, public and social health include health-related problems related to reduced water quantity and/or quality, such as increased concentration of contaminants; loss of human life (e.g. from heat stress, suicide); increased respiratory ailments; increased disease caused by wildland fire concentrations; increased human disease caused by changes in insect carrier populations; population migration (rural to urban areas, migrants into the United States); loss of aesthetic values; change in daily activities (non-recreational, like putting a bucket in the shower to catch water); elevated stress levels; meetings to discuss drought; communities creating drought plans; lawmakers altering penalties for violation of water restrictions; demand for higher water rates; cultural/historical discoveries form low water levels; prayer meetings; cancellations of fundraising events; cancellation/alteration of festivals or holiday traditions; stockpiling water; public service announcements and drought information websites; protests; and conflicts within the community due to competition for water.
- **Tourism & Recreation(10)**—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(11)**—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(0)**—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(0)**—Drought impacts that do not easily fit into any of the above categories.

Figure 3-10 compares the severity of the drought in Colorado in October 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. Colorado experienced a severe fire year in 2012, resulting in a Presidential Disaster Declaration for the Waldo Canyon and High Park wildfires. In 2020, Grand County was experiencing extreme and exceptional drought helping to fuel the East Troublesome and William Fork fires.

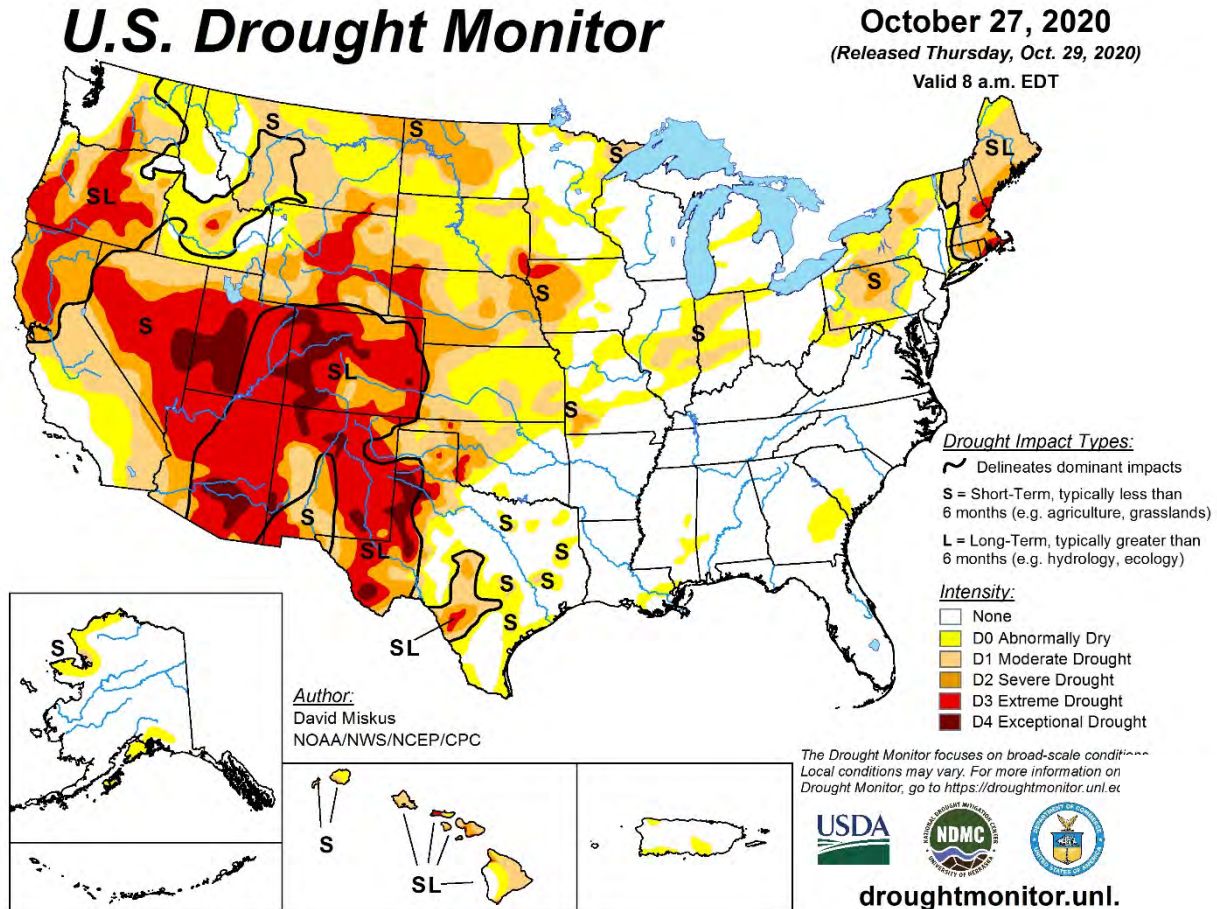
**Figure 3-10 U.S. Drought Monitor for Colorado, October 2020 (top) vs. June 2015 & June 2010**



Source: The National Drought Mitigation Center, University of Nebraska-Lincoln

Figure 3-11 shows the Drought Monitor for the entire United States as of October 27, 2020, with an excerpt for the West region of the U.S. dated October 27, 2020.

**Figure 3-11** United States Drought Monitor



Source: The National Drought Mitigation Center, University of Nebraska-Lincoln

October 27, 2020, West: With precipitation limited to western Washington, northern Cascades, northern Idaho, and the Rockies (the Southwest and Intermountain West were dry), only some slight improvements were made. This included central Washington (very slight reduction of D0-D2 on west side), while some D0 was removed in northern Idaho and western Montana as underlying soils were moist, and impressive mountain snows have started the Water Year. No other improvements were done, except for some small D3 to D2 changes in central Colorado due to beneficial storm totals in Huerfano and Costilla counties, and near Ft. Collins and Boulder areas. In the Southwest, California, and Intermountain West, since October is normally dry, temperatures had dropped, and extensive deteriorations had already been made during the past several months, no degradations were made this week. Unfortunately, large wildfires continued to spread and expand in California thanks to gusty Santa Ana winds. As the southern Rockies storm continued past Day7, any additional precipitation and possible improvements after the Tuesday 12 UTC cutoff will have to wait until next week in New Mexico and Colorado.

### Probability of Future Occurrence

**Likely** - According to information from the Colorado Drought Mitigation and Response Plan, including recent drought conditions, Colorado was in drought for 50 of the past 126 years (1893-2018). Thus, there is a 39.7% chance that a drought will happen in Colorado in any given year, and a drought can be expected somewhere in the state every 2.5 years. Grand County has had significant impacts in ten droughts in the last 43 years.

A drought vulnerability study prepared by the CWCB in 2010 and updated in 2018 looked at the potential for climate change to alter drought recurrence, length, and intensity. This study builds upon information obtained in Phase I of the CWCB's Colorado Water Availability Study. Based on these studies the average length of the observed drought in the Colorado River basin, which includes Grand County, is six years. The chance of experiencing a drought longer than the historical observed length is only slightly greater than 50%. The study indicates other basins in Colorado, notably the San Juan Basin in the southwest, has a higher chance of exceeding the drought longer than the observed record (75-88%). While there is a large amount of uncertainty regarding future climate scenarios and how these may translate to physical conditions, the study indicates that current climate is not stationary and that planning efforts should take into account this uncertainty.

### 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

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.

According to the 2018 Colorado Drought Mitigation and Response Plan, Grand County is among the highest-ranking counties for drought vulnerability in the Socioeconomic Sector. These are "counties with the largest rates of growing populations coupled with lack of economic diversification..."(CWCB 2018).

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 (FACE), 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.

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 3-12. Another map produced by the CGS shows these potentially active faults with maximum credible earthquake determinations, illustrated in Figure 3-13.

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.

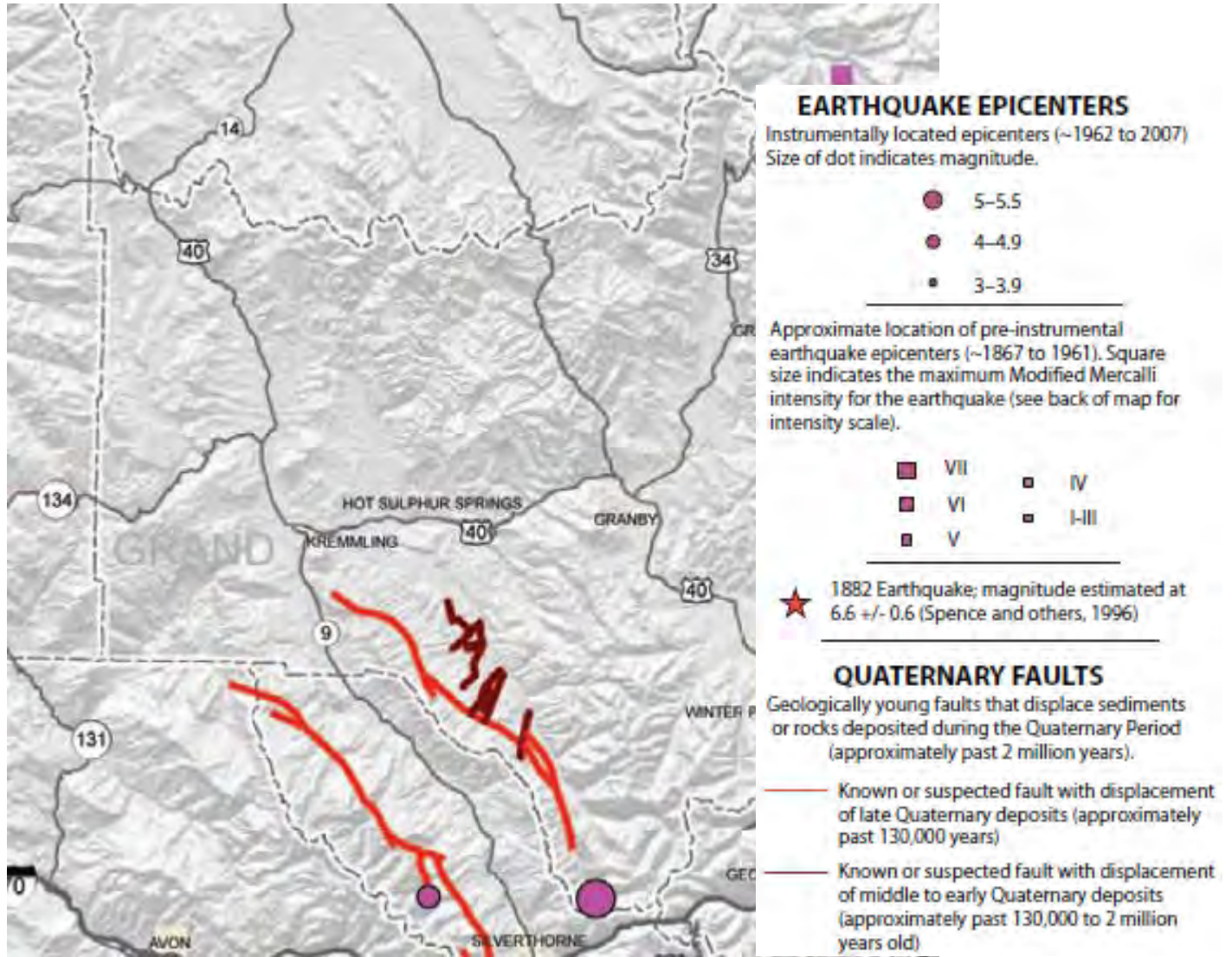
Another fault structure lacks a name, but lies in the Gore Range west of Kremmling. Recent data suggests this fault has had major movement on the east flank and minor movement on its west flank.

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.

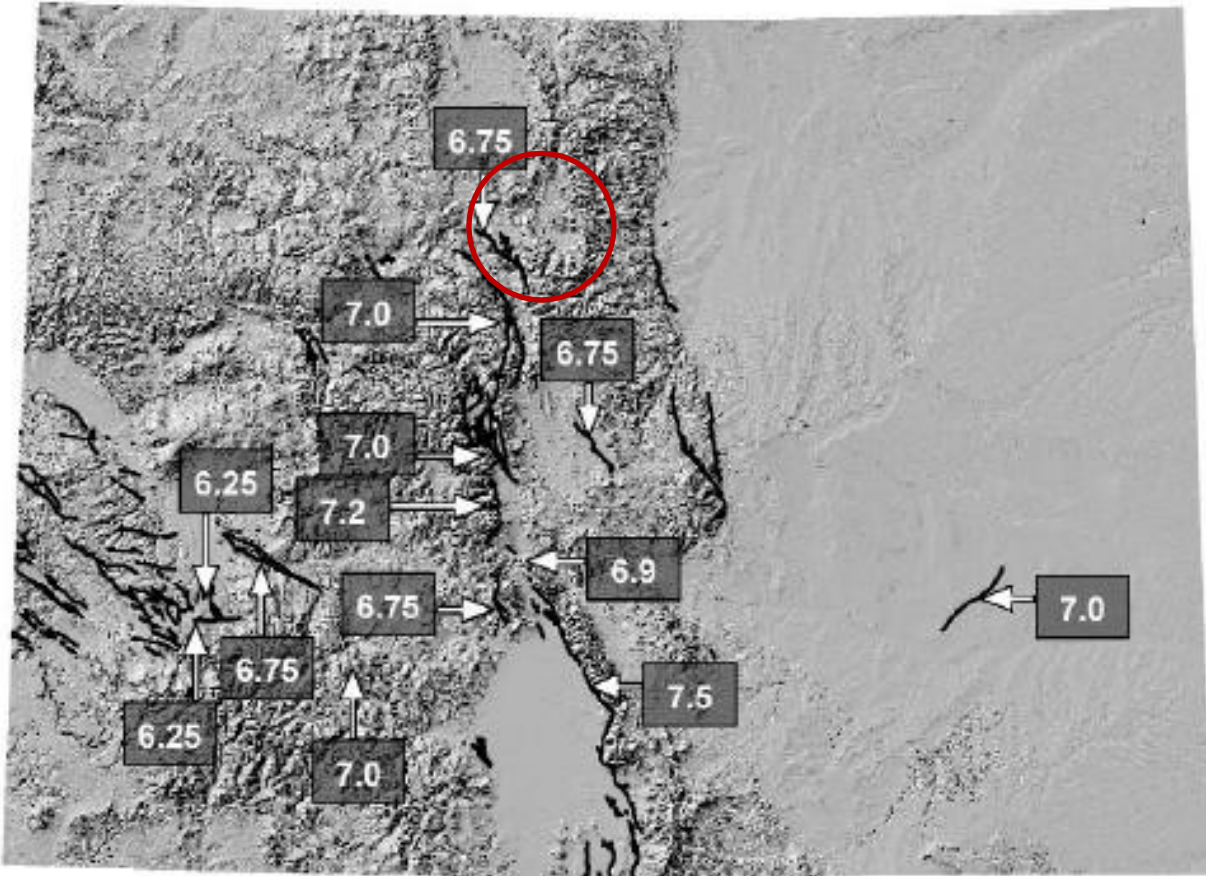
**Figure 3-12 Statewide Earthquake Hazard Map Excerpt Showing Grand County**



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 3-13 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.

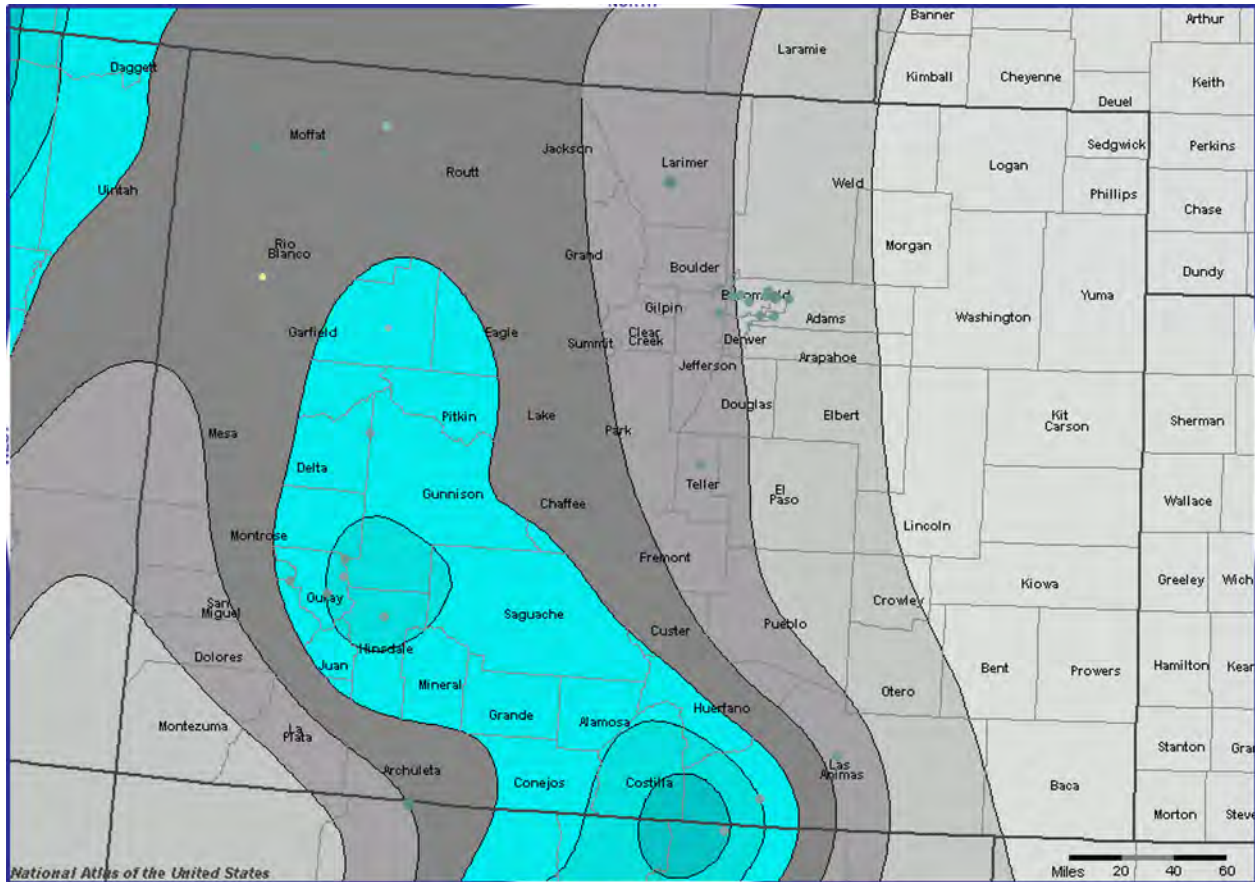
### Probability of Future Occurrence

**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 3-14 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 3-14 Colorado Seismic Hazard Map – 10% Probability of Exceedance in 50 Years**



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

Peak Horizontal Acceleration (%g)

- > 100
- 80 - 100
- 60 - 80
- 40 - 60
- 30 - 40
- 25 - 30
- 20 - 25
- 15 - 20
- 10 - 15
- 9 - 10
- 8 - 9
- 7 - 8
- 6 - 7
- 5 - 6
- 4 - 5
- 3 - 4
- 2 - 3
- 1 - 2
- 0 - 1

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 3-14, 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.

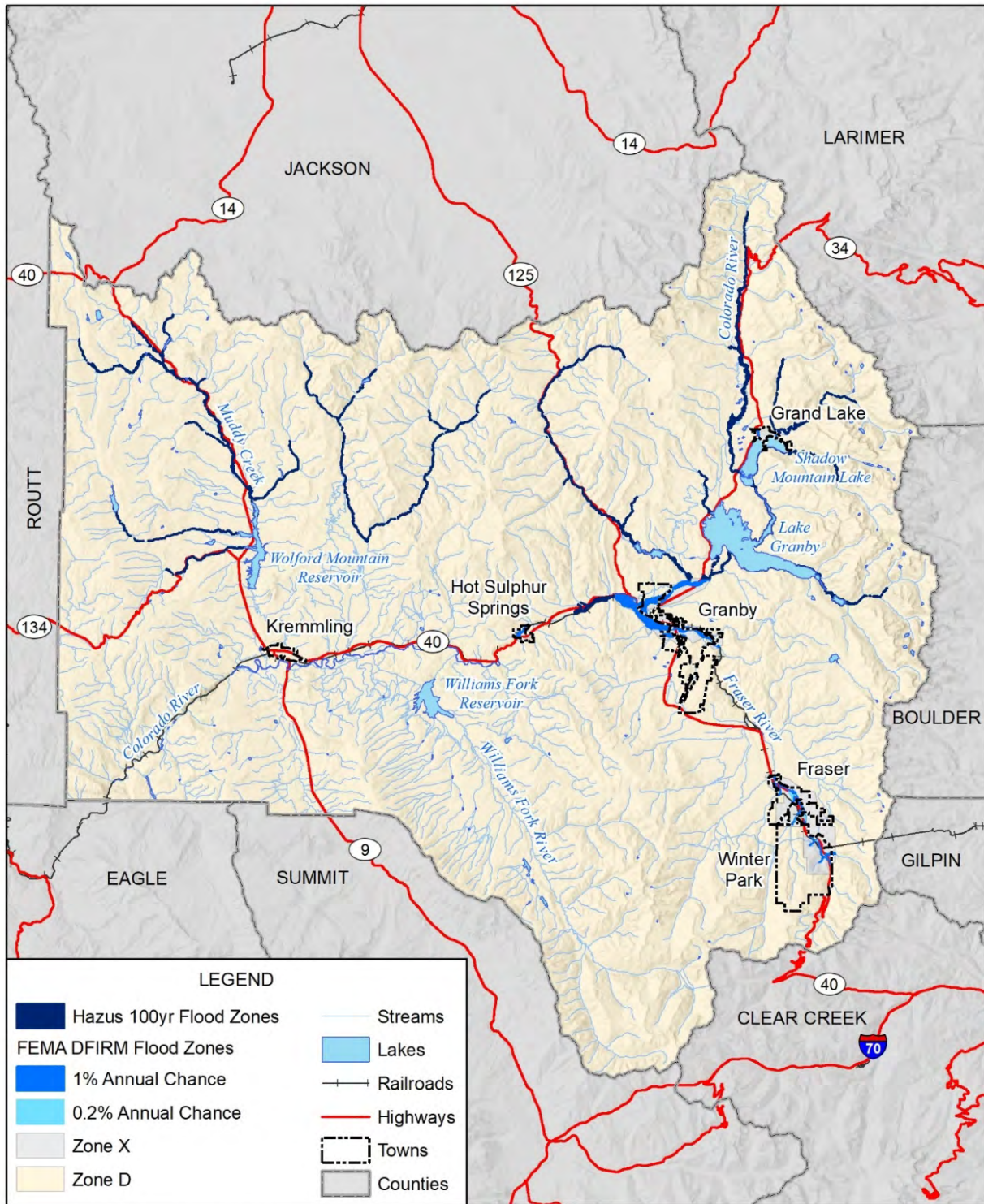
Willow Creek is a tributary of the Colorado River, approximately 35 miles long. It begins in northwestern Grand County, in the Arapaho National Forest south of Willow Creek Pass at the continental divide. It flows southeast, through Willow Creek Reservoir and joins the Colorado three miles northeast 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 2020 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 3-15 is a map of Grand County's DFIRM and Hazus 100-year floodplain.

**Figure 3-15 Grand County DFIRM and HAZUS 100-Year Flood Zones**



Map compiled 11/2020; intended for planning purposes only.  
 Data Source: Grand County, CDOT, Hazus-MH MR2, FEMA NFHL 12/13/2013

0 5 10 Miles



### **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 NCEI, there is some evidence of significant flooding in Grand County in recent years. Events of note from the studies, NCEI, and the HMPC include the following. Note that the NCEI Storm Events Database does not have records of flood events since 2011.

- **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. The USACE database was searched during the 2020 planning process and no recent events since 2013 were found.

**Potential Future Losses**

According to the Future Avoided Cost Explorer tool (FACE), 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.

**Probability of Future Occurrence**

**Likely** - 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 life 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 life 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

Zone	Definitions
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 roads and highways throughout the planning area. A hazardous material is any item or agent (biological, chemical, physical roads and highways in the County, 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 2019 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 2020, 22 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: 2010-2020**

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

Date	Description	Type	Cause	Nearest City
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
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
3/22/2009	Caller reported a discharge of gasoline and motor oil from a "Bobcat" (construction vehicle) that fell into the water through ice. Caller stated the Bobcat was clogging the ice away from the pier when the ice broke, causing the Bobcat to fall through. Caller stated the incident occurred between 0900	Mobile	Other	Grand Lake

Date	Description	Type	Cause	Nearest City
	MST and 1000 MST.			
7/8/2009	Caller reported a spill of unknown material from a retaining pond due to the material breaching the retaining pond's wall. Caller stated that an unknown material turned the Colorado River orange. Caller followed up stating that the water was tan. Caller stated that a few individuals got sick from the water which is used for the area water works.	Fixed	Unknown	Granby
3/29/2008	Caller reported that diesel fuel released from a tractor trailer saddle tank due to unknown causes. The materials released onto the ground. Caller also stated that Highway 40 was closed for roughly 6 hours.	Mobile	Unknown	Hot Sulphur Springs
3/22/2008	Caller reported a discharge of used oil from two drums that are lying on their sides with a hole in them. The snow was melting so the oil was being washed away. The caller stated that the drums may have been moved. This was discovered about a month prior to the call.	Storage Tank	Unknown	Hot Sulphur Springs
6/11/2008	Caller reported a material release from a tanker truck due to a transport accident (rollover). Caller stated that this was a single vehicle accident. Caller did not know who exactly the truck belonged to at the time of the call. Incident occurred at 2326 MST.	Mobile	Transport Accident	Hot Sulphur Springs
12/1/2008	Caller reported that a freight train derailed one rail car upright due to unknown causes. This incident occurred on a passenger train route. No injuries or release of materials were reported.	Railroad non-release	Derailement	Tabernash

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**— Based on best available data, there is more than a 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.

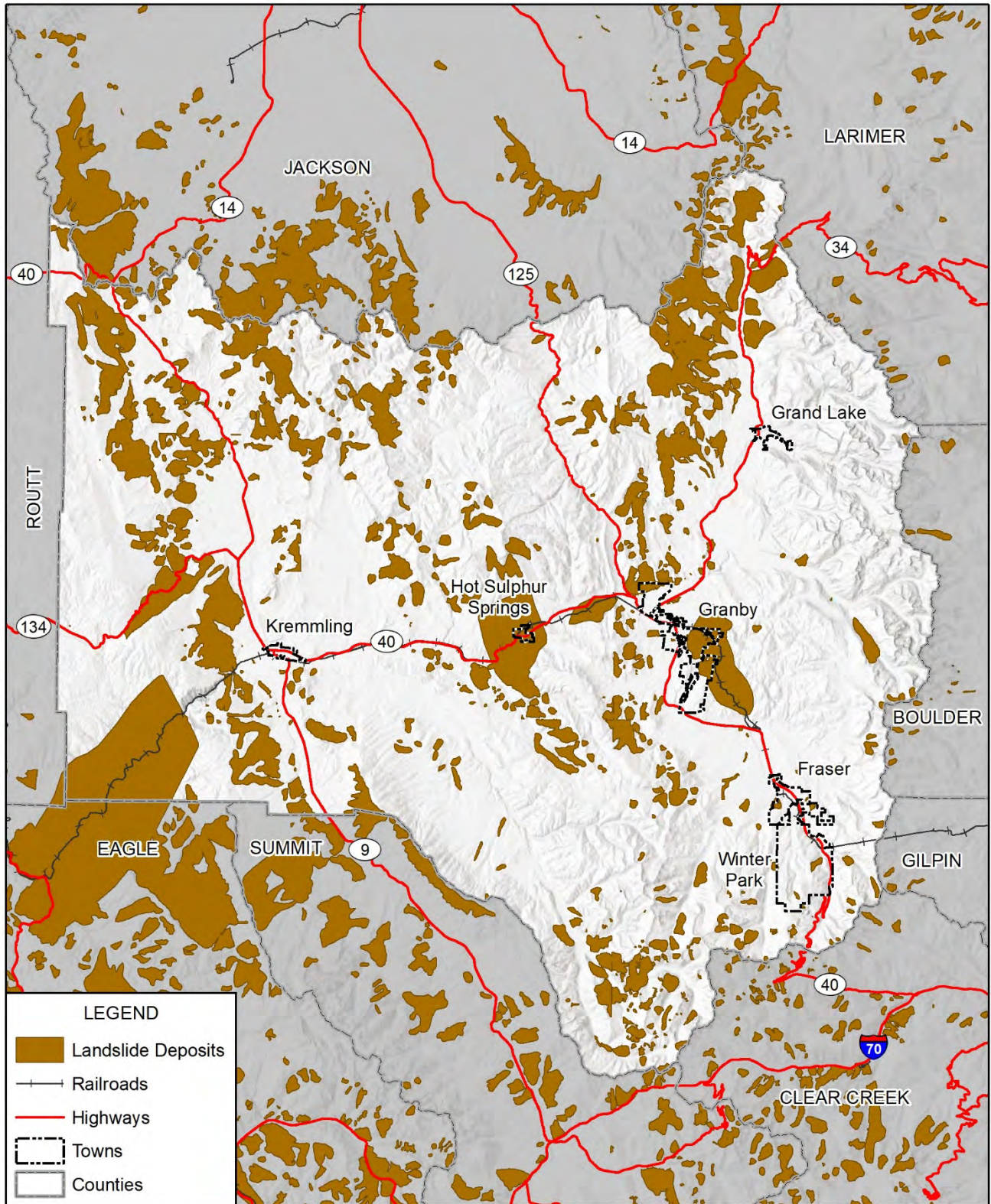
Grand County faces its share of landslide-related problems, especially in the western part of the County. Most of the County overall is rated a “medium” level landslide hazard area according to the State map. Fraser Canyon is identified as a Tier Two landslide/rockfall area. A landslide in Fraser Canyon 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

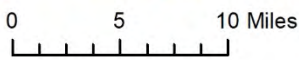
Union Pacific railroad pass through several canyons where rockslides occur annually. A burn area on the west side of Sheep Mountain was also identified as a potential debris flow hazard. Issues also exist in avalanche chutes and in Gore Canyon where there is potential for a train derailment.

Figure 3-16 illustrates significant landslide hazard areas in Grand County.

Figure 3-16 Grand County Landslide Hazard Areas



Map compiled 11/2020;  
intended for planning purposes only.  
Data Source: Grand County, CDOT,  
Colorado Geological Survey



## Previous Occurrences

Despite conscientious land use planning for rock fall 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 3-17 and Figure 3-18. 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.

**Figure 3-17** Rockfall Alarm Fence in Byers Canyon



Source: HMPC

**Figure 3-18 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

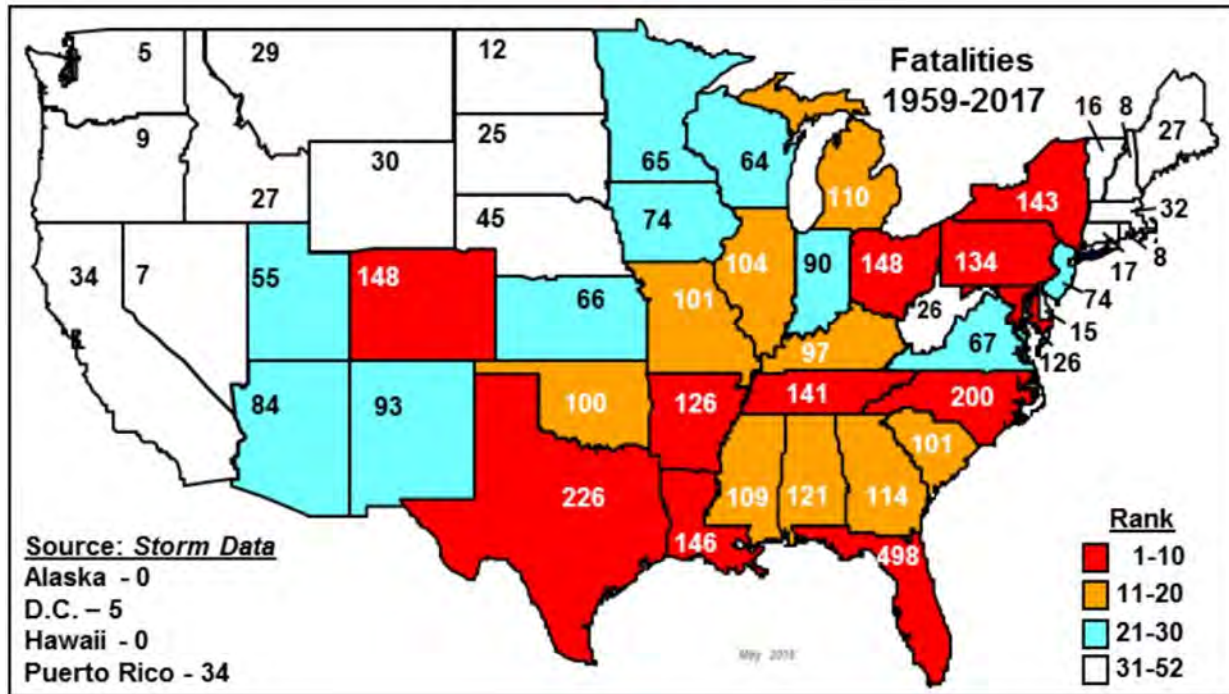
The geographic extent of this hazard in Grand County is large, in that it can occur anywhere in the County.

#### Previous Occurrences

According to the National Weather Service Colorado ranks 19th in the nation with respect to the number of cloud-to-ground lightning flashes with an average number of 490,164 flashes per year (based on data collected between 2008 and 2017). Colorado ranks 31st in terms of cloud-to-ground flash density in the United States, with an average 4.7 flashes per kilometer squared (National Weather Service).

Figure 3-19 shows state-by-state lightning deaths between 1959 and 2017. Colorado ranks fourth for the number of deaths at 148. Florida (498), Texas (226), and North Carolina (200) were ranked higher. Based on National Weather Service data since 1980 an average of 3 people are killed and 12 are injured in Colorado.

**Figure 3-19 Lightning Fatalities in the United States, 1959-2017**



Source: National Weather Service

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 a small portion of damaging lightning events; most go unreported. The National Weather Service has been tracking lightning casualties by county in Colorado since 1980. The NWS statistics only include lightning casualties through 2018. According to the NWS statistics, Grand County has not experienced a documented causality due to lightning between 2004 and 2018, refer to Table 3-13. All events took place in the afternoon and were most common in the summer months between June and July. According to the State of Colorado 2018 HMP, in any given day in July or August over 4,000 lightning flashes are expected to occur in Colorado.

**Table 3-13 Lightning Fatalities and Injuries in Grand County, 2004-2018**

Date	Time	Fatalities	Injury
July 8, 2018	2:10pm	0	1
July 3, 2006	12:20pm	0	1
June 20, 2004	1:50pm	0	19
<b>Total</b>		<b>0</b>	<b>21</b>

Source: National Weather Service

### 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 14 years, the County experienced three damaging lightning events. This averages to a damaging lightning event roughly every five years, or a 21 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 State of Colorado Hazard Mitigation Plan (2018) defines an infestation as a state of being invaded or overrun by parasites that attack plants, animals or humans. An infestation is the presence of a large number of pest organisms in an area, on the surface of a host, or in soil. Pests are any organism (insects, mammals, birds, parasite/pathogen, fungi, non-native species) that are a threat to other living species in its surrounding environment. Pest infestations can result in the destruction of various natural habitats, impact human health and cause disease and death among native plants, wildlife, and livestock.

Beetle epidemics are a natural part of forest ecosystems in Colorado. Certain factors, such as age of forests, drought, crowding, poor growing conditions, and warm temperatures, can fuel epidemics. While the stressed trees are targeted first, as beetle populations increase, they attack most of the large trees in an outbreak area. During an epidemic, enough beetles can emerge from an infested tree to kill at least two, and possibly more, trees the following year. The direction and spread rate of an infestation is impossible to predict. However, 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 postmortem, the dead stems become increasingly susceptible to rot and blow-down.

The pests that have been identified as a threat to Grand County's forests include the following:

- **Spruce Beetle** – The spruce beetle is native to Colorado and feasts on subalpine Engelmann Spruce as its primary source, although it will infest any spruce species. This beetle is most commonly observed at high elevation spruce forests at more than 9,000 feet. According to the United States Forest Service, the spruce beetle is responsible for the deaths of more spruce trees in North American than any other agent. Signs of a spruce beetle infestation are most visible in summer months. When population levels are low the beetle tends to infest downed trees and populations have been seen to increase quickly following an avalanche or windstorm event. The lifecycle of the spruce beetle is one to three years and are most active during the months of July and August.
- **Western Balsam Bark Beetle/Root Disease Complex** – This beetle has caused persistent damage to Colorado's high-elevation subalpine fir for several years. The western balsam bark beetle is most commonly found in trees that are weakened from root disease, drought or other damaging factors. Unlike other types of beetles (mountain pine and spruce) tree mortality as a result of the infestation is

not uniform across the affected landscape. External evidence of the beetle is difficult to find without the removal of the tree's bark. Fir trees killed by the beetle retain their red needles, the predominate symptom of the beetle, for up to 3 years or more. Despite remaining persistent in Colorado acres affected from the western balsam bark beetle decreased by 50% in 2018 (USFS 2018). The lifecycle is one to two years.

- **Western Spruce Budworm** – Colorado's most damaging and widespread forest defoliator for several years. The larvae of this moth feeds in the buds of new shoots of Douglas-fir, true firs and spruce trees. As a result of their feeding, the needles on the trees turn a reddish-brown color. Damage tends to occur from early spring through mid-summer months when they turn into moths.
- **Pine Needle Scale** – The pine needle scale is an invasive species that feeds on the needles of pine species including Douglas Fir, Englemann Spruce, Colorado Blue Spruce and Lodgepole Pines. Insects settle on every surface of the trees needles, taking tree nutrients and leading to premature needles drops. Other impacts include branch dieback and increased susceptibility to other insects or disease or tree death. The pine needle scale activity in Grand County declined in 2019 after causing significant damages between 2015 and 2018 (CSFS 2019).
- **Douglas-Fir Beetle** – This beetle is known as the "most destructive bark beetle of mature Douglas-fir forests in western North America" (CSFS 2016). Mature Douglas-fir trees are the only host for this beetle species. Generally small groups of trees are infested (groups of 100 or more during major outbreaks). Similar to the spruce beetle, a close relative, wind-thrown and downed trees are ideal habitats for the Douglas-fir beetle.
- **Mountain Pine Beetle** – The mountain pine beetle is native to western North America. The insect develops in and affects primarily pines, such as ponderosa, lodgepole, Scotch, and limber pines, and less commonly bristlecone and piñon pines. 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 vast majority of the forests affected by the insect disease infestation 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

**Large** - Each of the identified beetles above attack a variety of pine, fir and spruce species. While the 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).

In 2019, the spruce beetle affected 11,600 high-elevation Engelman spruce-fir forests throughout northwest Colorado; areas along the Fraser River are noted by the Colorado State Forest Service as being hit hard by the spruce beetle (CSFS 2019). The western spruce budworm affected more than 700 acres in northwest Colorado including defoliation in the Byers and Gore canyons in the county (CSFS 2019). According to the Colorado State Forest Service 2019 Report on the Health of the Colorado's Forests, while the pine needle scale declined in 2019 throughout Grand County, the pest remains persistent in the Town of Fraser and Town of Grand Lake.

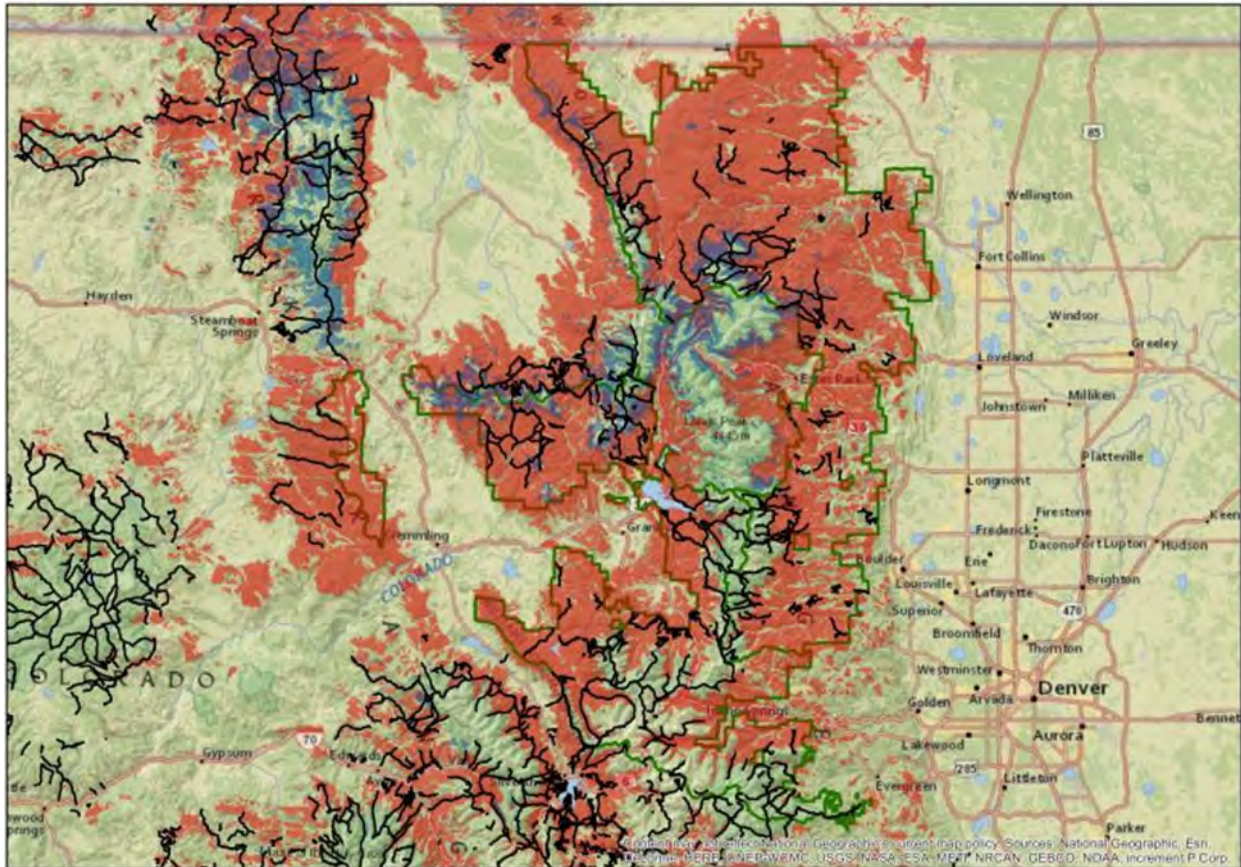
**Figure 3-20 Beetle-killed Trees Near Granby, Colorado**



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.

**Figure 3-21 Beetle Progression (1996-2016)**

Arapaho Roosevelt NFs: Trails and Beetle Activity



Source: U.S. Forest Service Rocky Mountain Ranger Station, August 21, 2019

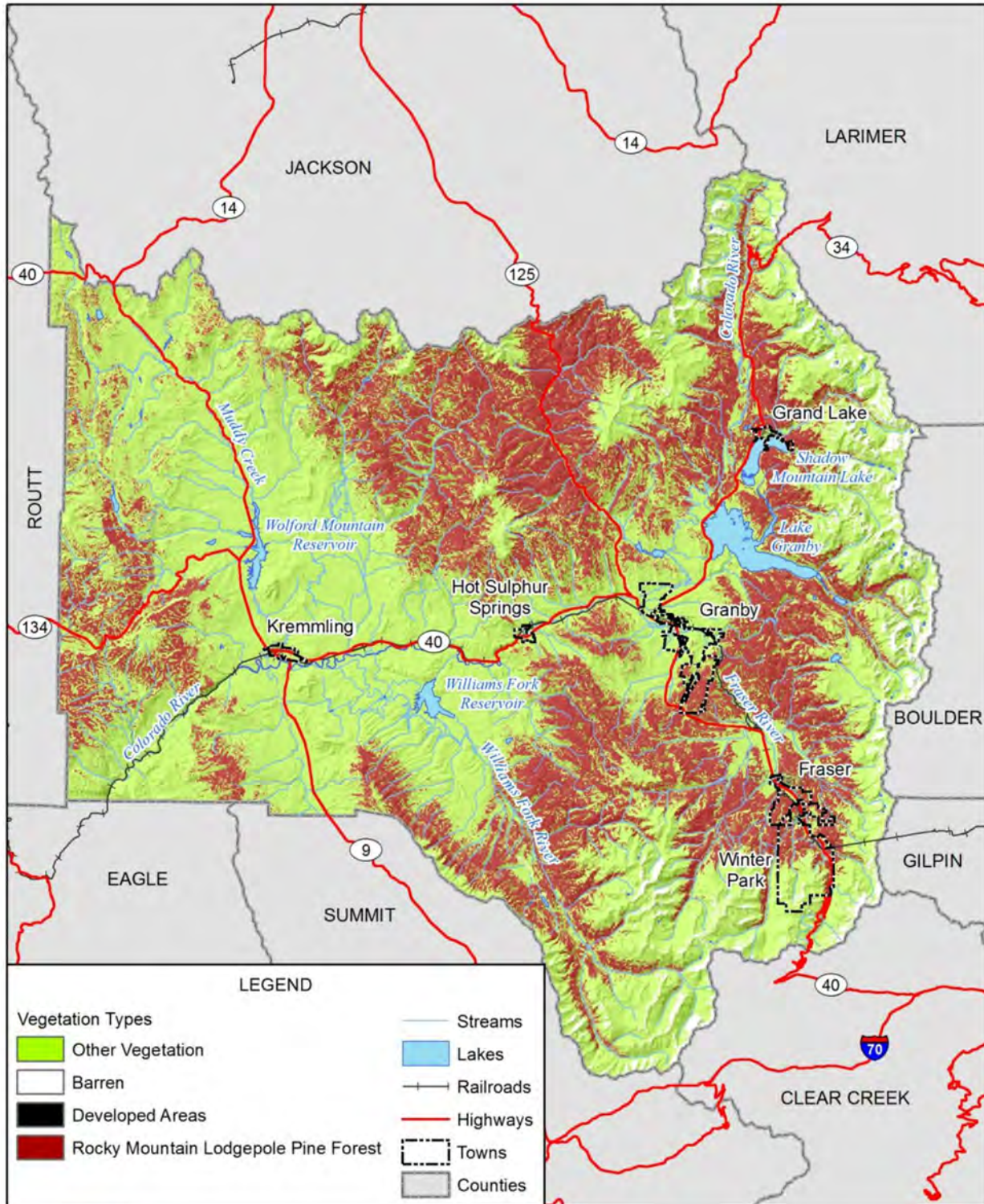
<https://www.fs.usda.gov/rmrs/science-spotlights/mountain-pine-beetle-colorado-story-changing-forests>

### Climate Change and Insect Disease Infestation

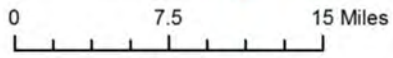
Changing climate conditions are expected to influence future pest infestation events. According to the Fourth National Climate Assessment, climate change is aiding in the spread of invasive species and often the changing climate favors the nonnative invading species over native ones. The State of Colorado Hazard Mitigation Plan (2018) identifies the following projected changes to pest infestations as a result of climate change:

- Pests are projected to expand into more northern and higher elevation regions as average temperatures increase.
- Pest infestations are projected to increase in intensity as average temperatures increase. The intensity and extent of infestations may also increase.
- Pest infestations are projected to increase in frequency due to increased temperatures.

Figure 3-22 Lodgepole Pine Forests in Grand County



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



**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. By 2012 over three million acres had been infested statewide. In 2012 mountain pine beetle activity in Colorado declined for the fourth consecutive year as food sources became depleted in many areas of the state (at this time 264,000 acres of active infestation were detected). Between 1996 and 2014 the mountain pine beetle affected 3.4 million acres. By 2018, the spruce beetle surpassed the mountain pine beetle as most active threat to Colorado forests. Between 2000 and 2018 the spruce beetle had affected over 1.84 million acres of forests, the Engelmann spruce trees being the main victim of infestations (USFS 2018).

The following table shows a breakdown of the number of forested acres affected by pest infestation in Grand County between 1996 and 2019.

**Table 3-14 Forest Disturbance Due to Insect Disease Infestation in Grand County, 1996-2019**

Type of Insect	2018 Acres Affected	2019 Acres Affected	# Of Cumulative Acres Affected (1996-2019)
Mountain Pine Beetle	0	0	581,000
Spruce Beetle	17,000	9,700	72,000
Douglas-fir Beetle	2	2	1,300
Western Balsam Bark Beetle	2,800	2,700	-
Western Spruce Budworm	200	60	-

Source: Colorado State Forest Service, Common Forest Insects & Diseases, 2019 Aerial Detection Survey Summary for the Rocky Mountain Region of the U.S. Forest Service

<https://csfs.colostate.edu/forest-management/common-forest-insects-diseases/#1578934956429-f1724b71-af2e>

**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).

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 3-23 Moderate Load Conifer Litter (Fuel Model TL3) Prior to Beetle Infestation**



**Figure 3-24 High Load Conifer Litter (Fuel Model TL%) Following Beetle Infestation**



**Figure 3-25 Very High Load Timber and Shrub (Fuel Model TU5) as a New Cohort of Pine is Released**



### 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  $-35^{\circ}\text{F}$ .

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  $\frac{1}{4}$  mile or less.
- Wind Chill Warning & Watch: Wind Chill Index less than  $-35\text{F}$ .
- Ice Storm Warning: Freezing rain &  $\frac{1}{4}$ " 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:  $\frac{1}{2}$ " 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 3-15 contains maximum 1-day total snowfall for the three stations and illustrates differences within the County. Table 3-16 shows maximum 3-day total snowfall and Table 3-17 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 3-15 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 3-16 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 3-17 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

**Previous Occurrences**

Historical data from SHELDUS and the NCEI 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 NCEI 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 NCEI 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. NCEI recorded 321 events (including blizzards, extreme cold and wind chill events, heavy snow, winter storms, and winter weather) between January 2000 and December 2019.

- **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

- **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 & 24th. 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**—More than a 100 percent chance of occurrence in next year or has a recurrence interval of 10 years or less

There were 372 recorded winter weather events in Grand County between 1960 and December 2019. 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.

### 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.

### 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 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

**Large** - 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, 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 3-28 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 3-26.

The Wildfire Intensity Scale map (Figure 3-27) displays areas where significant fuel hazards and dangerous fire behavior potential exist.

Figure 3-26 Grand County Wildfire Susceptibility

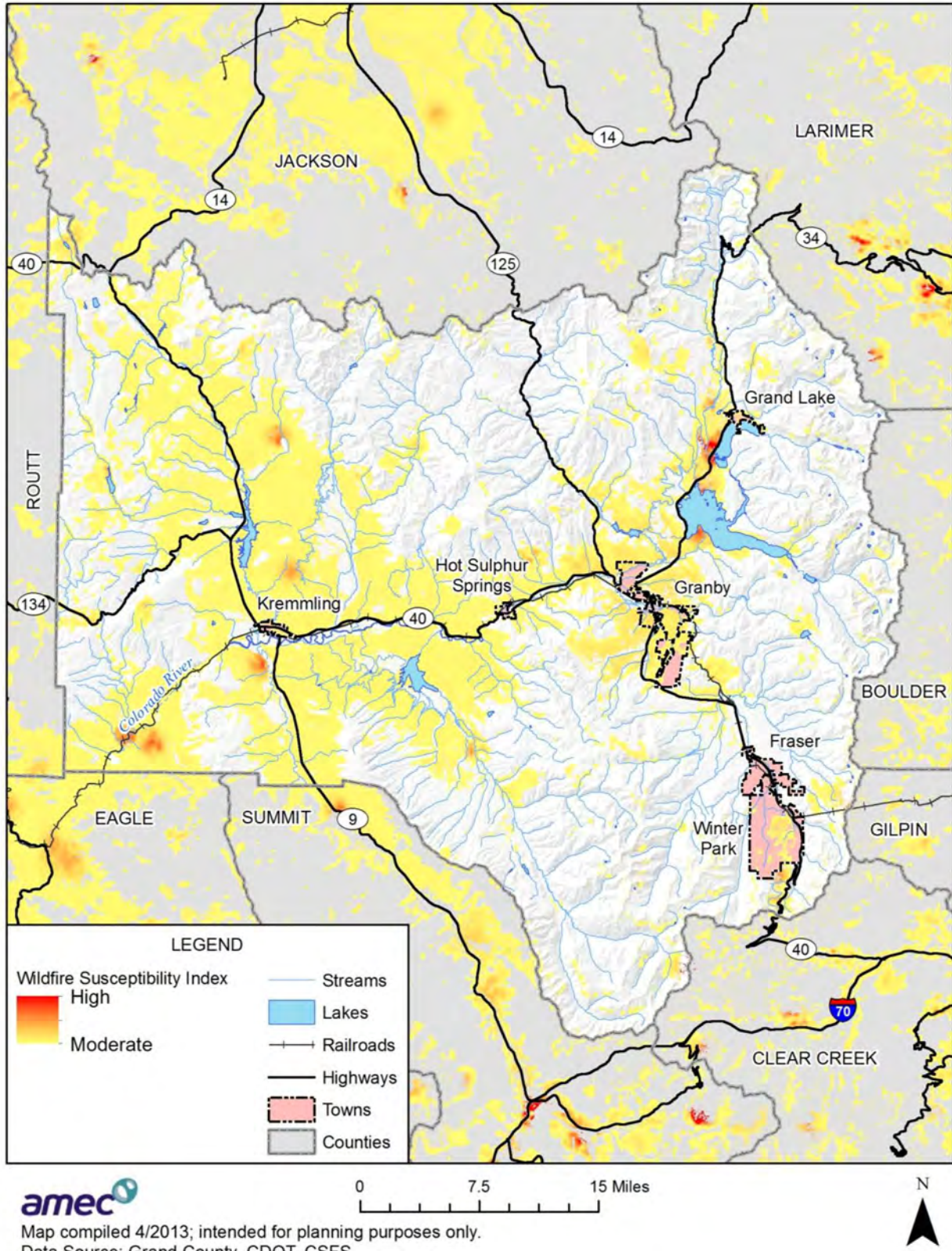
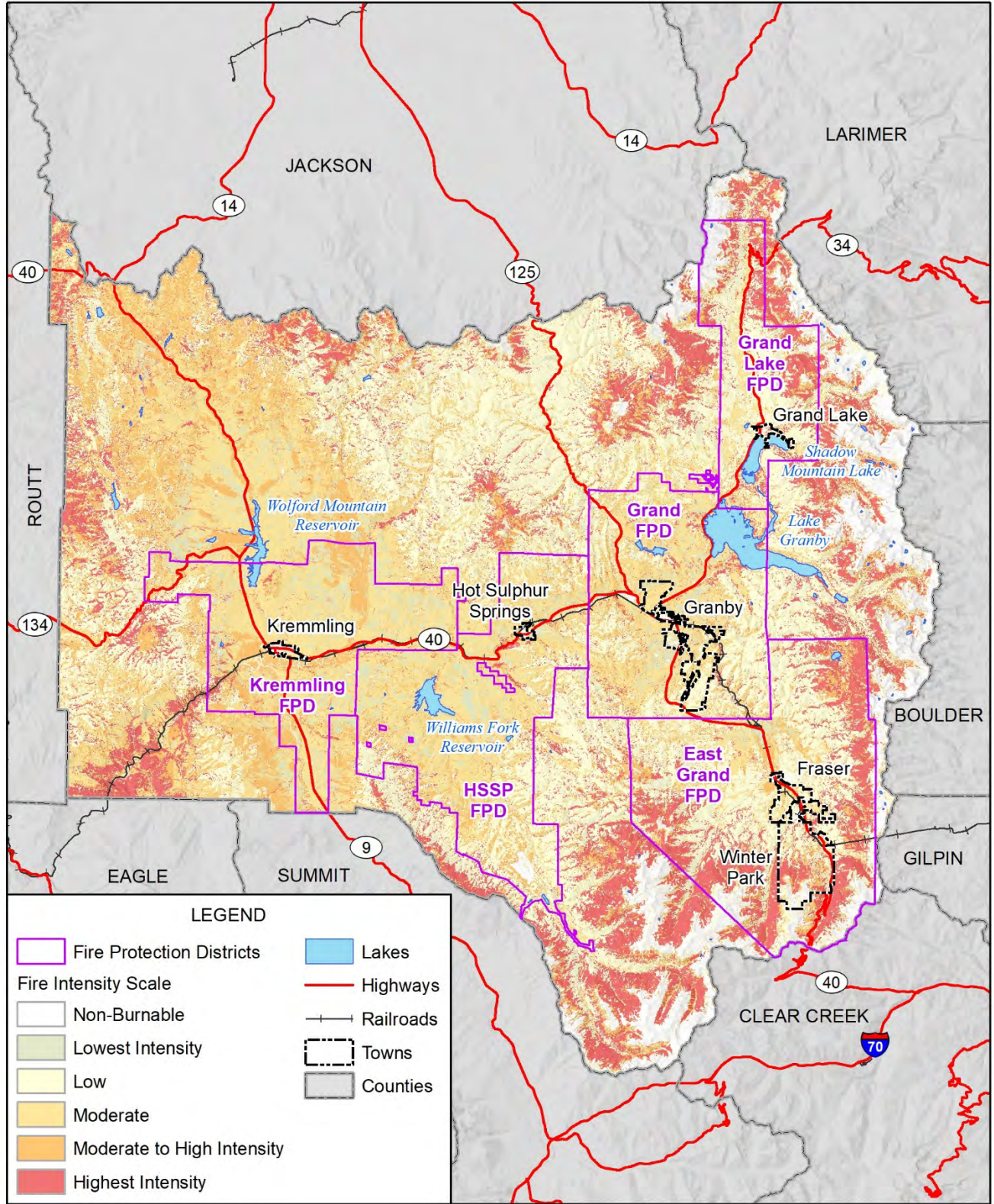


Figure 3-27 Grand County Wildfire Intensity

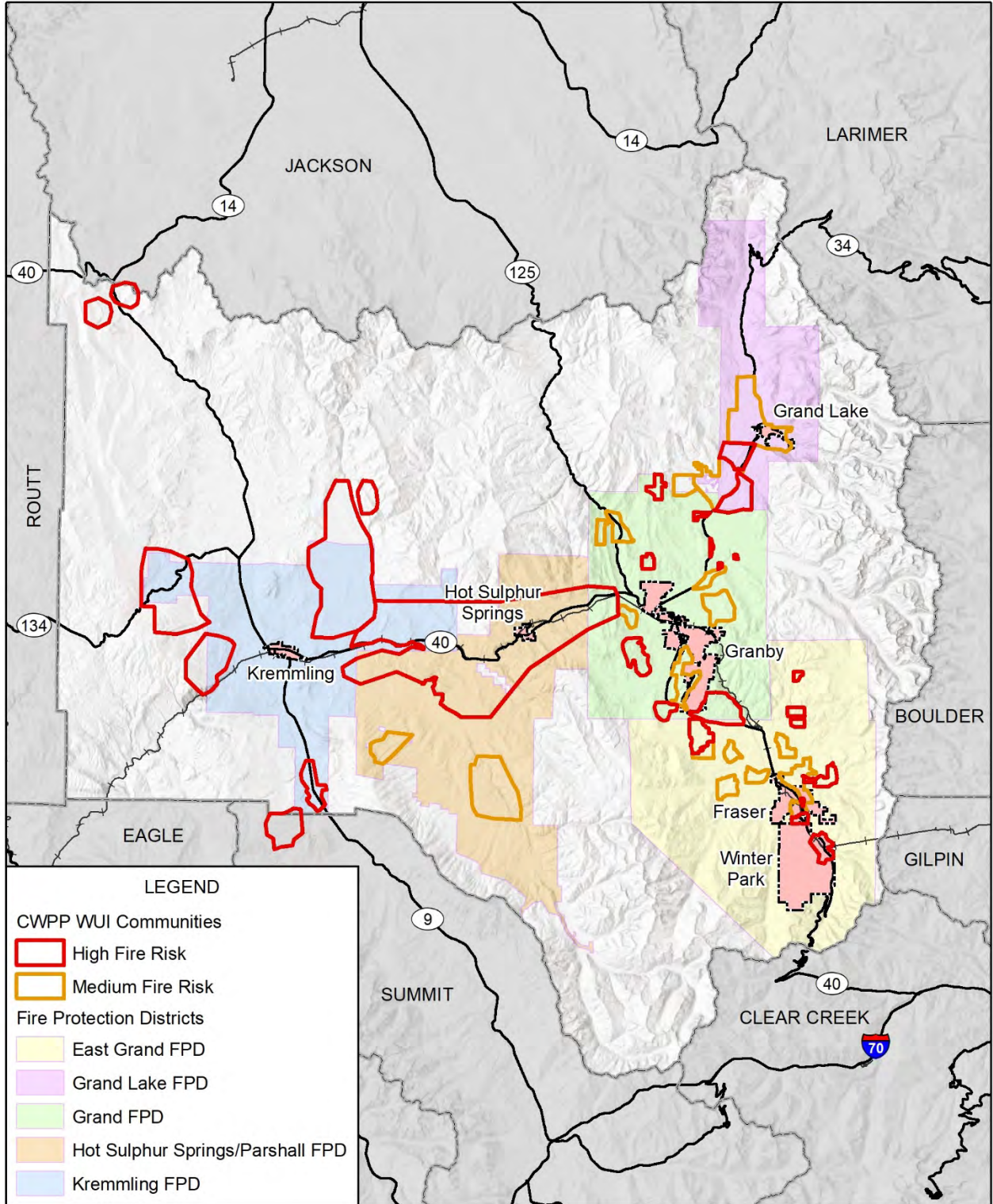


Map compiled 12/2020; intended for planning purposes only.  
 Data Source: Grand County, CDOT, Colorado Forest Atlas - Colorado State Forest Service

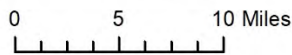
0 5 10 Miles



Figure 3-28 Grand County Wildland-Urban Interface Communities



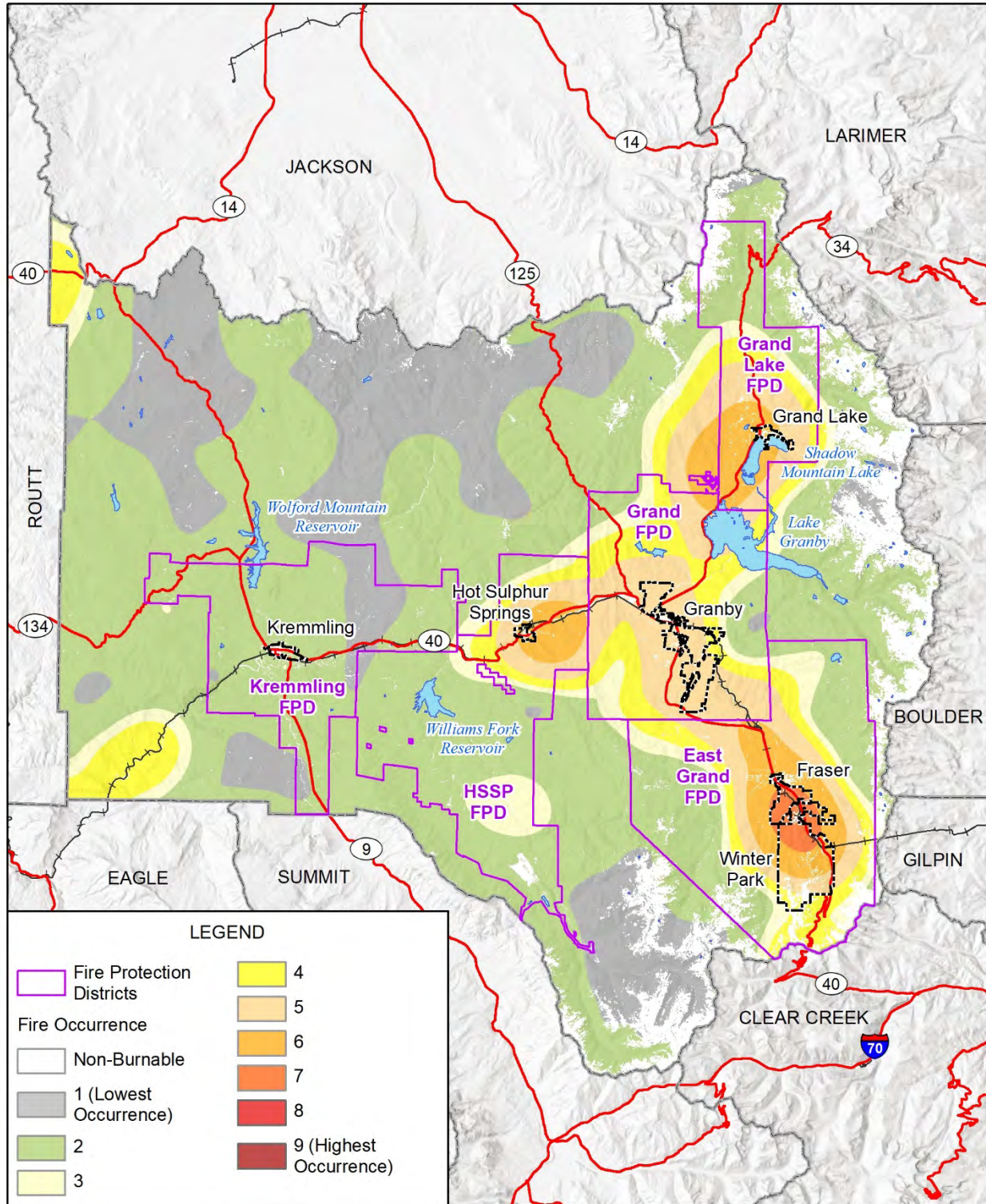
Map compiled 12/2020;  
intended for planning purposes only.  
Data Source: Grand County, CDOT,  
East Grand Fire Protection District



### **Previous Occurrences**

From 1980 through 2020, 333 Grand County fires were recorded in the Federal Wildland Fire Occurrence Data (<http://wildfire.cr.usgs.gov>). Though averaging only 8.3 fires per annum, fire occurrence appears to have increased significantly since the 1980s. Thirty-three of the forty-eight fires that burned more than ten acres have occurred since 2000.

Figure 3-29 Grand County Wildfire Probability Map



Map compiled 12/2020; intended for planning purposes only.  
 Data Source: Grand County, CDOT, Colorado Forest Atlas - Colorado State Forest Service

0 5 10 Miles



Sixty-two percent of Grand County’s wildfires since 1980 have remained smaller than a quarter of an acre. Ten percent (34 fires) have exceeded ten acres during this period (reference Table 3.14), the largest being the East Troublesome Fire (193,812 acres) in 2020 in the Arapaho National Forest near the Town of Grand Lake and Town of Granby. The County is one of many areas in Colorado and across the west that are beginning to see fires of unprecedented size and intensity.

**Table 3-18 Grand County Federal Wildfires by Size Class: 1980-2020**

Size Class	Acres	Number	Percentage
A	0-.25	207	62%
B	.25-10	74	22%
C	10-100	34	10%
D	100-300	6	2%
E	300-1,000	7	2%
F	1,000-5,000	5	2%

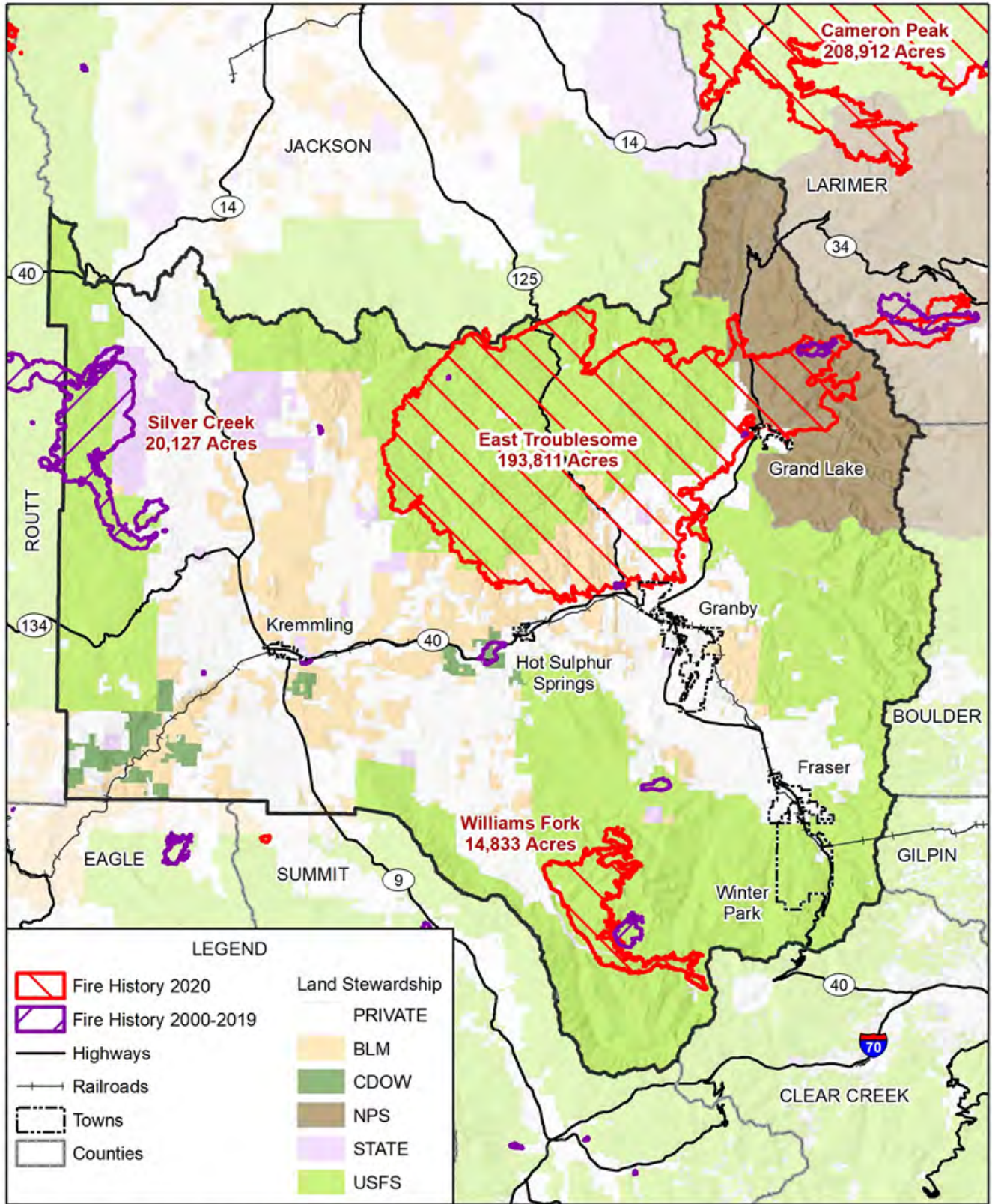
Source: National Wildfire Coordinating Group (<http://www.nwcg.gov/pms/pubs/glossary/s.htm>)

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.

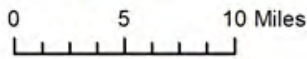
Recent fires worth noting:

- **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 3-34.
- **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 19th. It was among 229 fires that burned in NW Colorado that year, one of the worst and most expensive fire seasons on record.
- **August 14, 2020** – The Williams Fork Fire started 15 miles southwest of Fraser in the Arapahoe National Forest. The fire posed a threat to the Towns of Fraser and Winter Park. The cause of the fire is still under investigation. By the end of November 2020, the fire was determined to be 100% contained and affected 14,833 acres in total.
- **October 14, 2020** – The East Troublesome Fire is the second largest wildfire in state history with 193,812 acres affected. The first began 15 miles northeast of Kremmling on the Arapaho National Forest and led to mandatory evacuation orders for the Big Horn Park subdivision on the 14th followed by parts of County Road 21 on the 15th. Between October 20th and 23rd the fire increased in size dramatically, increasing from 18,000 acres to 87,000 in a 24-hour period from October 21st into October 22nd. The fire spread eastward into the Rocky Mountain National Park on the 22nd. While the cause of the fire is still under investigation, it’s known that the fire was fueled by drought conditions, dead and down beetle-killed trees, and red flag weather conditions of high wind and low humidity. The direction of the fire spread led to the closure of State Highway 125 as well as mandatory evacuations in areas north of the Town of Granby and for the Town of Grand Lake. In total over 35,000 people were placed under evacuation orders and over 360 homes and over 200 secondary structures were destroyed or damaged by the fire. Two people died after not evacuating their home and became caught in the fire. By early December 2020 the fire was determined to be 100% contained.

**Figure 3-30 Grand County Wildfire History, 2000-2020**



Map compiled 11/2020; intended for planning purposes only. Data Source: Grand County, CDOT, National Interagency Fire Center (NIFC)



**Figure 3-31 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 Insect Disease Infestation 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.

**Figure 3-32 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 (FACE), 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.

**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.

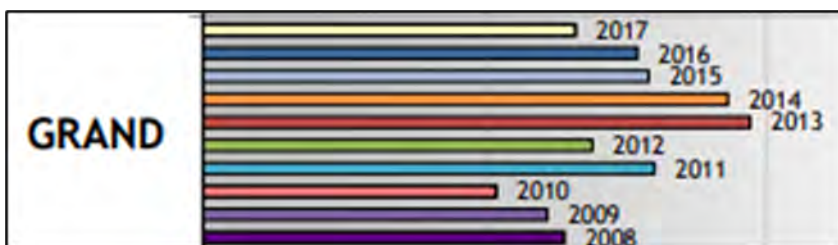
Table 3.15 shows the number of property damage only events (PDOs- refers to events in which no injuries or fatalities occurred), injuries, and fatalities from wildlife-vehicle collisions in Grand County between 2008 and 2017. Fortunately, no fatalities occurred in this time period.

**Table 3-19 Wildlife-Vehicle Collisions: 2008-2017**

Year	PDO	Injuries	Fatalities	Total
2008	60	4	0	64
2009	56	5	0	61
2010	49	3	0	52
2011	79	1	0	80
2012	66	3	0	69
2013	94	3	0	97
2014	69	2	0	71
2015	76	3	0	79
2016	83	5	0	88
2017	64	2	0	66
<b>Totals</b>	<b>691</b>	<b>31</b>	<b>0</b>	<b>722</b>

Source: Colorado Department of Transportation

**Figure 3-33 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 722 wildlife-vehicle accidents occurred between 1994, 2008, and 2017. Seven hundred forty-five twenty-twenty events over a 12-year span of time averages out to roughly 60 events per year. This equates to a 100% probability that a wildlife-vehicle crash will occur in the planning area during any year. Note, wildlife collision data tends to understate the problem as they are based on incidents when drivers stayed at the crash scene and waited for a police officer to file a report. The probability of future WVC events in Grand County is likely.

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*).

#### 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 Center for Environmental Information (NCEI) Storm Events Database was combined to determine that there were roughly 47 recorded wind events in Grand County between 1955 and June 2020. (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 NCEI 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.

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 3-20 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
Insect Disease Infestation	Large	Occasional	Limited	Medium
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, 2020

\*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 3-21 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	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
Insect Disease 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-Vehicle Collisions	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 3-22 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
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	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
Insect Disease 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-Vehicle Collisions	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 3-23 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	High	High	High	Low	Low	High	High	Medium	High	High
Landslide, Mudflow/Debris Flow, and Rockfall	High	Low	Medium	Medium	Medium	Low	Medium	Medium	High	Medium
Lightning	Low	Medium	Medium	Medium	Low	Medium	Low	Medium	Low	Low
Insect Disease 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-Vehicle Collisions	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

*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 FEMA's *Local Mitigation Planning Handbook (March 2013)*.

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 \$10,301,382,335 (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 3-24 Building Exposure by Property Type**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
Agricultural	547	\$308,375,460	\$308,375,460	\$616,750,920
Commercial Improved	535	\$194,698,390	\$194,698,390	\$389,396,780
Commercial Vacant	7	\$562,170	\$0	\$562,170
Conservation Easement	41	\$21,513,000	\$21,513,000	\$43,026,000
Industrial Improved	7	\$1,718,160	\$2,577,240	\$4,295,400
Mixed Use	71	\$34,107,040	\$34,107,040	\$68,214,080
Multi-Residential Improved	138	\$47,638,240	\$23,819,120	\$71,457,360
Residential Improved	15,308	\$5,803,654,230	\$2,901,827,115	\$8,705,481,345
Residential Vacant	182	\$15,205,130	\$0	\$15,205,130
Tax Exempt	212	\$193,050,980	\$193,050,980	\$386,101,960
Vacant Land	22	\$891,190	\$0	\$891,190
<b>Total</b>	<b>17,070</b>	<b>\$6,621,413,990</b>	<b>\$3,679,968,345</b>	<b>\$10,301,382,335</b>

Source: Grand County Assessors Data 11/9/2020

**Table 3-25 Building Exposure by Jurisdiction**

Jurisdiction	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
Fraser	1,368	\$600,923,200	\$320,458,300	\$921,381,500
Granby	3,649	\$1,248,361,080	\$708,745,205	\$1,957,106,285
Grand Lake	934	\$367,185,960	\$202,340,580	\$569,526,540
Hot Sulphur Springs	318	\$70,697,910	\$43,873,045	\$114,570,955
Kremmling	599	\$127,970,160	\$78,662,065	\$206,632,225
Winter Park	2,800	\$1,289,535,200	\$1,650,275,005	\$2,939,810,205
Unincorporated	7,402	\$2,916,740,480	\$675,614,145	\$3,592,354,625
<b>Total</b>	<b>17,070</b>	<b>\$6,621,413,990</b>	<b>\$3,679,968,345</b>	<b>\$10,301,382,335</b>

Source: Grand County Assessors Data 11/9/2020

**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 3-26 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	-

Facility Type	Unincorporated Areas	Fraser	Granby	Grand Lake	Hot Sulphur Springs	Kremmling	Winter Park
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

A FEMA Hazus 4.2 study region was created to obtain critical facilities and infrastructure values during the 2020 update. Assets were identified in Hazus within Grand County include airports, emergency operation center, hospitals, schools and wastewater facilities having a total estimated value of \$2,355,591,178.

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 3-27 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 acrocnema</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.

## 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:

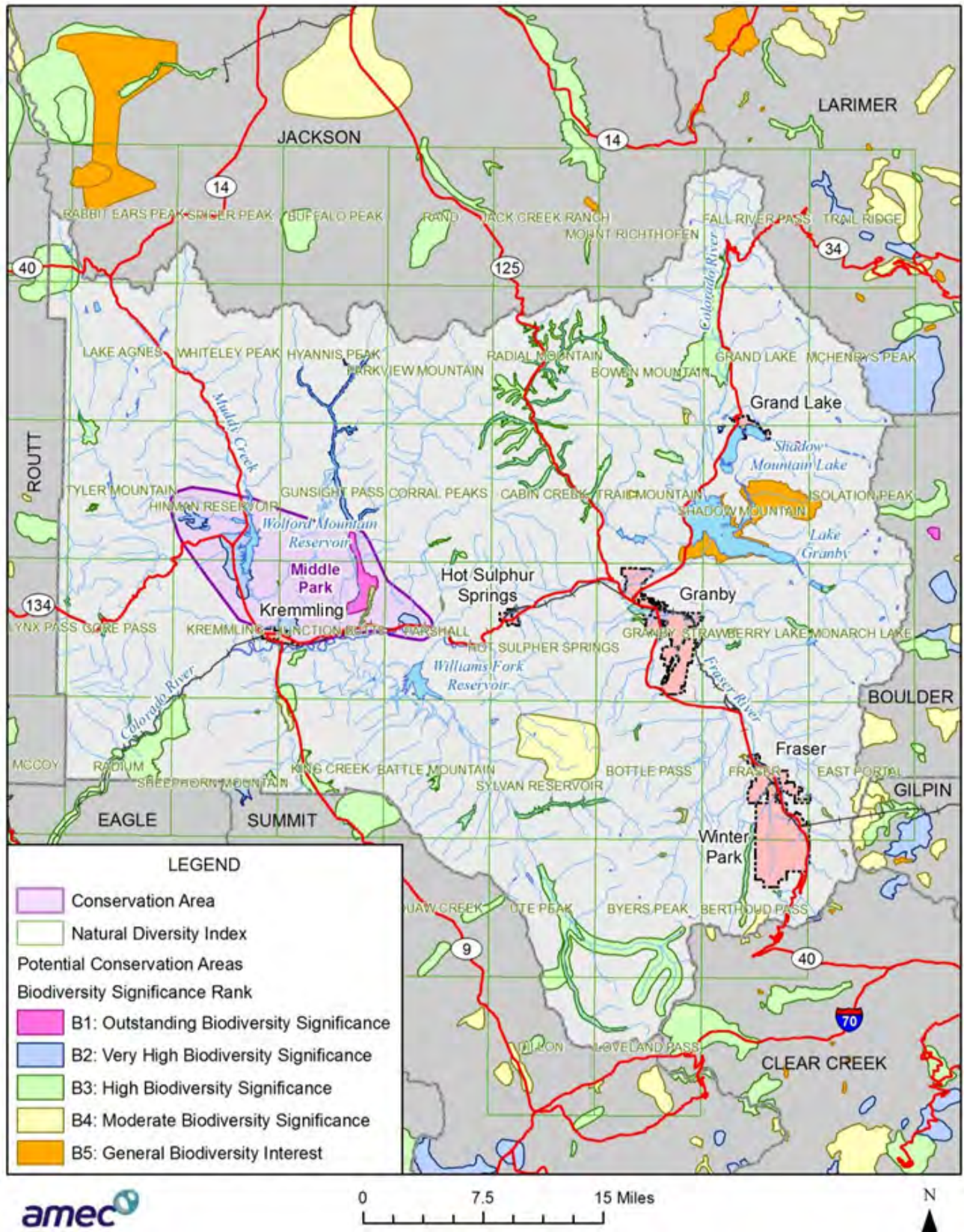
[https://cnhp.colostate.edu/wp-content/uploads/download/documents/2006/GRAND\\_FINAL\\_REPORT05\\_2006.pdf](https://cnhp.colostate.edu/wp-content/uploads/download/documents/2006/GRAND_FINAL_REPORT05_2006.pdf)

## Ecologically Sensitive Areas

Figure 3-36 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 3-34 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 3-28 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 3-28 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
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

Property Name	City	Location	Date Listed
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 3-29 lists the top employers in Grand County by district.

**Table 3-29 Top Employers in Grand County by District**

Name
<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 3-29 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 highways are also at risk of injury and death due to avalanches, which also cause road and highway closures. As noted under the Hazard Profile, there have been 11 fatalities in avalanches in Grand County between the 1950/51 season and 2018/2019 season. This averages out to 1.4 avalanche-related deaths per year in Grand County. Statewide since 1950 avalanches have caused 293 fatalities in Colorado, a majority of which (285) were related to people being in the backcountry.

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.

### **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 the Colorado Department of Public Health and Environment (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 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 2018 Colorado Drought Mitigation and Response 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 2018 State of Colorado Drought Mitigation and Response Plan, “the multiplier effect of decreased business revenue can impact the entire economy. When an individual’s income decreases or is lost, all of the goods and service providers they usually support will also be impacted” (Annex B, B.367). 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.

The 2018 State of Colorado Drought Mitigation and Response Plan evaluated the vulnerability of different sectors to drought for all counties in Colorado. (The evaluation excluded the Municipal and Industrial sector because that sector did not follow standard methodology.) The sector vulnerability scores for Grand County are shown in Table 3-30. A score of 3.0 or above means that sector is vulnerable to drought; the only sector in Grand County scoring at 3.0 is socioeconomic. This is largely due to the County’s lack of economic diversity and tourism economy base. This includes vulnerability to secondary economic impacts, behavioral health impacts and public health concerns specific to drought.

**Table 3-30 Grand County Drought Vulnerability Scores by Sector**

Sector	Grand County Score
Socioeconomic	3.00
Recreation	2.98
Agriculture	2.00
Environment	2.42
State Assets	2.11
Energy	1.38
<b>Average Overall Vulnerability</b>	<b>2.31</b>

Source: 2018 State of Colorado Drought Mitigation and Response Plan

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 3-37). Table 3-31 summarizes the results for Grand County.

**Figure 3-35 Faults Analyzed for Potential Losses, Statewide**



Source: Earthquake Evaluation Report

**Table 3-31 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 3-32. 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. As a result of that low significance, the County did not conduct another Hazus analysis; changes to the 2013 results would be small and would not significantly change the hazard assessment.

**Table 3-32 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
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.

A flood vulnerability assessment was performed for the entire County using GIS during 2020. FEMA's National Flood Hazard Layer (NFHL updated on 12/13/2013 by Letter of Map Revision) for Grand County 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 3-33 and Table 3-34 and are summarized by jurisdiction. More detail on the types of buildings impacted is provided in the appropriate jurisdictional annexes. Property Type refers to the land use of the parcel and includes agricultural, commercial, conservation easement, industrial, mixed use, residential, tax exempt and vacant land. Contents values were estimated as a percentage of building value based on their property 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 193 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 \$106 million. Flood loss is typically proportional to the depth of flooding in the structure; a 2 foot deep flood results in 25% loss to the structure and contents, approximately, based on FEMA depth-damage curves. Assuming a 2 foot deep flood, losses

could be on the order of \$26.6 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 0.26%.

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 (56), followed by Winter Park (53). The unincorporated County would have the highest potential dollar losses. Unincorporated losses could exceed \$10 million and Winter Park has estimated losses of \$6 million.

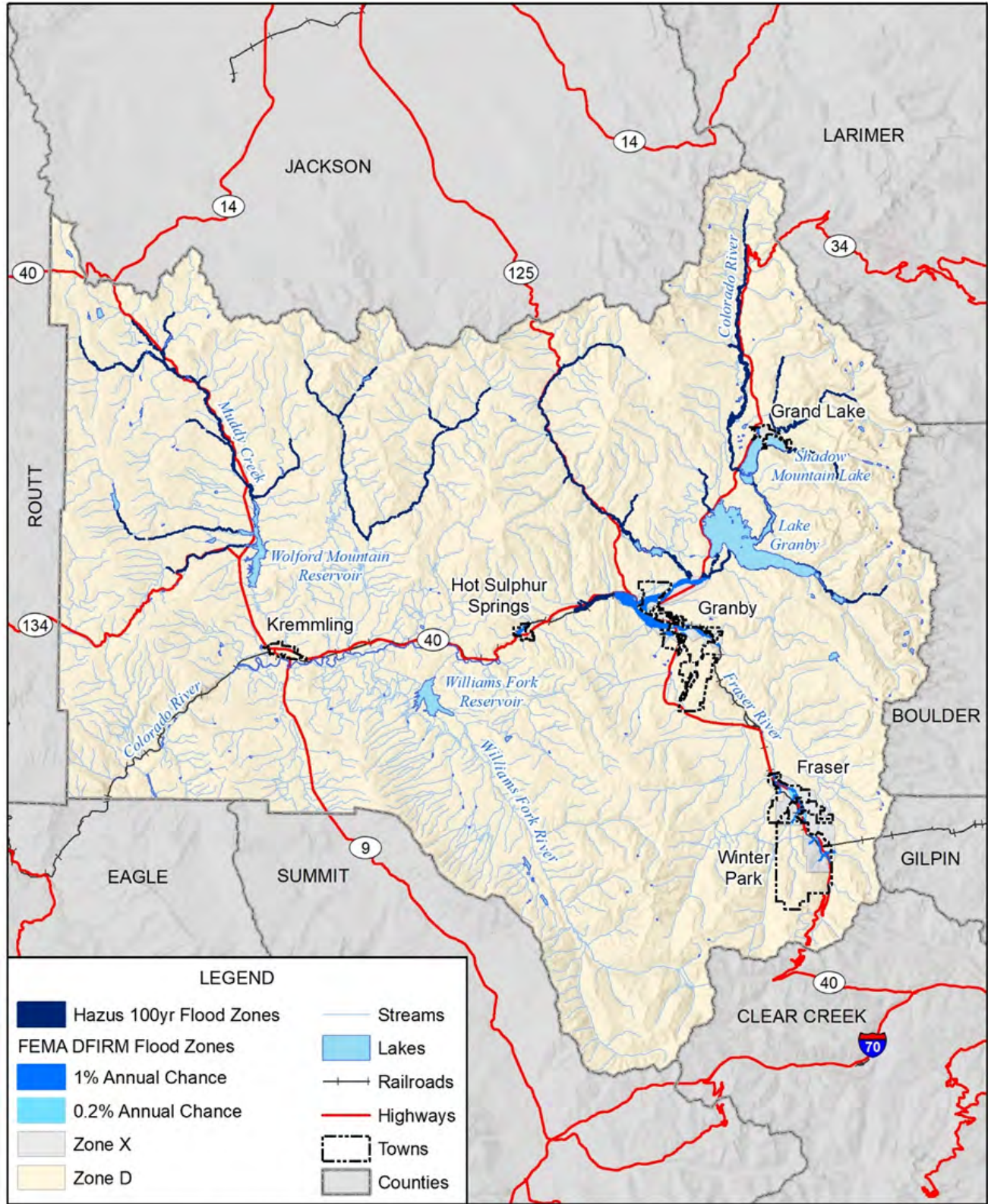
**Table 3-33 Summary of 1% Annual Chance Flood Building Risk and Potential Loss by Jurisdiction**

Jurisdiction	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Loss Estimate	Loss Ratio	Population
Fraser	44	\$13,034,960	\$6,468,380	\$19,503,340	\$4,875,835	0.53%	93
Granby	30	\$8,078,400	\$6,959,025	\$15,037,425	\$3,759,356	0.19%	19
Grand Lake	8	\$2,172,650	\$1,217,025	\$3,389,675	\$847,419	0.15%	14
Hot Sulphur Springs	2	\$645,370	\$322,685	\$968,055	\$242,014	0.21%	5
Kremmling	-	-	-	-	-	-	-
Winter Park	53	\$16,066,170	\$8,081,570	\$24,147,740	\$6,036,935	0.31%	107
Unincorporated	56	\$26,796,510	\$16,371,405	\$43,167,915	\$10,791,979	0.24%	92
<b>Total</b>	<b>193</b>	<b>\$66,794,060</b>	<b>\$39,420,090</b>	<b>\$106,214,150</b>	<b>\$26,553,538</b>	<b>0.26%</b>	<b>329</b>

**Table 3-34 Summary of 0.2% Annual Chance Flood Building Risk and Potential Loss by Jurisdiction**

Jurisdiction	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Loss Estimate	Loss Ratio	Population
Fraser	-	-	-	-	-	-	-
Granby	-	-	-	-	-	-	-
Grand Lake	-	-	-	-	-	-	-
Hot Sulphur Springs	-	-	-	-	-	-	-
Kremmling	-	-	-	-	-	-	-
Winter Park	23	\$9,433,930	\$6,327,250	\$15,761,180	\$3,940,295	0.20%	29
Unincorporated	-	-	-	-	-	-	-
<b>Total</b>	<b>23</b>	<b>\$9,433,930</b>	<b>\$6,327,250</b>	<b>\$15,761,180</b>	<b>\$3,940,295</b>	<b>0.20%</b>	<b>29</b>

Figure 3-36 Grand County Effective DFIRM/HAZUS Floodplains and Flood Prone Properties



Map compiled 11/2020;  
intended for planning purposes only.  
Data Source: Grand County, CDOT,  
Hazus-MH MR2, FEMA NFHL 12/13/2013

0 5 10 Miles



There are 23 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 \$15,761,180.

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 2019 data from the State Demography Office 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 329 people and a 0.2% flood would displace an additional 29 people. Table 3-35 summarizes the results of this analysis.

**Table 3-35 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	41	93
Granby	2.40	8	19
Grand Lake	1.96	7	14
Hot Sulphur Springs	2.49	2	5
Kremmling	2.23	-	-
Winter Park	2.05	52	107
Unincorporated	2.25	41	92
<b>Total</b>		<b>151</b>	<b>329</b>
<b>0.2% Annual Chance Flood</b>			
Winter Park	2.05	14	29
<b>Total</b>		<b>15</b>	<b>29</b>
<b>Grand Total</b>		<b>165</b>	<b>358</b>

Source: State Demography Office, FEMA NFHL 12/13/2013, Wood analysis

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 3-36 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 3-36 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	4	\$1,791,200	0	\$0
Town of Granby	5/15/08	1/2/2008	2	\$700,000	1	\$0
Town of Grand Lake	1/1/86	1/2/2008	6	\$1,873,200	0	\$0
Town of Hot Sulphur Springs	-	1/2/2008	-	\$0	0	\$0
Town of Kremmling	-	1/2/2008	-	\$0	0	\$0
Town of Winter Park	11/15/85	1/2/2008	126	\$21,935,600	1	\$5,960.58

Source: FEMA Community Information System

NFIP insurance data indicates that as of December 2020, there were 138 flood insurance policies in force in the County with \$26,300,000 of coverage. There have been 2 historical claims for flood losses totaling \$5,960.58.

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

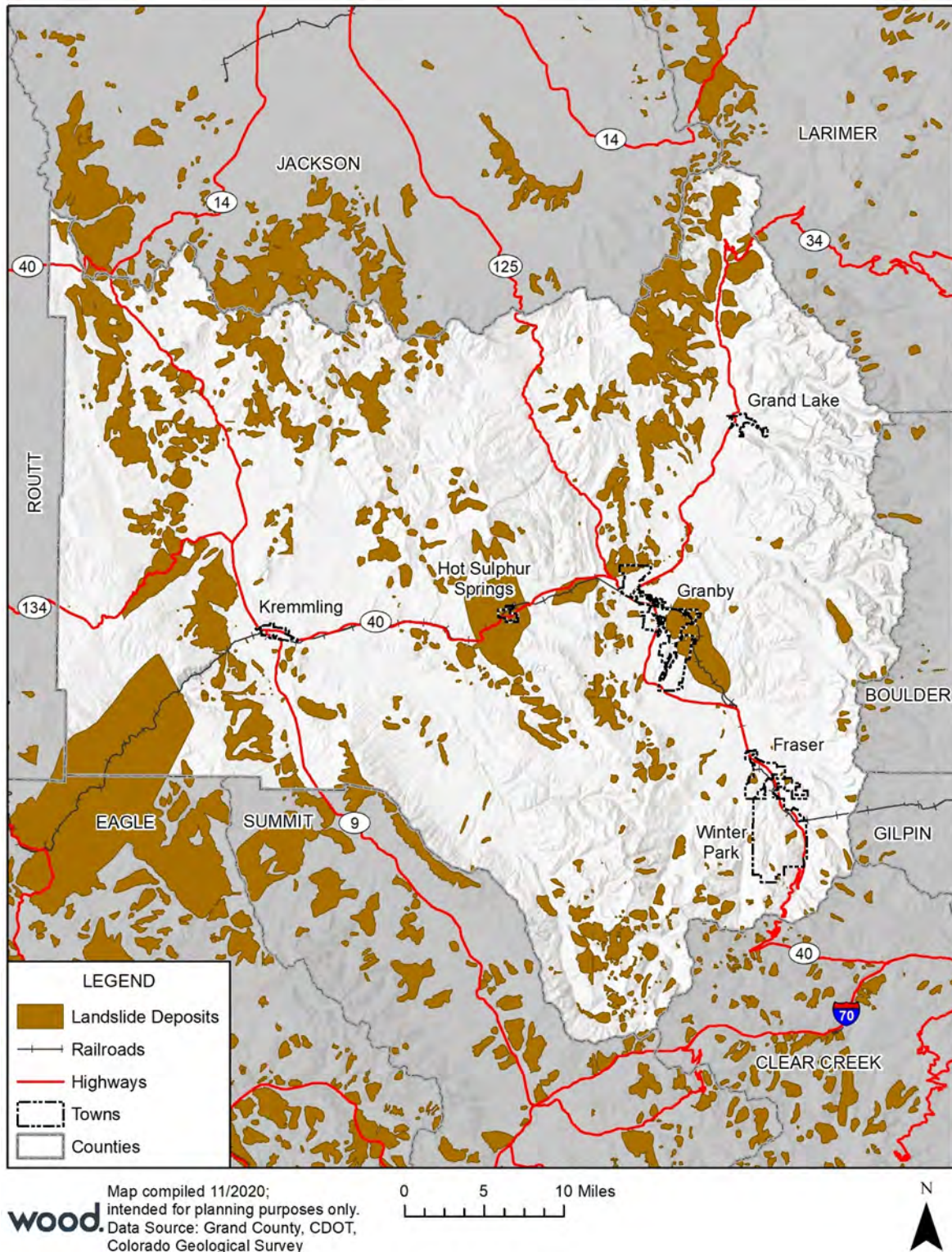
**Future Development**

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.

Figure 3-37 Grand County Landslide Deposits



**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 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 by jurisdiction. Additional landslide hazard analysis was completed using the updated Colorado Geological Survey landslide deposits layer during the 2020 update. The results of the overlay analysis are presented in Table 3-37, 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 town of Granby and Hot Sulphur Springs, a more detailed, site-specific analysis would need to be conducted to further assess potential risk.

**Table 3-37 Buildings at Risk to Landslide by Jurisdiction**

Jurisdiction	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Population
Fraser	20	\$15,939,840	\$7,969,920	\$23,909,760	45
Granby	528	\$183,296,080	\$99,429,240	\$282,725,320	1,151
Grand Lake	-	-	-	-	-
Hot Sulphur Springs	318	\$70,697,910	\$43,873,045	\$114,570,955	679
Kremmling	-	-	-	-	-
Winter Park	9	\$14,009,650	\$7,816,420	\$21,826,070	16
Kremmling FPD	430	\$152,612,870	\$97,839,300	\$250,452,170	755
<b>Total</b>	<b>1,305</b>	<b>\$436,556,350</b>	<b>\$256,927,925</b>	<b>\$693,484,275</b>	<b>2,646</b>

Source: Grand County GIS and Assessor’s Office (11/9/2020), Colorado Geological Survey

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 3-38 A more detailed, site- specific analysis would need to be conducted to further assess potential risk.

**Table 3-38 Critical Facilities in Landslide Hazard Areas**

Type	Name	Facility Count
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>

**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.

## Insect Disease 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 California in 2018 caused the Camp Fire, the deadliest and most destructive wildfire in California's history. In 2010, a multi-forest environmental 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 mitigation efforts to prevent loss of cover.

**Hazardous fuels:** There is no doubt that the MPB epidemic and the other insect disease infestation noted under hazard profile 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. The Town of Grand Lake specifically noted that 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.

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.

**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 3-39). 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.

**Table 3-39 Grand County Community Wildfire Hazard Ratings**

Hazard Rating	Community
High to Very High	Winter Park
High	Grand Lake

Hazard Rating	Community
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 3-40 Kremmling Fire Protection District Community Wildfire Hazard Ratings**

Hazard Rating	Community
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 3-41 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

Hazard Rating	Community
	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 Sunset Point

**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 3-42 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
High	Winter Park Ranch Beaver Village Winter Park Resort/Old Town Reserve at Elk Horn Ridge Beaver Mountain Perserve 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 Alpine Timbers
Moderate	Stagecoach Sheep Mountain Ridge Pole Creek Meadows Town of Winter Park
Low	Tabernash Fraser County Road 5170

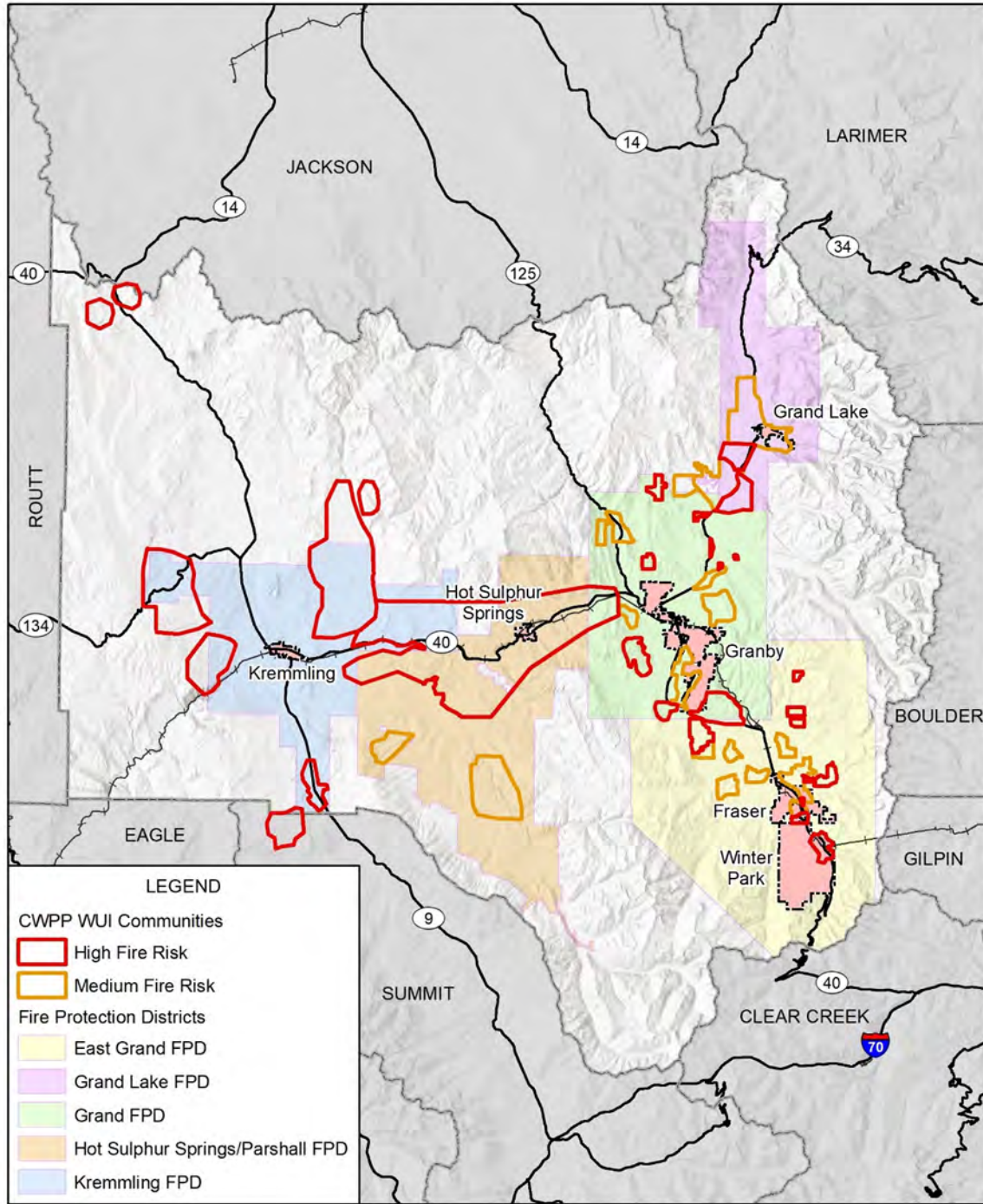
Infrastructure in the area includes two water treatment plants for the Town of Winter Park, US Highway 40, the Mettler substation, and the associated electric power infrastructure. It is notable that the electrical transmission lines in the Upper Fraser Valley are important for the operation of the Henderson 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**

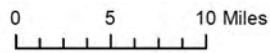
Currently Grand County has approximately 200 square miles of areas designated as medium risk or higher by the various CWPP's as seen in Figure 3-38. Tables 3-43 and 3-44 represent the parcel centroid analysis performed using the WUI Community layer created by the East Grand Fire Protection District. The WUI boundaries were created off the current CWPP's from the 5 Fire Protection Districts within Grand County and classified by High to Medium fire risk. Over 150sqmi is designated as high risk or higher and constitutes \$3.2 billion in built improvement and estimated content values threatened. Total built property and estimated content value of the areas designated medium or higher is \$4.3 billion. The built property value consists of 6,849 structures in the medium risk areas and 5,306 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.

Figure 3-39 Grand County WUI Communities and Fire Protection Districts



Map compiled 12/2020; intended for planning purposes only. Data Source: Grand County, CDOT, East Grand Fire Protection District



**Table 3-44 Grand County Improved Properties Within High Risk WUI Communities**

Jurisdiction	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Population
Granby	781	\$369,308,940	\$200,980,855	\$570,289,795	1,793
Hot Sulphur Springs	318	\$70,697,910	\$43,873,045	\$114,570,955	679
Winter Park	1,854	\$854,656,650	\$439,069,660	\$1,293,726,310	3,731
Unincorporated	2,353	\$804,536,930	\$430,690,075	\$1,235,227,005	4,766
<b>Total</b>	<b>5,306</b>	<b>\$2,099,200,430</b>	<b>\$1,114,613,635</b>	<b>\$3,213,814,065</b>	<b>10,969</b>

**Table 3-45 Grand County Improved Properties Within Medium Risk WUI Communities**

Jurisdiction	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Population
Fraser	622	\$350,315,810	\$176,050,165	\$526,365,975	1,395
Granby	572	\$214,040,110	\$108,113,625	\$322,153,735	1,306
Grand Lake	934	\$367,185,960	\$202,340,580	\$569,526,540	1,578
Winter Park	921	\$425,222,020	\$228,554,600	\$653,776,620	1,761
Unincorporated	3,800	\$1,506,904,370	\$782,152,945	\$2,289,057,315	8,231
<b>Total</b>	<b>6,849</b>	<b>\$2,863,668,270</b>	<b>\$1,497,211,915</b>	<b>\$4,360,880,185</b>	<b>14,272</b>

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 Unincorporated County has nearly \$2.3 billion in improved property values in medium to high wildfire threat zones.

**Potential Future Losses**

According to the Future Avoided Cost Explorer tool (FACE), 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 3-45 lists critical facilities in lowest, low-moderate, moderate, high-moderate, and highest wildfire intensity zones.

**Table 3-46 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>
<b>High-Moderate Wildfire Intensity</b>			
<b>Granby</b>	Communications	Power World	1
	Communications	Sol Vista Peak	1

Jurisdiction	Facility Type	Facility Name	Facility Count
	<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 HSSPPD	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>
<b>Hot Sulphur Springs</b>	Government*	Courthouse	1
	Government*	Sheriff's Office	1
	Jail*	Jail	1
	Government*	County Administration	1

Jurisdiction	Facility Type	Facility Name	Facility Count
	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	1
	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	
	Communications	Table Mountain (South)	1
	Communications	Williams Peak / Blue Ridge	1
	Communications	Wolford Mountain	1
	Emergency Operations Center	EOC County Road 5	1

Jurisdiction	Facility Type	Facility Name	Facility Count
	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>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

**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 cited 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**

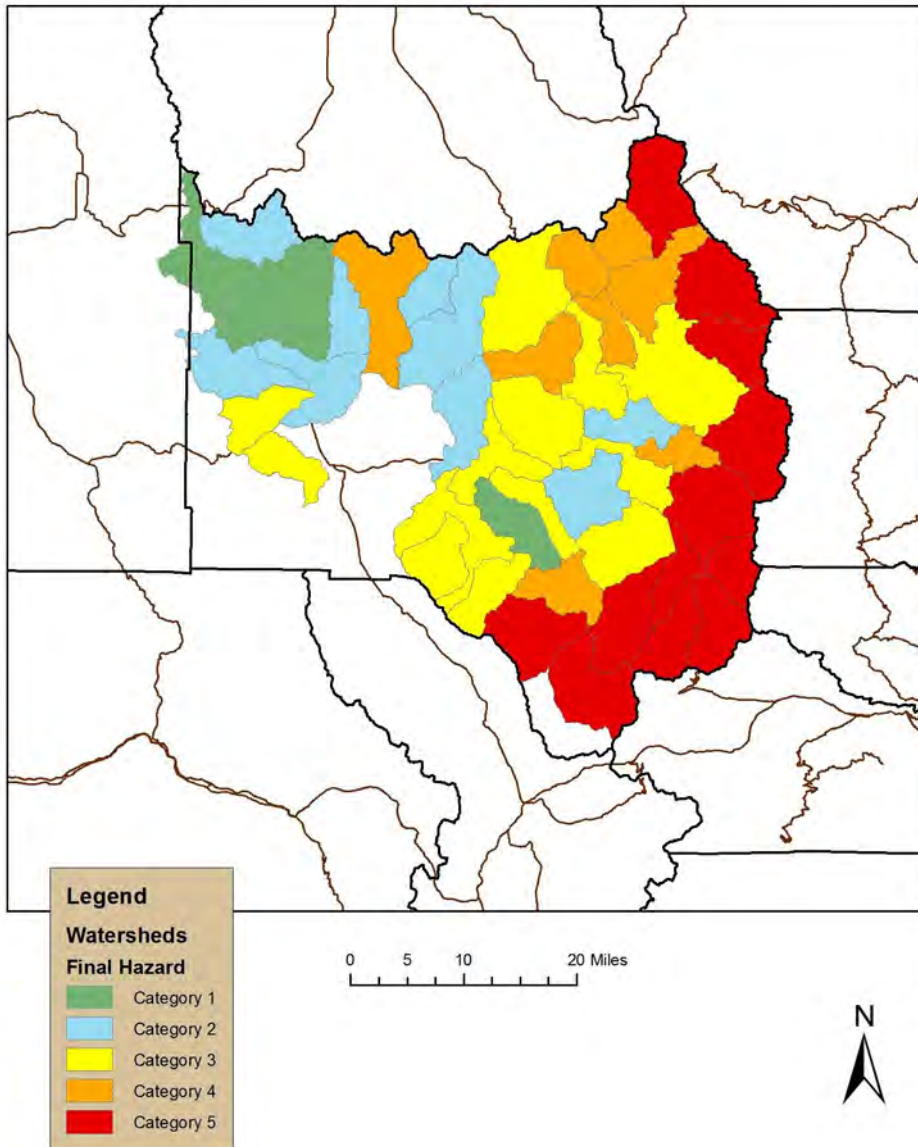
Watersheds and the numerous associated reservoirs in the county could be significantly impacted by high severity wildfire, especially in the wake of the mountain pine beetle epidemic. For example, the damage to Strontia Springs Reservoir caused by siltation from the 1996 Buffalo Creek Fire took fifteen 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 supply 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 3-40 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.

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## Wildlife-Vehicle Collisions

Travelling population in the planning area is at risk to this hazard. Generally, only a few people are affected by a wildlife hazard at any one time, although injuries or death are possible. WVCs have caused 31 injuries and no fatalities in Grand County between 2008 and 2017. Since the installation of two wildlife overpasses and five overpasses on State Highway 9 between Kremmling and Silverthorne CDOT has reported an 87% decrease in WVCs on that stretch of notoriously dangerous road.

Wildlife-vehicle collisions can temporarily close roads, which can potentially hurt the County's economy during peak tourist seasons. It is estimated that WVCs cost over \$60 million to the state economy each year.

Between 2014 and 2018 CDOT reported over 8,000 wild animals killed by WVCs throughout Region 3, the highest number of reported roadkill in the five CDOT regions. Statewide nearly 7,000 wild animals were killed in 2016 alone (highest in 2016). Deer and elk represent the majority of species killed by vehicle collision but threatened and endangered species such as lynx have also been reported in Region 3. A disruption in an animal's natural habitat such as a wildfire event or severe winter storm with heavy snow amounts can push wild animals out of the habitats, sometimes from higher to lower elevations leading to an increased risk of WVCs.

### Existing Development

The primary concern associated with wildlife hazards is public safety and to a lesser extent property damage. Wildlife-vehicle collisions caused 691 damages to property between 2008 and 2017. Statewide, WVCs have resulted in over \$30,000 in property damages since 2005.

### Future Development

As population growth continues in the County, increased road development and expansion is likely to follow. Both existing and future development need to take into account the locations of critical wildlife habitats. Wildlife migration corridors should be clearly marked during future development projects to help protect the County's residents, visitors, and wildlife

## 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. NCEI data did not provide enough details on past damages and casualties to perform an average annual loss assessment. Windstorm has a cascading impact on other hazards addressed in the plan. Windstorm vulnerability is increasing due to the damaged trees from pest infestations. Windstorms also contribute to the erosion hazard and have caused blowing dust during times of drought. Wind also is a major contributing factor to wildfire behavior.

Community members are the most vulnerable to high wind events. The availability of sheltered locations such as basements, buildings constructed using wind-resistant materials and methods, and public storm shelters, all reduce the exposure of the population. However, there are also segments of the population that are especially exposed to the indirect impacts of high winds, particularly the loss of electrical power. These populations include the elderly or disabled, especially those with medical needs and treatments dependent on electricity. Nursing homes, community-based residential facilities, and other special needs housing facilities are also vulnerable if electrical outages are prolonged, since backup power generally operates only minimal functions for a short period of time.

The U.S. Department of Health and Human Services ePOWER Mapping tool (<https://empowermap.hhs.gov/>) provides information on Medicare beneficiaries who rely on electricity-dependent medical equipment such as ventilators to live independently in their homes. According to the tool there are 2,728 Medicare Beneficiaries located in Grand County; of these individuals, 10% (approximately 275 persons) rely on electricity-dependent medical equipment, such as ventilators to live independently in their homes, making them more vulnerable to power outages as a result a wind event.

Public gathering places including (but not limited to) schools, community centers, shelters, nursing homes and churches, may have increased impacts at certain times of day if a high wind event was to occur. Due to the random nature of this hazard, a more specific risk assessment was not conducted for this plan.

Winds typically don't have long-term impacts on the economy. High winds may impact exposed critical infrastructure such as power lines; depending on the impact and the function, this could cause a short-term economic disruption. The most common problems associated with high winds are loss of utilities. Downed power lines can cause power outages, leaving large parts of the County isolated, and without electricity, water, and communication. Damage may also limit timely emergency response and the number of evacuation routes. Damaging winds can also cause fires, which may start along dry roadside grass vegetation. Downed electrical lines following a storm can also increase the potential for lethal electrical shock.

### Existing Development

General damages are both direct (what the wind event physically destroys) and indirect, which focuses on additional costs, damages and losses attributed to secondary hazards spawned by the event, or due to the damages caused by the wind event. Depending on the magnitude of the wind events they are capable of damaging and eventually destroying almost anything. Construction practices and building codes can help maximize the resistance of the structures to damage.

Secondary impacts of damage caused by wind events often result from damage to infrastructure. Downed power and communications transmission lines, coupled with disruptions to transportation, create difficulties in reporting and responding to emergencies. These indirect impacts of a wind event put tremendous strain on a community. In the immediate aftermath, the focus is on emergency services.

### Future Development

As the County continues increasing in population, the number of people and housing developments exposed to the hazard increases. Proper education on building techniques and the use of sturdy building materials, basements, attached foundations, and other structural techniques may minimize the property vulnerabilities.

Public shelters at parks and open spaces may help reduce the impacts of windstorms on the recreational populations exposed to storms.

**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, State Demography Office,
- U.S. Census Bureau

**Current Status and Past Development**

According to the Colorado State Demography Office, the 2019 estimated population of Grand County was 15,718. This is an increase of over 13% from the 2000 census population of 12,442. Table 3-46 through Table 3.43 illustrate past growth in Grand County.

**Table 3-47 Grand County Population Growth 1960-2019**

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	15,718	1.26	5,763,976	

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

**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.

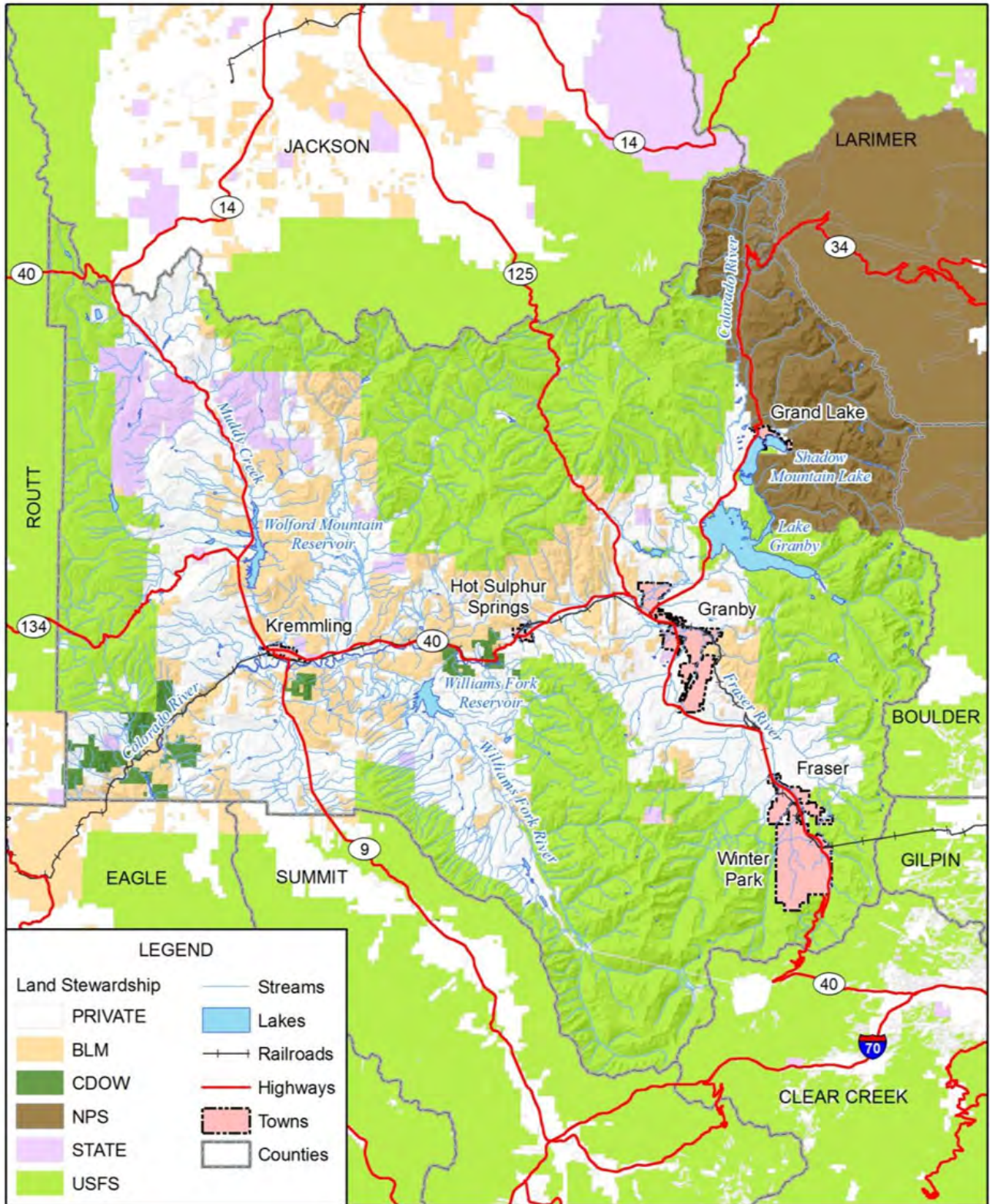
As of 2018, Granby was growing more quickly and had more opportunity sites for housing than the other communities. Granby also currently houses a mix of employees, primarily from Winter Park through Hot Sulphur Springs.

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).

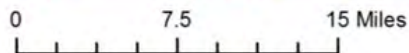
**Land Use**

Figure 3-42 shows the land stewardship distribution in Grand County.

Figure 3-41 Grand County Land Stewardship



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



**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 3-48 shows the population projections for the County as a whole through 2040. The State Demography Office does not produce population forecasts for municipalities.

**Table 3-48 Population Projections for Grand County, 2010-2040**

	2010	2015	2020	2025	2030	2035	2040
Population	14,790	14,726	15,736	16,590	17,745	19,173	20,598
Percent Change (%)		-0.1%	1.3%	1.1%	1.4%	1.6%	1.4%

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. The following are as written in the Grand County Master Plan (2011):

- 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, 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.

**3.4 Risk Assessment Summary**

The Grand County Risk Assessment revealed a number of problem areas to be addressed in the mitigation strategy. These key vulnerability 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.
- The CAIC has recorded 11 fatalities in Grand County between the 1950-51 season and 2018-19 season; Grand County is ranked 10th in the state for fatalities.
- 21 avalanche events between 2008 and 2018 were recorded in NCEI Storm Events database, and by CAIC.
- 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**

- 12 high hazard and 14 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.
- Granby and Unincorporated Grand County have the largest population at risk to dam failure.
- 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 Socioeconomic tourism and recreation sectors are particularly vulnerable to drought.
- Drought increases risk to other hazards, such as erosion and deposition, 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 dollars.
- The building and income related losses are estimated to be \$33.22 million, with 72% of the damages impacting residential structures, and 23% of losses being tied to business interruptions.
- No major casualties are expected from the modeled scenario, but a potential 8 households could be displaced, and 4 persons may seek temporary shelter due to this earthquake event.

### **Flood**

- Greatest losses in terms of people and number of improved parcels in unincorporated areas of the County followed by the Town of Winter Park.
- Flooding is common along the Fraser River and its tributaries Leland Creek, Vasquez Creek and Jim Creek are common during June due to snowmelt.
- Insufficient capacity of the culvert under Highway 40 restricts flow of flood waters from Leland Creek to enter the Fraser River.
- Countywide estimated losses could exceed \$26.6 million to a 1% Annual Chance flooding event.
- \$26,300,00 in flood insurance in force (138 policies) in Grand County. There have been 2 historical claims for flood losses totaling in \$5,960.

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

- There were 22 transportation-related hazardous materials incidents reported between 2008-2020; 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
- There are 21 tier II facilities located in Grand County.
- 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
- Gore Canyon, Byers Canyon, Highway 125, Highway 40 at Windy Gap, the landfill on Highway 34 and CR 1 near Inspiration Point have been identified by the HMPC as problem areas for landslide and rockfall.
- Has caused train derailments in the past

### **Lightning**

- Lightning-caused 21 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

### **Insect Disease Infestation**

- The insect disease infestation hazard is widespread in Grand County.
- This hazard contributes to other hazards such as blowdown and high-speed sustained winds.
- There are no reports of the mountain pine beetle affecting a significant amount of acres in 2018 or 2019 but cumulatively between 1996 and 2019 the mountain pine beetle affected 581,000 acres in the county.
- Areas along the Fraser River have been identified by the Colorado State Forest Service as being impacted by the spruce beetle. Between 1996 and 2019 the spruce beetle has affected 72,000 acres in Grand County.
- The western spruce budworm has led to defoliation in the Byers and Gore Canyons. Between 2018 and 2019 the western spruce budworm affected 260 acres in Grand County.
- Insect disease infestation is projected to increase as a result of climate change.
- 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
- 321 recorded events between 2000 and 2019
- Severe winter storms can close roads, strand travelers, and isolate the County, possibly for days at a time

### **Wildfire**

- Countywide there is an estimated \$3.2 billion in property value in high wildfire risk areas; \$4.4 billion in medium 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
- 563 WVCs took place in Summit County between 2005 and 2017 resulting in 521 incidents of property damage, 41 injuries and 1 fatality.
- Wildlife-vehicle collisions are especially likely to occur in spring and fall between the hours of dusk and dawn when animals are most active
- CDOT Region 3 (includes Grand County) had the highest number of wildlife animals killed from vehicle collisions, with over 8,000 animals killed in 4 years (2014-2018).

### **Windstorm**

- There have been 47 recorded wind events in the past 65 years in the County. The highest recorded event was 116 mph in 2005.
- There is growing risk related to blowdown of dead trees which could impact recreational areas and powerline infrastructure.
- 10% of Medicare Beneficiaries (approximately 275 persons) in the County are dependent on electricity to live independently making them highly vulnerable to loss of power.

### **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's *Local Mitigation Planning Handbook (March 2013)*:

- **Goals** are general guidelines that explain what the community wants to achieve with the plan. They are usually broad policy-type statements that are long-term, and they represent visions for reducing or avoiding losses from the identified hazards.
- **Objectives** (optional) are broader than specific actions, but are measurable, unlike goals. Objectives connect goals with the actual mitigation actions.
- **Mitigation Actions** are specific projects and activities that help achieve the goals.

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

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

**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 2018-2023 Colorado Hazard Mitigation Plan, 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. After reviewing these materials and the updated risk assessment, the HMPC determined that the goals and objectives from the previous HMP are still valid and retained them without change.

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

### 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

*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 following mitigation action categories during the planning process, as defined by the CRS:

- **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.

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)?

**4.4 Mitigation Action Plan**

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.

**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.

The 2013 plan included over 80 mitigation actions proposed by participating jurisdictions, 33 of which have now been removed from the 2020 update due to either being completed since the last plan update or being deleted for other reasons. Table 4-1 below summarizes the deleted actions. The majority of these deleted actions were deleted because they were deemed to be redundant actions, were overlapping with actions handled by a different jurisdiction or entity, or their data was insufficient or duplicating data.

**Table 4-1 Deleted Mitigation Actions from 2013 Plan**

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	Deleted – redundant with Fire Protection Districts' action items.
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	Deleted – can pull data from CDPHE.
2015-5	Plan and execute hazmat exercises, including private stakeholders identified in the surveys from the 2008 HMP.	High	OEM; LEPC	Hazmat	1	Deleted – Under the county's Fire Protection District's training/exercise committee.
2015-17	Organize local	Low	Road & Bridge	Landslide	1, 2, 3,	Deleted per R&B as they

Action ID	Action	Priority	Lead Agency/Dept.	Hazards Addressed	Goals Addressed	Status and Comments
	landslide committees with regular meetings to prioritize needs, make recommendations , etc.		& CDOT		4	are aware of landslide areas.
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	Deleted – redundant to other hazardous fuels action items. Partners have identified areas.
2015-19	Wildlife mitigation on Highway 9.	Medium	County and Kremmling	Wildlife	1	Deleted – Town of Kremmling has duplicate action item.
<b>Grand County</b>						
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	Deleted per Road & Bridge. Have ID'd roads and landslide areas.
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.

There have been 25 mitigation actions that were identified in the 2013 plan which have since been successfully completed. These actions are summarized below in Table 4-2.

**Table 4-2 Completed Mitigation Actions from 2013 Plan**

Action ID	Action	Priority	Lead Agency/Dept.	Hazards Addressed	Goals Addressed	Status and Comments
<b>Multi-Jurisdictional</b>						
2015-4	Conduct commodity flow studies of main highways and railroads throughout the County.	High	OEM; LEPC	Hazmat	1	After completing, data was deemed invaluable.
2015-10	Implement warning and alert systems with specific coverage of the hazard areas.	High	OEM / SO/ CDOT	Multi-Hazard	1	Complete – Systems set up in Byers Canyon; also avalanche warnings and closure systems in Berthoud Pass. CAIC issues avalanche forecasts.
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	Completed with 2015-15.
2015-15	Distribute results of the petroleum assessments to all relevant stakeholders & FPDs.	Medium	LEPC Hazmat committee	Hazmat	1	Completed.
2015-16	Coordinate countywide hazmat response resources.	Medium	LEPC	Hazmat	1	Completed.
<b>Grand County</b>						
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	Completed as of last Plan update.
2015-13	Develop, implement, and promote	Medium	County Planning	Wildfire	1, 2	Completed as of last Plan update.

Action ID	Action	Priority	Lead Agency/Dept.	Hazards Addressed	Goals Addressed	Status and Comments
	subdivision wildfire protection protocols.					
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	Completed as of last Plan update.
2015-18	Implement "overlay zoning" provisions to minimize development in high risk areas.*	Medium	County Planning	Multi-Hazard	1, 2	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	Completed as of last Plan update.
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	Completed - NOAA weather coverage completed 2013-2015. Transmitter installed and functioning in N. Cottonwood.
<b>Town of Fraser</b>						
2015-1	Fraser/St. Louis Creek bank stabilization to keep waters within banks during high water events.	High	Town of Fraser	Flood	1, 2	Completed.
<b>Town of Hot Sulphur Springs</b>						
2015-2	Repair Town fire hydrants.	Medium/High	Dana Kepner Company	Wildfire	1, 2	Completed the project.
2015-3	Sewer collection system maintenance	High	Anderson Services	Disease outbreak, flooding	1, 2	Completed the project.
<b>Fire Protection Districts</b>						
2015-2	Identify high-risk critical structures within the WUI;	High	FPDs, OEM	Wildfire	1, 2, 3	Completed in CWPPS.

## Mitigation Strategy

Action ID	Action	Priority	Lead Agency/Dept.	Hazards Addressed	Goals Addressed	Status and Comments
	develop fire protection strategies appropriate for those structures.					
2015-3	Acquire 4-wheel drive pumper trucks.	Medium	FPDs & GC Fire Chief Association	Wildfire	1, 2	Completed – (7) type-1 tactical tenders, (9) type-6, (5) type-4, (5) type-3 in the County.
<b>Northern Water</b>						
2015-2	Upper Colorado and Colorado-Big Thompson Watershed Analyses	High	Northern Water	Multi-Hazard	2	Completed-updated post-fire sediment reports in 2016.
2015-3	Colorado-Big Thompson Headwaters Partnership Post-Wildfire Planning	High	Northern Water	Multi-Hazard	2	Report completed.
2015-4	Willow Creek Timber Sale	High	Northern Water	Multi-Hazard	2	Completed-all timber sold.
2015-5	Colorado Department of Natural Resources Wildfire Risk Reduction Grant	High	Northern Water	Multi-Hazard	2	Completed - funds handed out.
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>Denver Water</b>						
2015-1	Update drought management plan	High	Denver Water	Drought	3	Completed-reviewed annually.
2015-2	Develop IGA with Grand County	Low	Denver Water	Multi-Hazard	1	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	Completed- Annual AOPs are reviewed and updated. Denver Water is included in these plans.
2015-5	GIS Mapping Coordination Project	Low	Denver Water	Dam failure	1	Completed- Flood inundation maps were updated.

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

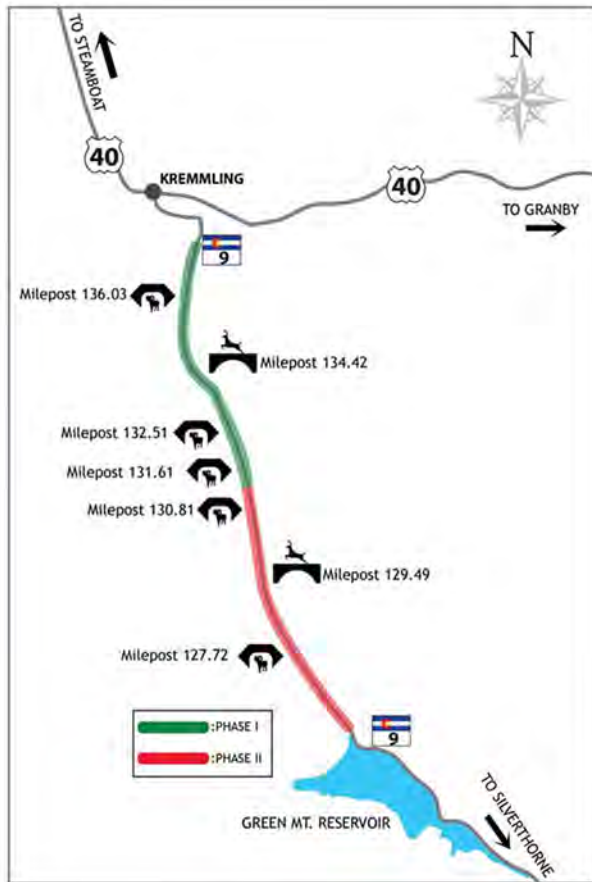
Bielenberg Pond, at Elk Park. The HOA also implemented fuels reduction projects, created fuel breaks on properties, and added reflective, fireproof addressing.

- 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.

The following success story was shared by the HMPC related to the mitigation of wildlife vehicle collisions:

According to Colorado Parks and Wildlife, 1,597 wildlife-vehicle collisions (WVC) 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 WVCs.



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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#### 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 and Hot Sulphur Springs have considered the costs and benefits of participation in the NFIP over the years, but both do not participate and are sanctioned communities. During the 2020 plan update the County added a mitigation action to revisit possible participation in the NFIP, which means residents do not have access to NFIP-based flood insurance. The County has been proactive in its land use and development policies that have limited placement of structures in flood prone areas. Hot Sulphur Springs does not consider the flood hazard to be significant enough to warrant participation and has historically followed the County's lead regarding NFIP participation, but may reconsider this in the future.

#### 4.4.3 Updated Mitigation Action Plan

The new and continuing mitigation actions developed by the HMPC are summarized in Table 4-3. 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 4-3 for multi-jurisdictional actions.

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 4-3 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 4-3 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.

Specific to new identified actions during the 2020 plan update process, upon review the jurisdictions noted that several actions from the previous plan that had not been completed were still relevant and still

addressed the priority hazards. The general consensus of the planning team was to prioritize completing these existing actions as opposed to adding a number of new ones. Each jurisdiction has, at a minimum, identified at least one new mitigation action in 2020.

**Table 4-3 Mitigation Action Matrix**

Action ID	Action	Priority	Lead Agency/ Dept.	Hazards Addressed	Goals Addressed	Status and Comments
<b>Multi-Jurisdictional</b>						
2015-2	Adopt the proposed countywide wildfire regulations.*	High	County Planning, participating jurisdictions	Wildfire	1, 2, 3	In progress - in subdivisions. 2008 burn ban ordinance adopted in County and municipalities
2015-6	Create a countywide hazmat response plan.	High	LEPC	Hazmat	1	In progress through LEPC Hazmat committee
2015-7	Conduct hazmat training to bring all responders to awareness (at minimum) level.	High	LEPC	Hazmat	1	In progress – 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	Annual Implementation
2015-9	Rock fall mitigation Hwy 40, Byers Canyon, MP 200	High	CDOT, County Road and Bridge	Rock fall	1	In progress. – need to identify & upgrade alternate routes.
2015-11	Adoption of International Fire Code.*	Medium	County Planning and FPDs	Wildfire	1, 2	In Progress. 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	In Progress.

Action ID	Action	Priority	Lead Agency/ Dept.	Hazards Addressed	Goals Addressed	Status and Comments
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	In Progress. - complete in Grand Lake Fire PD. RMNP has ID'd & certified bridges. Work needs to be done in other parts of the County.
2020-1	Sheep Mountain Fuel Break and Sanitation	High	Grand County in partnership with efforts lead by BLM	Wildfire, Insect Disease	2	New-2020. Create 200' fuel break on land adjacent to private property to reduce future fuel load and keep the public safe.
2020-2	10-Mile Hand Thinning & Piling.	Low	Grand County in partnership with efforts lead by BLM	Wildfire, Insect Disease	1	New-2020. Proposed treatment will be to chainsaws to buck, cut, pile the trees.
<b>Grand County</b>						
2015-1	Have County staff certified by the National Wildfire Coordinating Group	High	Sheriff's Office and County Road and Bridge	Wildfire	1, 2	In progress. 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.
2015-4	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	In progress. Mapping and GIS based analysis improved in 2013 and 2020 updates including DFIRM flood hazards and landslide data; Additional landslide data incorporated from CGS.
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	In progress with annual monitoring

Action ID	Action	Priority	Lead Agency/ Dept.	Hazards Addressed	Goals Addressed	Status and Comments
2015-6	Ensure emergency responders and other County staff receives appropriate training in disease outbreak issues.	High	GC Public Health	Disease Outbreak	1	In progress with annual implementation
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	In progress.
2015-8	Update mutual aid agreements, especially with other northwest region counties.	High	GC Public Health	Disease Outbreak	1, 4	Ongoing
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 with annual implementation
2015-11	Fix addressing countywide.	High	Grand County GIS	Multi-Hazard	1, 2, 3	Continue – Not Completed
2015-12	Evacuation plans for public and privately-maintained PA roads.	High	OEM and Road and Bridge	Multi-Hazard	1	Continue – Not Completed
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	In progress. Priority changed from Medium to High during 2020 and COVID 19 pandemic.
2015-15	Assign to one County official the duty of monitoring the availability of funds from all sources for the	High	GC Public Health	Disease Outbreak	1, 4	In progress. Priority changed from Medium to High during 2020 and COVID 19 pandemic.

Action ID	Action	Priority	Lead Agency/ Dept.	Hazards Addressed	Goals Addressed	Status and Comments
	purpose of planning, prevention, and purchasing needed supplies or equipment.					
2015-17	Establish Storm Ready programs, adapted for winter storms, within the County.	Medium	OEM, Road & bridge	Multi-Hazard	1, 2	In progress. Process begun to NWS certification, relates to outreach programs, shelters
2015-20	Review and implement or update as necessary building and grading codes in the hazard areas.*	Medium	County Planning	Multi-Hazard	1, 2	In progress. 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	In progress. Done as necessary.
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	Continue – not completed. Deferred in 2015 and 2020 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	In progress with COVID 19 vaccinations in late 2020. 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	Continue – not completed. 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	In progress - Responders have mobile GIS capabilities; County GIS can provide on request, information also available online Sidwell GIS enhancements in works
2015-27	Develop Sheltering Plan	Low	OEM	Multi-Hazard	1	In progress. Outreach to public done through Code Red & social media. Red Cross will use

Action ID	Action	Priority	Lead Agency/ Dept.	Hazards Addressed	Goals Addressed	Status and Comments
						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	Annual implementation. 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	In progress. Major repaving in 2020.
2020-1	River Gauge Warning Project from East Troublesome Fire (ETF)	High	OEM, Town of Grand Lake, USGS, NWS Boulder	Flood, Landslide, Mudflow/ Debris Flow	1,2,4	New in 2020.
2020-2	Landslide Mapping and Risk Evaluation Project*	High	OEM, USGS, CGS, CDOT	Landslide, Mudflow/ Debris Flow	1,2,3	New in 2020. Based on revised action in 2015 plan.
2020-3	National Flood Insurance Program Evaluation Project*	High	OEM, Community Development Managers Office	Flood	1,2,3,4	New in 2020.
<b>Town of Fraser</b>						
2015-2	Forest mitigation. Rendezvous and Grand Park have completed extensive hazard tree removal.	High	Private	Wildfire, mountain pine beetle, windstorm	1, 2	Ongoing
2020-1	Well Field Generator Connections	Medium	Public Works/Town of Fraser	Flood, Wildfire, Lightning, Severe Winter Weather, Wildfire	3,4	New in 2020.
<b>Town of Granby</b>						
2015-1	Water Supply Protection for Fraser River and Val	High	Town of Granby	Wildfire, hazmat	1, 2	In progress. Granby added: 'advertise the importance of source water protection.'

Action ID	Action	Priority	Lead Agency/ Dept.	Hazards Addressed	Goals Addressed	Status and Comments
	Moritz Wells.					
2020-1	Emergency Operations Plan Update	Medium	Police Department	Multi-hazard	1, 2	New in 2020
2020-2	Develop a Source Water Protection Plan.	Medium	Denver Water, Northern Water, other county water providers	Dam/Levee Failure, Flood, Landslide-Debris Flows-Rockfall, Drought	1, 2	New in 2020
<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	In progress.
2020-1	Debris Flow Mitigation from East Troublesome Fire	High	Grand Lake Public Works	Flood, Debris flow	1,2	New in 2020
<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	In progress– continual fuel loads mitigated each year.
2015-4	Street Repairs	High	Public Works, Acord Asphalt, Inc.	Severe Winter Storm	1, 2	In progress– still updating the streets.
2020-1	Power Outage Resiliency	High	Public Works	Winter storm, lightning, wildfire, landslide	1	New in 2020
2020-2	Implementation of wells for alternate source of raw water supply	High	Public Works	Flood, debris flow, drought	2	New in 2020
<b>Town of Kremmling</b>						
2015-1	Wildlife mitigation on Highway 9	Medium	County and Kremmling	Wildlife	1	In progress. In 2016, CDOT in cooperation with Colorado Parks and Wildlife and other partners,

Action ID	Action	Priority	Lead Agency/ Dept.	Hazards Addressed	Goals Addressed	Status and Comments
						completed Colorado's first-of-its-kind wildlife overpass system, on Highway 9 between Green Mtn Reservoir and Kremmling.
2015-2	Improve safety at pedestrian crosswalks in Kremmling.	High	County and Kremmling	Multi-hazard, winter weather	1	Continue- not completed
2015-3	Pave roads and install drainage pans to protect houses	Medium	Kremmling	Flood	2	Continue- not completed
2020-1	Dam Failure Evacuation and Communication Plan	Medium	Kremmling	Dam Failure	1	New in 2020
<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	In progress. Associated actions have been incorporated in the CWPPs, HOAs are applying for grants.
2020-1	Develop a Stormwater Master Plan*	Medium	Winter Park Public Works Dept	Flood, Landslide, Debris Flow, Mudflow, Rockfall	1, 2, 3, 4	New in 2020
<b>Fire Protection Districts</b>						
2015-1	Develop and implement a voluntary wildfire protection program for residents within wildfire/urban interface.	High	FPDs, Towns	Wildfire	1, 2	In Progress – wildfire council formed in 2015

Action ID	Action	Priority	Lead Agency/ Dept.	Hazards Addressed	Goals Addressed	Status and Comments
2020-1	Alternate Route Improvement	High	FPDs	Landslide/ Rockfall	1	New in 2020. Improve bypass traffic-ways during closures from accidents or rock fall.
2020-2	Wildfire Protection Lines Improvement (Fuel Breaks)	High	East Grand Fire	Wildfire	1, 2, 3, 4	New in 2020 – 5 year completion timeline and ongoing maintenance.
2020-3	Alternative/Emergency Access Identification and Improvement	High	Grand County/ FPDs	Wildfire, Wildlife-Vehicle Collisions, Windstorm, Dam/Levee Failure, Earthquake, Flood, Hazardous Materials, Landslide	1, 2, 3, 4	New in 2020 – 5 Year completion timeline. Action to identify and mitigate problem access routes in county.
2020-4	Capital Replacement Vehicles	High	East Grand Fire District	Drought, Lightning, Wildfire	1, 2, 3, 4	New in 2020 – Action to upgrade and replace wildfire engines. Ongoing.
2020-5	Adopt Wildland-Urban Interface Codes	Medium	Grand FPD	Wildfire	1, 2, 3, 4	New in 2020 – Adopt during next code cycle

Action ID	Action	Priority	Lead Agency/ Dept.	Hazards Addressed	Goals Addressed	Status and Comments
2020-6	Evacuation Planning	High	Grand FPD, County OEM	Dam/Levee Failure, Flood, Hazardous Materials, Landslide, Wildfire	1	New in 2020 – Timeline for completion: 2021
2020-7	Grand Lake Fire Protection District CWPP Implementation Support and Outreach	High	Grand Lake FPD	Wildfire	1,2	New in 2020
2020-8	Post East Troublesome Fire Mitigation and Fuels Reduction	High	Grand Lake FPD	Landslide, Lightning, Wildfire, Windstorm	1, 2	New in 2020 – 2 years until completion.
2020-9	Update Community Wildfire Protection Plan	High	Hot Sulphur Springs/Pars hall Fire Protection District	Wildfire	1,2,3	New in 2020
2020-10	Implementation of voluntary wildfire protection programs	High	Kremmling Fire Protection District	Wildfire	1, 2	Ongoing project
<b>Northern Water</b>						
2015-1	Colorado-Big Thompson Headwaters Partnership for	High	Northern Water	Multi-Hazard	2	In progress – MOU revised in 2017; 5-yr plan update in progress; quarterly meetings occurring between partners. Still considered to

Action ID	Action	Priority	Lead Agency/ Dept.	Hazards Addressed	Goals Addressed	Status and Comments
	watershed protection					be a significant action in 2020, which was expanded upon during the plan update process. Estimated completion Sept. 30, 2021.
2020-1	Colorado-Big Thompson Headwaters Partnership for Watershed Protection Hazardous Fuels Reduction	High	Northern Water	Multi-Hazard	2	New in 2020
<b>Denver Water</b>						
2015-4	Public Outreach in Grand County	Low	Denver Water	Dam failure, drought	1	In progress.
2020-1	Proactive Right-of-Way (ROW) Wildfire Mitigation	Low	Denver Water	Wildfire	1	New in 2020.
2020-2	Proactive Forest Management for hazardous fuels reduction	High	Denver Water	Wildfire	2	New in 2020. Estimated completion in 2023
2020-3	Williams Fork Fire Recovery and Debris Flow Mitigation	Medium	Denver Water	Landslide, Mudflow/ Debris Flow	2, 3	New in 2020

\*Action addresses reducing losses to future development

**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>	In progress. in subdivisions. 2008 burn ban ordinance adopted in County and municipalities.

**Mitigation Action: Multi-Jurisdictional 2015-6 Countywide Hazmat Plan**

<b>Jurisdiction:</b>	Multi-Jurisdictional
<b>Hazard Addressed</b>	Hazardous Materials
<b>Project Description, Issue &amp; Background</b>	Creating and maintaining a current hazmat plan is essential for effective response and mitigation of an incident.
<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>	Staff time
<b>Benefits: (Losses Avoided)</b>	Protect life safety, property, and critical facilities from hazmat incidents; identify strengths and gaps in hazmat response and recovery capabilities
<b>Potential Funding:</b>	County funds
<b>Timeline:</b>	2025
<b>Status:</b>	In progress through LEPC Hazmat committee

**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>	Annual implementation
<b>Status:</b>	In progress – revolving door with FPDs, long-term plan is to include road & bridge. Less than 50% of first responders are at Operations level.

**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>	In progress

**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>	In progress – need to identify & upgrade alternate routes.

**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>	In progress. 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.

**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>	In progress.

**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>	2025

**Status:** In Progress. 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.

### **Mitigation Action: 2020-1 Sheep Mountain Fuel Break and Sanitation**

**Jurisdiction:** BLM KFO

**Hazard Addressed** Wildfire, Insect Disease

**Project Description, Issue & Background** 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.

**Lead Agency and Title of Lead Person** BLM-Kremmling Field Office

**Priority:** High

**Cost Estimate:** Unknown at this time

**Benefits:** Fuel load reduction and removal of diseased trees.

**Potential Funding:** Unknown at this time.

**Timeline:** 3 plus years

**Status:** New in 2020.

**Mitigation Action: 2020-2 10-Mile Hand Thinning and Piling**

<b>Jurisdiction:</b>	BLM KFO
<b>Hazard Addressed</b>	Wildfire, Insect Disease
<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.

# 5 PLAN IMPLEMENTATION AND MAINTENANCE

*44 CFR Requirement 201.6(c)(4): The plan maintenance process shall include a section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five- year cycle.*

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 2020 update.

## 5.1 Implementation

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.

## 5.2 Monitoring, Evaluating, and Updating the Plan

### 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.

### **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 Division of Homeland Security and 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 2023. The County will inquire with DHSEM and FEMA for funds to assist with the update in 2022 as most applicable grants have multiple years to expend the funds. Funding sources may include the Building Resilient Infrastructure and Communities (BRIC) and the Hazard Mitigation Grant Program (HMGP; if a presidential disaster Fire Management Assistance Grant (FMAG) has been declared). The next plan update is anticipated to be completed and reapproved by DHSEM and FEMA Region VIII by December 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 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

*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
- Local CWPPs
- Comprehensive or master plans of participating jurisdictions
- 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 mechanisms, and to improve integration with the Community Wildfire Protection Plan and the multi-hazard mitigation plan. Many of the proposed mitigation actions will build off of this plan to link to new planning or regulatory mechanisms. Mitigation action 2015-2 (Adopt Wildfire Regulations) will adopt and implement the International Wildland-Urban Interface Code and certain special building construction regulations regarding fire hazard severity reduction. Mitigation Action 2015-11 (Adoption of International Fire Code) will explore adopting the International Fire Code countywide, improving the county's efforts for life safety and mitigation of fire damage

to buildings. Another example is Mitigation Action 2015-6 (Countywide Hazmat Plan), an ongoing action which the county has given a high priority.

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**

*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**

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**

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**

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.1. Other countywide vulnerability information is covered in Section 3.3 Vulnerability Assessment in the main plan.

**Table A.1. 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

Facility Type	Name	Address	City
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.2 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.2. Grand County—Planning and 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	Updated in 2018

Regulatory Tool (Ordinances, Codes, Plans)	Yes/No	Comments
Building Code Effectiveness Grading Schedule (BCEGS) Rating	Yes	Verified in 2017 with a BCEGS rating of 9 for residential and 9 for commercial
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	
Community Wildfire Protection Plan (CWPP) and year	Yes	Grand County CWPP 2006
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.
- **1.5 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.
- **1.6 Emergency Management**
  - 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 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 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 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 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

- 
- **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;

## **Grand County Subdivision Regulations**

- **Article II Design Standards, Section 2.1 Special site considerations:**
  - 1) Steep, unstable, or swampy land, and land subject to inadequate drainage, avalanche or rockslides, 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 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 ensure 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 crossroad 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 interval flood to minimize health and life hazards, damage to structures, and interruption 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 crossroad 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

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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 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 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 be 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 and Technical Mitigation Capabilities

Table A.3 identifies the personnel responsible for activities related to mitigation and loss prevention in Grand County.

**Table A.3. 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	Yes		
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
<b>Other personnel</b>		
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	
Resiliency Planner	No	No dedicated individual but Community Development Dept. can build resiliency into all of our activities over time.
Transportation Planner	No	Consultant that helps with traffic engineering and analysis of traffic impact studies.
Other		

## Fiscal Mitigation Capabilities

Table A.4 identifies financial tools or resources that Grand County could potentially use to help fund mitigation activities, and which have been used in the past to fund 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.4. Grand County—Fiscal Mitigation Capabilities**

Financial Resources	Accessible/Eligible to Use (Yes/No)	Has it been used to fund mitigation in the past?
Community Development Block Grants	Y	N
Capital Improvements Project Funding	Y	N
Authority to Levy Taxes for Specific Purposes	Y	N
Fees for Water, Sewer, Gas, or Electric Services	Y	N
Impact Fees for New Development	Y -Emergency Service Impact Fee	N
Incur Debt through General Obligation Bonds	Y	N
Incur Debt through Special Tax Bonds	Y	N
Incur Debt through Private Activities	Y	N
Withhold Spending in Hazard Prone Areas	Y	N

## Mitigation Outreach and Partnerships

**Table A.5 Mitigation Education and Outreach Capabilities**

Education & Outreach Capabilities	Yes/No	Comments
Local Citizen Groups That Communicate Hazard Risks	Yes	Grand County Wildfire Council
Firewise	Yes	<ul style="list-style-type: none"> <li>Fairways at Pole Creek HOA, Tabernash</li> <li>Pole Creek Meadows, Tabernash</li> <li>The Valley at Winter Park, Tabernash</li> <li>The Reserve at Elkhorn Ridge</li> </ul>
StormReady	No	
Other	Yes	

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.
- Grand County in partnership with the incorporated jurisdictions develops an annual High Water Awareness Brochure for residents, business owners and visitors to the County.

## 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 warnings and closure systems along Berthoud Pass and does avalanche control in winter. CAIC also issues avalanche forecasts.
- The County and the fire protection district 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.

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- 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.

## **Opportunities for Enhancement**

The 2020 update provided the County an opportunity to review and update the capabilities currently in place to mitigate hazards. This also provided an opportunity to identify where capabilities could be improved or enhanced. Specific opportunities could include:

- Join the National Flood Insurance Program; refer to mitigation action 2020-3 National Flood Insurance Program Evaluation Project.
- Providing training for County staff members related to hazards or hazard mitigation grant funding in partnership with the County and DHSEM.
- Integrate risk assessment information into future updates to the County's Comprehensive Plan and Community Wildfire Protection Plan.
- Improve the County Building Code Effectiveness Grading System rating, which is currently at an entry level.

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## **A.5 Goals and Objectives**

Grand County adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 4 Mitigation Strategy.

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## **A.6 Mitigation Actions**

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>	In progress.. Completed for road & bridge. (1) Sheriff's Deputy is now trained as a wildland firefighter. 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>	2025
<b>Status:</b>	In progress. Mapping and GIS based analysis improved in 2013 update including DFIRM flood hazards and landslide data; Additional landslide data being prepared by CGS. A revised statewide GIS layer from the CGS was utilized for analysis during the 2020 update, but more refined mapping is needed.

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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 with annual monitoring
<b>Status:</b>	In progress. All populations could be vulnerable. Vulnerable populations will vary based on the specific disease. For example, with the 2020 COVID 19 outbreak senior populations and those with underlying health conditions were most

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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 with annual implementation
<b>Status:</b>	In progress.

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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>	2021
<b>Status:</b>	In progress.

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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 with annual implementation
<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>	Wildfire, Severe Winter Weather, Hazardous Materials
<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>	2025
<b>Status:</b>	Continue – Not Completed

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## Mitigation Action: Grand County 2015-12 Evacuation Plans

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Wildfire, Severe Winter Weather, Flood, Hazardous Materials
<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>	2026
<b>Status:</b>	Continue – Not Completed

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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>	Annual implementation
<b>Status:</b>	In progress. Priority changed from Medium to High during 2020 and COVID 19 pandemic.

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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>	Annual implementation
<b>Status:</b>	In progress. Priority changed from Medium to High during 2020 and COVID 19 pandemic.

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## Mitigation Action: Grand County 2015-17 Establish Storm Ready Programs

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Avalanche, flood, lightning, severe winter weather, wildfire, windstorm
<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>	2025
<b>Status:</b>	In progress. Process begun to NWS certification; relates to outreach programs, shelters

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## Mitigation Action: Grand County 2015-20 Review/Update Building Codes in Hazard Areas

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Earthquake, Flood, Landslide, Lightning, Severe Winter Weather, Wildfire, Windstorm
<b>Project Description, Issue &amp; Background</b>	Review and implement or update as necessary building and grading codes in the hazard areas.
<b>Lead Agency and Title of Lead Person</b>	Grand County Planning
<b>Partners:</b>	Grand County Building
<b>Priority:</b>	Medium
<b>Cost Estimate:</b>	Staff time
<b>Benefits: (Losses Avoided)</b>	Protect life safety and property from hazard areas; reduce potential damage to buildings by adhering to updated building codes
<b>Potential Funding:</b>	Staff time
<b>Timeline:</b>	2025
<b>Status:</b>	In progress. Building code was updated in 2018, but this action should be revisited when new editions of the international building code become available.

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## Mitigation Action: Grand County 2015-21 Review/Implement Land Use Regulations

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Flood, Landslide, Wildfire
<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>	Annual implementation
<b>Status:</b>	In progress. Done as necessary.

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**Mitigation Action: Grand County 2015-22 Develop public awareness programs to notify stakeholders in hazard areas of policies and regulations in the areas.**

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Wildfire, landslide
<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>	2025
<b>Status:</b>	Continue – not completed. Deferred in 2015 and 2020 due to other priorities. Priority changed from high to medium in last update.

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## 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>	2021
<b>Status:</b>	In progress with COVID 19 vaccinations in late 2020. Dependent on disease and vulnerable populations affected

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## Mitigation Action: Grand County 2015-24 Compliance to Land Use Standards (H.B. 1041)

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Avalanche, flood, landslide/debris flow/rockfall
<b>Project Description, Issue &amp; Background Lead Agency and Title of Lead Person</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. 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>	2025
<b>Status:</b>	Continue – not completed. 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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## Mitigation Action: Grand County 2015-25 Incorporate GIS into Emergency Response Procedures

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Wildfire, Severe Winter Weather, Hazardous Materials
<b>Project Description, Issue &amp; Background</b>	Incorporate GIS layer for land-ownership parcels into emergency response procedures.
<b>Lead Agency and Title of Lead Person</b>	Grand County OEM
<b>Partners:</b>	Grand County Planning, County GIS
<b>Priority:</b>	Low
<b>Cost Estimate:</b>	Staff time
<b>Benefits: (Losses Avoided)</b>	Improve emergency response capabilities
<b>Potential Funding:</b>	Staff time
<b>Timeline:</b>	2025
<b>Status:</b>	In progress - Responders have mobile GIS capabilities; County GIS can provide on request, information also available online. Sidwell GIS enhancements in works 2020.

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## Mitigation Action: Grand County 2015-27 Develop Sheltering Plan

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Flood, Wildfire, Severe Winter Weather, Hazardous Materials
<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>	2025
<b>Status:</b>	In progress. 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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## Mitigation Action: Grand County 2015-28 Public Outreach on Emergency Information

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Flood, Wildfire, Severe Winter Weather, Hazardous Materials, Disease Outbreak
<b>Project Description, Issue &amp; Background</b>	Public information/outreach where the public can find information during an emergency event. OEM currently uses Facebook, Twitter, and Nextdoor to reach the public. The County uses gcemergency.com to link to a County webpage during an emergency. OEM also utilizes Grand County Recovers during a disaster, 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>	2025
<b>Status:</b>	Annual implementation. OEM currently uses Facebook, Twitter, & Nextdoor. Also, Grand County Recovers, where the public can get updated info, volunteer or donate.

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## 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>	2025
<b>Status:</b>	In progress. Major repaving in 2020.

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## Mitigation Action: Grand County 2020-1 River Gauge Warning Project from East Troublesome Fire (ETF)

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Flood, Landslide/Mudflow/Debris Flow
<b>Project Description, Issue &amp; Background</b>	<p>Grand County was impacted by the East Troublesome Creek Fire in October and November 2020 with over 193,812 acres burned by wildfire. While the primary land ownership burned was the United States Forest Service and National Park Service, within this land acreage was over 17,000 acres of private property agricultural and forested land. The fire affected four watersheds with burn severity ranging from 29% to over 90% in two of the four watersheds.</p> <p>Grand County and the Town of Grand Lake have identified residential properties that could be impacted by river flooding, debris flow and landslide. Emergency Warning to these areas will be impacted by the degree of monitoring available on primary and secondary rivers and streams. These impacts could result in public health and safety issues with the need for evacuation and isolation of areas.</p> <p>With this action, Grand County will be working with the USGS and NWS to update, enhance, and improve as necessary the river gauging stations. We will further work to have a sufficient number of forecasting and warning points to properly warn the public of any threats to life and safety.</p>
<b>Lead Department/Agency and Support Agencies/Partners</b>	Grand County OEM, Town of Grand Lake, USGS, NWS Boulder
<b>Priority:</b>	High
<b>Cost Estimate:</b>	\$100k-\$500k with specifics to be determined
<b>Benefits: (Losses Avoided)</b>	Reduce risk to the public, ensure sustained and resilient operation of river forecast and warning points
<b>Potential Funding:</b>	Federal Grants, Local Government Funds
<b>Timeline:</b>	2021
<b>Status:</b>	New in 2020.

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## Mitigation Action: Grand County 2020-02 Landslide Mapping and Risk Evaluation Project

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Landslide, Mudflow/Debris Flow
<b>Project Description, Issue &amp; Background</b>	<p>Grand County identified in prior action project #24 in the 2015 plan in regard to the Landslide hazard. We intend to re-activate this action item and work towards the stated outcomes.</p> <p>The project description: Conduct a planning session with the CGS, CDOT, and DNR to identify and prioritize landslide mitigation techniques relevant to the planning area. Review high and medium risk landslide hazard areas for evaluation and prioritization for mitigation systems.</p> <p>Grand County was impacted by the East Troublesome Creek Fire in October and November 2020 with over 193,812 acres burned by wildfire. While the primary land ownership burned was the United States Forest Service and National Park Service, within this land acreage was over 17,000 acres of private property agricultural and forested land. The fire affected four watersheds with burn severity ranging from 29% to over 90% in two of the four watersheds.</p> <p>Grand County as a result of the fire, soil disturbance and loss of vegetation that landslide hazards should be evaluated.</p>
<b>Lead Department/Agency and Support Agencies/Partners</b>	Grand County OEM, USGS, CGS, CDOT
<b>Priority:</b>	High
<b>Cost Estimate:</b>	\$100k-\$500k with specifics to be determined
<b>Benefits: (Losses Avoided)</b>	Reduce risk to the public from landslide.
<b>Potential Funding:</b>	Federal Grants, Local Government Funds
<b>Timeline:</b>	2021
<b>Status:</b>	New in 2020.

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## Mitigation Action: Grand County 2020-03 National Flood Insurance Program Evaluation Project

<b>Jurisdiction:</b>	Grand County
<b>Hazard Addressed</b>	Flood
<b>Project Description, Issue &amp; Background</b>	Grand County does not participate in the National Flood Insurance Program (NFIP). Grand County will convene the planning team and subject matter experts as necessary for evaluation, analysis, and discussion about the program benefits and challenges to adoption and implementation of the NFIP.
<b>Lead Department/Agency and Support Agencies/Partners</b>	Grand County OEM, Community Development, Managers Office, Colorado Water Conservation Board
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Staff time
<b>Benefits: (Losses Avoided)</b>	Provide insurance options for downstream property owners to protect themselves from loss from Flood.
<b>Potential Funding:</b>	State Grants, Local Government Funds
<b>Timeline:</b>	2021
<b>Status:</b>	New in 2020.

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# ANNEX B: TOWN OF FRASER

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## B.1 Community Profile

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### 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. 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.

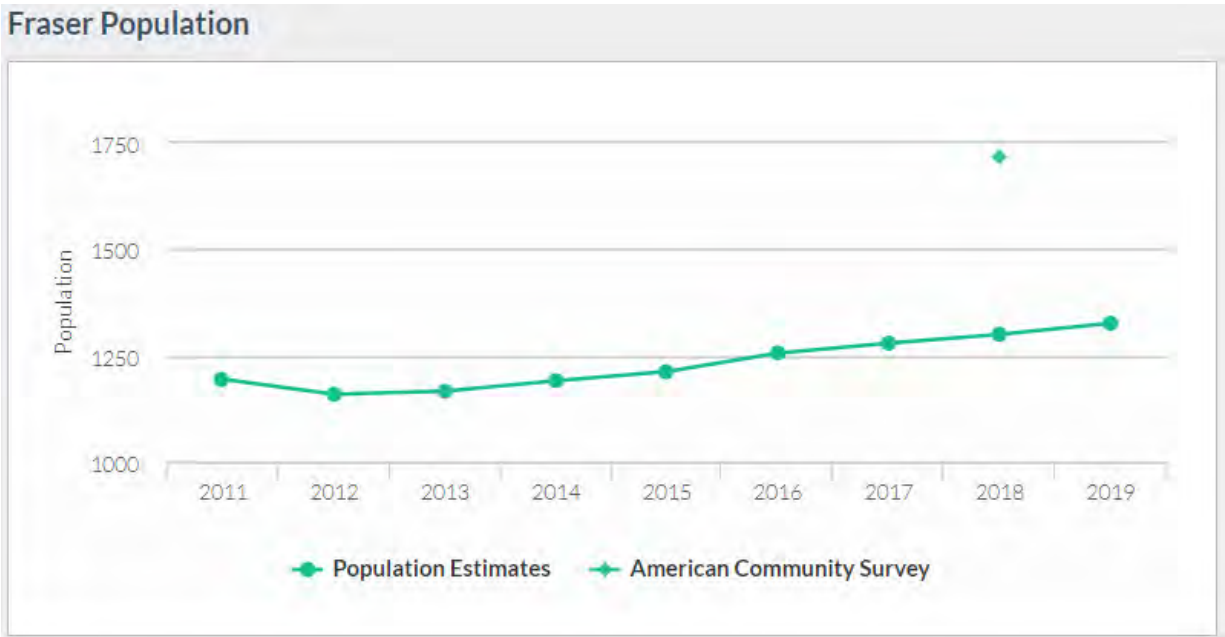
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**Figure B.1. Map of Fraser**



## Fraser Demographic and Social Characteristics

With 1,335 people, Fraser is the 135th most populated city in the state of Colorado out of 272 municipalities. 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 (71.4%) followed by Hispanic (19.3%) and Black (6.2%). In 2019, the median household income of Fraser residents was \$56,083.



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."

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 American Community Survey 2019 estimates, the industries that employed the highest percentage of Fraser’s labor force were arts, entertainment, recreation, accommodation, and food services (35.9%); construction (17.5%); finance, insurance, real estate, and rental and leasing (10.212.1%); retail trade (10.6%) and other services except public administration (5.7%).

## 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.1). In the context of the countywide planning area, there are no hazards that are unique to Fraser.

**Table B.1. 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
Insect Disease 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	Neqligible	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 property tax revenue listed as \$335,040.

Table B.2 shows the total number of improved parcels, properties, and their improvement and content values for the Town of Fraser. Refer to Section 3 Risk Assessment for the methodology used to conduct the parcel analysis.

**Table B.2 Fraser Improved Parcel and Property Exposure**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
Agricultural	6	\$810,920	\$810,920	\$1,621,840
Commercial Improved	44	\$24,793,480	\$24,793,480	\$49,586,960
Mixed Use	1	\$364,010	\$364,010	\$728,020
Multi-Residential Improved	43	\$14,942,000	\$7,471,000	\$22,413,000
Residential Improved	1,251	\$545,523,700	\$272,761,850	\$818,285,550
Tax Exempt	22	\$14,257,040	\$14,257,040	\$28,514,080
Vacant Land	1	\$232,050	\$0	\$232,050
<b>Total</b>	<b>1,368</b>	<b>\$600,923,200</b>	<b>\$320,458,300</b>	<b>\$921,381,500</b>

Source: Grand County Assessor’s Data, November 2020

Table B.3 lists critical facilities and other community assets identified by Fraser’s planning team as extremely important to protect in the event of a disaster. The Fraser Experimental Forest, established in 1937 and a portion of Arapahoe National Forest, is an important asset. It is not listed in the table below because it resides on the outskirts of the Town of Fraser and is USDA-USFS facilities and land.

**Table B.3. Fraser—Critical Facilities and Other Community Assets**

Name of Asset	Type*	Replacement Value (\$)	Hazard Specific Info/Comments
East Grand Fire PD	EF	10,000,000	Fire
Fraser Domestic Water System	EF	10,000,000	Fire/ Flood
Upper Fraser Valley Wastewater treatment facility	EF	15,000,000	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		
Fraser Public Works	EF	1,000,000	Fire

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, 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***

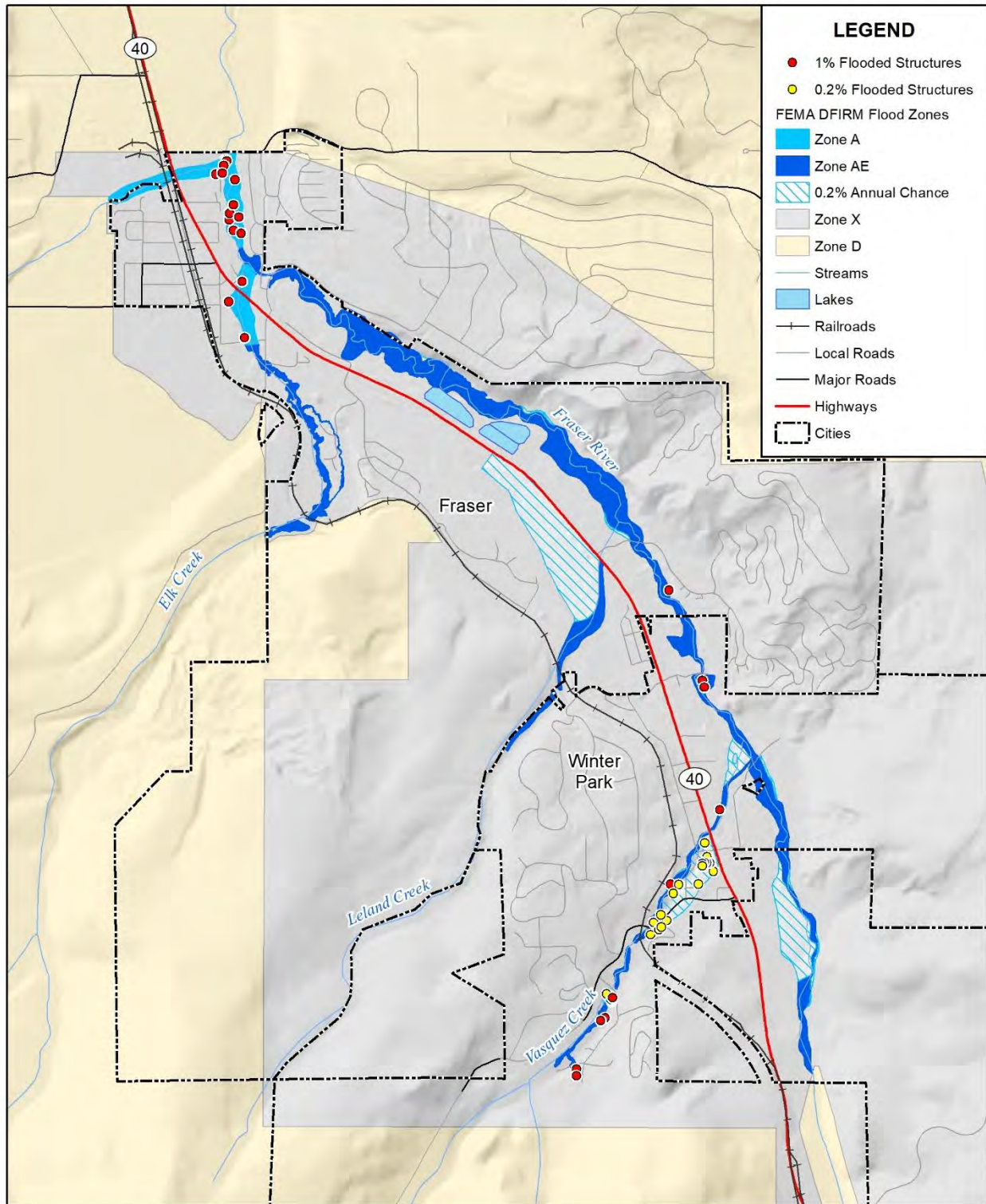
Table B.4 shows the results of the GIS analysis that was conducted using the best available flood hazard data to identify property exposure located in flood hazard zone and loss estimates. Refer to Section 3.3.3 Vulnerability by Hazard for an explanation on the methodology used to conduct the flood hazard analysis. Based on the analysis conducted, the Town’s A Zone has an exposure value of over \$8 million. 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. A Letter of Map Revision on Elk Creek since the 2015 update resulted in a number of properties removed from that portion of the 1% annual chance floodplain. According to analysis of critical facilities in flood zones the Town’s Visitors Center is at risk to the 1% annual chance flood.

**Table B.4. Fraser—Flood Risk by Flood Zone and Property Type**

Flood Zone	Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Loss Estimate
Zone A	Multi-Residential Improved	1	\$412,280	\$206,140	\$618,420	\$154,605
	Residential Improved	40	\$12,256,780	\$6,128,390	\$18,385,170	\$4,596,293
	Tax Exempt	2	\$133,850	\$133,850	\$267,700	\$66,925
	<b>Total</b>	<b>43</b>	<b>\$12,802,910</b>	<b>\$6,468,380</b>	<b>\$19,271,290</b>	<b>\$4,817,823</b>
Zone AE	Vacant Land	1	\$232,050	\$0	\$232,050	\$58,013
	<b>Total</b>	<b>1</b>	<b>\$232,050</b>	<b>\$0</b>	<b>\$232,050</b>	<b>\$58,013</b>
<b>Grand Total</b>		<b>44</b>	<b>\$13,034,960</b>	<b>\$6,468,380</b>	<b>\$19,503,340</b>	<b>\$4,875,835</b>

Source: Wood analysis of DFIRM

**Figure B.2. FEMA DFIRM Flood Zones and Floodprone Improved Properties in Fraser**



Map compiled 11/2020;  
intended for planning purposes only.  
Data Source: Grand County, CDOT,  
FEMA NFHL 12/13/2013

0 0.5 1 Miles



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### ***National Flood Insurance Program***

Fraser joined the National Flood Insurance Program (NFIP) on January 2, 2008. NFIP insurance data indicates that as of December 2020, there were 4 flood insurance policies in force in Fraser with \$1,791,200 of coverage. One of the policies is in Fraser's A zone, and three are located outside of the Special Flood Hazard Area.

There have been zero historical claims for flood losses. There were no repetitive or severe repetitive loss structures.

The population exposed to the flood hazards described in the flood vulnerability analysis above was estimated by applying an average household size factor (based on Colorado State Demography Office 2019 estimates for Fraser of 2.26 persons per household) to the number of improved residential properties identified in the flood hazard areas within Fraser. These estimates yielded the population exposures shown in Table 3-33 in Chapter 3 Risk Assessment. As such, a flood in Zone A or AE would potentially displace a total of 93 people, based on the residential structures which fall in those flood zones. For additional details on potential displacements by flood event, see the Grand County Base Plan.

Flooding can have a major economic impact on the economy, including indirect losses such as business interruption, lost wages, and other downtime costs. Flooding often coincides with the busy summer tourism months in Grand County, and may impact, directly or indirectly (such as from the negative perception of potential danger to his hazard), the revenues of shops, restaurants, hotels, and other major industries which keep the local economy thriving. In addition, major flooding which led to road or other infrastructure closures could additionally limit access to the Town by tourists, locals, and even basic goods and services.

The environment is mostly resilient to general flooding. However, cultural, or historic properties within floodplains would be affected in similar ways as property and critical facilities/infrastructure, especially those with underground or basement levels where water would easily seep and potential ruin archives, resources, or other important assets.

### ***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 four reporting Tier II facilities (for 2020) in Fraser, so the potential also exists for fixed hazmat incidents in the Town. Data from the National Response Center (NRC) between 2008 and 2020 did not show any reported incidents in Fraser, but there have been two in the nearby Town of Winter Park. For the Town of Fraser, it is more likely a matter of "when" rather than "if" given that hazmat events have happened in every other town in the County.

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## 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 the Town and smaller area on the southeast side of Fraser, refer to Figure B.3.

### *Existing Development*

The results of the landslide zone overlay analysis for the Town of Fraser are presented in Table B.5. No critical facilities were identified in landslide zones in Fraser. Refer to Section 3.3.3 Vulnerability by Hazard for an explanation on the methodology used to conduct the landslide hazard analysis.

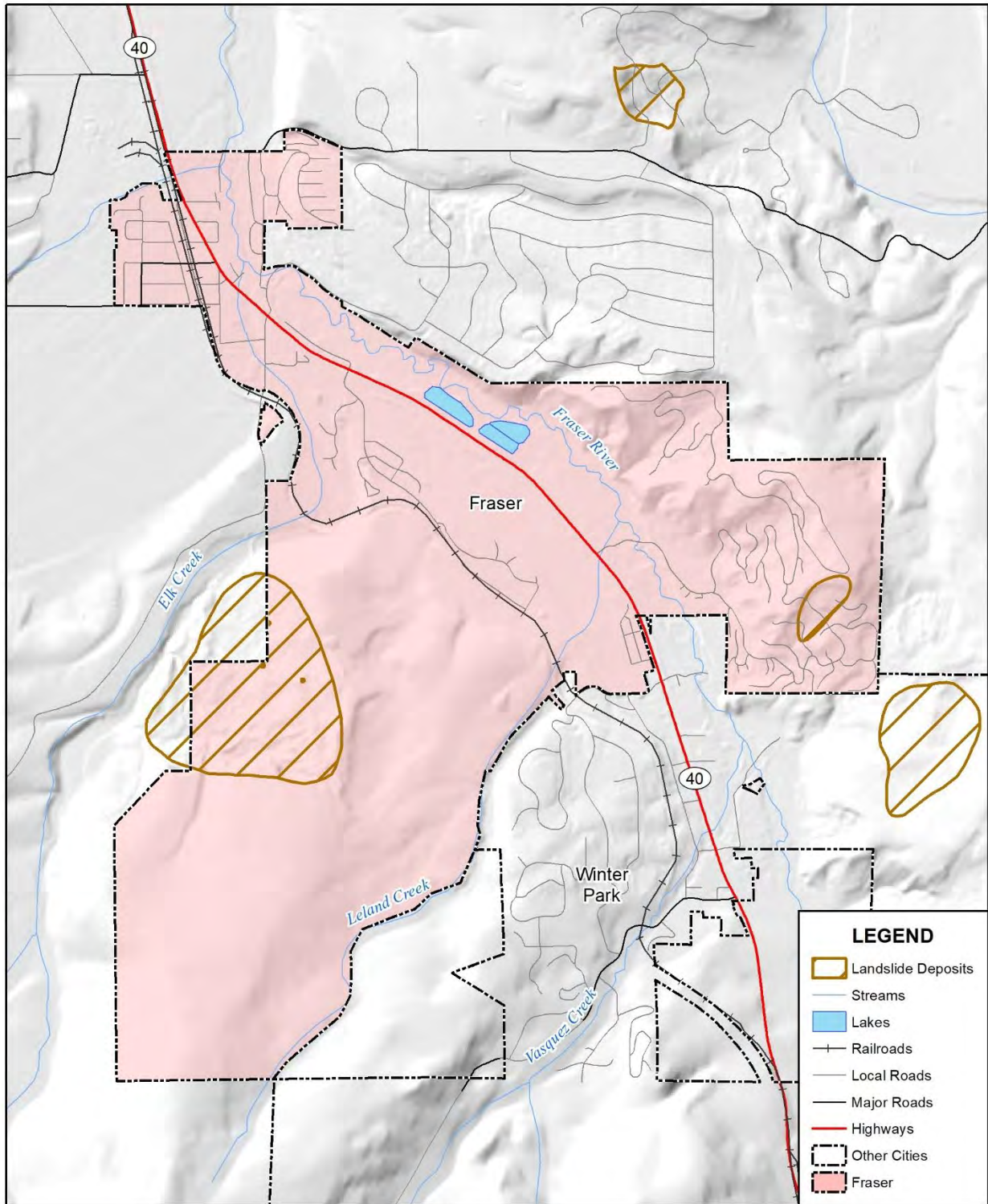
**Table B.5. Fraser—Landslide Exposure by Property Type**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
Residential Improved	20	\$15,939,840	\$7,969,920	\$23,909,760
<b>Total</b>	<b>20</b>	<b>\$15,939,840</b>	<b>\$7,969,920</b>	<b>\$23,909,760</b>

Source: Wood analysis, USGS, County Assessor

Fraser's residential properties have a total exposure value of over \$23 million. A total of 20 properties are exposed to general landslide hazards. A site-specific analysis would be needed to further quantify actual risk to structures on these parcels. No critical facilities are found at risk of landslide hazards in Fraser.

**Figure B.3. Landslide Areas in Fraser**



**wood** Map compiled 11/2020;  
intended for planning purposes only.  
Data Source: Grand County, CDOT,  
Colorado Geological Survey

0 0.5 1 Miles



People could be susceptible if they are caught in a landslide or debris flow, potentially leading to injury or death. There is also a danger to drivers operating vehicles, as rocks and debris can strike vehicles passing through the hazard area or cause dangerous shifts in roadways. Based on Table 3-37 in the base plan, an estimated 45 people could be at risk of general landslide hazards in Fraser. At risk population was estimated by multiplying the average number of persons living in each household in the Town of Fraser (which is 2.26 per household) times the number of properties of type "residential" where landslide areas have been inventoried in the town.

Economic impacts related to landslide, rockfall, debris fall, and mudslide hazards typically center around transportation routes temporarily closed by debris flow or other activity. No routes were found to be at risk.

As primarily natural processes, landslides and debris flows can have varying impacts to the natural environment as well as cultural or historical resources found on their path. For buildings and other structures, impacts would be similar as those seen on general property or critical facilities/infrastructure.

### ***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 3-42 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 majority of risk to wildfire is to residential structures, as well as tax exempt properties and vacant land. 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

**Table B.6 Fraser Improved Properties within Medium Risk WUI Communities**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
Multi-Residential Improved	13	\$8,087,910	\$4,043,955	\$12,131,865
Residential Improved	605	\$339,979,280	\$169,989,640	\$509,968,920
Tax Exempt	3	\$2,016,570	\$2,016,570	\$4,033,140
Vacant Land	1	\$232,050	\$0	\$232,050
<b>Total</b>	<b>622</b>	<b>\$350,315,810</b>	<b>\$176,050,165</b>	<b>\$526,365,975</b>

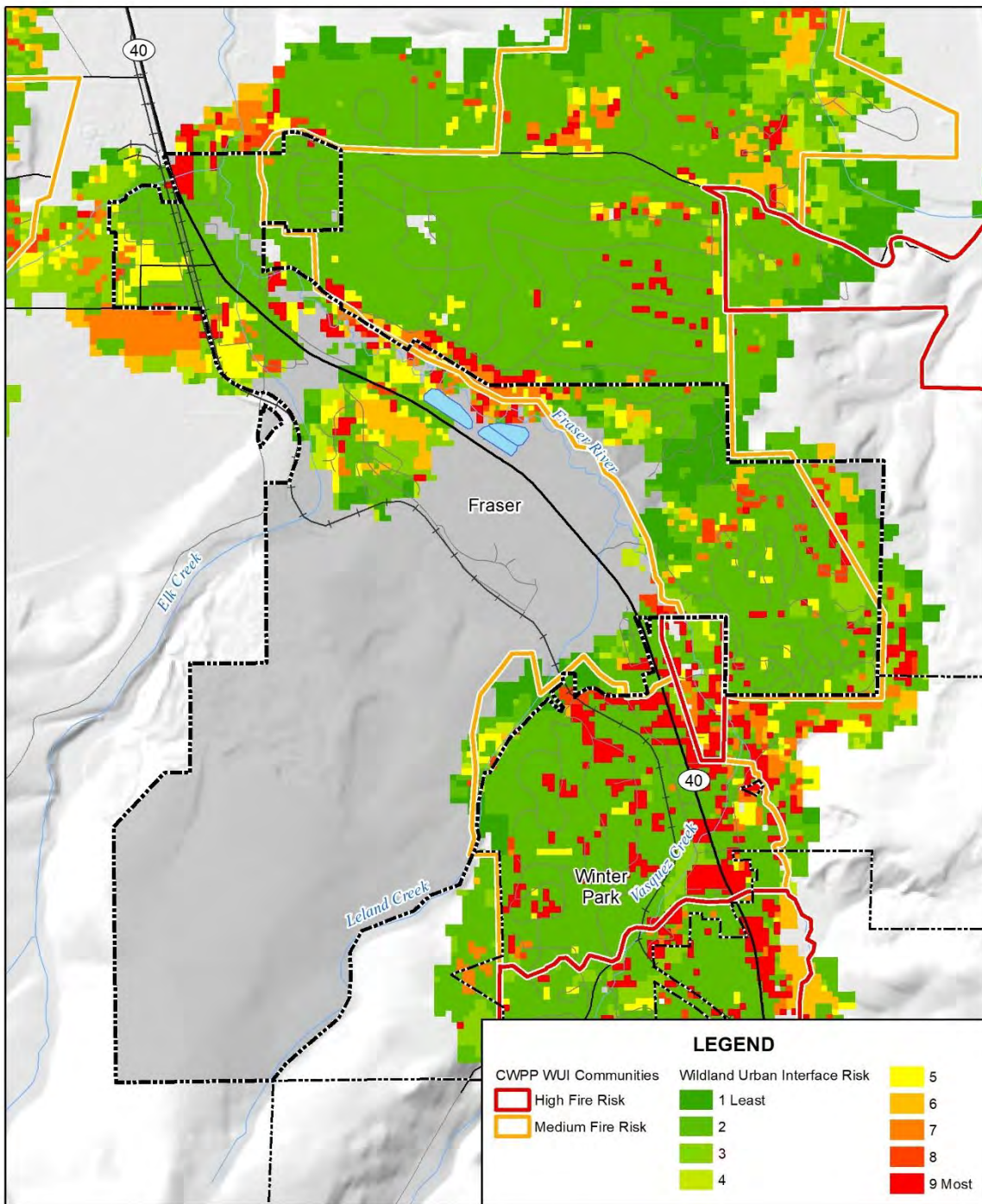
Source: Wood analysis, County Assessor, Upper Fraser Valley/East Grand Fire Protection District CWPP

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.

The Town of Fraser has an estimated 1,395 number of people at risk within medium risk WUI communities. Note: There are a number of second homes in the area, thus are not populated year-round. However, the population projected in this modeling may reflect the seasonal population swells, that often coincides with high fire season in the summer. These totals were estimated by multiplying the average persons per household in Fraser by the number of residential properties falling within the fire zone/s.

Tourism, the accommodation, and food services industry (e.g., hotels and restaurants), and retail are major components of Grand County's economy, and in Fraser as well. Wildland fires can cause economic disruptions, for example, lead to significant tourism reductions due to health and safety concerns, causing lost revenues from lack of visitation, stays in hotels, spending on restaurants and other commerce sources, and more.

**Figure B.4. WUI Communities and Risk in the Town of Fraser**



Map compiled 12/2020; intended for planning purposes only.  
 Data Source: Grand County, CDOT, East Grand Fire Protection District, Colorado Forest Atlas - Colorado State Forest Service

0 0.5 1 Miles

N

## **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.7 illustrates how Fraser has grown in terms of population and number of housing units between 2000 and 2018.

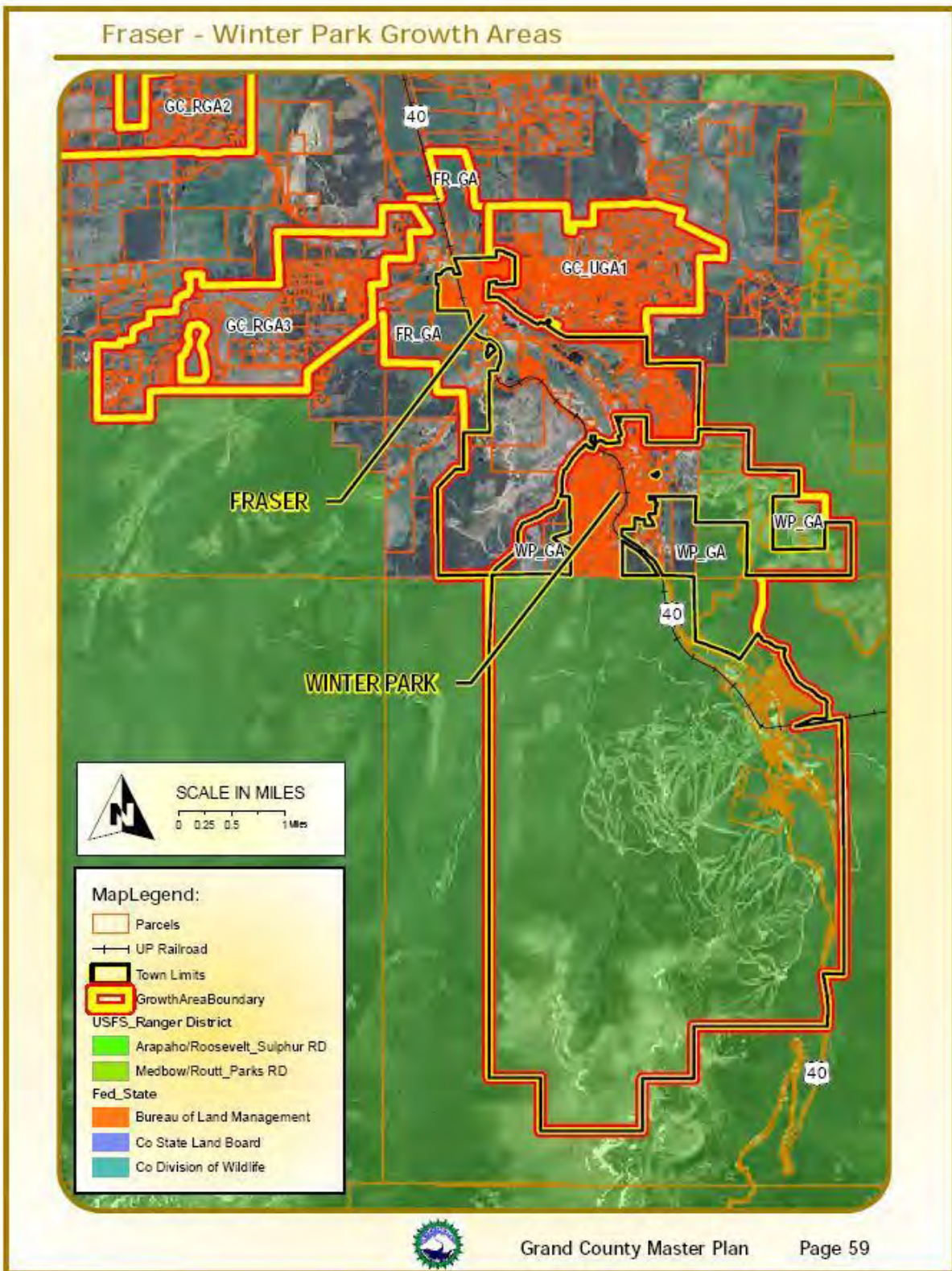
**Table B.7. Fraser—Change in Population and Housing Units, 2000-2018**

2000 Population	2011 Population	2019 Population Estimate*	2000 # of Housing Units	2011 Estimated # of Housing Units	2018 Estimated # of Housing Units
910	1,216	1,335	622	950	1,135

Source: factfinder2.census.gov \*Colorado State Demography Office 2019 Estimates

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.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 Fraser.

**Table B.8. 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	2015
Building Code Effectiveness Grading Schedule (BCEGS) Rating	Yes	4 for residential and 4 for commercial
Fire department ISO rating	Yes	
Erosion or sediment control program	Yes	
Stormwater management program	Yes	
Site plan review requirements	Yes	
Capital improvements plan	Yes	
Economic development plan	No	
Local emergency operations plan	No	
Other special plans	Yes	Trail Plan EOP; Water and Sewer plan completed (2012) Fraser River Corridor Master plan (2018)
Flood insurance study or other engineering study for streams	Yes	
Elevation certificates (for floodplain development)	Yes	
National Flood Insurance Program	Yes	
Community Rating System	No	
Community Wildfire Protection Plan	Yes	Upper Fraser Valley CWPP (2007), Grand County CWPP (2006)

## 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

### Sec. 19-3-130. - Policy.

- (a) It is the policy of the Town to consider the subdivision of land and the subsequent development of the subdivided land as subject to the control of the Town pursuant to this Chapter, the Comprehensive Plan, these subdivision regulations and all other applicable regulations, ordinances, codes and rules of the Town for the orderly, planned, efficient and economical development of the Town. All proposed subdivisions for which Town approval is required under these regulations shall be consistent with the Comprehensive Plan. No application for subdivision shall be approved if not in conformance with the Comprehensive Plan, and such failure shall be a reasonable ground for denial of the application.
- (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. 452 §1(Exh. A), 2018)

### Sec. 19-4-125. - Natural features.

- (a) The design and development of a site or subdivision shall preserve, insofar as it is possible, the natural terrain, natural drainage, existing topsoil, unusual rock formations, lakes, rivers, streams and trees. The visual destruction of natural land forms caused by cutting, filling, grading or vegetation removal shall be minimized.
- (b) Significant vegetation, including dominant or mature trees and shrubs, shall be retained where possible. When regenerating sites, replacement trees or shrubs shall be selected from indigenous species native to the region. Provisions shall be made to provide adequate hydration and appropriate soil for the replacement trees to ensure successful growth.
- (c) Dredging and/or filling of wetlands and construction in or directly adjacent to any watercourse, such as culvert or bridge installations, shall require measures to protect water quality and channel stability. In all cases, construction shall conform to applicable U.S. Army Corps of Engineers permitting requirements.
- (d) Archeological, historic sites and similar irreplaceable assets shall also be preserved.

( Ord. 452 §1(Exh. A), 2018)

**Sec. 19-4-135. – Geological hazards.**

- (a) Based on a finding by a licensed Colorado Professional Engineer, no land which is determined 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 shall be subdivided or developed unless the natural hazards are mitigated in a manner acceptable to the Town.
- (b) 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 licensed Colorado Professional Engineer and all mitigation measures necessary to prevent lateral movement and/or slippage of improvements have been approved by the Town Engineer.
- (c) Cut-and-fill slopes shall be kept to a minimum. Graded or filled slopes shall be kept to a three-to-one (3:1) slope or less and designed for long-term stability, unless otherwise approved by the Town.
- (d) Soil types shall be described and/or illustrated in sufficient detail to indicate any potential development problems resulting from groundwater, instability in road excavations and fills, expansive soils and structural bearing strength for building foundations.
- (e) Any subdivision or development located within a special flood hazard area shall be in conformance with Article 5 of this Chapter,

**Sec. 19-5-140. - Methods of reducing flood losses.**

To accomplish its purposes, this Article uses the following methods:

- (1) Restrict or prohibit uses that are dangerous to health, safety or property in times of flood, or cause excessive increases in flood heights or velocities;
- (2) Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
- (3) Control the alteration of natural floodplains, stream channels, and natural protective barriers, which are involved in the accommodation of flood waters;
- (4) Control filling, grading, dredging and other development which may increase flood damage; and
- (5) Prevent or regulate the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards to other lands.

( Ord. 452 §1(Exh. A), 2018)

**Sec. 14-1-10. - Standards adopted.**

- (a) The Board of Trustees has adopted the *Design Criteria and Construction Standards* ("Standards") set forth in this Chapter to govern various aspects of development and construction within the Town. Presented in these Standards are the minimum design and technical criteria for the design and construction of additions and modifications to the following:
  - (1) Water system;
  - (2) Sanitary sewer system;
  - (3) Street and roadway system;
  - (4) Stormwater system; and
  - (5) Private infrastructure.
- (b) Such Standards are applicable within the Town according to their terms and as provided in this Code. References in other parts of this Code to design criteria or construction standards shall be deemed to refer to the criteria and standards contained in this Chapter unless the context otherwise requires.

(Ord. 389 Part 1.1, 2012)

**Sec. 19-4-185. – Snow storage.**

- (a) General. Snow management is critical in the Town's mountain climate, and adequate space must be provided for the storage of snow.
  - (1) A snow storage and/or removal plan shall be required for all multi-family, commercial and mixed-use development.
  - (2) Roofs should be designed to either hold snow or shed snow onto appropriate areas. Use of snow guards and protected entries in high risk areas may be required.
  - (3) 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.
  - (4) An increase in minimum right-of-way or easement widths may be required by the Town to accommodate required snow storage.
- (b) On-site snow storage.
  - (1) One (1) square foot of snow storage space is required for each three (3) square feet of parking, driveway, walkway and/or loading area to be cleared.
  - (2) Snow storage areas shall be graded so that drainage from snow storage areas flows away from adjacent properties and building sites, in accordance with Chapter 14 of this Code, Design Criteria and Construction Standards.
  - (3) Snow storage areas shall be designed so that snow is not stored in a manner where, when melting, it directly discharges into any watercourses, streets, pedestrian pathways and/or bicycle pathways. Silt catch and/or detention basins may be required at the discretion of the Town Staff.
  - (4) Snow storage shall not interfere with intersection sight distances, traffic, signage, fire hydrants or water, wastewater, stormwater facilities and parking spaces.
  - (5) Snow storage is prohibited on areas devoted to vehicular and/or pedestrian use (including parking, trails and sidewalks), and in designated drainage courses/swales.
  - (6) Snow storage shall not be located on or within twenty-five (25) feet of wetlands, or within thirty (30) feet of the high water mark on each side of a watercourse.
- (c) Off-site snow storage. If the development necessitates off-site snow storage, an easement from the adjacent property owner shall be required. The applicant shall show evidence and plans to ensure that the off-site snow storage will not result in the degradation of streams, rivers, creeks or other watercourses, in accordance with Section 19-4-155.

## Administrative/Technical Mitigation Capabilities

Table B.9 identifies the personnel responsible for activities related to mitigation and loss prevention in Fraser.

**Table B.9. 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	
Resiliency Planner	No		
Transportation Planner	No		
Other	Yes		

### Fiscal Mitigation Capabilities

Table B.10 identifies financial tools or resources that Fraser could potentially use to help fund mitigation activities, and which have been used in the past to fund activities.

**Table B.10. Fraser—Fiscal Mitigation Capabilities**

Financial Resources	Accessible/Eligible to Use (Yes/No)	Has it been used to fund mitigation in the past?
Community Development Block Grants	Y	N
Capital Improvements Project Funding	Y	N
Authority to Levy Taxes for Specific Purposes	Y	N
Fees for Water, Sewer, Gas, or Electric Services	Y	N
Impact Fees for New Development	Y	N
Incur Debt through General Obligation Bonds	Y	N
Incur Debt through Special Tax Bonds	Y	N
Incur Debt through Private Activities	Y	N
Withhold Spending in Hazard Prone Areas	Y	N

### Mitigation Outreach and Partnerships

**Table B.11 Mitigation Education and Outreach Capabilities**

Education & Outreach Capabilities	Yes/No	Comments
Local Citizen Groups That Communicate Hazard Risks	No	
Firewise	No	
StormReady	No	
Other	Yes	

The Town of Fraser is involved in the following mitigation related outreach programs 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

### **Opportunities for Enhancement**

Based on the capability assessment, Fraser has several existing mechanisms in place that already help to mitigate hazards. There are also opportunities for the Town to expand or improve on these policies and programs to further protect the community. Future improvements may include providing training for staff members related to hazards or hazard mitigation grant funding in partnership with the County and DHSEM. Additional training opportunities will help to inform Town staff and Town Council on how best to integrate hazard information and mitigation projects into the Town policies and ongoing duties of the Town. Continuing to train Town staff on mitigation and the hazards that pose a risk to the Town will lead to more informed staff members who can better communicate this information to the public. Other capability enhancements would be to integrate risk assessment information into future updates to the Town's Comprehensive Plan, become a StormReady community and participate in the FireWise program.

## **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.
- 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>	\$100,000
<b>Benefits: (Losses Avoided)</b>	Protection of property and life safety enhancement
<b>Potential Funding:</b>	Private funds/effort
<b>Timeline:</b>	Ongoing
<b>Status:</b>	Ongoing

## Mitigation Action: Fraser 2020-1 Well Field Generator Connections

<b>Jurisdiction:</b>	Fraser
<b>Hazard Addressed</b>	Flood, Wildfire, Lightning, Severe Winter Weather, Wildfire
<b>Project Description, Issue/Background</b>	<p>Various hazards can result in power disruptions. The loss of potable water production (well pumping) due to the loss of power at the individual wells within the Town of Fraser's water system.</p> <p>In the southern well field, the pump station/treatment plant already has a backup generator located adjacent to it (centralized power source). The water wells are located a long distance away from the pump station/treatment plant. Although the wells can be powered by the pump station/treatment plant backup generator, if power were interrupted between the plant and the wells (either permanent or backup power), this would result in loss of water production of that well(s) which would put a strain on the southern water system. The town encountered this situation with two of its wells in 2020.</p> <p>In the northern well field, there is not a centralized power source. Each facility has its own power source. Due to this, the wells do not have a backup source of power and would rely on portable generators being brought to the site to provide backup power to the well.</p>
<b>Lead Department/Agency and Support Agencies/Partners</b>	Public Works/Town of Fraser
<b>Priority (High, Medium, Low)</b>	Medium
<b>Cost Estimate</b>	\$25,000
<b>Potential Funding Sources</b>	Matching Funds, Grants, Town Funding
<b>Timeline for Completion</b>	End of 2022
<b>Benefits (Avoided Losses)</b>	This project would enable generator(s) to be connected quickly to power an individual well(s). A portion of the Town's raw water system wells already have this capability. This project would provide consistency and redundancy throughout the raw water system and improve the potable water system's reliability for the town's residents.
<b>Status</b>	New in 2020.

# ANNEX C: TOWN OF GRANBY

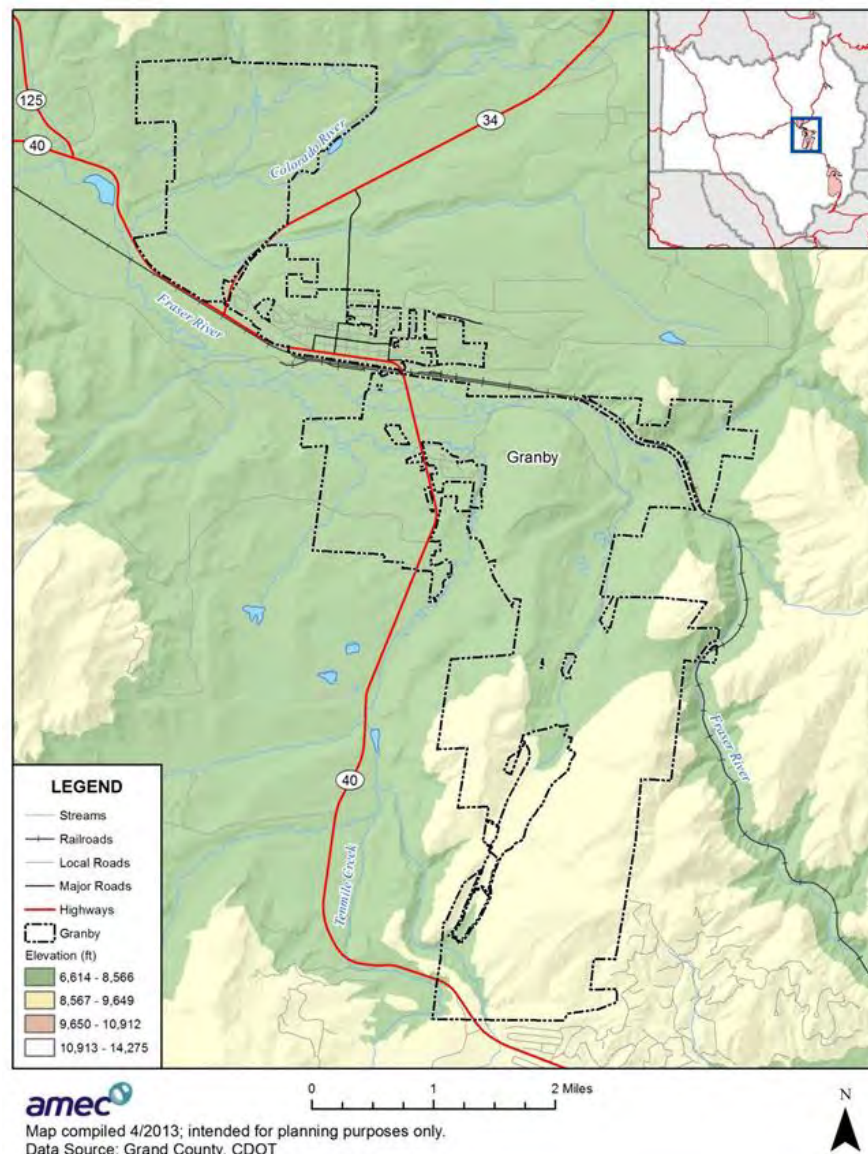
## C.1 Community Profile

### 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.

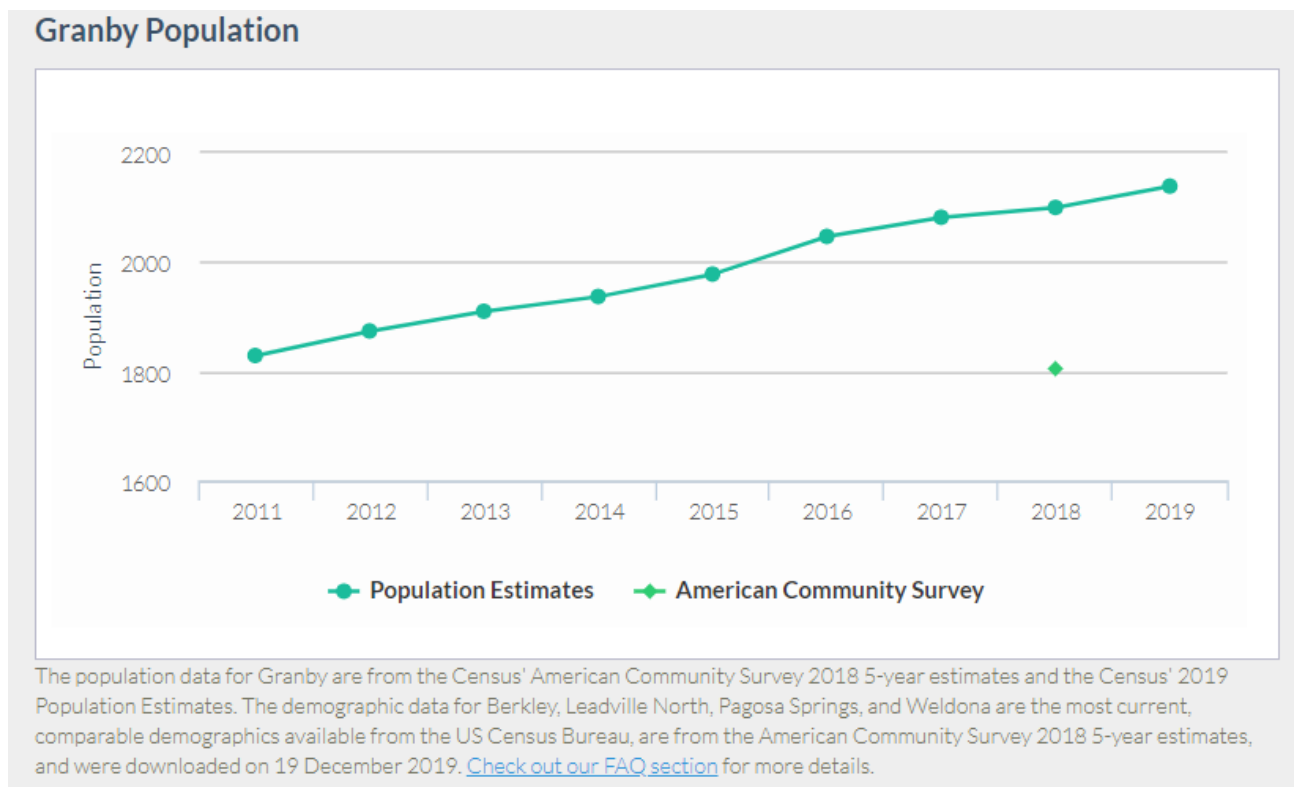
Figure C.1 shows a map of the Town of Granby and its location within Grand County. The map also shows critical facilities and landslide deposits.

**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 2,167 in 2019. Select American Community Survey (ACS) 2018 and 2019 estimates of demographic and social characteristics for Granby's "permanent" population are shown in the table below.



## 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 2019 estimates, the industries that employed the highest percentage of Granby's labor force were arts, entertainment, recreation, accommodation, and food services (35.9%); construction (17.5%); finance, insurance, real estate, and rental and leasing (12.1%); and retail trade (10.6%).

## C.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 C.1). In the context of the countywide planning area, there are no hazards that are unique to Granby.

**Table C.1. 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
Insect Disease 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.2 shows the total number of improved parcels, properties, and their improvement and content values for the Town of Granby. Refer to Section 3 Risk Assessment for the methodology used to conduct the parcel analysis.

**Table C.2. Granby Improved Parcel and Property Exposure**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
Agricultural	114	\$54,086,420	\$54,086,420	\$108,172,840
Commercial Improved	160	\$46,339,950	\$46,339,950	\$92,679,900
Commercial Vacant	1	\$117,470	\$0	\$117,470
Conservation Easement	11	\$4,106,000	\$4,106,000	\$8,212,000
Industrial Improved	3	\$739,710	\$1,109,565	\$1,849,275
Mixed Use	16	\$3,416,590	\$3,416,590	\$6,833,180
Multi-Residential Improved	33	\$8,928,820	\$4,464,410	\$13,393,230
Residential Improved	3,198	\$1,060,831,720	\$530,415,860	\$1,591,247,580
Residential Vacant	42	\$4,938,370	\$0	\$4,938,370
Tax Exempt	68	\$64,806,410	\$64,806,410	\$129,612,820
Vacant Land	3	\$49,620	\$0	\$49,620
<b>Total</b>	<b>3,649</b>	<b>\$1,248,361,080</b>	<b>\$708,745,205</b>	<b>\$1,957,106,285</b>

Source: Grand County Assessor’s Data, November 2020

Table C.3 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.3. 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: 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.

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## **Vulnerability by Hazard**

The intent of this section is to assess Granby's vulnerability separate from that of the County as a whole, which has already been assessed in Section 3.3.3 Vulnerability Assessment of the Base Plan. For most of the hazards listed in Table C.3, hazard and vulnerability do not vary significantly from the County overall, or vulnerability data is difficult to compile or estimate below county level. As a result, only Flood, Hazardous Materials Incidents, Landslide, Mud Flow/Debris Flow and Wildfire are profiled separately in this annex. For the purpose of this plan, only the parts of the town that lie specifically within Grand County have been assessed for vulnerability data.

For more information about how hazards affect Grand County, see Section 3 (Risk Assessment) of the Base Plan.

## **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***

Table C.4 shows the results of the GIS analysis that was conducted using the best available flood hazard data to identify property exposure located in flood hazard zone and loss estimates. Refer to Section 3.3.3 Vulnerability by Hazard for an explanation on the methodology used to conduct the flood hazard analysis. Based on the analysis, the Town's 1% annual chance flood zones have an exposure value of over \$15 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 \$3.7 million. Flooded structures for the DFIRM and HAZUS flood zones are depicted in Figure C.2.

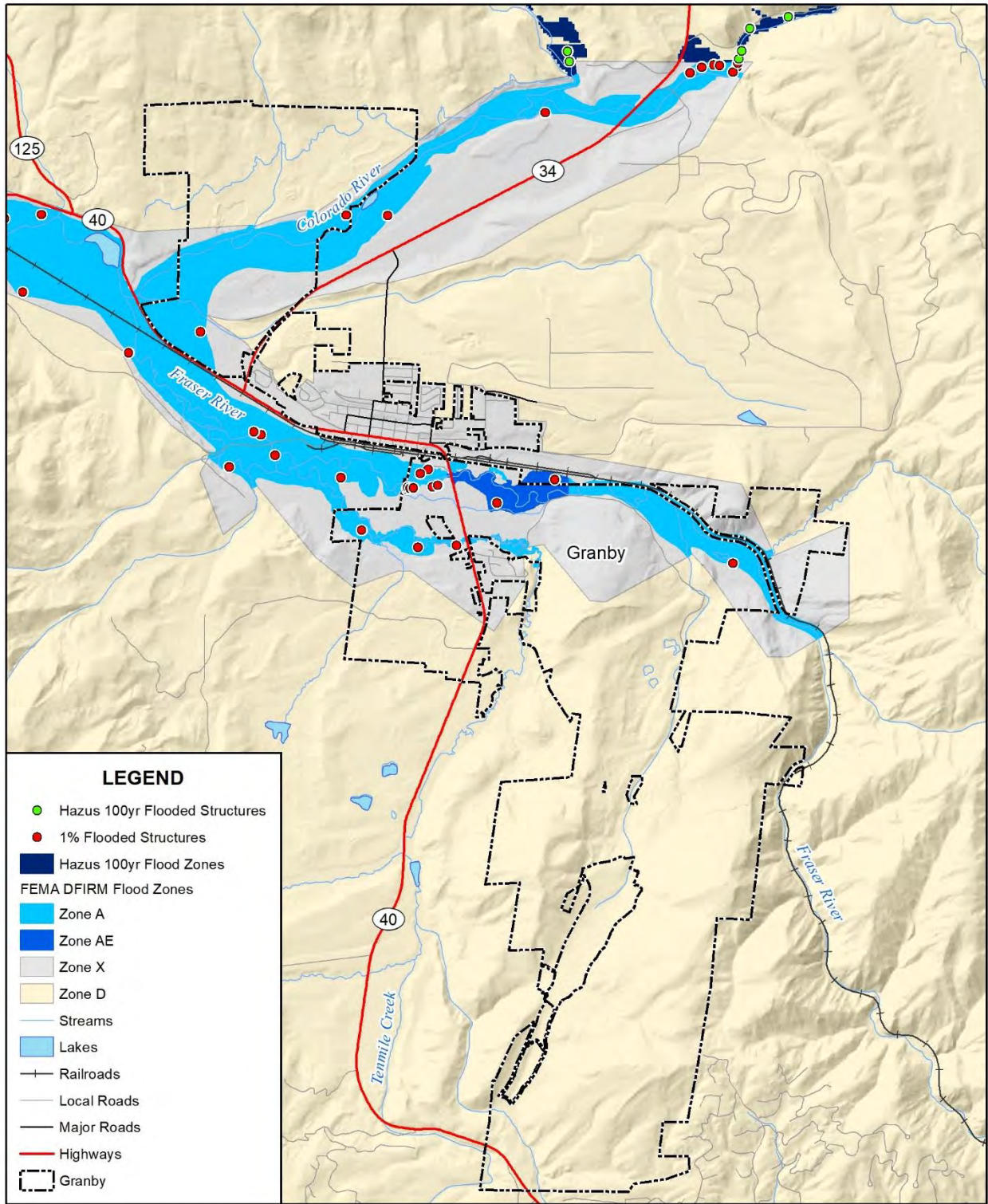
According to the GIS analysis conducted there are no critical facilities located in the floodplain in Granby. The HMPC members noted concerns for the Town's water treatment plants that are on the Fraser and Colorado rivers and have developed a new mitigation action in 2020 to mitigate the potential impacts on these plants due to flooding outside the 1% annual chance flood. Refer to the Town's mitigation action 2020-1 Granby Source Water Protection Plan.

**Table C.4. Granby—Flood Risk by Flood Zone and Property Type**

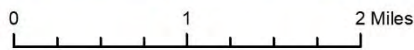
Flood	Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Loss Estimate
Zone A	Agricultural	5	\$1,088,500	\$1,088,500	\$2,177,000	\$544,250
	Commercial	3	\$408,440	\$408,440	\$816,880	\$204,220
	Conservation	2	\$404,780	\$404,780	\$809,560	\$202,390
	Residential	7	\$1,907,590	\$953,795	\$2,861,385	\$715,346
	Residential	1	\$108,460	\$0	\$108,460	\$27,115
	Tax Exempt	8	\$3,425,880	\$3,425,880	\$6,851,760	\$1,712,940
	<b>Total</b>	<b>26</b>	<b>\$7,343,650</b>	<b>\$6,281,395</b>	<b>\$13,625,045</b>	<b>\$3,406,261</b>
Zone AE	Agricultural	1	\$18,130	\$18,130	\$36,260	\$9,065
	Tax Exempt	1	\$338,700	\$338,700	\$677,400	\$169,350
	<b>Total</b>	<b>2</b>	<b>\$356,830</b>	<b>\$356,830</b>	<b>\$713,660</b>	<b>\$178,415</b>
Hazard 100 Year Flood	Agricultural	1	\$263,680	\$263,680	\$527,360	\$131,840
	Residential	1	\$114,240	\$57,120	\$171,360	\$42,840
	<b>Total</b>	<b>2</b>	<b>\$377,920</b>	<b>\$320,800</b>	<b>\$698,720</b>	<b>\$174,680</b>
<b>Grand Total</b>		<b>30</b>	<b>\$8,078,400</b>	<b>\$6,959,025</b>	<b>\$15,037,425</b>	<b>\$3,759,356</b>

Source: Wood analysis of DFIRM

**Figure C.2. DFIRM and HAZUS Food Zones and Floodprone Properties in Granby**



Map compiled 11/2020;  
intended for planning purposes only.  
Data Source: Grand County, CDOT,  
Hazus-MH MR2, FEMA NFHL 12/13/2013



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### ***National Flood Insurance Program***

Granby joined the National Flood Insurance Program (NFIP) on May 15, 2008. NFIP insurance data indicates that as of December 2020, there were 2 flood insurance policies in force in Granby with \$700,00 of coverage. None of the policies is in Granby's A zone, and two are located outside of the Special Flood Hazard Area.

According to a review of FEMA's Community Information System in December 2020, there has been one historical claim for flood losses totaling \$0. There were no repetitive or severe repetitive loss structures.

The population exposed to the flood hazards described in the flood vulnerability analysis above was estimated by applying an average household size factor (based on Colorado State Demography Office 2019 estimates for Granby of 2.40 persons per household) to the number of improved residential properties identified in the flood hazard areas within Granby. These estimates yielded the population exposures shown in Table 3-33 in Chapter 3 Risk Assessment. As such, a flood in Zone A or AE would potentially displace a total of 19 people, based on the residential structures which fall in those flood zones. For additional details on potential displacements by flood event, see the Grand County Base Plan.

Flooding can have a major economic impact on the economy, including indirect losses such as business interruption, lost wages, and other downtime costs. Flooding often coincides with the busy summer tourism months in Grand County, and may impact, directly or indirectly (such as from the negative perception of potential danger to his hazard), the revenues of shops, restaurants, hotels, and other major industries which keep the local economy thriving. In addition, major flooding which led to road or other infrastructure closures could additionally limit access to the Town by tourists, locals, and even basic goods and services.

The environment is mostly resilient to general flooding. However, cultural, or historic properties within floodplains would be affected in similar ways as property and critical facilities/infrastructure, especially those with underground or basement levels where water would easily seep and potential ruin archives, resources, or other important assets.

### ***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.

### **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 six reporting Tier II facilities (for 2020) in Granby, so the potential also exists for fixed hazmat incidents in the Town. Data from the National Response Center (NRC) between 2008 and 2020 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.

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### **Existing Development**

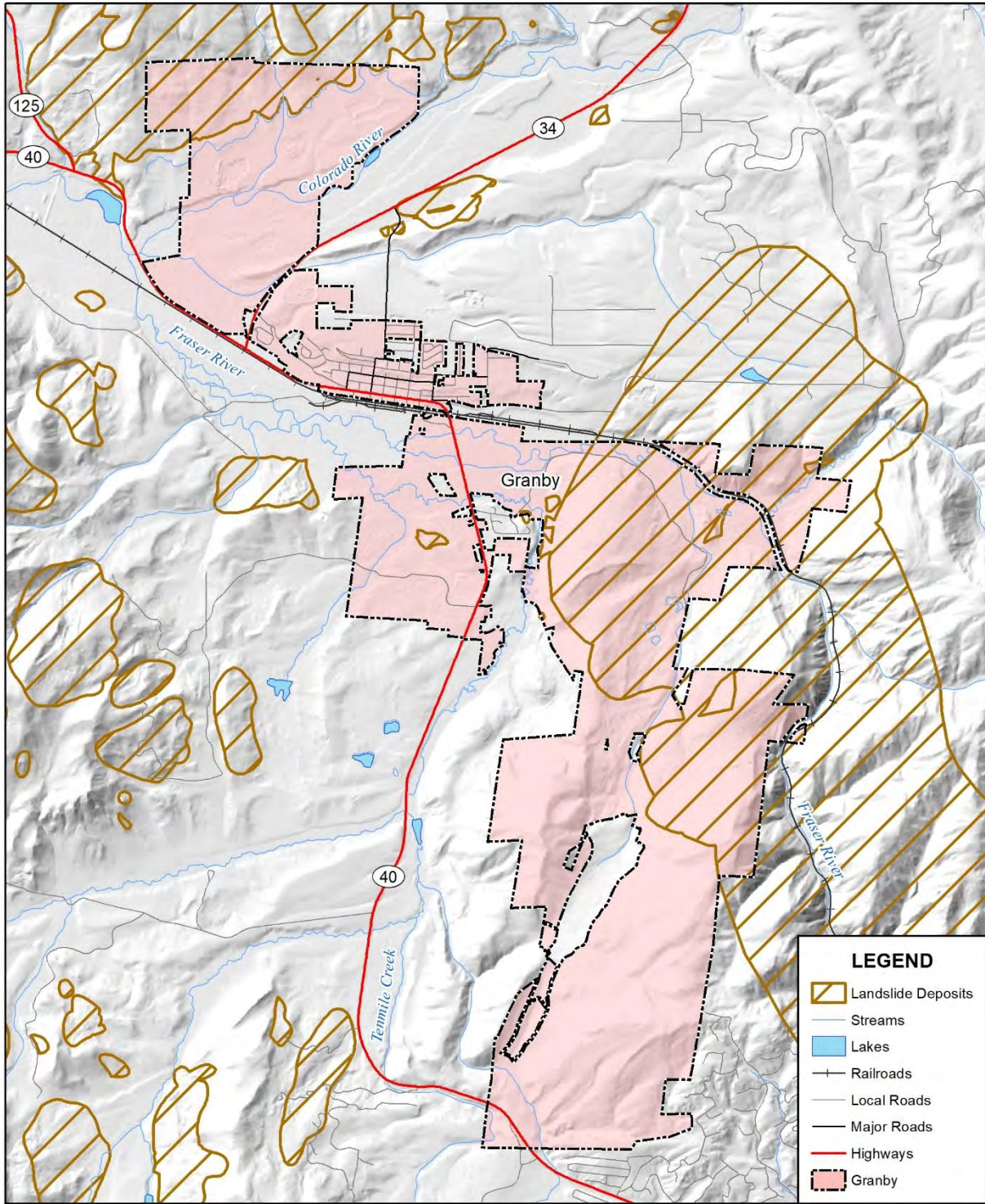
The results of the landslide area overlay analysis for the Town of Granby are presented in Table C.5. No critical facilities were identified in landslide zones in Granby. Refer to Section 3.3.3 Vulnerability by Hazard for an explanation on the methodology used to conduct the landslide hazard analysis.


**Table C.5. Granby—Landslide Exposure by Property Type**

<b>Property Type</b>	<b>Improved Parcel Count</b>	<b>Improved Value</b>	<b>Estimated Content Value</b>	<b>Total Value</b>
Agricultural	21	\$11,558,100	\$11,558,100	\$23,116,200
Commercial Improved	1	\$62,690	\$62,690	\$125,380
Conservation Easement	4	\$2,093,390	\$2,093,390	\$4,186,780
Multi-Residential Improved	1	\$502,340	\$251,170	\$753,510
Residential Improved	479	\$166,986,080	\$83,493,040	\$250,479,120
Residential Vacant	15	\$114,280	\$0	\$114,280
Tax Exempt	6	\$1,970,850	\$1,970,850	\$3,941,700
Vacant Land	1	\$8,350	\$0	\$8,350
<b>Total</b>	<b>528</b>	<b>\$183,296,080</b>	<b>\$99,429,240</b>	<b>\$282,725,320</b>

Source: Wood analysis, USGS, County Assessor

**Figure C.3.Landslide Areas in Granby**




 Map compiled 11/2020;  
 intended for planning purposes only.  
 Data Source: Grand County, CDOT,  
 Colorado Geological Survey

0 1 2 Miles



People could be susceptible if they are caught in a landslide or debris flow, potentially leading to injury or death. There is also a danger to drivers operating vehicles, as rocks and debris can strike vehicles passing through the hazard area or cause dangerous shifts in roadways. Based on Table 3-37 in the Grand County base plan, an estimated 1,148 people could be at risk of general landslide hazards in Granby. At risk population was estimated by multiplying the average number of persons living in each household in the Town of Granby (which is 2.40 per household) times the number of properties of type "residential" where landslide areas have been inventoried in the town.

Based on the analysis shown in Table C.5., 1 commercial property with a total value of \$125,380 is at risk to landslide hazards. Economic impacts related to landslide, rockfall, debris fall, and mudslide hazards typically center around transportation routes temporarily closed by debris flow or other activity. No routes were found to be at risk.

As primarily natural processes, landslides and debris flows can have varying impacts to the natural environment as well as cultural or historical resources found on their path. For buildings and other structures, impacts would be similar as those seen on general property or critical facilities/infrastructure.

### ***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, the majority of risk to wildfire is to residential structure. The breakdown of improved properties within high and medium risk WUI communities are shown in Table C.6 and in Figure C.4.

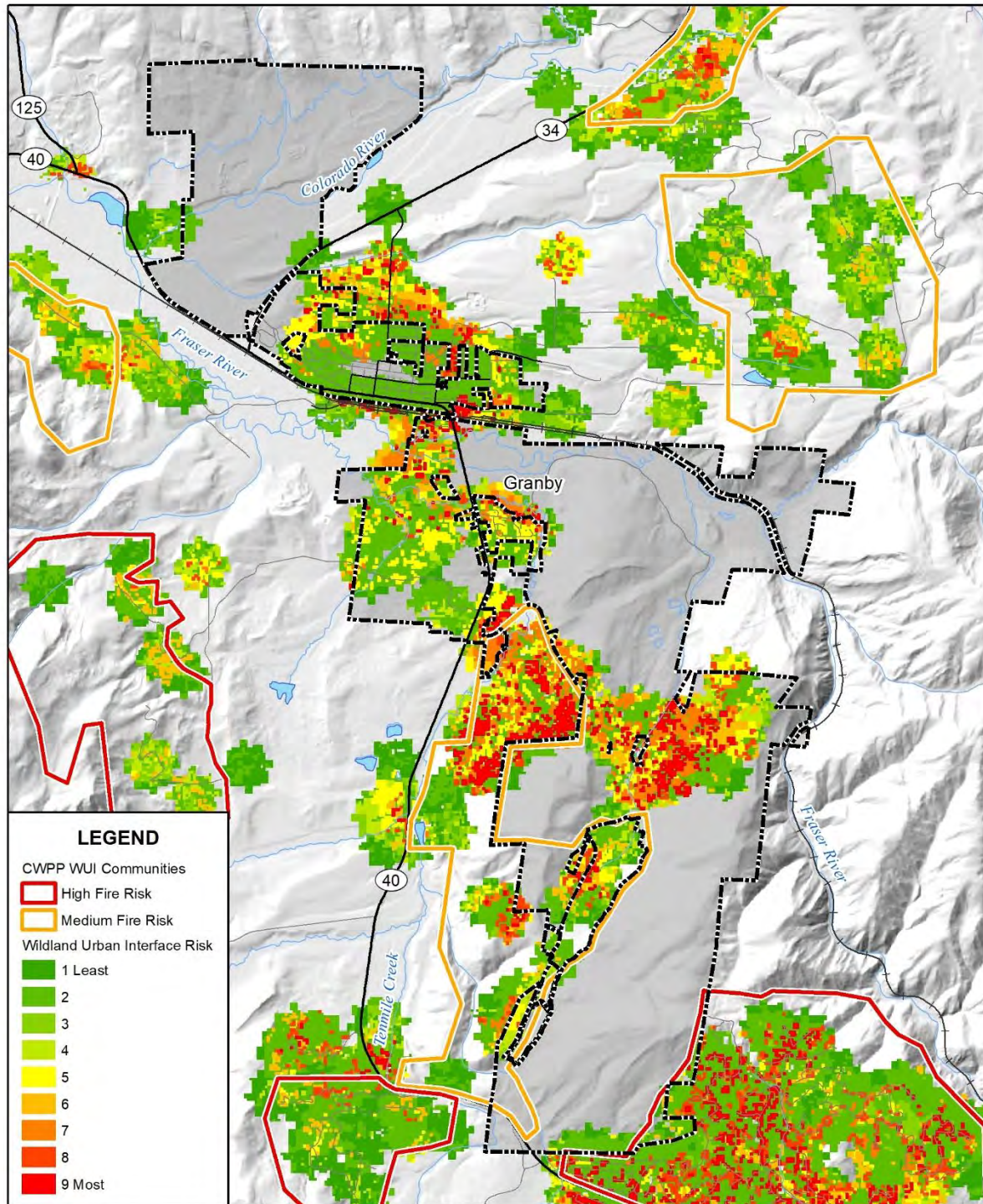
Five critical facilities were identified in moderate and high-moderate wildfire zones in Granby. Two communications facilities, Power World and Sol Vista Peak, are located in Granby's high- moderate wildfire zone. The three critical facilities in the Town's moderate wildfire zone include U.S. 40 ML, Grand Fire Protection District Station, and Middle Park High School.

**Table C.6. Granby— Improved Properties within Medium and High Risk WUI Communities**

WUI Risk	Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
<b>High</b>	Agricultural	17	\$24,448,870	\$24,448,870	\$48,897,740
	Conservation Easement	1	\$193,400	\$193,400	\$386,800
	Multi-Residential Improved	7	\$2,730,850	\$1,365,425	\$4,096,275
	Residential Improved	741	\$331,983,120	\$165,991,560	\$497,974,680
	Residential Vacant	9	\$962,750	\$0	\$962,750
	Tax Exempt	5	\$8,981,600	\$8,981,600	\$17,963,200
	Vacant Land	1	\$8,350	\$0	\$8,350
	<b>Total</b>		<b>781</b>	<b>\$369,308,940</b>	<b>\$200,980,855</b>
<b>Medium</b>	Agricultural	12	\$4,488,000	\$4,488,000	\$8,976,000
	Commercial Improved	3	\$1,159,420	\$1,159,420	\$2,318,840
	Multi-Residential Improved	5	\$1,705,910	\$852,955	\$2,558,865
	Residential Improved	540	\$202,897,640	\$101,448,820	\$304,346,460
	Residential Vacant	10	\$3,615,340	\$0	\$3,615,340
	Tax Exempt	1	\$164,430	\$164,430	\$328,860
	Vacant Land	1	\$9,370	\$0	\$9,370
	<b>Total</b>		<b>572</b>	<b>\$214,040,110</b>	<b>\$108,113,625</b>

Source: Wood analysis, County Assessor, Grand Fire Protection District CWPP

Figure C.4. WUI Communities and Risk in the Town of Granby



Map compiled 12/2020;  
intended for planning purposes only.  
Data Source: Grand County, CDOT,  
East Grand Fire Protection District,  
Colorado Forest Atlas - Colorado State Forest Service

0 1 2 Miles



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.

The Town of Granby has an estimated 3,099 people at risk within high (1,793) and medium risk (1,306) WUI communities. These totals were estimated by multiplying the average persons per household in Granby by the number of residential properties falling within the fire zone/s.

Tourism, the accommodation, and food services industry (e.g., hotels and restaurants), and retail are major components of Grand County’s economy, and Granby’s as well. Wildland fires can cause economic disruptions, for example, lead to significant tourism reductions due to health and safety concerns, causing lost revenues from lack of visitation, stays in hotels, spending on restaurants and other commerce sources, and more.

**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.7 illustrates how Granby has grown in terms of population and number of housing units between 2000 and 2018.

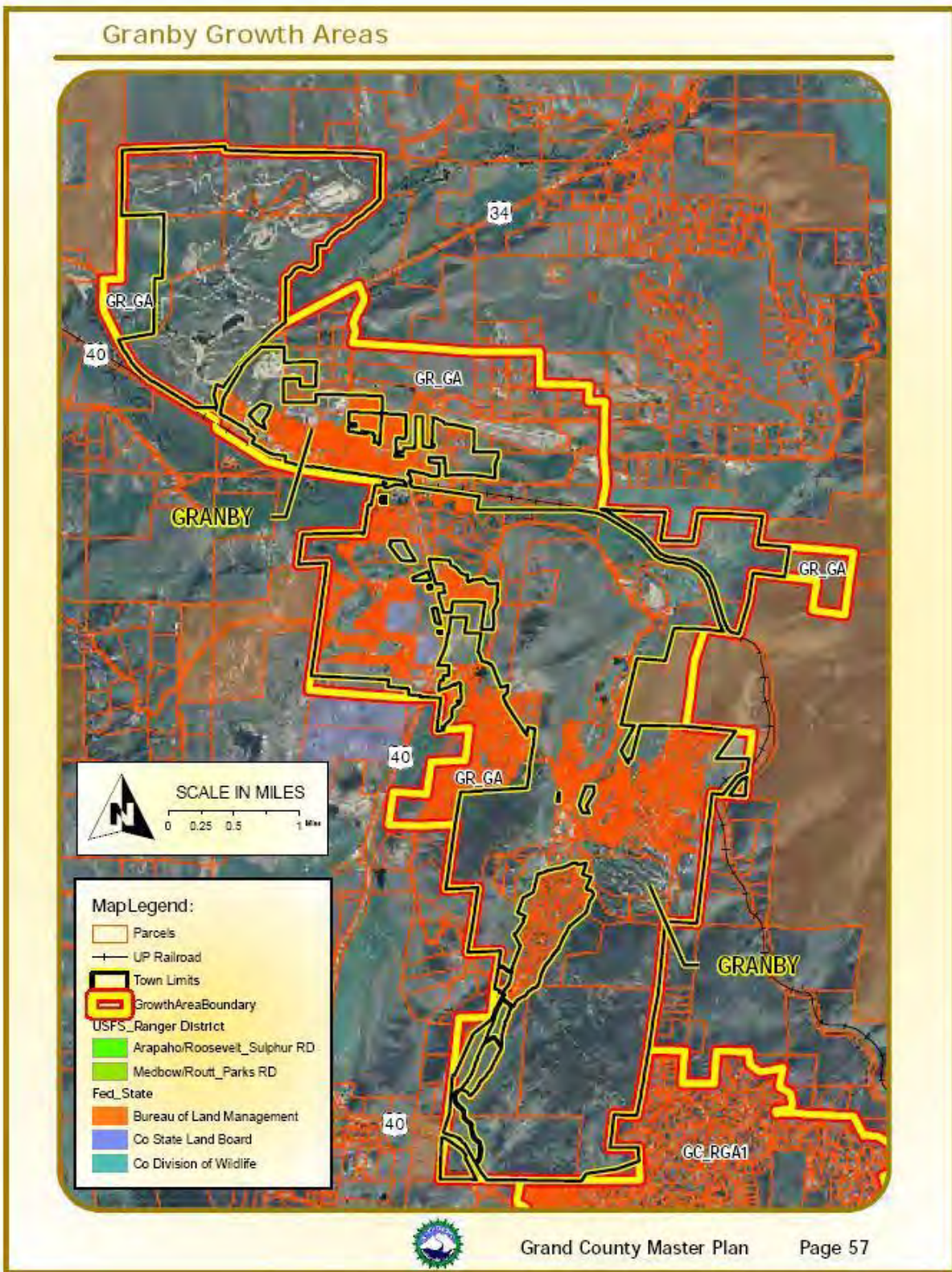
**Table C.7. Granby—Change in Population and Housing Units, 2000-2018**

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	2,167	628	1,378	1,599

Source: factfinder2.census.gov \*Colorado State Demography Office 2019 Estimates

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.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 Granby.

**Table C.8. 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	2015
Building Code Effectiveness Grading Schedule (BCEGS) Rating	Yes	4 for residential and 4 for commercial
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	
<b>Other special plans</b>		
Flood insurance study or other engineering study for streams	Yes	
Elevation certificates (for floodplain development)	Yes	
National Flood Insurance Program	Yes	
Community Rating System	No	
Community Wildfire Protection Plan	Yes	Grand County CWPP (2006), Grand Fire Protection District No. 1 CWPP (2015)
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, anything 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 rockslides, 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.9 identifies the personnel responsible for activities related to mitigation and loss prevention in Granby.

**Table C.9. Granby—Administrative and Technical Mitigation Capabilities**

Personnel Resources	Yes/No	Department/Position	Comments
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		
Resiliency Planner	No		
Transportation Planner	No		
Other personnel	No		
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
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**Fiscal Mitigation Capabilities**

Table C.10 identifies financial tools or resources that Granby that have been used and could potentially use to help fund mitigation activities.

**Table C.10. Granby—Fiscal Mitigation Capabilities**

Financial Resources	Accessible/Eligible to Use (Yes/No)	Has it been used to fund mitigation in the past?
Community Development Block Grants	N	N
Capital Improvements Project Funding	Y	Y
Authority to Levy Taxes for Specific Purposes	N	N
Fees for Water, Sewer, Gas, or Electric Services	N	N
Impact Fees for New Development	N	N
Incur Debt through General Obligation Bonds	N	N
Incur Debt through Special Tax Bonds	N	N
Incur Debt through Private Activities	N	N
Withhold Spending in Hazard Prone Areas	N	N

**Mitigation Outreach and Partnerships**

**Table C.11 Mitigation Education and Outreach Capabilities**

Education & Outreach Capabilities	Yes/No	Comments
Local Citizen Groups That Communicate Hazard Risks	No	
Firewise	Yes	<ul style="list-style-type: none"> <li>• Homestead Hills HOA</li> <li>• Shadow Mountain Ranch</li> <li>• Ten Mile Creek OA</li> <li>• Winter Park Highlands</li> </ul>
StormReady	No	
Other	Yes	

The Town of Granby is involved in the following mitigation related outreach programs 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.
- The Colorado State Forest Service in partnership with the Town and residents have done or planned several forest health treatments in and around Granby.

## 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.

## Opportunities for Enhancement

Based on the capability assessment, Granby has several existing mechanisms in place that already help to mitigate hazards. There are also opportunities for the Town to expand or improve on these policies and programs to further protect the community. Future improvements may include providing training for staff members related to hazards or hazard mitigation grant funding in partnership with the County and DHSEM. Additional training opportunities will help to inform Town staff and Town Council on how best to integrate hazard information and mitigation projects into the Town policies and ongoing duties of the Town. Continuing to train Town staff on mitigation and the hazards that pose a risk to the Town will lead to more informed staff members who can better communicate this information to the public. Other capability enhancements would be to integrate risk assessment information into future updates to the Town's Comprehensive Plan, and to become a StormReady community.

### C.5 Mitigation Goals and Objectives

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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.
- 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>	In progress. Granby added: 'advertise the importance of source water protection.'

## Mitigation Action: Granby 2020-1 Emergency Operations Plan Update

<b>Jurisdiction:</b>	Town of Granby
<b>Hazard Addressed</b>	Dam/Levee Failure; Disease Outbreak; Flood; Hazardous Materials; Severe Winter Storms; Wildfire;
<b>Project Description, Issue &amp; Background</b>	Update the Town of Granby emergency operations plan with the help of a consultant. These plans have not been updated for a number of years. This should benefit the Town in that it will give our Town staff, police department, and other stakeholders proper guidelines to follow in the event of a number of different emergencies.
<b>Lead Agency and Title of Lead Person</b>	Town of Granby Police Department
<b>Partners:</b>	Fire District, Sewer District, water entities, Grand County Sheriff
<b>Priority:</b>	Medium
<b>Cost Estimate:</b>	\$10,000 - \$100,000
<b>Benefits: (Losses Avoided)</b>	Enhanced coordination and response during emergencies
<b>Potential Funding:</b>	Grants, Town general fund, state funding if available
<b>Timeline:</b>	3-5 years
<b>Status:</b>	New in 2020.

## Mitigation Action: Granby 2020-2 Granby Source Water Protection

<b>Jurisdiction:</b>	Town of Granby
<b>Hazard Addressed</b>	Dam/Levee Failure; Flood; Landslide, Debris Flows, Mudflow, Rockfall; Drought;
<b>Project Description, Issue &amp; Background</b>	Develop a source water protection plan for the Town's water plants on the Fraser and Colorado rivers, to include the identification and analysis of specific mitigation strategies to reduce impacts to the water supply and infrastructure.
<b>Lead Agency and Title of Lead Person</b>	Town of Granby Water
<b>Partners:</b>	Denver Water, Northern Water, other county water providers
<b>Priority:</b>	Medium
<b>Cost Estimate:</b>	\$100,000 - \$1,000,000
<b>Benefits: (Losses Avoided)</b>	Avoid damages to critical infrastructure
<b>Potential Funding:</b>	Water budget funding, grants
<b>Timeline:</b>	3-5 years
<b>Status:</b>	New in 2020.

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# ANNEX D: TOWN OF GRAND LAKE

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## D.1 Community Profile

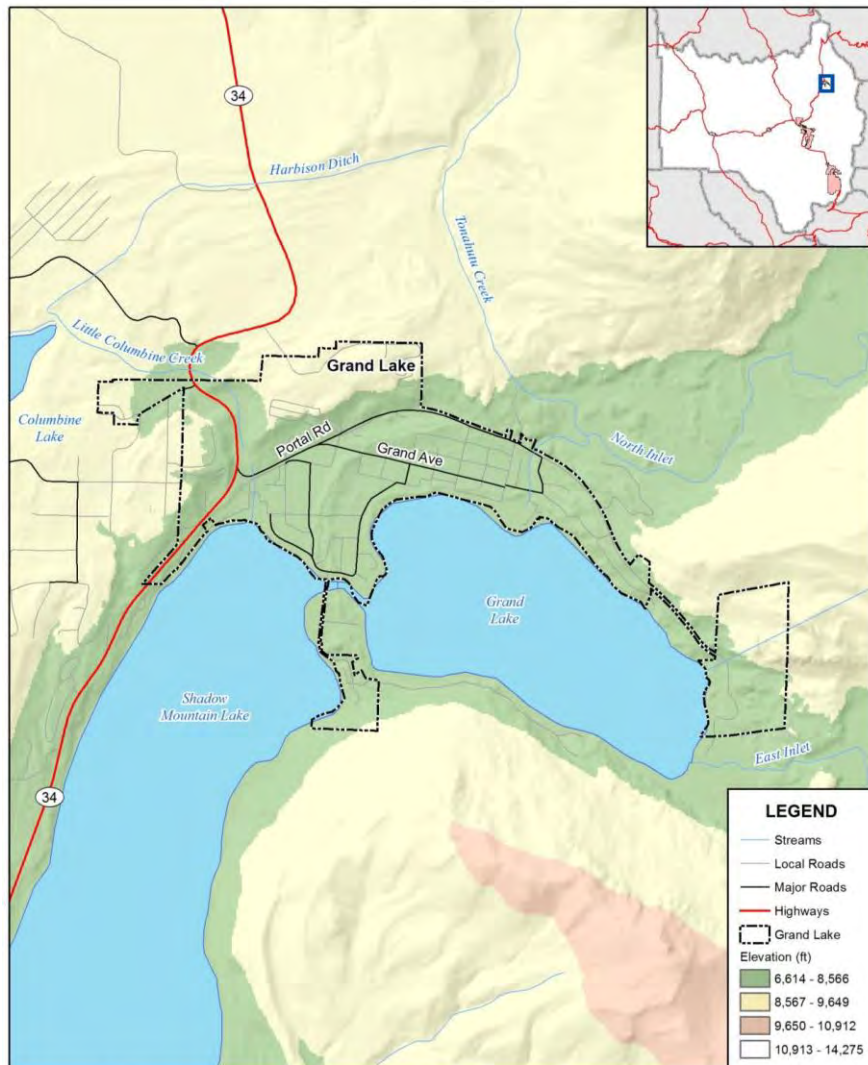
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### Geography

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.

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**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 514 in 2019. Refer to Chapter 1 of the Grand County Base Plan for selected demographic and economic characteristics for Grand Lake compared to the County as a whole and the other participating jurisdictions.

## 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 2019 estimates, the industries that employed the highest percentage of Grand Lake’s labor force were arts, entertainment, recreation, accommodation, and food services (22.5%); retail trade (23.0%); construction (18.0%); and finance, insurance, real estate, and rental and leasing (8.4%).

### 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.1). In the context of the countywide planning area, there are no hazards that are unique to Grand Lake.

**Table D.1. 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
Insect Disease Infestation	Large	Occasional	Limited	Medium
Severe Winter Weather	Large	Highly Likely	Critical	High
Wildfire	Large	Highly Likely	Catastroph	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

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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.2 shows the total number of improved parcels, properties, and their improvement and content values for the Town of Grand Lake. Refer to Section 3 Risk Assessment for the methodology used to conduct the parcel analysis.

**Table D.2. Grand Lake Improved Parcel and Property Exposure**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
Agricultural	1	\$2,210	\$2,210	\$4,420
Commercial Improved	92	\$28,521,000	\$28,521,000	\$57,042,000
Mixed Use	15	\$4,351,720	\$4,351,720	\$8,703,440
Multi-Residential Improved	1	\$264,640	\$132,320	\$396,960
Residential Improved	805	\$327,809,580	\$163,904,790	\$491,714,370
Residential Vacant	7	\$808,270	\$0	\$808,270
Tax Exempt	13	\$5,428,540	\$5,428,540	\$10,857,080
<b>Total</b>	<b>934</b>	<b>\$367,185,960</b>	<b>\$202,340,580</b>	<b>\$569,526,540</b>

Source: Grand County Assessor’s Data, November 2020

**Table D.3. 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
Public Works Shop	LS	100s of Thousands	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.
Adams Tunnel	LL	Millions	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	EA	Millions	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

The intent of this section is to assess Grand Lake’s vulnerability separate from that of the County as a whole, which has already been assessed in Section 3.3.3 Vulnerability Assessment of the Base Plan. For most of the hazards listed in Table D.3, hazard and vulnerability do not vary significantly from the County overall, or vulnerability data is difficult to compile or estimate below county level. As a result, only Flood and, Wildfire are profiled separately in this annex. For the purpose of this plan, only the parts of the town that lie specifically within Grand County have been assessed for vulnerability data.

For more information about how hazards affect Grand County, see Section 3 (Risk Assessment) of the Base Plan.

### 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

Table D.4 shows the results of the GIS analysis that was conducted using the best available flood hazard data to identify property exposure located in flood hazard zone and loss estimates. Refer to Section 3.3.3 Vulnerability by Hazard for an explanation on the methodology used to conduct the flood hazard analysis. Based on the analysis conducted, the Town’s A Zone has an exposure value of over \$3 million. Flood loss from the 1% annual chance event based on this assessment would be in the magnitude of \$847 thousand. Flooded structures for the DFIRM flood zones are depicted in Figure D.2.

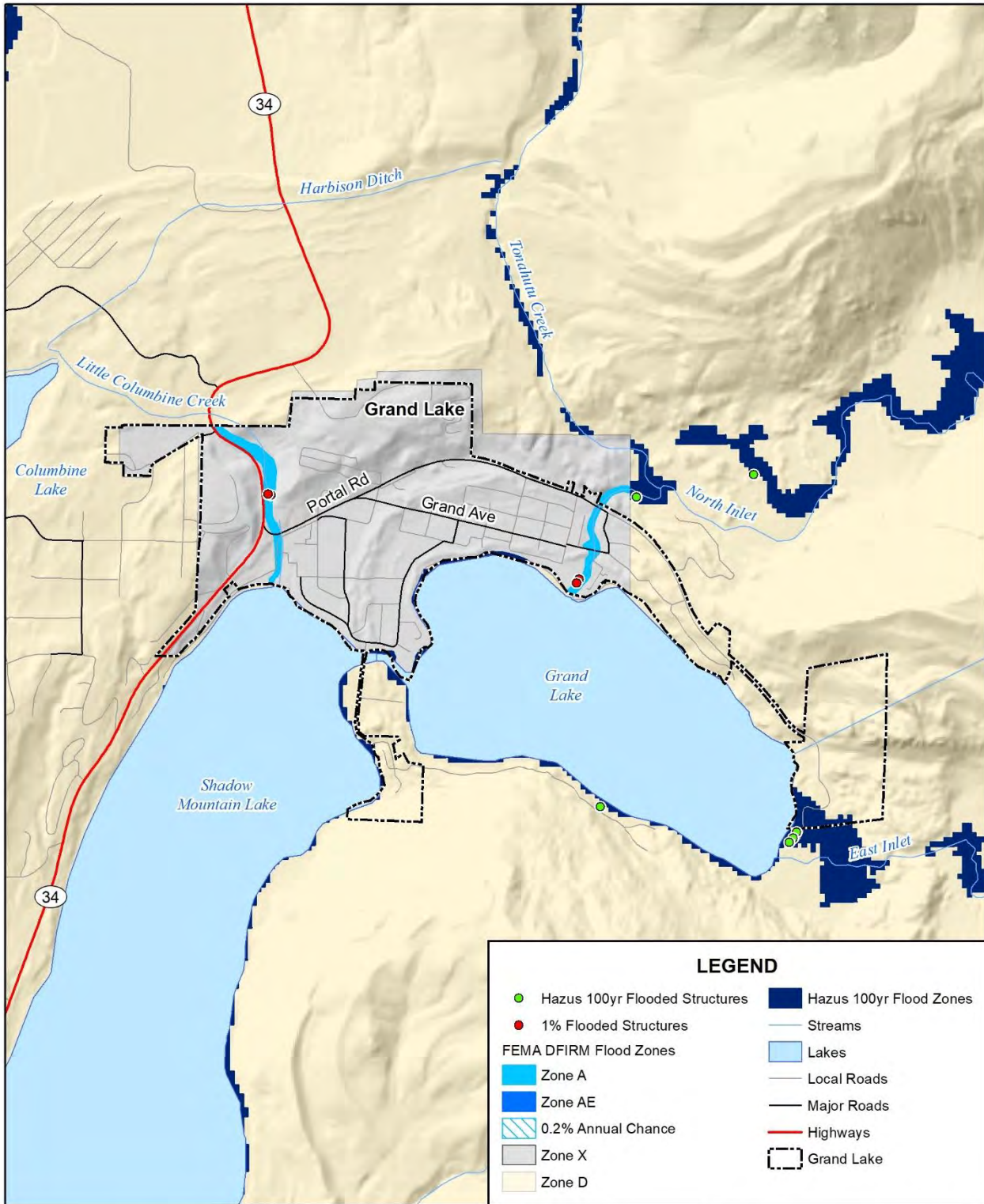
There is one critical facility, a bridge on Grand Avenue, located in the floodplain in Grand Lake.

**Table D.4. Grand Lake—Flood Risk by Flood Zone and Property Type**

Flood	Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Loss Estimate
Zone A	Commercial	1	\$261,400	\$261,400	\$522,800	\$130,700
	Residential	7	\$1,911,250	\$955,625	\$2,866,875	\$716,719
	<b>Total</b>	<b>8</b>	<b>\$2,172,650</b>	<b>\$1,217,025</b>	<b>\$3,389,675</b>	<b>\$847,419</b>

Source: Wood analysis of DFIRM

**Figure D.2. DFIRM Flood Zones and Floodprone Properties in Grand Lake**



Map compiled 11/2020; intended for planning purposes only.  
 Data Source: Grand County, CDOT, Hazus-MH MR2, FEMA NFHL 12/13/2013

0 0.5 1 Miles



### ***National Flood Insurance Program***

Grand Lake joined the National Flood Insurance Program (NFIP) on January 1, 1986. NFIP insurance data indicates that as of December 2020, there were 6 flood insurance policies in force in Grand Lake with \$1,873,200 of coverage. One of the policies are in Grand Lake's A zone, and four 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.

The population exposed to the flood hazards described in the flood vulnerability analysis above was estimated by applying an average household size factor (based on Colorado State Demography Office 2019 estimates for Grand Lake of 1.96 persons per household) to the number of improved residential properties identified in the flood hazard areas within Grand Lake. These estimates yielded the population exposures shown in Table 3.33 in Chapter 3 Risk Assessment. As such, a flood in Zone A or AE would potentially displace a total of 14 people, based on the residential structures which fall in those flood zones. For additional details on potential displacements by flood event, see the Grand County Base Plan.

Flooding can have a major economic impact on the economy, including indirect losses such as business interruption, lost wages, and other downtime costs. Flooding often coincides with the busy summer tourism months in Grand County, and may impact, directly or indirectly (such as from the negative perception of potential danger to his hazard), the revenues of shops, restaurants, hotels, and other major industries which keep the local economy thriving. In addition, major flooding which led to road or other infrastructure closures could additionally limit access to the Town by tourists, locals, and even basic goods and services.

The environment is mostly resilient to general flooding. However, cultural, or historic properties within floodplains would be affected in similar ways as property and critical facilities/infrastructure, especially those with underground or basement levels where water would easily seep and potential ruin archives, resources, or other important assets.

### ***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**

Note during the 2020 planning process for the Grand County Hazard Mitigation Plan, the East Troublesome Fire took place within the County and lead to evacuations with Town of Grand Lake. Refer to Section 3.2.12 of the base plan for details on the fire and its impacts.

### ***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 the breakdown of improved properties within medium risk WUI communities are shown in Table D.5 and in Figure D.3.

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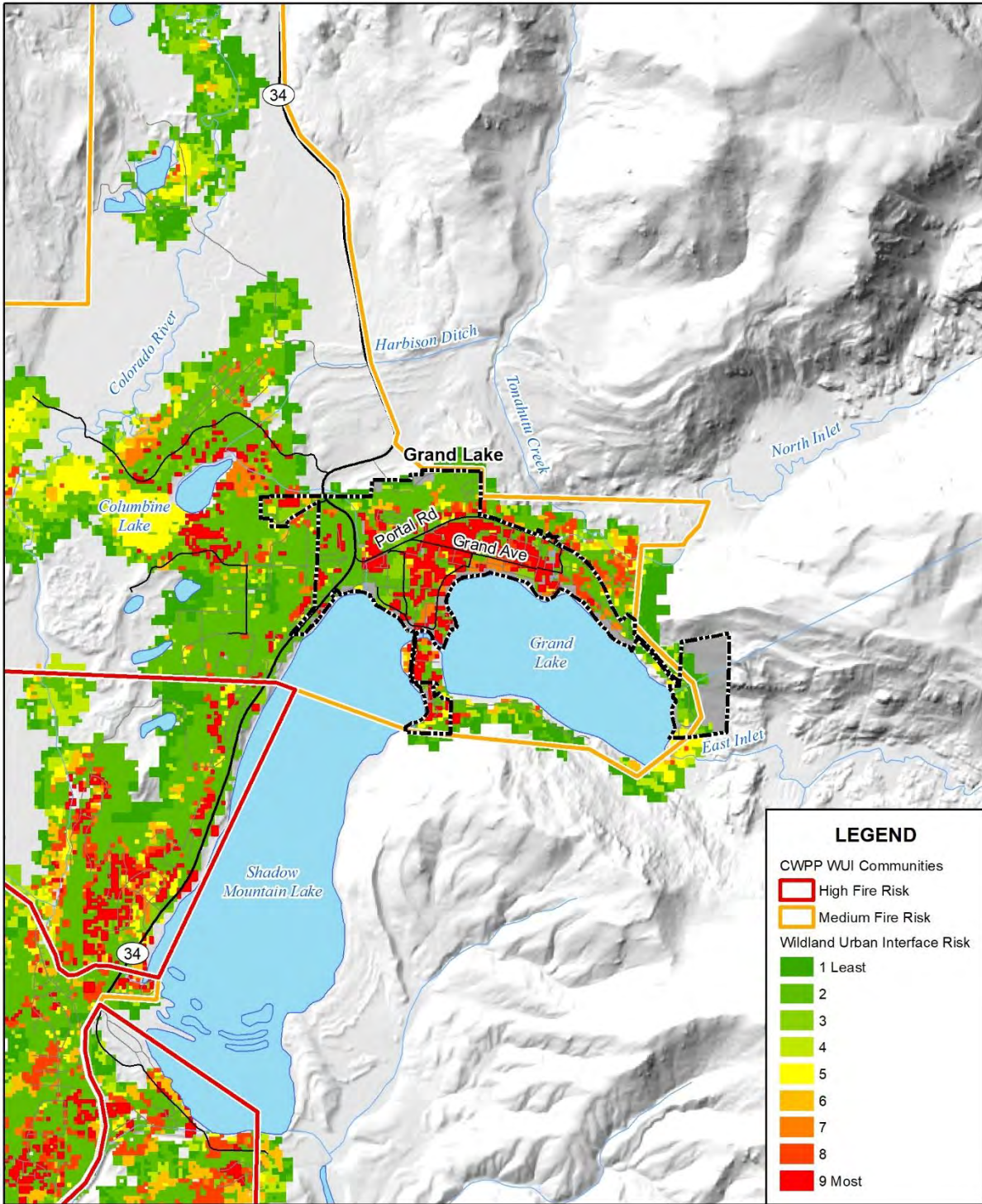
**Table D.5. Grand Lake— Improved Properties within Medium Risk WUI Communities**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
Agricultural	1	\$2,210	\$2,210	\$4,420
Commercial Improved	92	\$28,521,000	\$28,521,000	\$57,042,000
Mixed Use	15	\$4,351,720	\$4,351,720	\$8,703,440
Multi-Residential Improved	1	\$264,640	\$132,320	\$396,960
Residential Improved	805	\$327,809,580	\$163,904,790	\$491,714,370
Residential Vacant	7	\$808,270	\$0	\$808,270
Tax Exempt	13	\$5,428,540	\$5,428,540	\$10,857,080
<b>Total</b>	<b>934</b>	<b>\$367,185,960</b>	<b>\$202,340,580</b>	<b>\$569,526,540</b>

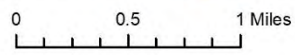
Source: Wood analysis, County Assessor, Grand Lake Fire Protection District CWPP

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. WUI Communities and Risk in the Town of Grand Lake**



Map compiled 12/2020;  
intended for planning purposes only.  
Data Source: Grand County, CDOT,  
East Grand Fire Protection District,  
Colorado Forest Atlas - Colorado State Forest Service



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.

The Town of Grand Lake has an estimated 1,578 number of people at risk within medium risk WUI communities. Note: There are a number of second homes in the area, thus are not populated year-round. However, the population projected in this modeling may reflect the seasonal population swells, that often coincides with high fire season in the summer. These totals were estimated by multiplying the average persons per household in Grand Lake by the number of residential properties falling within the fire zone/s.

Tourism, the accommodation, and food services industry (e.g., hotels and restaurants), and retail are major components of Grand County’s economy, and Grand Lake’s as well. Wildland fires can cause economic disruptions, for example, lead to significant tourism reductions due to health and safety concerns, causing lost revenues from lack of visitation, stays in hotels, spending on restaurants and other commerce sources, and more.

**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.

**Growth and Development Trends**

Table D.6 illustrates how Grand Lake has grown in terms of population and number of housing units between 2000 and 2018.

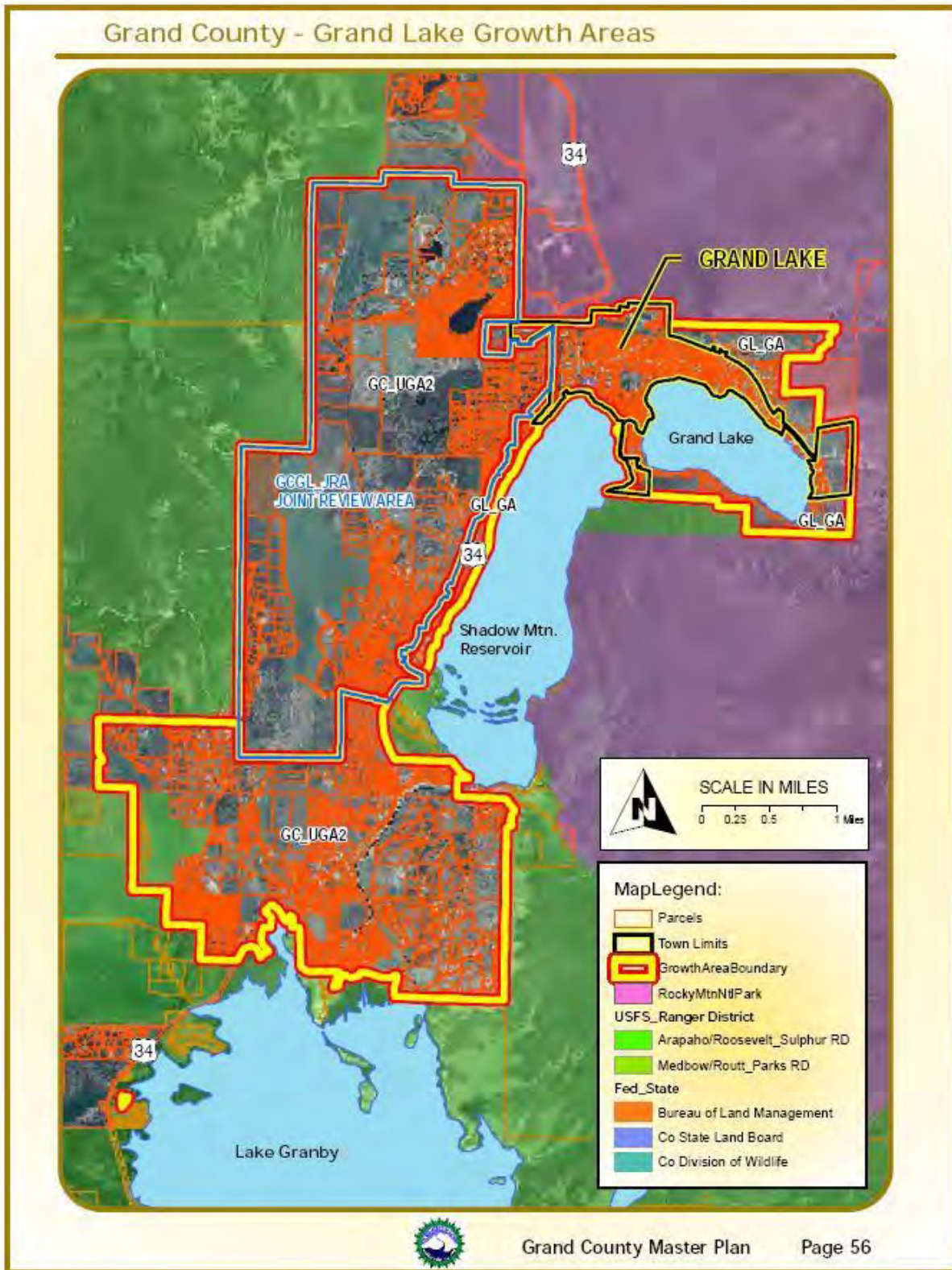
**Table D.6. Grand Lake—Change in Population and Housing Units, 2000-2018**

2000 Population	2011 Population Estimate	2019 Population Estimate*	2000 # of Housing Units	2011 Estimated # of Housing Units	2018 Estimated # of Housing Units
447	357	514	748	1,096	956

Source: ACS 2011 and 2018 and US Census 2000, factfinder2.census.gov, \*Colorado State Demography Office 2019 Estimates

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.7 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.7. 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) 2015
Building Code Effectiveness Grading Schedule (BCEGS) Rating	N/A	
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
National Flood Insurance Program	Yes	
Community Rating System	No	
Community Wildfire Protection Plan	Yes	Grand Lake FPD CWPP (2015)
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.8 identifies the personnel responsible for activities related to mitigation and loss prevention in Grand Lake.

**Table D.8. 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

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	
Resiliency Planner	No		
Transportation Planner	No		
Other	Yes	Public Works	On Call

### Fiscal Mitigation Capabilities

Table D.9 identifies financial tools or resources that Grand Lake that have been used and could potentially use to help fund mitigation activities. Other funding sources include general fund revenues and reserves, and water utility reserves.

**Table D.9. Grand Lake—Fiscal Mitigation Capabilities**

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Community Development Block Grants	Y	N
Capital Improvements Project Funding	N	N
Authority to Levy Taxes for Specific Purposes	Y	N
Fees for Water, Sewer, Gas, or Electric Services	Y	N
Impact Fees for New Development	N	N
Incur Debt through General Obligation Bonds	Y	N
Incur Debt through Special Tax Bonds	Y	N
Incur Debt through Private Activities	N	N
Withhold Spending in Hazard Prone Areas	Y	N

### Mitigation Outreach and Partnerships

**Table D.10 Mitigation Education and Outreach Capabilities**

Education & Outreach Capabilities	Yes/No	Comments
Local Citizen Groups That Communicate Hazard Risks	No	
Firewise	Yes	Mountain Shadows Estates
StormReady	No	
Other	Yes	

The Town of Grand Lake is involved in the following mitigation related outreach programs 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.
- The Colorado State Forest Service in partnership with the Town and residents have done or planned several forest health treatments in and around Grand Lake.

### **Past Mitigation Efforts**

- Several mitigation projects were identified in the Grand Lake CWPP.

### **Opportunities for Enhancement**

Based on the capability assessment, Grand Lake has several existing mechanisms in place that already help to mitigate hazards. There are also opportunities for the Town to expand or improve on these policies and programs to further protect the community. Future improvements may include providing training for staff members related to hazards or hazard mitigation grant funding in partnership with the County and DHSEM. Additional training opportunities will help to inform Town staff and Town Council on how best to integrate hazard information and mitigation projects into the Town policies and ongoing duties of the Town. Continuing to train Town staff on mitigation and the hazards that pose a risk to the Town will lead to more informed staff members who can better communicate this information to the public. Other capability enhancements would be to integrate risk assessment information into future updates to the Town's Comprehensive Plan and to become a StormReady community.

### **D.5 Mitigation Goals and Objectives**

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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.
- 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>	2025
<b>Status:</b>	In progress

## Mitigation Action Grand Lake 2020-1 Debris Flow Mitigation from East Troublesome Fire

<b>Jurisdiction:</b>	Town of Grand Lake
<b>Hazard Addressed</b>	Flood, Landslide, Mudflow/Debris Flow
<b>Project Description, Issue &amp; Background</b>	<p>Grand Lake was impacted by the East Troublesome Creek Fire in October and November 2020 with over 193,812 acres burned by wildfire. The fire affected four watersheds with burn severity ranging from 29% to over 90% in two of the four watersheds. One of the watersheds flows directly through the Town of Grand Lake</p> <p>Grand Lake owns and maintains critical public road infrastructure just downstream from the burn area. Soil burn severity identified in the BAER report indicates a high likelihood of sediment, erosion, and debris traveling in water courses and managing and impacting road and road improvement structures. These impacts could result in public health and safety issues. These impacts are also expected to present flood hazard to properties immediately downstream from the road infrastructure if debris builds up at the structures.</p> <p>Grand Lake will be working to analyze, monitor and take protective action to ensure safety and operation of the infrastructure. We will be working with Grand County, NRCS, CWCB, NPS, USGS, USACE and other participating agencies in risk analysis and identification of values at risk and in need of protection. These working groups will make determinations about application for EWP program funding as objectives and outcomes are identified.</p>
<b>Lead Agency and Partners</b>	Grand Lake Public Works, and the Recovery Task Force working group titled Natural and Cultural Resources, and Infrastructure
<b>Priority:</b>	High
<b>Cost Estimate:</b>	\$100k-\$500k with specifics to be determined
<b>Benefits: (Losses Avoided)</b>	Reduce risk to the public, ensure sustained and resilient operation of critical road and draining infrastructure
<b>Potential Funding:</b>	Federal Grants, Local Government Funds
<b>Timeline:</b>	24-36 months
<b>Status:</b>	New in 2020.

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# ANNEX E: TOWN OF HOT SULPHUR SPRINGS

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## E.1 Community Profile

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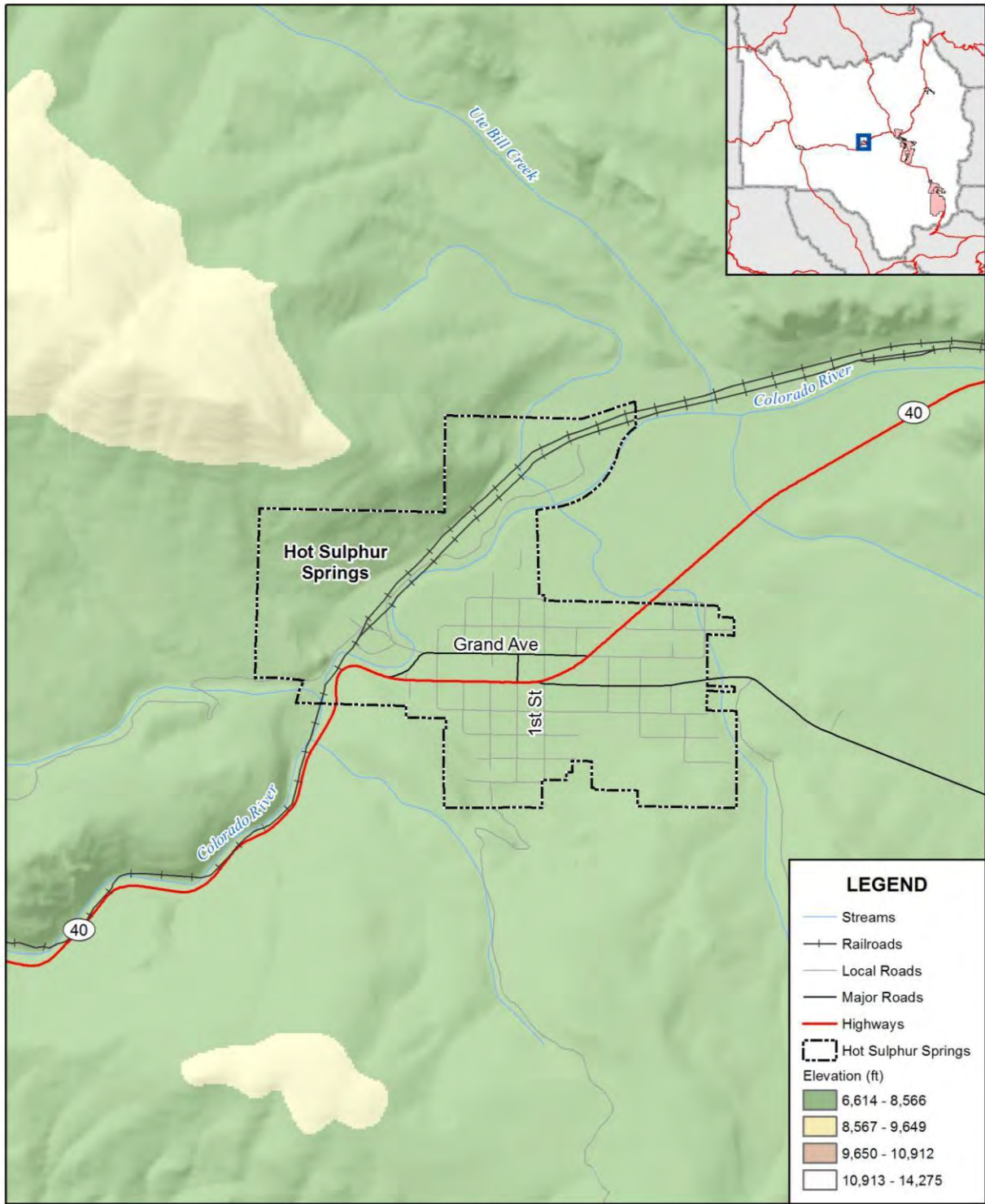
### Geography

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 34 years of records (1982-2016) recorded at a weather station at the Williams Fork Dam, which is located southwest of Parshall, the annual average max temperature is 53.7° F and average minimum temperature of 21.2 ° F. Average annual precipitation is 14.64 inches. The wettest month is July, which receives on average 1.85 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 75 inches of snow a year with an average depth of 2 inches.

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**



0 0.5 1 Miles

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 719 in 2019. Refer to Chapter 1 of the Grand County Base Plan for selected demographic and economic characteristics for Hot Sulphur Springs compared to the County as a whole and the other participating jurisdictions.

## **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 2019 estimates, the industries that employed the highest percentage of Hot Sulphur Springs's labor force were arts, entertainment, recreation, accommodation and food services (35.9%), construction (17.5%); finance, insurance, real estate, and rental and leasing (10.72.1%); retail trade (10.6%) and other services, except public administration (5.7%).

### **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.1). In the context of the countywide planning area, there are no hazards that are unique to Hot Sulphur Springs.

**Table E.1. Hot Sulphur Springs—Hazard Summary**

Hazard Type	Geographic Location*	Probability*	Magnitude*	Hazard Rating
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
Insect Disease 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.2 shows the total number of improved parcels, properties, and their improvement and content values for the Town of Hot Sulphur Springs’. Refer to Section 3 Risk Assessment for the methodology used to conduct the parcel analysis.

**Table E.2. Hot Sulphur Springs Improved Parcel and Property Exposure**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
Commercial Improved	16	\$3,683,660	\$3,683,660	\$7,367,320
Commercial Vacant	1	\$1,830	\$0	\$1,830
Mixed Use	9	\$5,574,620	\$5,574,620	\$11,149,240
Multi-Residential Improved	4	\$821,530	\$410,765	\$1,232,295
Residential Improved	268	\$52,724,420	\$26,362,210	\$79,086,630
Residential Vacant	5	\$50,060	\$0	\$50,060
Tax Exempt	15	\$7,841,790	\$7,841,790	\$15,683,580
<b>Total</b>	<b>318</b>	<b>\$70,697,910</b>	<b>\$43,873,045</b>	<b>\$114,570,955</b>

Source: Grand County Assessor’s Data, November 2020

Table E.3 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.3. 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

The intent of this section is to assess Hot Sulphur Spring’s vulnerability separate from that of the County as a whole, which has already been assessed in Section 3.3.3 Vulnerability Assessment of the Base Plan. For most of the hazards listed in Table E.3, hazard and vulnerability do not vary significantly from the County overall, or vulnerability data is difficult to compile or estimate below county level. As a result, only Flood, Landslide, and Wildfire are profiled separately in this annex. For the purpose of this plan, only the parts of the town that lie specifically within Grand County have been assessed for vulnerability data.

### 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

Table E.4 shows the results of the GIS analysis that was conducted using the best available flood hazard data to identify property exposure located in flood hazard zone and loss estimates. Refer to Section 3.3.3 Vulnerability by Hazard for an explanation on the methodology used to conduct the flood hazard analysis. Based on the analysis conducted, the town’s A Zone has an exposure value of over \$968,055. Flood loss estimates from the 1% annual chance event based on this assessment would be approximately \$242,014. Flooded structures for the DFIRM flood zones are depicted in Figure E.2.

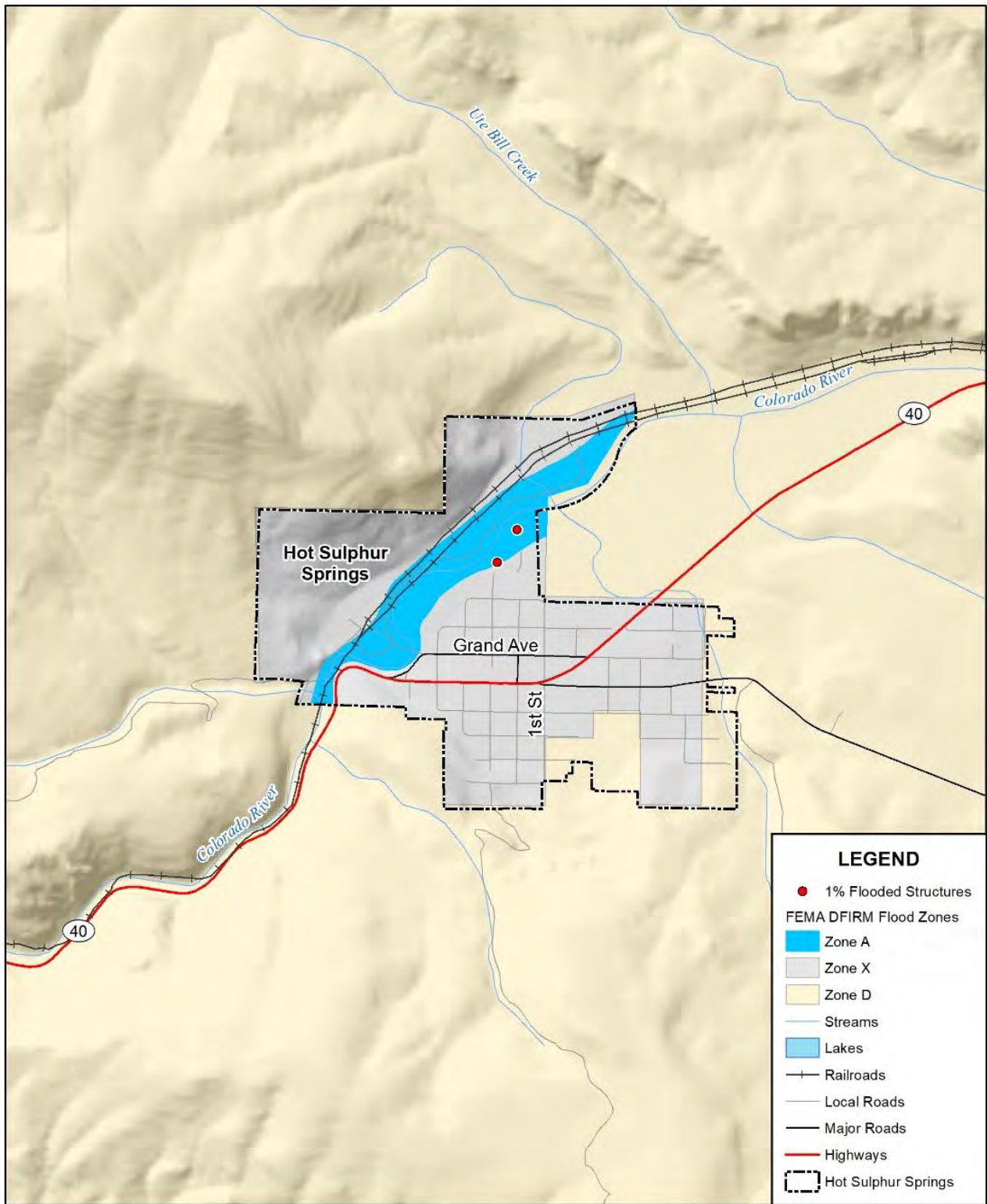
There are no critical facilities located in the floodplain in Hot Sulphur Springs.

**Table E.4. Hot Sulphur Springs—Flood Risk by Flood Zone and Property Type**

Flood	Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Loss Estimate
Zone A	Residential Improved	2	\$645,370	\$322,685	\$968,055	\$242,014
	<b>Total</b>	<b>2</b>	<b>\$645,370</b>	<b>\$322,685</b>	<b>\$968,055</b>	<b>\$242,014</b>

Source: Wood analysis of DFIRM

**Figure E.2. DFIRM Flood Zones and Flood-prone Properties in Hot Sulphur Springs**



Map compiled 11/2020;  
intended for planning purposes only.  
Data Source: Grand County, CDOT,  
FEMA NFHL 12/13/2013

0 0.5 1 Miles



The population exposed to the flood hazards described in the flood vulnerability analysis above was estimated by applying an average household size factor (based on Colorado State Demography Office 2019 estimates for Hot Sulphur Springs of 2.49 persons per household) to the number of improved residential properties identified in the flood hazard areas within Fraser. These estimates yielded the population exposures shown in Table 3-33 in Chapter 3 Risk Assessment. As such, a flood in Zone A or AE would potentially displace a total of 5 people, based on the residential structures which fall in those flood zones. For additional details on potential displacements by flood event, see the Grand County Base Plan.

Flooding can have a major economic impact on the economy, including indirect losses such as business interruption, lost wages, and other downtime costs. Flooding often coincides with the busy summer tourism months in Grand County, and may impact, directly or indirectly (such as from the negative perception of potential danger to his hazard), the revenues of shops, restaurants, hotels, and other major industries which keep the local economy thriving. In addition, major flooding which led to road or other infrastructure closures could additionally limit access to the Town by tourists, locals, and even basic goods and services.

The environment is mostly resilient to general flooding. However, cultural, or historic properties within floodplains would be affected in similar ways as property and critical facilities/infrastructure, especially those with underground or basement levels where water would easily seep and potential ruin archives, resources, or other important assets.

### ***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. Refer to Figure E.3 depicts the location of landslide deposits identified in Hot Sulphur Springs.

### ***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 2020 update. The results of the overlay analysis for the Town of Hot Sulphur Springs are presented in Table E.7.

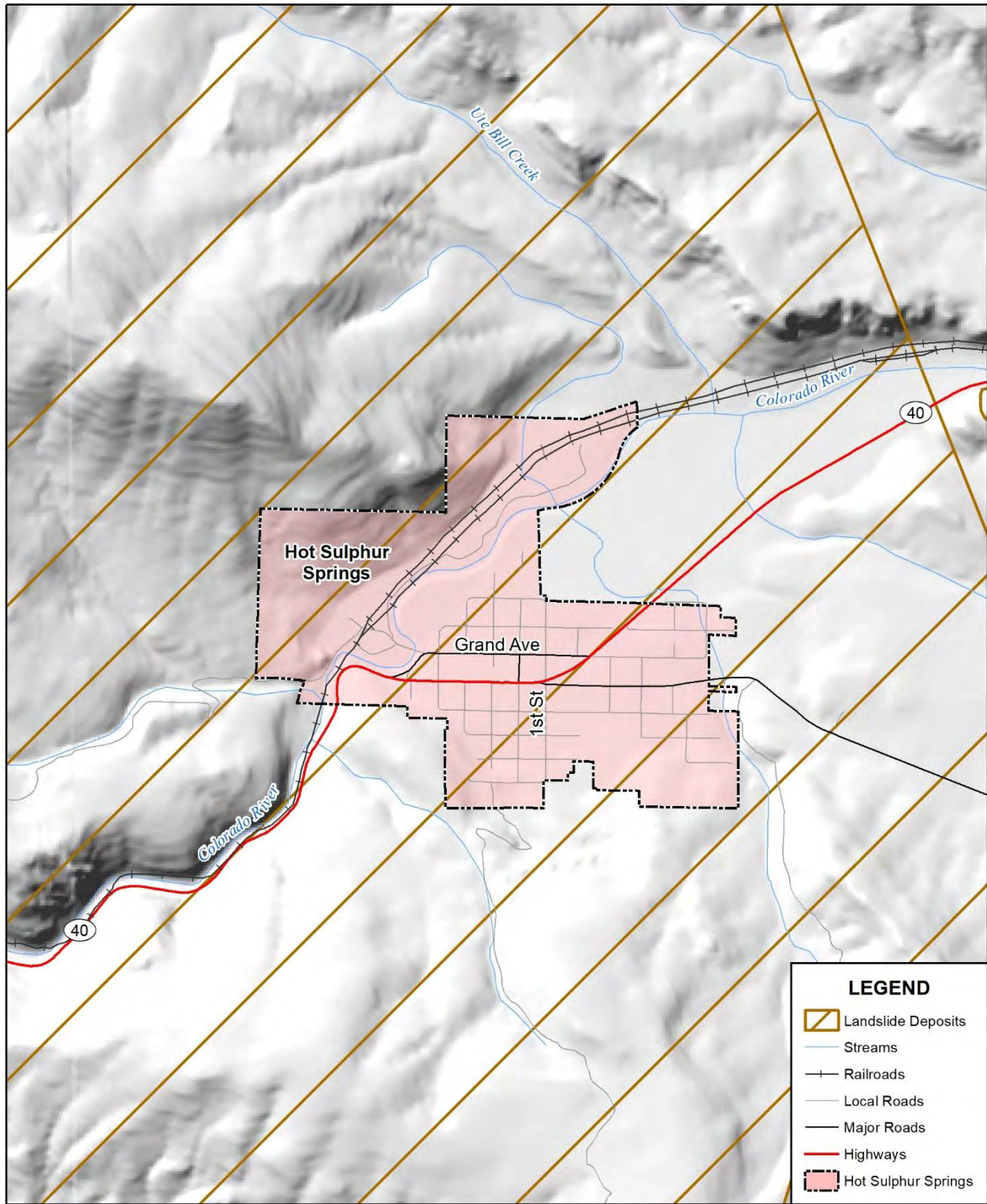
Based on the analysis, Hot Sulphur Springs have a total exposure value of over \$114 million. A total of 318 properties are exposed to general landslide hazards, of those 272 properties are residential. A site-specific analysis would be needed to further quantify actual risk to structures on these parcels.

**Table E.5 Landslide Exposure by Property Type**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
Commercial Improved	16	\$3,683,660	\$3,683,660	\$7,367,320
Commercial Vacant	1	\$1,830	\$0	\$1,830
Mixed Use	9	\$5,574,620	\$5,574,620	\$11,149,240
Multi-Residential	4	\$821,530	\$410,765	\$1,232,295
Residential Improved	268	\$52,724,420	\$26,362,210	\$79,086,630
Residential Vacant	5	\$50,060	\$0	\$50,060
Tax Exempt	15	\$7,841,790	\$7,841,790	\$15,683,580
<b>Total</b>	<b>318</b>	<b>\$70,697,910</b>	<b>\$43,873,045</b>	<b>\$114,570,955</b>

Source: Wood analysis, USGS, County Assessor

**Figure E.3. Landslide Areas in Hot Sulphur Springs**



Map compiled 11/2020;  
intended for planning purposes only.  
Data Source: Grand County, CDOT,  
Colorado Geological Survey

0 0.5 1 Miles



People could be susceptible if they are caught in a landslide or debris flow, potentially leading to injury or death. There is also a danger to drivers operating vehicles, as rocks and debris can strike vehicles passing through the hazard area or cause dangerous shifts in roadways. Based on Table 3-37 in the Grand County base plan, an estimated 679 people could be at risk of general landslide hazards in Hot Sulphur Springs. At risk population was estimated by multiplying the average number of persons living in each household in the Town of Hot Sulphur Springs (which is 2.49 per household) times the number of properties of type "residential" where landslide areas have been inventoried in the town.

Based on the analysis shown in Table E.5., 16 commercial properties with a total value of \$7,367,320 are at risk to landslide hazards. Economic impacts related to landslide, rockfall, debris fall, and mudslide hazards typically center around transportation routes temporarily closed by debris flow or other activity. No routes were found to be at risk.

As primarily natural processes, landslides and debris flows can have varying impacts to the natural environment as well as cultural or historical resources found on their path. For buildings and other structures, impacts would be similar as those seen on general property or critical facilities/infrastructure.

### ***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, the majority of risk to wildfire is to residential structure. The breakdown of improved properties within high risk WUI communities are shown in Table E.6 and in Figure E.4. The majority of risk to wildfire is to residential structures, but some commercial areas are at risk as well.

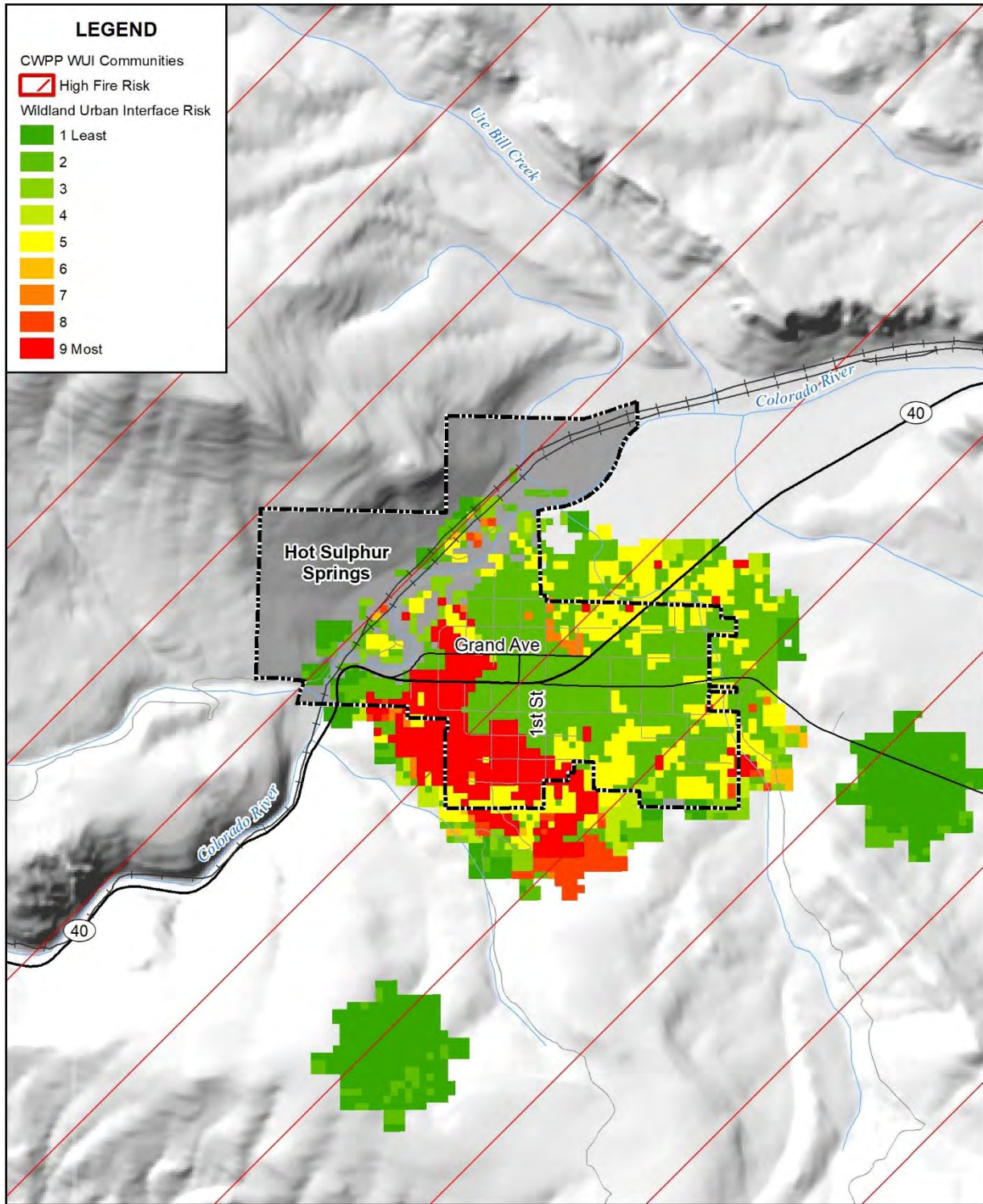
**Table E.6 Hot Sulphur Springs— Improved Properties within High Risk WUI Communities**

<b>Property Type</b>	<b>Improved Parcel Count</b>	<b>Improved Value</b>	<b>Estimated Content Value</b>	<b>Total Value</b>
Commercial Improved	16	\$3,683,660	\$3,683,660	\$7,367,320
Commercial Vacant	1	\$1,830	\$0	\$1,830
Mixed Use	9	\$5,574,620	\$5,574,620	\$11,149,240
Multi-Residential Improved	4	\$821,530	\$410,765	\$1,232,295
Residential Improved	268	\$52,724,420	\$26,362,210	\$79,086,630
Residential Vacant	5	\$50,060	\$0	\$50,060
Tax Exempt	15	\$7,841,790	\$7,841,790	\$15,683,580
<b>Total</b>	<b>318</b>	<b>\$70,697,910</b>	<b>\$43,873,045</b>	<b>\$114,570,955</b>

Source: Wood analysis, County Assessor, Hot Sulphur Springs/Parshall Protection District CWPP

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.

**Figure E.4. WUI Communities and Risk in Hot Sulphur Springs**



Map compiled 12/2020; intended for planning purposes only.  
 Data Source: Grand County, CDOT, East Grand Fire Protection District, Colorado Forest Atlas - Colorado State Forest Service

0 0.5 1 Miles



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.

The Town of Hot Sulphur Springs has an estimated 679 number of people at risk within high risk WUI communities. Note: There are a number of second homes in the area, thus are not populated year-round. However, the population projected in this modeling may reflect the seasonal population swells, that often coincides with high fire season in the summer. These totals were estimated by multiplying the average persons per household in Grand Lake by the number of residential properties falling within the fire zone/s.

Tourism, the accommodation, and food services industry (e.g., hotels and restaurants), and retail are major components of Grand County's economy, and Hot Sulphur Springs' as well. Wildland fires can cause economic disruptions, for example, lead to significant tourism reductions due to health and safety concerns, causing lost revenues from lack of visitation, stays in hotels, spending on restaurants and other commerce sources, and more.

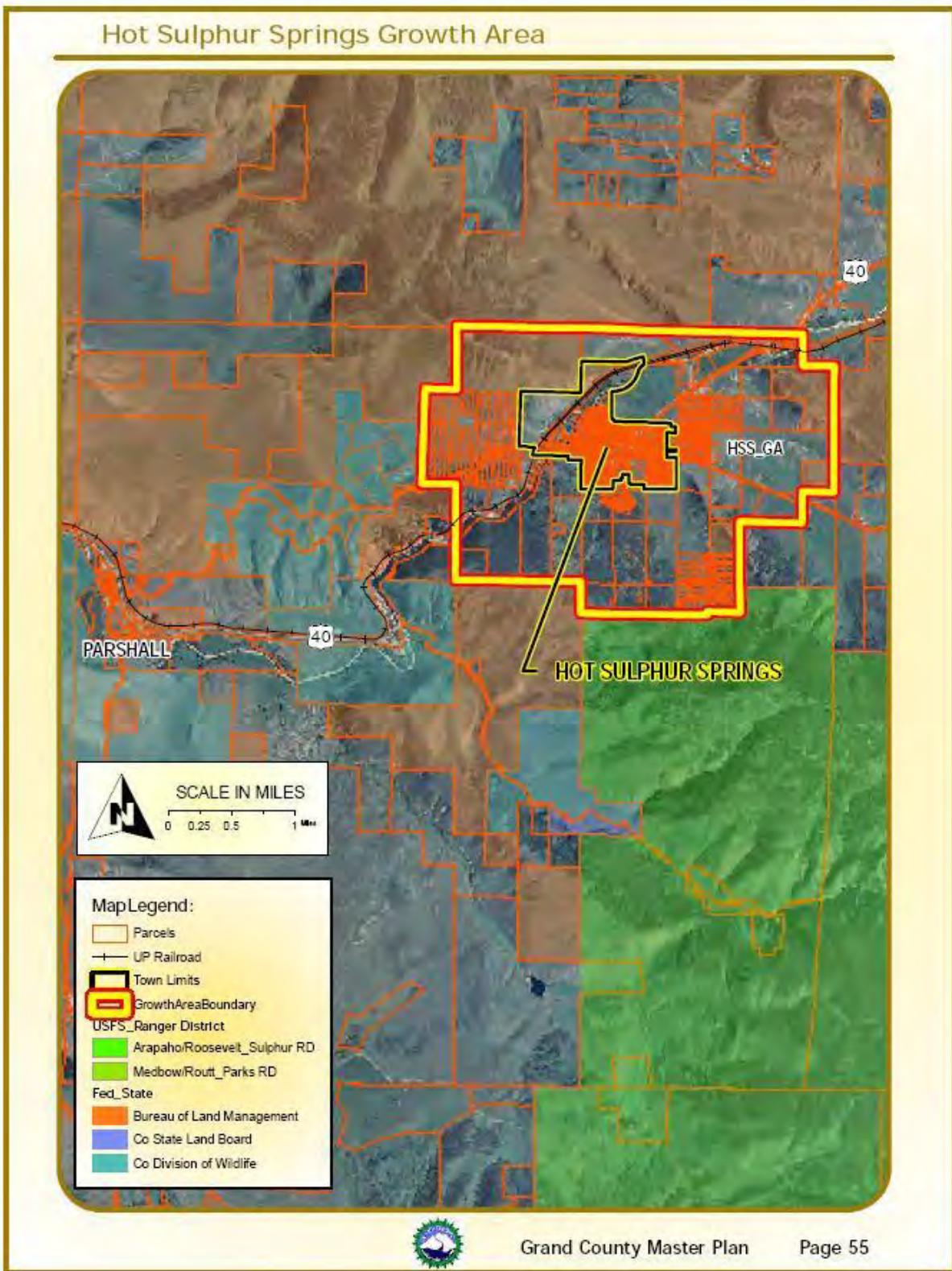
### ***Future Development***

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.

### **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.7 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 has followed Grand County's lead in regards to the NFIP, who also does not participate. The Town has minimal flood risk to existing development and the community addresses floodplain management policies in its Municipal Code. The Town may reconsider NFIP participation in the future.

**Table E.7. Hot Sulphur Springs—Regulatory Mitigation Capabilities**

Regulatory Tool (Ordinances, Codes, Plans)	Yes/No	Comments
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	2009
Building Code Effectiveness Grading Schedule (BCEGS) Rating	Yes	9 for residential and 9 for commercial
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	
National Flood Insurance Program	No	Sanctioned since 1975
Community Rating System	No	
Community Wildfire Protection Plan	Yes	Hot Sulphur Springs – Parshall Fire Protection District (CWPP) 2011

Other
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**Administrative/Technical Mitigation Capabilities**

Table E.8 identifies the personnel responsible for activities related to mitigation and loss prevention in Hot Sulphur Springs.

**Table E.8. Hot Sulphur Springs – Regulatory Mitigation Capabilities**

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Yes	Contracted with Community Planning Strategies	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Contracted with Ed Duerr, Inc	
Planner/engineer/scientist with an understanding of natural hazards	Yes	Contracted with Ed Duerr, Inc	
Personnel skilled in GIS	Yes	Contracted with GEI Consultants	
Full time building official	No	IGA with GC	
Floodplain manager	No		
Emergency manager	Yes	Public Works Director	
Grant writer	Yes	Town Clerk	
<b>Other personnel</b>			
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Yes	Contracted with GEI Consultants	
Warning Systems - CodeRED	Yes	Public Works Director	
Resiliency Planner	No		
Transportation Planner	No		

**Fiscal Mitigation Capabilities**

Table E.9 identifies financial tools or resources that Hot Sulphur Springs that have been used and could potentially use to help fund mitigation activities.

**Table E.9. Hot Sulphur Springs – Fiscal Mitigation Capabilities**

Financial Resources	Accessible/Eligible to Use (Yes/No)	Has it been used to fund mitigation in the past?
Community Development Block Grants	N	N
Capital Improvements Project Funding	N	N
Authority to Levy Taxes for Specific Purposes	N	N
Fees for Water, Sewer, Gas, or Electric Services	N	N
Impact Fees for New Development	N	N
Incur Debt through General Obligation Bonds	N	N
Incur Debt through Special Tax Bonds	N	N
Incur Debt through Private Activities	N	N
Withhold Spending in Hazard Prone Areas	N	N

## Mitigation Outreach and Partnerships

**Table E.10 Mitigation Education and Outreach Capabilities**

Education & Outreach Capabilities	Yes/No	Comments
Local Citizen Groups That Communicate Hazard Risks	Yes	Grand County Wildfire Council
Firewise	No	
StormReady	No	
Other	Yes	Headwaters Trail Alliance

The Colorado State Forest Service was noted as a mitigation partner in Hot Sulphur Springs and have done or planned some forest health treatments in and around Hot Sulphur Springs. Members of the HMPC also noted during the planning process that the Headwaters Trails Alliance work throughout Grand County to help maintain and build trail throughout the county including providing signage along trails. During this planning process the Town of Hot Sulphur Springs noted that the Alliance could be involved and leveraged in future efforts of public education and outreach related to hazards in the Hot Sulphur Springs.

## Opportunities for Enhancement

Based on the capability assessment, Hot Sulphur Springs has several existing mechanisms in place that already help to mitigate hazards. There are also opportunities for the Town to expand or improve on these policies and programs to further protect the community. Future improvements may include providing training for staff members related to hazards or hazard mitigation grant funding in partnership with the County and DHSEM. Additional training opportunities will help to inform Town staff and Town Council on how best to integrate hazard information and mitigation projects into the Town policies and ongoing duties of the Town. Continuing to train Town staff on mitigation and the hazards that pose a risk to the Town will lead to more informed staff members who can better communicate this information to the public.

Other capability enhancements would be to integrate risk assessment information into future updates to the Town's Comprehensive Plan and to join the National Flood Insurance Program. Could also work to improve the Building Code Effectiveness Grading System rating, which is currently at an entry level.

## **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>	2025
<b>Status:</b>	In progress. 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>	Severe Winter Storm
<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>	Hot Sulphur Springs Public Works, 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>	2025
<b>Status:</b>	In progress– still updating the streets.

## Mitigation Action: Hot Sulphur Springs 2020-1 Power Outage Resiliency

<b>Jurisdiction:</b>	Town of Hot Sulphur Springs
<b>Hazard(s) Addressed</b>	Lightning, Wildfire, Severe Winter Weather,
<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>	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, FEMA
<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

## Mitigation Action: Hot Sulphur Springs 2020-2 Implementation of wells for alternate source of raw water supply

<b>Jurisdiction:</b>	Town of Hot Sulphur Springs
<b>Hazard Addressed</b>	Flood, Landslide/Mud Flow/Debris Flow/Rock Fall, Wildfire, Drought
<b>Project Description, Issue &amp; Background</b>	<p>Heavy sediment in the Colorado River causing the raw water infiltration pipes to become plugged and severely limiting the ability to provide clean safe water to the citizens, as well as extensive cost to repair or replace damaged water treatment equipment due to heavy sediment.</p> <p>Wildfires in the surrounding areas of Hot Sulphur Springs have the potential to negatively affect the local water sheds causing landslides, debris, firefighting chemicals, and heavy sediment in general to be carried to the Colorado River. Sediment or debris travel downstream to the town's raw water intake gallery consequently plugging the intake pipes in the riverbed. The town's water treatment facilities rely on adequate and quality raw water for the treatment process. Without a reliable raw water source from the Colorado River, the possibility exists of being unable to provide safe, clean drinking water to the citizens of Hot Sulphur Springs. To mitigate this scenario, we propose to drill a number of wells near the current raw water infiltration gallery. This will allow for an alternate source of quality raw water to be treated, thereby mitigating surface water quality issues, and providing additional supply during times of drought.</p>
<b>Lead Agency and Title of Lead Person</b>	Town of Hot Sulphur Springs Public Works
<b>Partners:</b>	CDPHE Water Quality Control Division, Northern Water, Army Corps of Engineers, Well Drilling Contractor.
<b>Priority:</b>	High
<b>Cost Estimate:</b>	\$500,000.00
<b>Benefits: (Losses Avoided)</b>	<p>Avoid a health crisis due to lack of safe, clean, potable water as well as significant cost to replace or repair the town's damaged water treatment equipment.</p> <p>Approximately 4 months</p>
<b>Timeline:</b>	
<b>Status:</b>	New in 2020

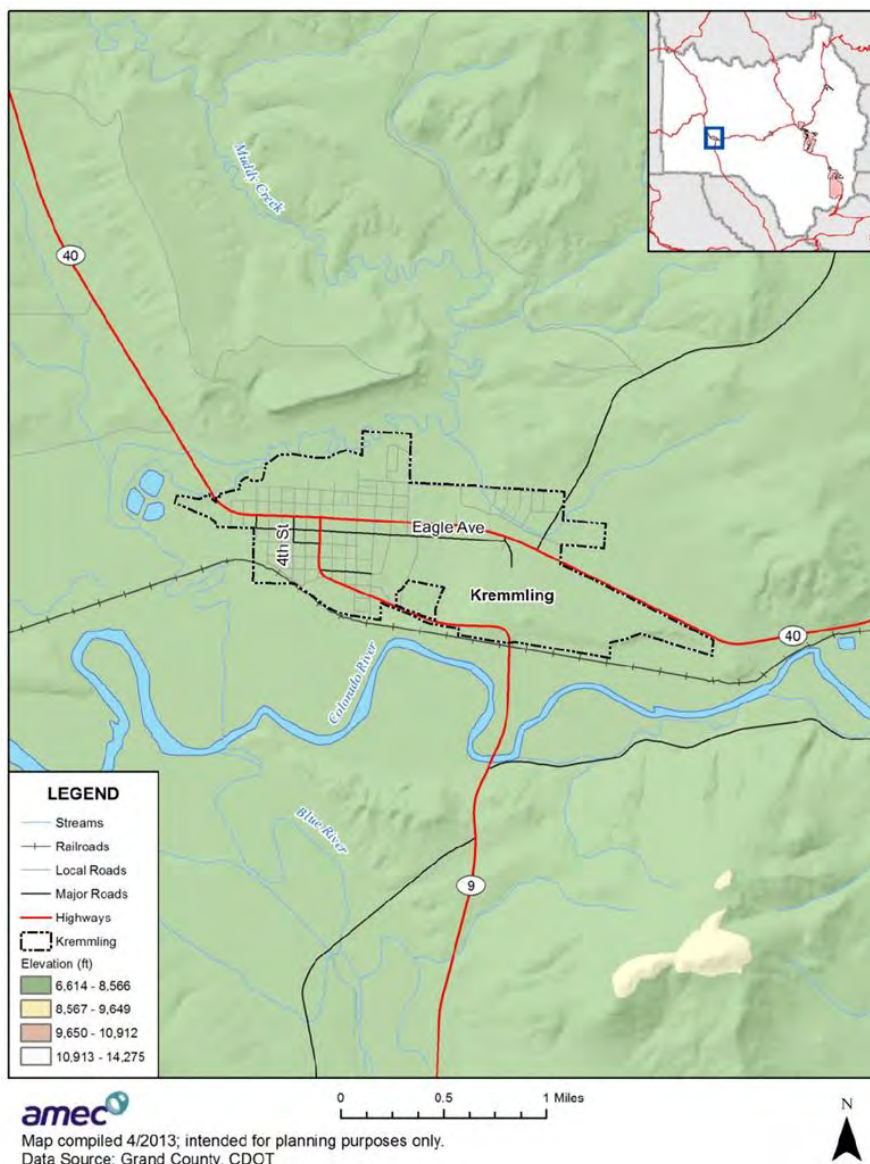
# ANNEX F: TOWN OF KREMMLING

## 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 1,444 in 2019. Refer to Chapter 1 of the Grand County Base Plan for selected demographic and economic characteristics for Kremmling compared to the County as a whole and the other participating jurisdictions.

## **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 Postmaster. 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 20th Century progressed, ranching became the main industry in the valley in the vicinity of the Town.

## **Economy**

According to the ACS 2019 estimates, the industries that employed the highest percentage of Kremmling's labor force were arts, entertainment, recreation, accommodation, and food services (14.2%); retail trade (8.5%); construction (20.5%); and finance, insurance, real estate, and rental and leasing (6.5%).

## F.2 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.1). 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.1. 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
Insect Disease 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.3 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.2 shows the total number of improved parcels, properties, and their improvement and content values for the Town of Kremmling. Refer to Section 3 Risk Assessment for the methodology used to conduct the parcel analysis.

**Table F.2 Kremmling Improved Parcel and Property Exposure**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
Commercial Improved	70	\$19,129,970	\$19,129,970	\$38,259,940
Commercial Vacant	3	\$5,860	\$0	\$5,860
Industrial Improved	3	\$938,300	\$1,407,450	\$2,345,750
Mixed Use	10	\$2,518,070	\$2,518,070	\$5,036,140
Multi-Residential Improved	8	\$2,243,520	\$1,121,760	\$3,365,280
Residential Improved	477	\$97,037,710	\$48,518,855	\$145,556,565
Residential Vacant	6	\$69,140	\$0	\$69,140
Tax Exempt	20	\$5,965,960	\$5,965,960	\$11,931,920
Vacant Land	2	\$61,630	\$0	\$61,630
<b>Total</b>	<b>599</b>	<b>\$127,970,160</b>	<b>\$78,662,065</b>	<b>\$206,632,225</b>

Source: Grand County Assessor’s Data, November 2020

Table F.3 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.3. 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: Lifeline facilities; HCNA: Historic, cultural, or natural assets; EA: Economic Asset

\*\*Identified separately by Grand County OEM

## **Vulnerability by Hazard**

The intent of this section is to assess Kremmling’s vulnerability separate from that of the County as a whole, which has already been assessed in Section 3.3.3 Vulnerability Assessment of the Base Plan. For most of the hazards listed in Table F.1, hazard and vulnerability do not vary significantly from the County overall, or vulnerability data is difficult to compile or estimate below county level. As a result, only Flood, Hazardous Materials, Landslide and Wildfire are profiled separately in this annex. For the purpose of this plan, only the parts of the town that lie specifically within Grand County have been assessed for vulnerability data.

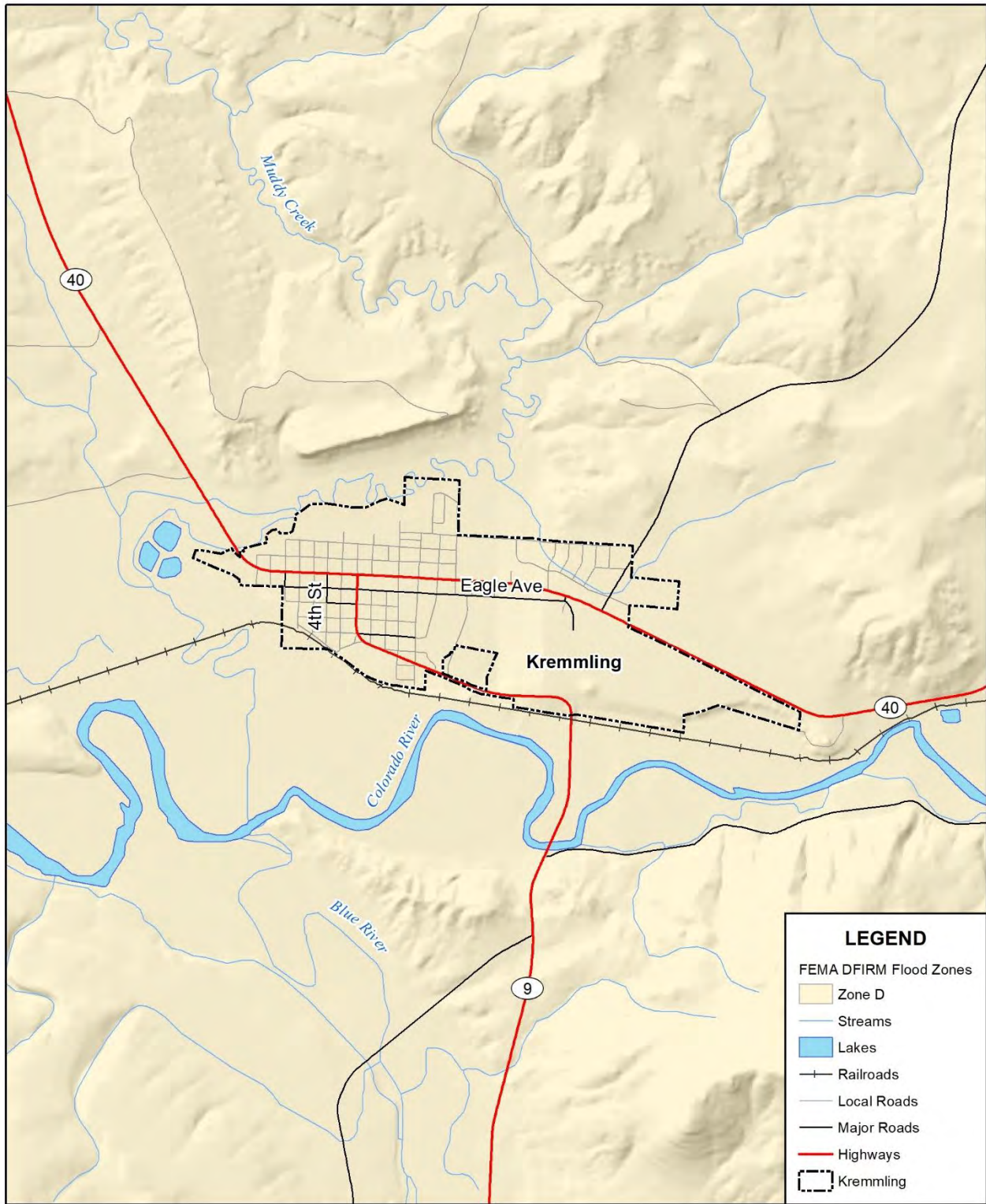
For more information about how hazards affect Grand County, see Section 3 (Risk Assessment) of the Base Plan.

### **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. 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**



**wood.** Map compiled 11/2020;  
intended for planning purposes only.  
Data Source: Grand County, CDOT,  
FEMA NFHL 12/13/2013

0 0.5 1 Miles



## **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 2020) in Kremmling, so the potential also exists for fixed hazmat incidents in the Town. Data from the National Response Center (NRC) between 2008 and 2020 showed six reported hazmat events in Kremmling, including one railroad event and five mobile events.

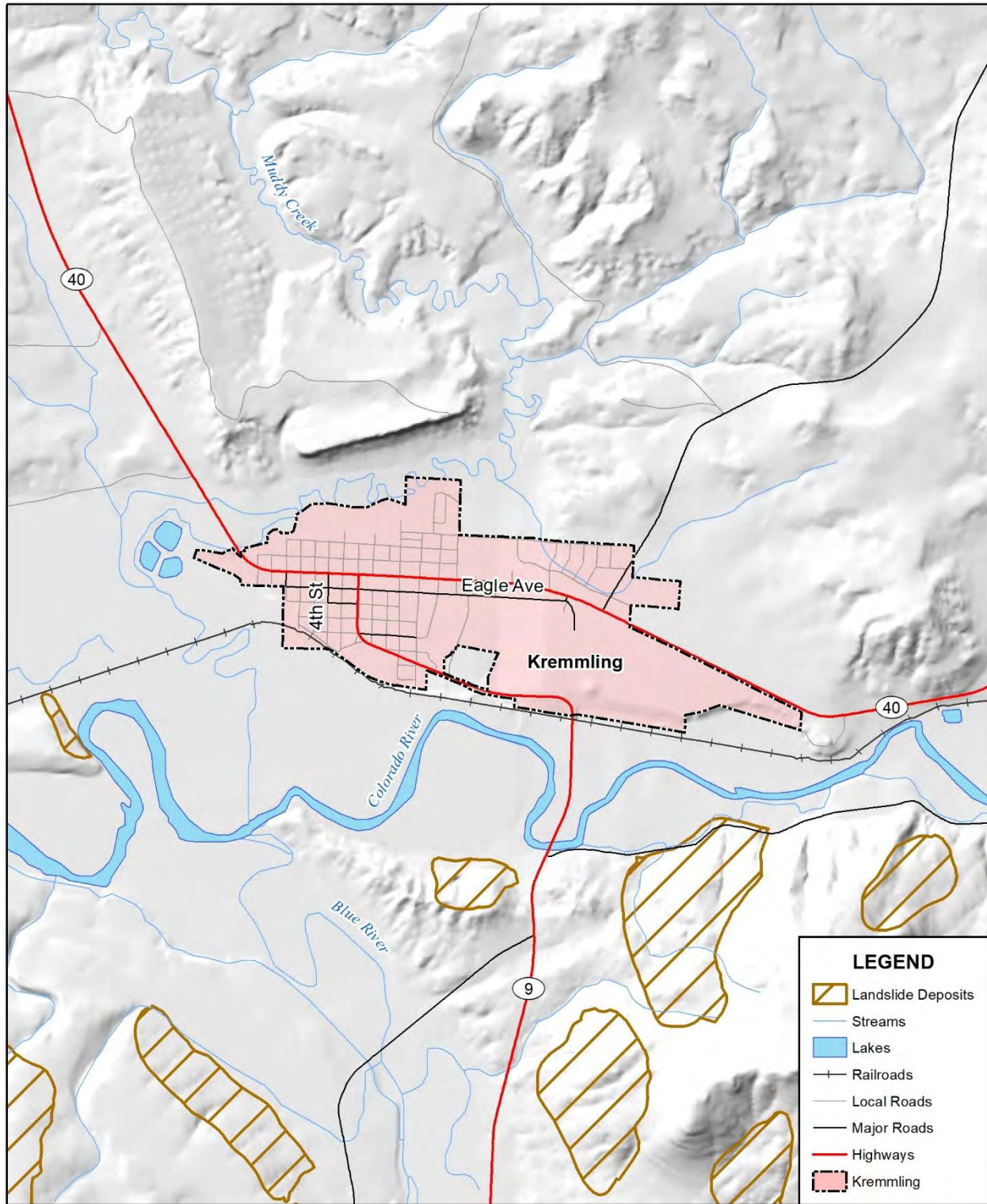
## **Landslide, Mud Flow/Debris Flow, Rock Fall**

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.

People could be susceptible if they are caught in a landslide or debris flow, potentially leading to injury or death. There is also a danger to drivers operating vehicles, as rocks and debris can strike vehicles passing through the hazard area or cause dangerous shifts in roadways, potentially leading to secondary economic impacts.

As primarily natural processes, landslides and debris flows can have varying impacts to the natural environment as well as cultural or historical resources found on their path. For buildings and other structures, impacts would be similar as those seen on general property or critical facilities/infrastructure. No critical facilities/infrastructure were found to be near landslide deposits based on the best available data.

**Figure F.3. Landslide Areas in Kremmling**



**wood** Map compiled 11/2020;  
intended for planning purposes only.  
Data Source: Grand County, CDOT,  
Colorado Geological Survey

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.

## **Wildfire**

### ***Existing Development***

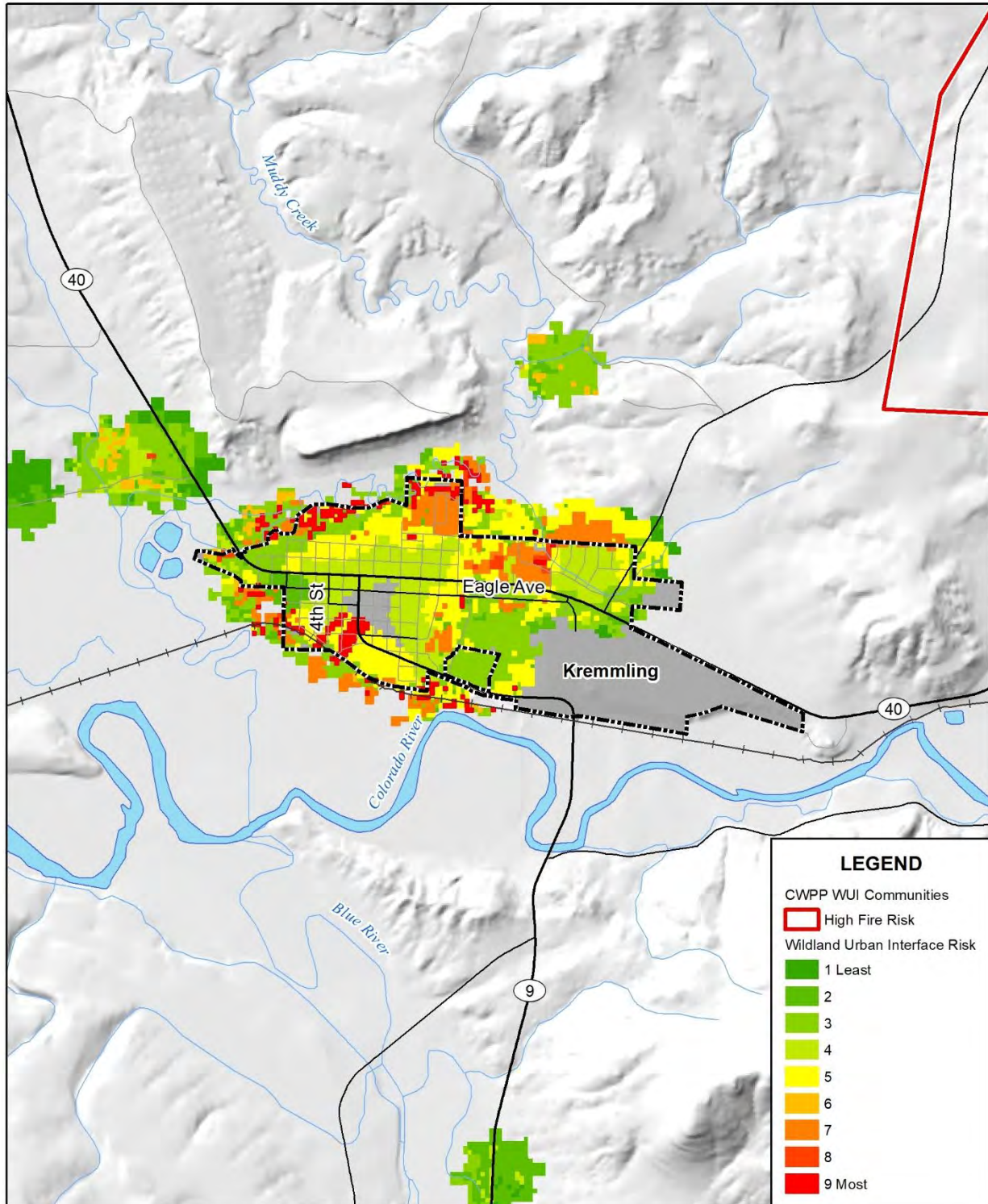
The Grand County CWPP (2006) evaluated the wildfire hazards to each of the incorporated and unincorporated towns in the County. Kremmling received a hazard rating of low. Kremmling is also covered by the Kremmling FPD CWPP. Refer to Table 3-40 for further details on the community wildfire hazard ratings in the Kremmling FPD CWPP. Figure F.4. shows the relative wildfire risk within the Town of Kremmling. Due to WUI areas ~~are~~ not being mapped within or near the Town in the Kremmling Fire Protection District CWPP, ~~because the data is currently not available~~ property exposure analysis specific to wildfire **for the Town** was not conducted. Refer to Annex H. Fire Protection Districts, and Table H.16 for the analysis results for the Kremmling Fire Protection District.

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.

Tourism, the accommodation, and food services industry (e.g., hotels and restaurants), and retail are major components of Grand County's economy, and in Fraser as well. Wildland fires can cause economic disruptions, for example, lead to significant tourism reductions due to health and safety concerns, causing lost revenues from lack of visitation, stays in hotels, spending on restaurants and other commerce sources, and more.

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.

**Figure F.4 Wildfire Risk in Kremmling**



Map compiled 12/2020;  
 intended for planning purposes only.  
 Data Source: Grand County, CDOT,  
 East Grand Fire Protection District,  
 Colorado Forest Atlas - Colorado State Forest Service

0 0.5 1 Miles

## Growth and Development Trends

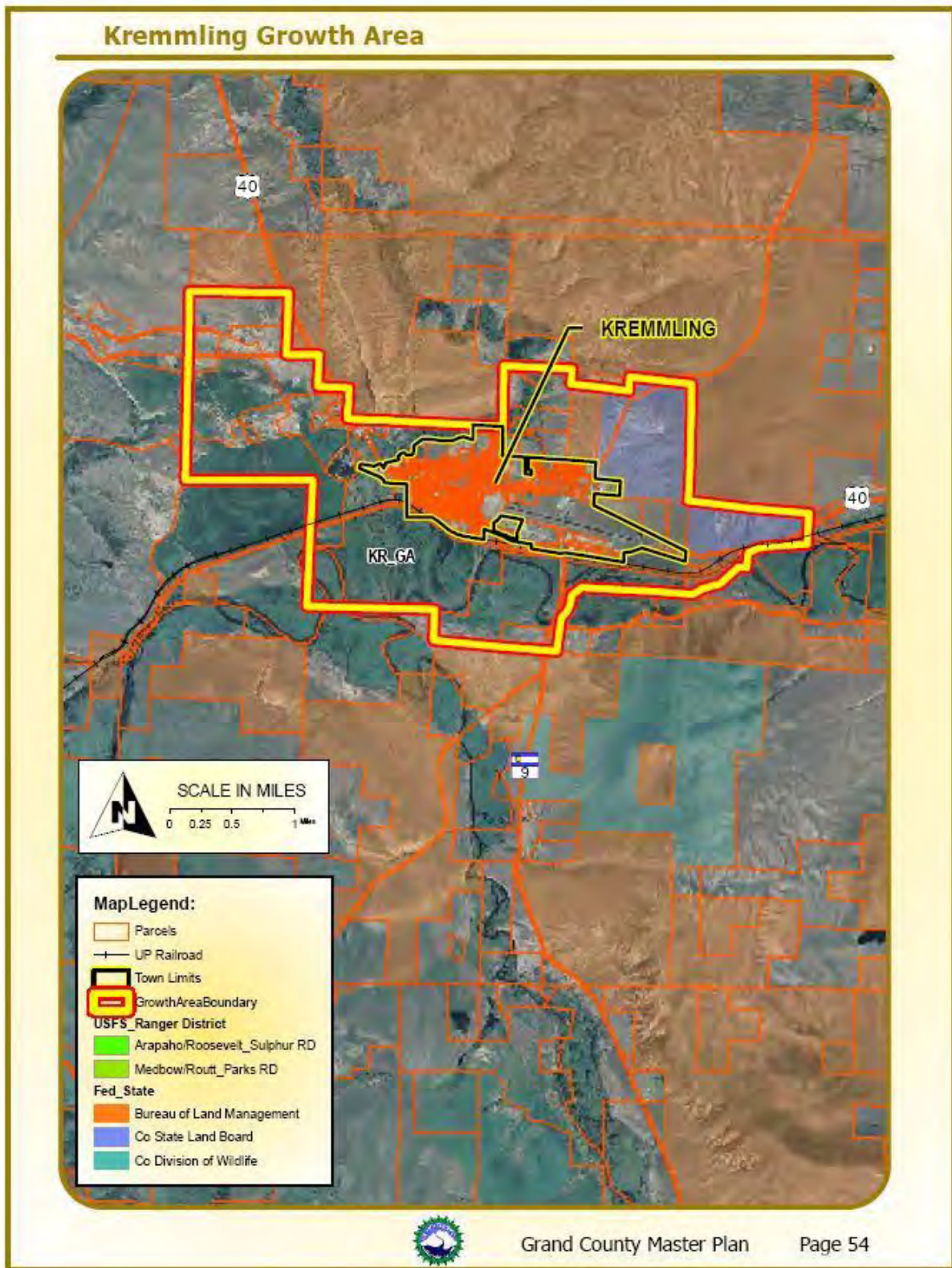
Table F.5 illustrates how Kremmling has grown in terms of population and number of housing units between 2000 and 2018. Growth has not been occurring within any identified hazard zone.

**Table F.5 Kremmling – Change in Population and Housing Units, 2000-2018**

2000 Population	2011 Population	2019 Population Estimate*	2000 # of Housing Units	2011 Estimated # of Housing Units	2018 Estimated # of Housing Units
1,578	2,039	1,444	2,039	722	742

Source: factfinder2.census.gov \*Colorado State Demography Office 2019 Estimates

Figure F.4. Kremmling Growth Areas



## F.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 F.6 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.6. Kremmling—Regulatory Mitigation Capabilities**

Regulatory Tool (Ordinances, Codes, Plans)	Yes/No	Comments
General or Comprehensive plan	Yes	2014
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	2009
Building Code Effectiveness Grading Schedule (BCEGS) Rating	N/A	
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	
National Flood Insurance Program	No	Participation not required
Community Rating System	No	
Community Wildfire Protection Plan	Yes	Kremmling Fire Protection District CWPP (2011)
Other		

## Administrative/Technical Mitigation Capabilities

Table E.7 identifies the personnel responsible for activities related to mitigation and loss prevention in Hot Sulphur Springs.

**Table F.7 Kremmling – Regulatory Mitigation Capabilities**

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Yes	Town Manager	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	No		
Planner/engineer/scientist with an understanding of natural hazards	No		
Personnel skilled in GIS	Yes	Town Manager	
Full time building official	No		
Floodplain manager	No		
Emergency manager	Yes	Town Manager	
Grant writer	Yes	Town Manger	
<b>Other personnel</b>			
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	No		
Warning Systems - CodeRED	Yes		
Resiliency Planner	No		
Transportation Planner	No		

## Fiscal Mitigation Capabilities

Table F.8 identifies financial tools or resources that Kremmling that have been used and could potentially use to help fund mitigation activities.

**Table F.8. Kremmling—Fiscal Mitigation Capabilities**

Financial Resources	Accessible/Eligible to Use (Yes/No)	Has it been used to fund mitigation in the past?
Community Development Block Grants	Y	No
Capital Improvements Project Funding	Y	No
Authority to Levy Taxes for Specific Purposes	Y	No
Fees for Water, Sewer, Gas, or Electric Services	Y	No
Impact Fees for New Development	Y	No
Incur Debt through General Obligation Bonds	Y	No
Incur Debt through Special Tax Bonds	Y	No
Incur Debt through Private Activities	Y	No
Withhold Spending in Hazard Prone Areas	Y	No

## Mitigation Outreach and Partnerships

**Table F. 9 Mitigation Education and Outreach Capabilities**

Education & Outreach Capabilities	Yes/No	Comments
Local Citizen Groups That Communicate Hazard Risks	No	
Firewise	Yes	Gorewood subdivision
StormReady	No	
Other	Yes	

The Town of Kremmling is involved in the following mitigation related outreach programs and partnerships:

- Fire safety programs are given at Kremmling schools
- Kremmling FPD participated in the development of the Kremmling FPD Community Wildfire Protection Plan.

## Opportunities for Enhancement

Based on the capability assessment, Kremmling has several existing mechanisms in place that already help to mitigate hazards. There are also opportunities for the Town to expand or improve on these policies and programs to further protect the community. Future improvements may include providing training for staff members related to hazards or hazard mitigation grant funding in partnership with the County and DHSEM. Additional training opportunities will help to inform Town staff and Town Council on how best to integrate hazard information and mitigation projects into the Town policies and ongoing duties of the Town. Continuing to train Town staff on mitigation and the hazards that pose a risk to the Town will lead to more informed staff members who can better communicate this information to the public.

Other capability enhancements would be to integrate risk assessment information into future updates to the Town’s Comprehensive Plan and to join the National Flood Insurance Program.

## **F.5 Mitigation Goals and Objectives**

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Kremmling had adopted the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 4 Mitigation Strategy.

## **F.6 Mitigation Actions**

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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>	<p>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.</p> <p>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.</p>
<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>	2025
<b>Status:</b>	In progress. In 2016, CDOT in cooperation with Colorado Parks and Wildlife and other partners, completed Colorado's first-of-its-kind wildlife overpass system, on Highway 9 between Green Mtn Reservoir and Kremmling.

## Mitigation Action: Kremmling 2015-2 Pedestrian Road Crossing or Crosswalk

<b>Jurisdiction:</b>	Grand County/Kremmling
<b>Hazard Addressed</b>	Severe 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>	2025
<b>Status:</b>	Continue- not completed

## Mitigation Action: Kremmling 2015-3 Road Paving Project

<b>Jurisdiction:</b>	Kremmling
<b>Hazard Addressed</b>	Flood, Severe Winter Storm (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>	Town Of Kremmling
<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>	2025
<b>Status:</b>	Continue- not completed

## Mitigation Action: Kremmling 2020-1 Dam Failure Evacuation and Communication Plan

<b>Jurisdiction:</b>	Kremmling
<b>Hazard Addressed</b>	Dam Failure; Flood
<b>Project Description, Issue &amp; Background</b>	Develop an evacuation and communication plan for the Town of Kremmling in response to a failure at the Wolford Dam. While unlikely, If the Wolford Dam were to fail, the impacts on the town would be catastrophic, and if people were unable to effectively evacuate, a large loss of life would be probable. The town does not currently have an evacuation plan for such an event or alert and warning capabilities.
<b>Lead Agency/Partners</b>	Town of Kremmling, Kremmling Police Department, Grand County, GCSO, The Colorado River District
<b>Priority:</b>	Medium
<b>Cost Estimate:</b>	\$30,000
<b>Benefits: (Losses Avoided)</b>	Avoid loss of life
<b>Potential Funding:</b>	HHPD
<b>Timeline:</b>	Late 2022
<b>Status:</b>	New in 2020

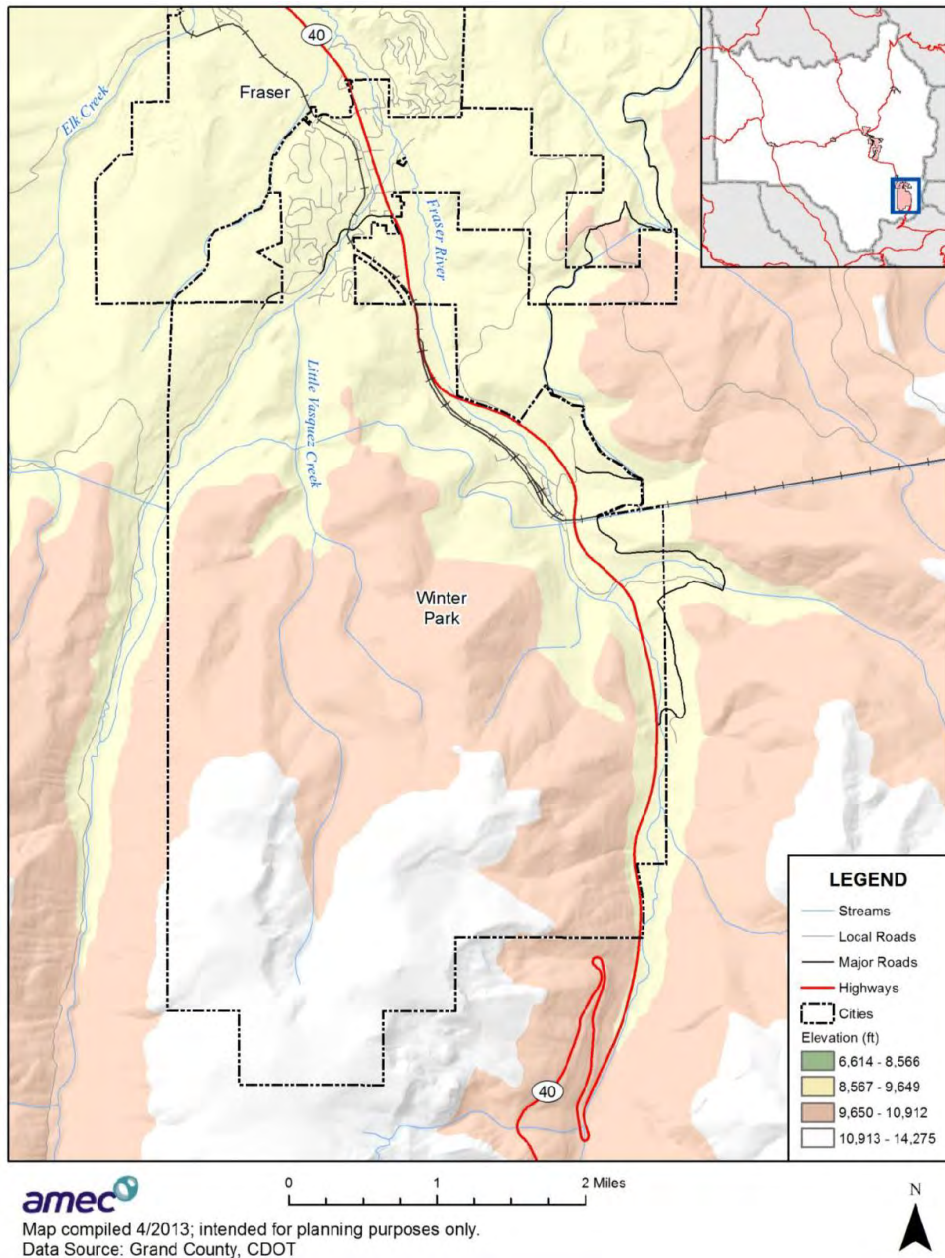
# ANNEX G: TOWN OF WINTER PARK

## 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. Refer to Chapter 1 of the Grand County Base Plan for selected demographic and economic characteristics for Winter Park compared to the County as a whole and the other participating jurisdictions.

## **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 2019 estimates, the industries that employed the highest percentage of Winter Park’s labor force were arts, entertainment, recreation, accommodation, and food services (46.1%); retail trade (3.1%); construction (11.6%); and finance, insurance, real estate, and rental and leasing (9.2%).

## 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.1). In the context of the countywide planning area, there are no hazards that are unique to Winter Park.

**Table G.1. 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
Insect Disease 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.2 shows the total number of improved parcels, properties, and their improvement and content values for the Town of Winter Park. Refer to Section 3 Risk Assessment for the methodology used to conduct the parcel analysis.

**Table G. 2 Winter Park Improved Parcel and Property Exposure**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
Commercial Improved	88	\$53,127,890	\$53,127,890	\$106,255,780
Commercial Vacant	1	\$40,480	\$0	\$40,480
Multi-Residential Improved	21	\$11,270,960	\$5,635,480	\$16,906,440
Residential Improved	2,667	\$1,214,223,790	\$607,111,895	\$1,821,335,685
Residential Vacant	3	\$1,133,200	\$0	\$1,133,200
Tax Exempt	20	\$9,738,880	\$9,738,880	\$19,477,760
<b>Total</b>	<b>2,800</b>	<b>\$1,289,535,200</b>	<b>\$675,614,145</b>	<b>\$1,965,149,345</b>

Source: Grand County Assessor’s Data, November 2020

Table G.3 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.3. 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: 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**

The intent of this section is to assess Winter Park's vulnerability separate from that of the County as a whole, which has already been assessed in Section 3.3.3 Vulnerability Assessment of the Base Plan. For most of the hazards listed in Table G.1, hazard and vulnerability do not vary significantly from the County overall, or vulnerability data is difficult to compile or estimate below county level. As a result, only Avalanche, Flood, Hazardous Materials, Landslide and Wildfire are profiled separately in this annex. For the purpose of this plan, only the parts of the town that lie specifically within Grand County have been assessed for vulnerability data.

For more information about how hazards affect Grand County, see Section 3 (Risk Assessment) of the Base Plan. These hazards include avalanche, flood, hazardous materials, landslide, and wildfire.

### **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***

Table G.4 shows the results of the GIS analysis that was conducted using the best available flood hazard data to identify property exposure located in flood hazard zone and loss estimates. Refer to Section 3.3.3 Vulnerability by Hazard for an explanation on the methodology used to conduct the flood hazard analysis. Based on the analysis conducted, the Town's AE Zone has an exposure value of over \$24 million for a total of 53 properties. Flood loss from the 1% annual chance event based on this assessment would be in the magnitude of \$6 million. The total exposure value in Winter Park's 0.2% annual chance flood zone is \$15 million, with a loss estimate of over \$3 million. Flooded structures for the DFIRM flood zones are depicted in Figure G.2.

**Table G.4 Winter Park—Flood Risk to FEMA 1% Annual Chance Flood Hazard**

Flood	Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Loss Estimate
Zone AE	Multi-Residential Improved	1	\$302,190	\$151,095	\$453,285	\$113,321
	Residential Improved	51	\$15,667,010	\$7,833,505	\$23,500,515	\$5,875,129
	Tax Exempt	1	\$96,970	\$96,970	\$193,940	\$48,485
<b>Total</b>		<b>53</b>	<b>\$16,066,170</b>	<b>\$8,081,570</b>	<b>\$24,147,740</b>	<b>\$6,036,935</b>

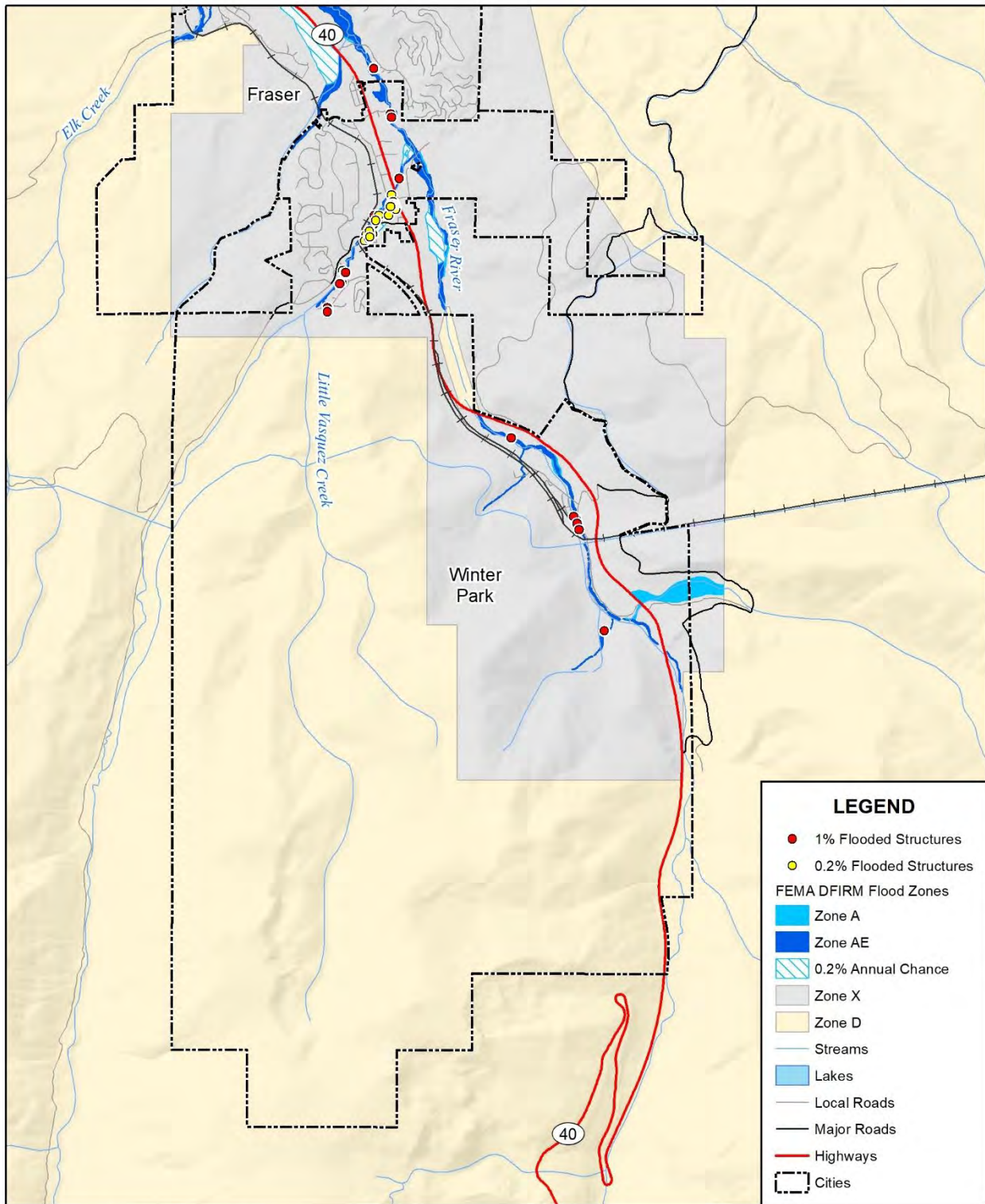
Source: Wood analysis of DFIRM

**Table G. 5 Winter Park—Flood Risk to FEMA 0.2% Annual Chance Flood Hazard**

Flood	Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Loss Estimate
0.2% Annual Chance	Commercial Improved	9	\$3,220,570	\$3,220,570	\$6,441,140	\$1,610,285
	Multi-Residential Improved	1	\$405,090	\$202,545	\$607,635	\$151,909
	Residential Improved	13	\$5,808,270	\$2,904,135	\$8,712,405	\$2,178,101
<b>Total</b>		<b>23</b>	<b>\$9,433,930</b>	<b>\$6,327,250</b>	<b>\$15,761,180</b>	<b>\$3,940,295</b>

According to analysis of critical facilities in flood zones, there is 1 facility, the Sunspot Water Pumpstation is at risk to the 1% annual chance flood.

**Figure G.2. DFIRM Flood Zones and Flood-prone Properties in Winter Park**



Map compiled 11/2020;  
intended for planning purposes only.  
Data Source: Grand County, CDOT,  
FEMA NFHL 12/13/2013

0 1 2 Miles



### ***National Flood Insurance Program***

Winter Park joined the National Flood Insurance Program (NFIP) on November 15, 1985. NFIP insurance data indicates that as of December 2020, there were 126 flood insurance policies in force in Winter Park with \$21,935,600 of coverage. Seventy-six of the policies are in Winter Park's A zone, and forty-two 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.

The population exposed to the flood hazards described in the flood vulnerability analysis above was estimated by applying an average household size factor (based on Colorado State Demography Office 2019 estimates for Winter Park of 2.05 persons per household) to the number of improved residential properties identified in the flood hazard areas within Fraser. These estimates yielded the population exposures shown in Table 3-33 in Chapter 3 Risk Assessment. As such, a flood in Zone A or AE would potentially displace a total of 102 people, based on the residential structures which fall in those flood zones. A total of twenty-nine people would be potentially displaced in the event of a 0.2% annual chance flood. For additional details on potential displacements by flood event, see the Grand County Base Plan.

Flooding can have a major economic impact on the economy, including indirect losses such as business interruption, lost wages, and other downtime costs. Flooding often coincides with the busy summer tourism months in Grand County, and may impact, directly or indirectly (such as from the negative perception of potential danger to his hazard), the revenues of shops, restaurants, hotels, and other major industries which keep the local economy thriving. In addition, major flooding which led to road or other infrastructure closures could additionally limit access to the Town by tourists, locals, and even basic goods and services.

The environment is mostly resilient to general flooding. However, cultural, or historic properties within floodplains would be affected in similar ways as property and critical facilities/infrastructure, especially those with underground or basement levels where water would easily seep and potential ruin archives, resources, or other important assets.

### ***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 two reporting Tier II facility 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 2020 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***

The results of the landslide zone overlay analysis for the Town of Winter Park are presented in Table G.5. Refer to Section 3.3.3 Vulnerability by Hazard for an explanation on the methodology used to conduct the landslide hazard analysis.

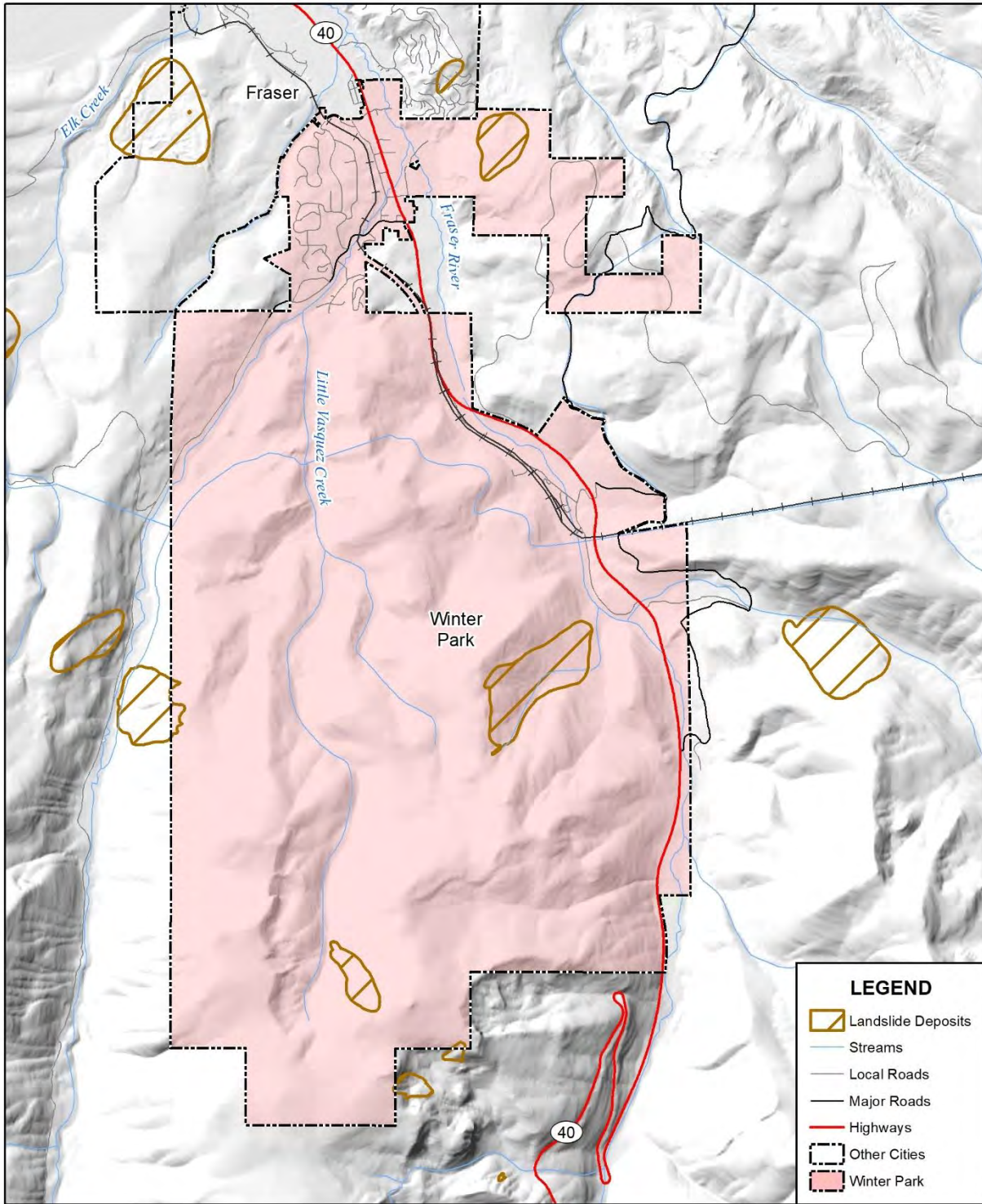
**Table G.5 Winter Park—Landslide Exposure by Property Type**

<b>Property Type</b>	<b>Improved Parcel Count</b>	<b>Improved Value</b>	<b>Estimated Content Value</b>	<b>Total Value</b>
Commercial Improved	1	\$1,623,190	\$1,623,190	\$3,246,380
Residential Improved	8	\$12,386,460	\$6,193,230	\$18,579,690
<b>Total</b>	<b>9</b>	<b>\$14,009,650</b>	<b>\$7,816,420</b>	<b>\$21,826,070</b>

Source: Wood analysis, USGS, County Assessor

Winter Park's residential properties have a total exposure value of over \$18 million. A total of 9 properties are exposed to general landslide hazards. A site-specific analysis would be needed to further quantify actual risk to structures on these parcels. No critical facilities are found at risk of landslide hazards in Winter Park.

**Figure G.3. Landslide Areas in Winter Park**



Map compiled 11/2020;  
intended for planning purposes only.  
Data Source: Grand County, CDOT,  
Colorado Geological Survey

0 1 2 Miles



People could be susceptible if they are caught in a landslide or debris flow, potentially leading to injury or death. There is also a danger to drivers operating vehicles, as rocks and debris can strike vehicles passing through the hazard area or cause dangerous shifts in roadways. Based on Table 3-37 in the base plan, an estimated 16 people could be at risk of general landslide hazards in Winter Park. At risk population was estimated by multiplying the average number of persons living in each household in the Town of Winter Park (which is 2.05 per household) times the number of properties of type "residential" where landslide areas have been inventoried in the town.

Economic impacts related to landslide, rockfall, debris fall, and mudslide hazards typically center around transportation routes temporarily closed by debris flow or other activity. No routes were found to be at risk.

As primarily natural processes, landslides and debris flows can have varying impacts to the natural environment as well as cultural or historical resources found on their path. For buildings and other structures, impacts would be similar as those seen on general property or critical facilities/infrastructure.

### ***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. Refer to Table 3-42 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 majority of risk to wildfire is to residential and commercial structures. A total of 1,854 properties are within the high risk WUI in addition to 921 properties within the medium risk WUI. Overall there are over 2,000 properties with a total value of 1.9 billion in high and medium risk WUI communities in Winter Park.

**Table G.6 Winter Park Improved Properties within High Risk WUI Communities**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
Commercial Improved	18	\$17,728,860	\$17,728,860	\$35,457,720
Multi-Residential Improved	8	\$4,905,870	\$2,452,935	\$7,358,805
Residential Improved	1,812	\$825,133,510	\$412,566,755	\$1,237,700,265
Residential Vacant	1	\$567,300	\$0	\$567,300
Tax Exempt	15	\$6,321,110	\$6,321,110	\$12,642,220
<b>Total</b>	<b>1,854</b>	<b>\$854,656,650</b>	<b>\$439,069,660</b>	<b>\$1,293,726,310</b>

Source: Wood analysis, County Assessor, East Grand Fire Protection District CWPP

**Table G.7 Winter Park Improved Properties within Medium Risk WUI Communities**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
Commercial Improved	55	\$30,806,420	\$30,806,420	\$61,612,840
Commercial Vacant	1	\$40,480	\$0	\$40,480
Multi-Residential Improved	13	\$6,365,090	\$3,182,545	\$9,547,635
Residential Improved	846	\$385,756,990	\$192,878,495	\$578,635,485
Residential Vacant	2	\$565,900	\$0	\$565,900
Tax Exempt	4	\$1,687,140	\$1,687,140	\$3,374,280
<b>Total</b>	<b>921</b>	<b>\$425,222,020</b>	<b>\$228,554,600</b>	<b>\$653,776,620</b>

Source: Wood analysis, County Assessor, East Grand Fire Protection District CWPP

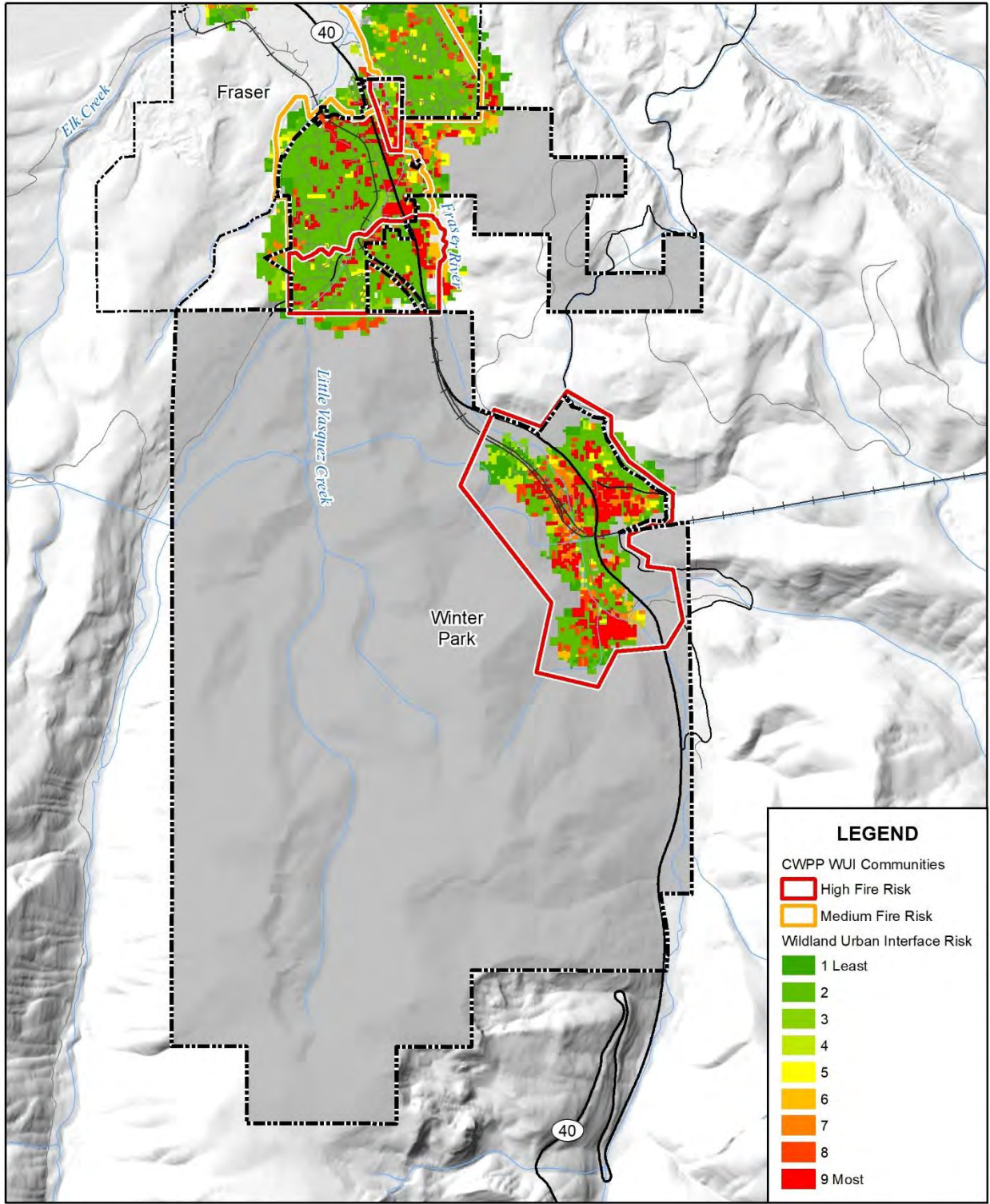
Eleven critical facilities were identified in low-moderate, moderate, and high-moderate wildfire zones in Winter Park. The Sunspot Water Pumpstation and Winter Park Water and Sanitation Treatment Plant are located in Winter Park’s high-moderate wildfire zone. The seven facilities in the Town’s moderate 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.

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.

The Town of Winter Park has an estimated 5,492 number of people at risk within high (3,731) and medium risk (1,761) WUI communities. Note: There are a number of second homes in the area, thus are not populated year-round. However, the population projected in this modeling may reflect the seasonal population swells, that often coincides with high fire season in the summer. These totals were estimated by multiplying the average persons per household in Winter Park by the number of residential properties falling within the fire zone/s.

Tourism, the accommodation, and food services industry (e.g., hotels and restaurants), and retail are major components of Grand County’s economy, and in Winter Park as well. Wildland fires can cause economic disruptions, for example, lead to significant tourism reductions due to health and safety concerns, causing lost revenues from lack of visitation, stays in hotels, spending on restaurants and other commerce sources, and more.

**Figure G.4. WUI Communities and Risk in the Town of Winter Park**



Map compiled 12/2020; intended for planning purposes only.  
 Data Source: Grand County, CDOT, East Grand Fire Protection District, Colorado Forest Atlas - Colorado State Forest Service

0 1 2 Miles



## ***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.

## **Growth and Development Trends**

Table G.8 illustrates how Winter Park has grown in terms of population and number of housing units between 2000 and 2018.

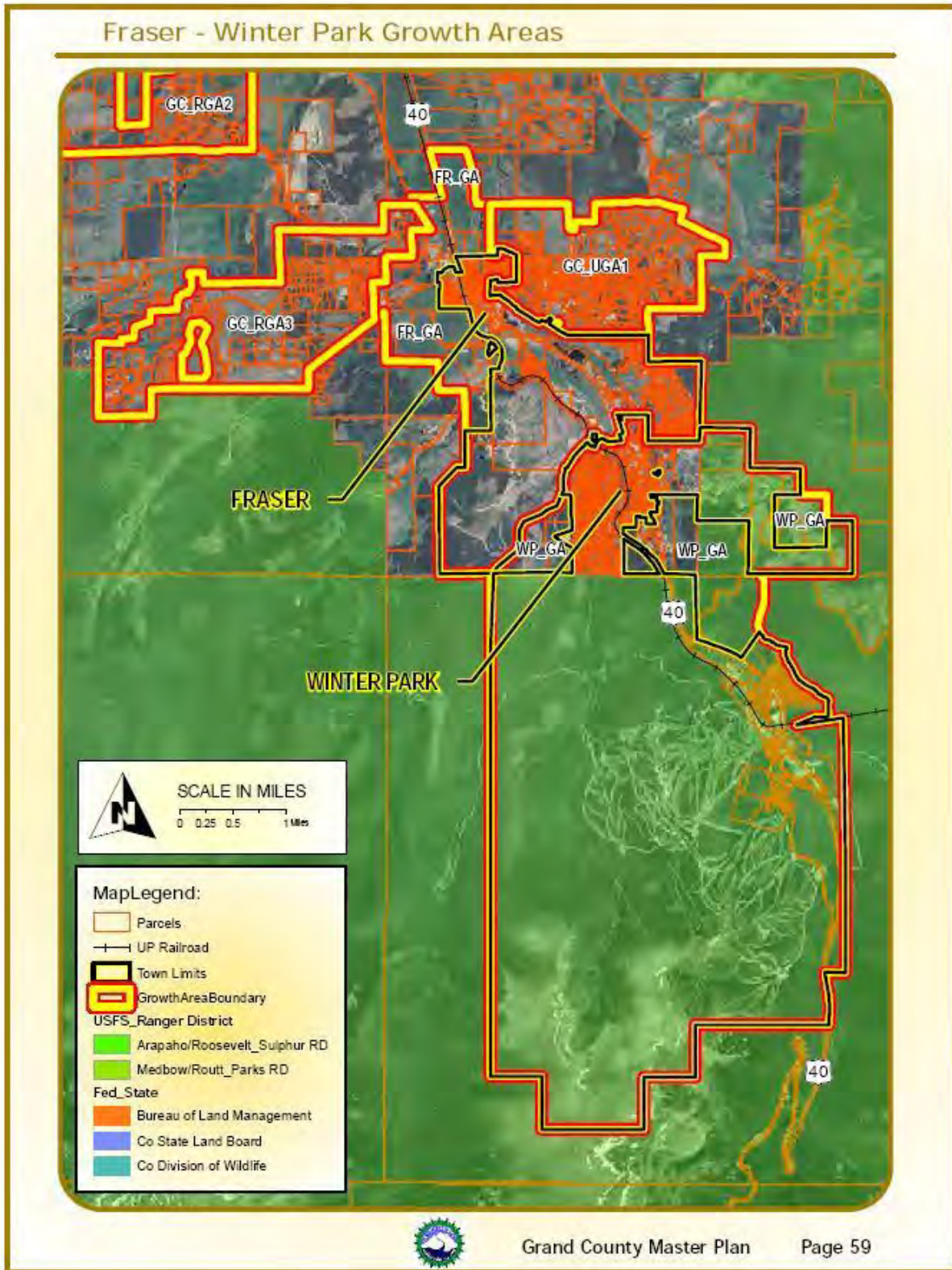
**Table G.8. Winter Park—Change in Population and Housing Units, 2000-2018**

<b>2000 Population</b>	<b>2011 Population Estimate</b>	<b>2019 Population Estimate*</b>	<b>2000 # of Housing Units</b>	<b>2011 Estimated # of Housing Units</b>	<b>2018 Estimated # of Housing Units</b>
662	536	1,077	1,231	2,158	2,575

Source: Censusreporter.org \*Colorado State Demography Office 2019 Estimates

Proposed growth areas identified in the Grand County Master Plan (2011) 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 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.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 Winter Park.

**Table G.9. 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	2015
Building Code Effectiveness Grading Schedule (BCEGS) Rating	Yes	4 residential and 4 commercial; verified in 2019.
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	
National Flood Insurance Program	Yes	
Community Rating System	No	
Community Wildfire Protection Plan	Yes	Upper Fraser Valley CWPP (2007)
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.10 identifies the personnel responsible for activities related to mitigation and loss prevention in Winter Park.

**Table G.10. Winter Park—Administrative and Technical Mitigation Capabilities**

Personnel Resources	Yes/No	Department/Position	Comments
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	
Resiliency Planner	No		
Transportation Planner	No		

### Fiscal Mitigation Capabilities

Table G.11 identifies financial tools or resources that Winter Park could potentially use to help fund mitigation activities, and which have been used in the past to fund 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.11. Winter Park—Fiscal Mitigation Capabilities**

Financial Resources	Accessible/Eligible to Use (Yes/No)	Has it been used to fund mitigation in the past?
Community Development Block Grants	N	N
Capital Improvements Project Funding	N	N
Authority to Levy Taxes for Specific Purposes	Y	N
Fees for Water, Sewer, Gas, or Electric Services	N	N
Impact Fees for New Development	N	N
Incur Debt through General Obligation Bonds	N	N
Incur Debt through Special Tax Bonds	N	N

Incur Debt through Private Activities	N	N
Withhold Spending in Hazard Prone Areas	N	N

## Mitigation Outreach and Partnerships

**Table G.12 Mitigation Education and Outreach Capabilities**

Education & Outreach Capabilities	Yes/No	Comments
Local Citizen Groups That Communicate Hazard Risks	No	
Firewise	No	
StormReady	No	
Other	Yes	

The Town of Winter Park is involved in the following mitigation related outreach programs 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.

### Opportunities for Enhancement

Based on the capability assessment, Winter Park has several existing mechanisms in place that already help to mitigate hazards. There are also opportunities for the Town to expand or improve on these policies and programs to further protect the community. Future improvements may include providing training for staff members related to hazards or hazard mitigation grant funding in partnership with the County and DHSEM. Additional training opportunities will help to inform Town staff and Town Council on how best to integrate hazard information and mitigation projects into the Town policies and ongoing duties of the Town. Continuing to train Town staff on mitigation and the hazards that pose a risk to the Town will lead to more informed staff members who can better communicate this information to the public. Another capability enhancement would be to integrate risk assessment information into future updates to the Town's Comprehensive Plan and.

## 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.
- 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, Shelly 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

## Mitigation Action: Winter Park 2020-1 Stormwater Master Plan

<b>Jurisdiction:</b>	Town of Winter Park
<b>Hazard Addressed</b>	Flooding, Landslide, Debris Flow, Mudflow, Rockfall
<b>Project Description, Issue &amp; Background</b>	<p>The Town of Winter Park continues to see exponential growth and development that continues to negatively impact the Fraser River and its smaller tributaries. In addition, the annual snowfall and resulting spring melt off often creates flooding conditions in certain developed areas along the river.</p> <p>This project proposes the creation of a stormwater master plan in Winter Park to delineate all drainage basins and propose prioritized capital projects to improve our storm water facilities and help land developers construct adequate retention/detention basins and other necessary infrastructure. This plan will assist in the review and implementation of local development regulations concerning floodplain restrictions and stream setback requirements.</p>
<b>Lead Agency and Title of Lead Person</b>	Winter Park Public Works Department
<b>Partners:</b>	Grand County W&S District, Winter Park W&S District, Fraser River Source Water Protection Partnership
<b>Priority:</b>	Medium
<b>Cost Estimate:</b>	\$100,000-\$1,00,00,00
<b>Benefits: (Losses Avoided)</b>	
<b>Potential Funding:</b>	Winter Park CIP, State Grants, Local River Improvement Grants
<b>Timeline:</b>	October 2023 - Budget and procure Storm Water Master Plan. Begin capital project construction.
<b>Status:</b>	New in 2020.

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# ANNEX H: FIRE PROTECTION DISTRICTS

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## H.1 District Profiles

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 50th 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. GFPD was formed in 1951 and provides service to an area comprising 150 square miles in Grand County. GFPD is staffed by volunteer and resident firefighters responding out of two stations operating twelve apparatus. GFPD has 26 firefighters and 2 administrative staff. GFPD is governed by an elected Board of Directors consisting of five people. GFPD 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. GFPD 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))

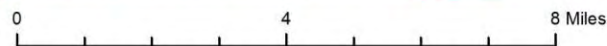
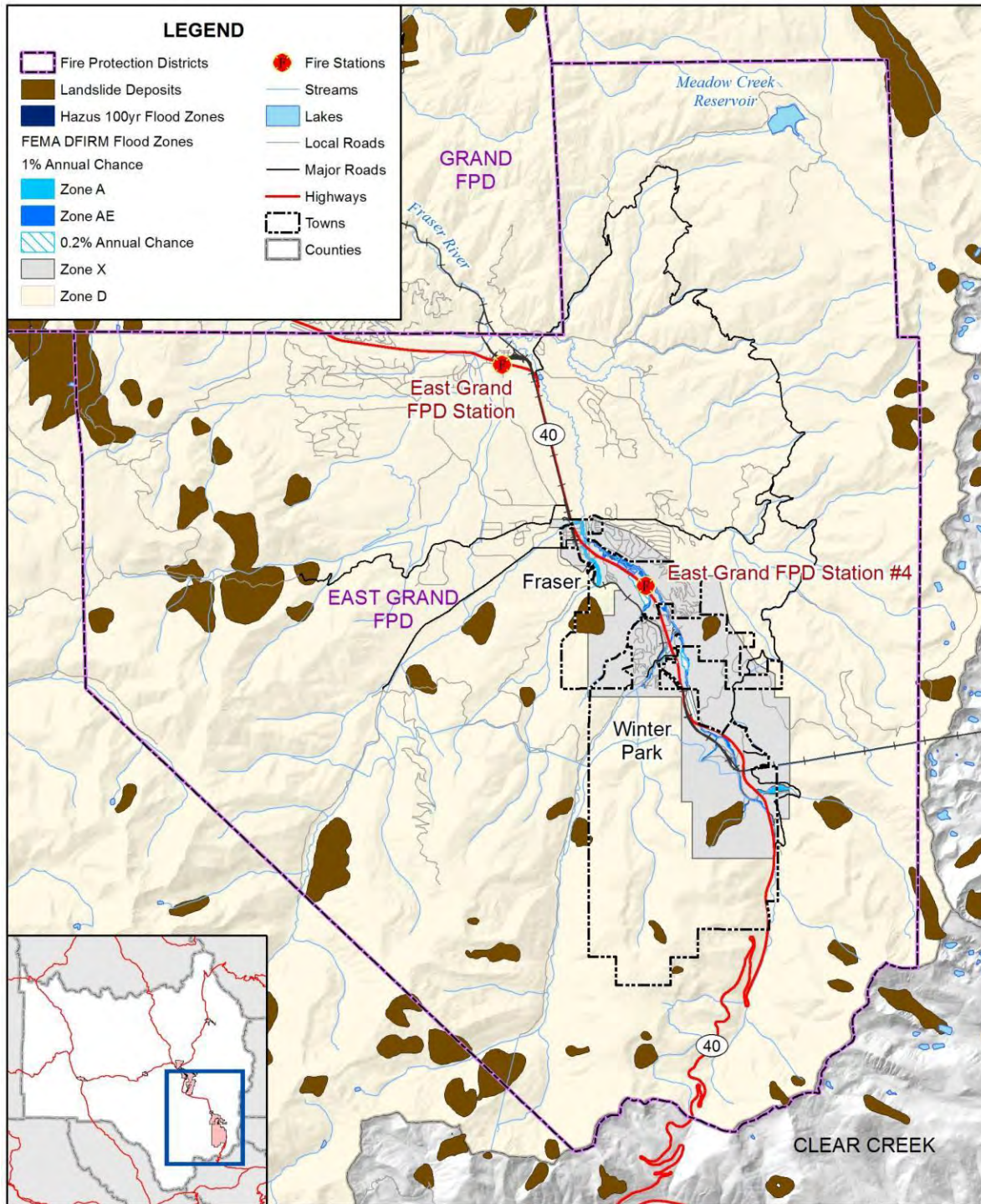
## **Hot Sulphur Springs/Parshall Fire Protection District**

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**

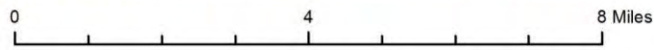
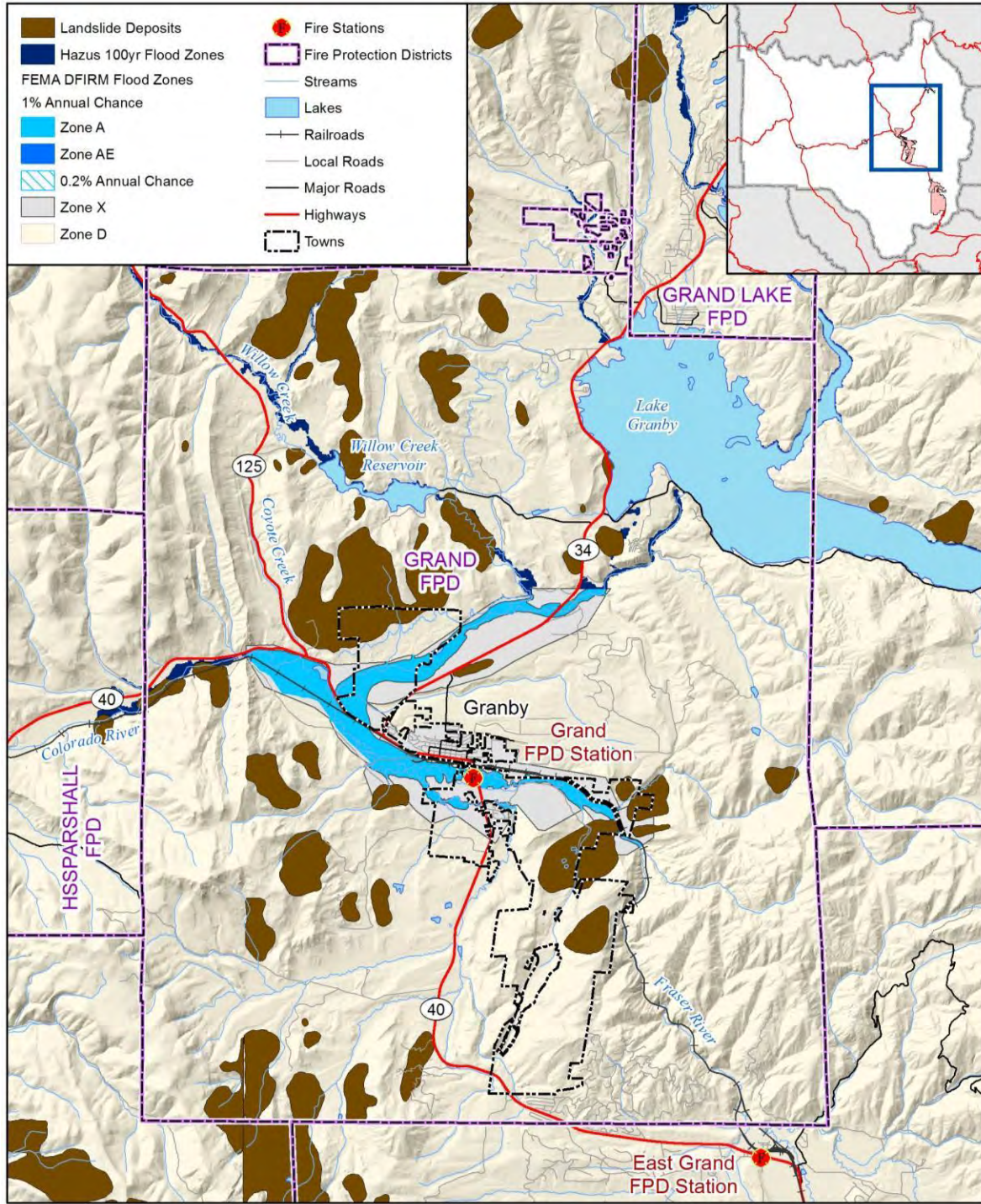
The Kremmling Fire Protection District (Kremmling FPD) is located on Eagle Avenue. There are roughly 15 firefighters in the Kremmling Fire Department at any given time, and the Department is recruiting. Kremmling FPD no longer uses a second fire station.

**Figure H.1. Map of East Grand Fire Protection District**



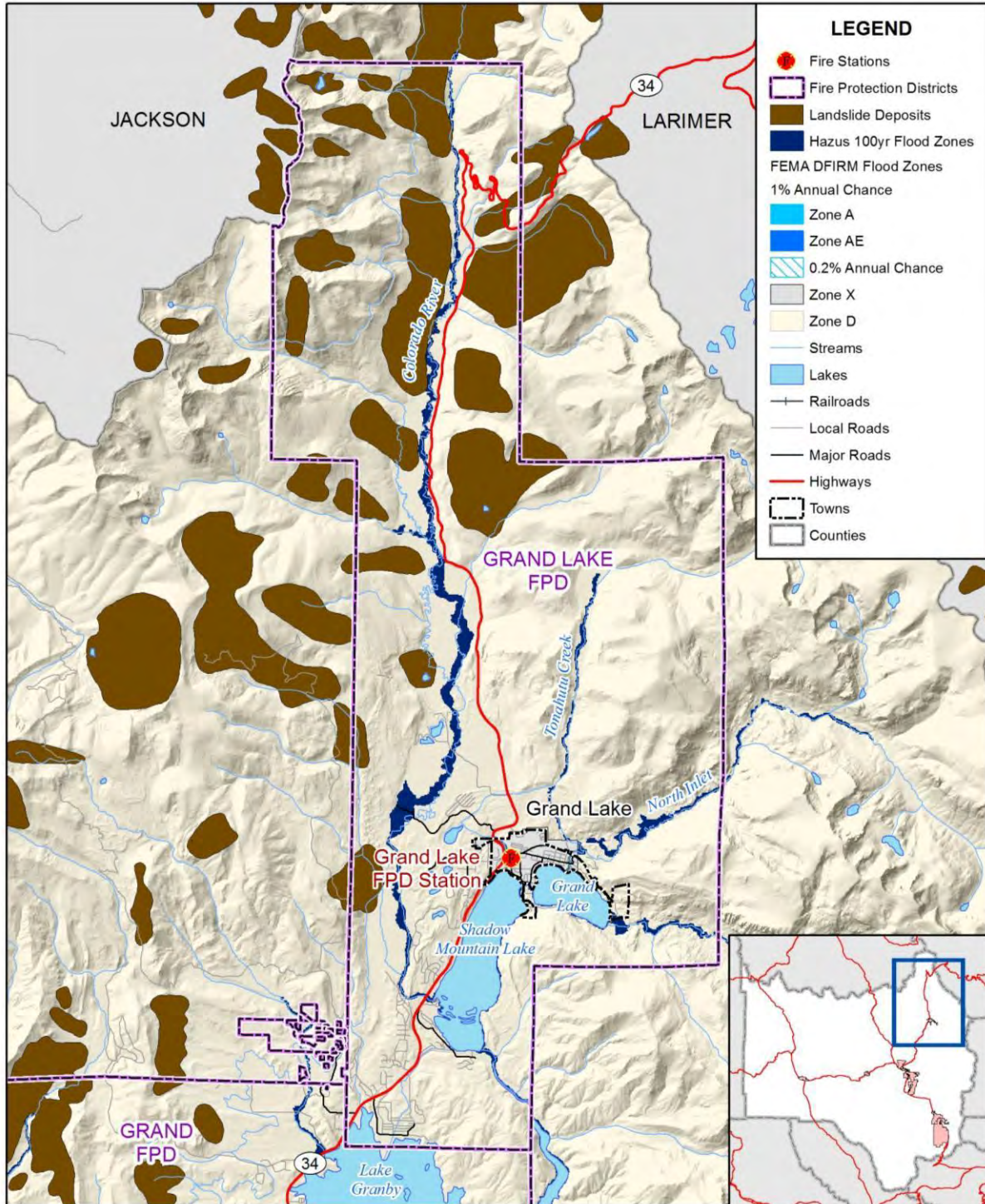
Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT, Hazus-MH MR2,  
 FEMA DIFRM 1/2/2008, Colton/USGS Earth Data Analysis Center

**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**

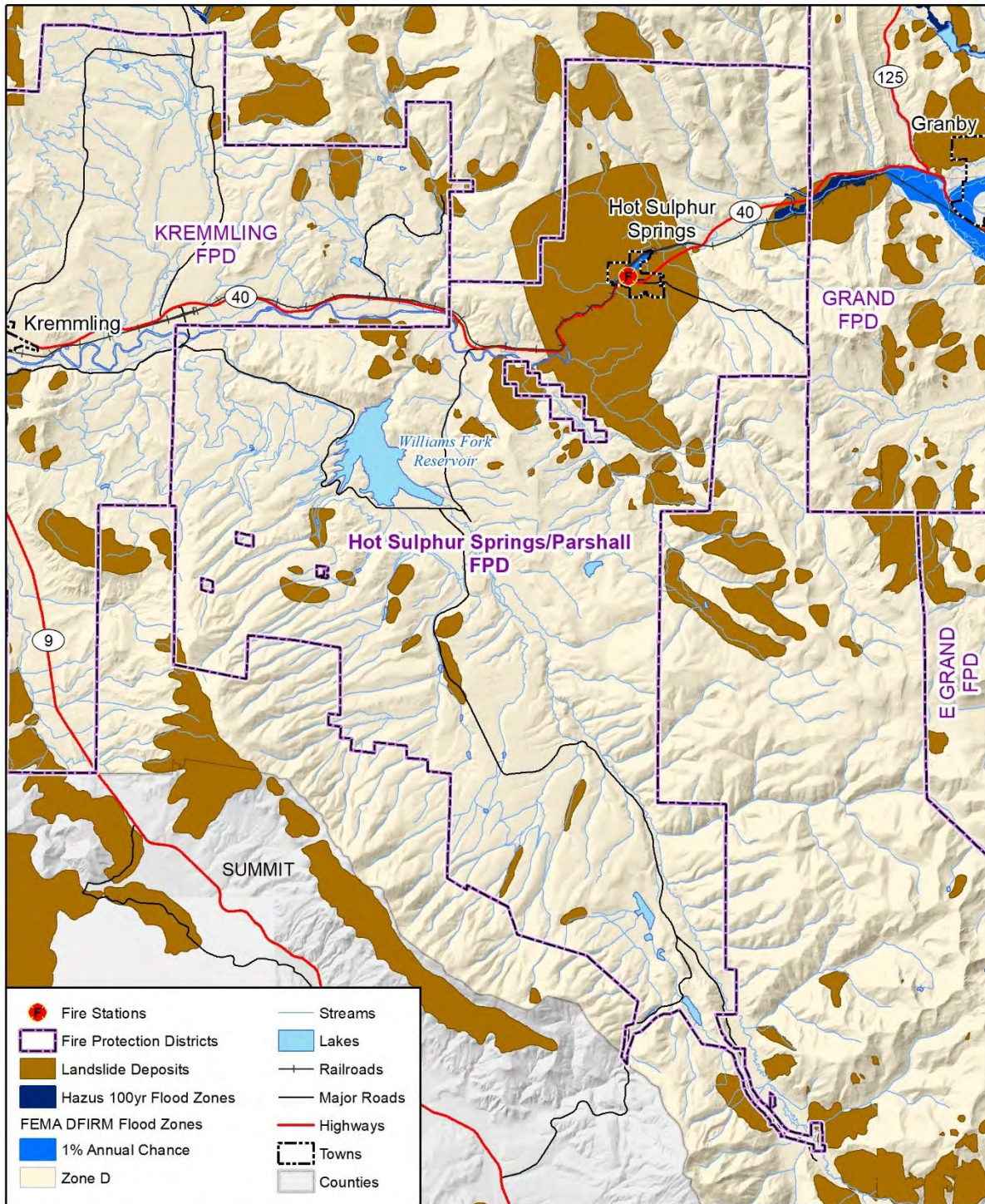


0 4 8 Miles

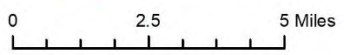


Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT, Hazus-MH MR2,  
 FEMA DIFRM 1/2/2008, Colton/USGS Earth Data Analysis Center

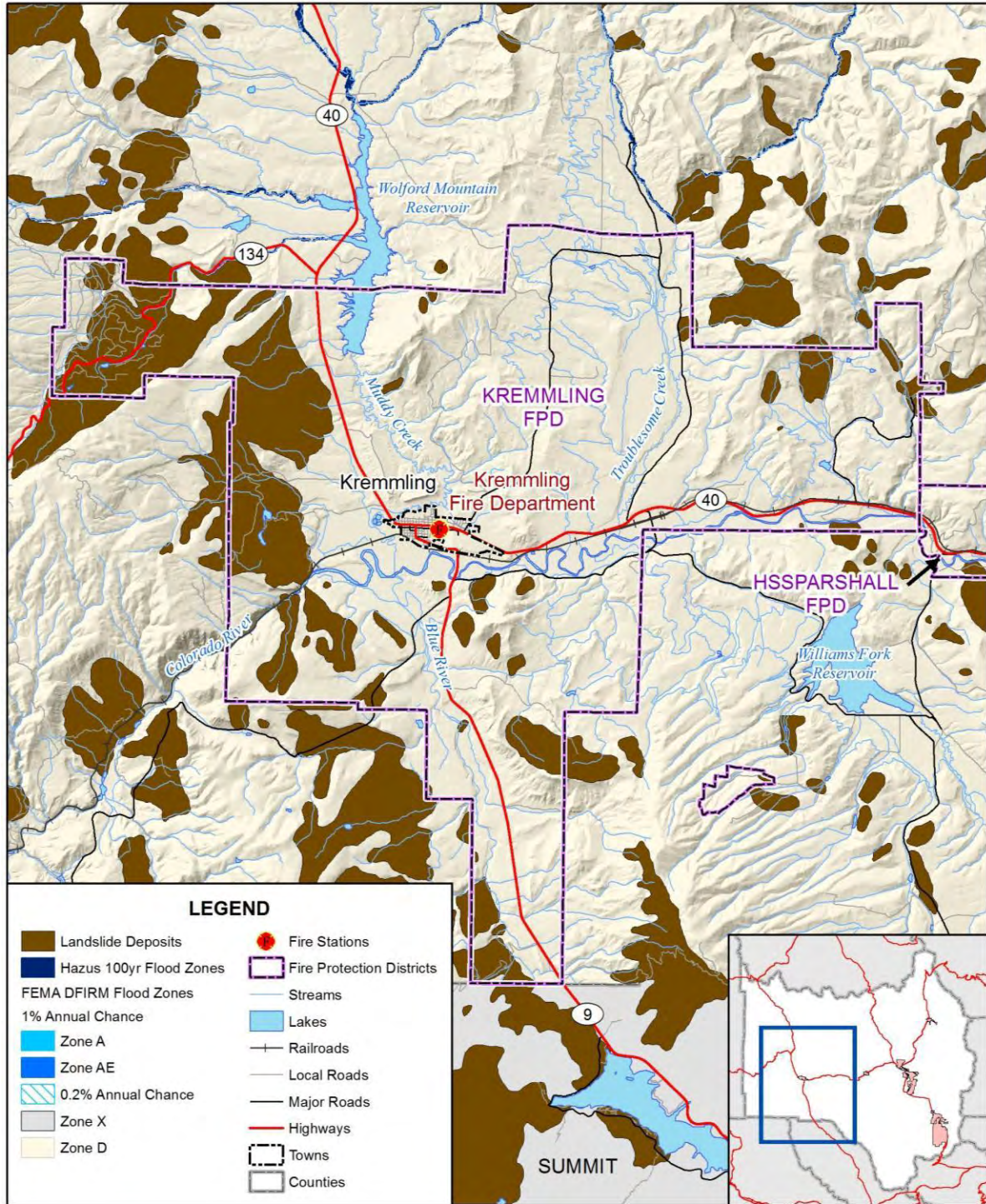
Figure H.4. Map of Hot Sulphur Springs/Parshall Fire Protection District



Map compiled 11/2020;  
intended for planning purposes only.  
Data Source: Grand County, CDOT, CGS  
Hazus-MH MR2, FEMA NFHL 12/13/2013



**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 DFIRM 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
Insect Disease Infestation	Large	Occasional	Limited	Medium
Severe Winter Weather	Large	Highly Likely	Limited	Medium
Wildfire	Medium	Highly Likely	Critical	High
Wildlife-Vehicle Collisions	Isolated	Highly Likely	Negligible	Medium
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
Insect Disease Infestation	Large	Occasional	Limited	Medium
Severe Winter Weather	Large	Highly Likely	Limited	Medium
Wildfire	Large	Highly Likely	Catastrophic	High
Wildlife-Vehicle Collisions	Isolated	Highly Likely	Negligible	Medium
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
Insect Disease Infestation	Large	Occasional	Limited	Medium
Severe Winter Weather	Large	Highly Likely	Critical	Medium
Wildfire	Large	Highly Likely	Catastrophic	High
Wildlife-Vehicle Collisions	Isolated	Highly Likely	Negligible	Medium
Windstorm	Large	Highly Likely	Negligible	Medium
<b>HSSPPFD</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
Insect Disease 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
Insect Disease 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 section below.

#### District Asset Inventory

Tables H.2 through H.6 the total number of improved parcels, properties, and their improvement and content values for the property located within the Fire Protection Districts (FPDs). Counts and values are based on the latest county assessor's data (as of November 2019), which was provided in GIS format. Contents exposure values were estimated as a percent of the improvement value based on FEMA methods. Total Values were aggregated by adding the improvement and content values for each parcel type category. A combined total of all five FPDs shows there is 16,713 properties with a total loss estimate of \$10 billion within the potentially exposed to natural hazards. Based on the analysis there is also 33,998 persons potentially exposed to hazards, with the largest portion of people living within the East Grand Fire Protection District boundaries.

**Table H.2. East Grand Fire Protection District Total Exposure of Improved Properties by Property Type**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Population
Agricultural	77	\$64,650,350	\$64,650,350	\$129,300,700	
Commercial Improved	169	\$88,806,570	\$88,806,570	\$177,613,140	
Commercial Vacant	1	\$40,480	\$0	\$40,480	
Conservation Easement	5	\$4,691,370	\$4,691,370	\$9,382,740	
Mixed Use	2	\$733,810	\$733,810	\$1,467,620	
Multi-Residential Improved	90	\$34,860,700	\$17,430,350	\$52,291,050	199
Residential Improved	6,914	\$3,091,157,230	\$1,545,578,615	\$4,636,735,845	15,060
Residential Vacant	21	\$2,931,870	\$0	\$2,931,870	
Tax Exempt	76	\$85,430,130	\$85,430,130	\$170,860,260	
Vacant Land	5	\$551,840	\$0	\$551,840	
<b>Total</b>	<b>7,360</b>	<b>\$3,373,854,350</b>	<b>\$1,807,321,195</b>	<b>\$5,181,175,545</b>	<b>15,259</b>

Source: Grand County Assessor 2020

**Table H.3 Grand Fire Protection District Total Exposure of Improved Properties by Property Type**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Population
Agricultural	175	\$99,323,320	\$99,323,320	\$198,646,640	
Commercial Improved	159	\$46,030,130	\$46,030,130	\$92,060,260	
Commercial Vacant	1	\$117,470	\$0	\$117,470	
Conservation Easement	15	\$7,432,430	\$7,432,430	\$14,864,860	
Industrial Improved	3	\$739,710	\$1,109,565	\$1,849,275	
Mixed Use	18	\$8,513,240	\$8,513,240	\$17,026,480	
Multi-Residential Improved	33	\$8,928,820	\$4,464,410	\$13,393,230	79
Residential Improved	3,624	\$1,138,297,240	\$569,148,620	\$1,707,445,860	8,591
Residential Vacant	57	\$6,692,200	\$0	\$6,692,200	
Tax Exempt	63	\$30,205,770	\$30,205,770	\$60,411,540	
Vacant Land	5	\$44,390	\$0	\$44,390	
<b>Total</b>	<b>4,153</b>	<b>\$1,346,324,720</b>	<b>\$766,227,485</b>	<b>\$2,112,552,205</b>	<b>8,670</b>

Source: Grand County Assessor 2020

**Table H. 4 Grand Lake Fire Protection District Total Exposure of Improved Properties by Property Type**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Population
Agricultural	23	\$16,811,300	\$16,811,300	\$33,622,600	
Commercial Improved	112	\$34,755,790	\$34,755,790	\$69,511,580	
Commercial Vacant	1	\$396,530	\$0	\$396,530	
Conservation Easement	2	\$1,538,010	\$1,538,010	\$3,076,020	
Mixed Use	23	\$9,833,890	\$9,833,890	\$19,667,780	
Multi-Residential Improved	3	\$783,670	\$391,835	\$1,175,505	6
Residential Improved	3,203	\$1,192,062,280	\$596,031,140	\$1,788,093,420	6,967
Residential Vacant	40	\$2,432,810	\$0	\$2,432,810	
Tax Exempt	20	\$6,845,490	\$6,845,490	\$13,690,980	
Vacant Land	8	\$193,130	\$0	\$193,130	
<b>Total</b>	<b>3,435</b>	<b>\$1,265,652,900</b>	<b>\$666,207,455</b>	<b>\$1,931,860,355</b>	<b>6,973</b>

Source: Grand County Assessor 2020

**Table H.5 Hot Sulphur Springs/Parshall FPD– Total Exposure of Improved Properties by Property Type**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Population
Agricultural	84	\$29,421,850	\$29,421,850	\$58,843,700	
Commercial Improved	19	\$4,688,260	\$4,688,260	\$9,376,520	
Commercial Vacant	1	\$1,830	\$0	\$1,830	
Conservation Easement	4	\$1,531,420	\$1,531,420	\$3,062,840	
Industrial Improved	1	\$40,150	\$60,225	\$100,375	
Mixed Use	13	\$8,045,810	\$8,045,810	\$16,091,620	
Multi-Residential Improved	4	\$821,530	\$410,765	\$1,232,295	10
Residential Improved	414	\$89,974,800	\$44,987,400	\$134,962,200	997
Residential Vacant	14	\$317,030	\$0	\$317,030	
Tax Exempt	23	\$64,065,410	\$64,065,410	\$128,130,820	
Vacant Land	1	\$40,180	\$0	\$40,180	
<b>Total</b>	<b>578</b>	<b>\$198,948,270</b>	<b>\$153,211,140</b>	<b>\$352,159,410</b>	<b>1,007</b>

Source: Grand County Assessor 2020

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**Table H.6 Kremmling FPD– Total Exposure of Improved Properties by Property Type**

<b>Property Type</b>	<b>Improved Parcel Count</b>	<b>Improved Value</b>	<b>Estimated Content Value</b>	<b>Total Value</b>	<b>Population</b>
Agricultural	102	\$52,985,500	\$52,985,500	\$105,971,000	
Commercial Improved	74	\$20,245,210	\$20,245,210	\$40,490,420	
Commercial Vacant	3	\$5,860	\$0	\$5,860	
Conservation Easement	5	\$1,571,940	\$1,571,940	\$3,143,880	
Industrial Improved	3	\$938,300	\$1,407,450	\$2,345,750	
Mixed Use	11	\$2,656,650	\$2,656,650	\$5,313,300	
Multi-Residential Improved	8	\$2,243,520	\$1,121,760	\$3,365,280	18
Residential Improved	926	\$222,252,590	\$111,126,295	\$333,378,885	2,071
Residential Vacant	28	\$525,230	\$0	\$525,230	
Tax Exempt	25	\$6,324,490	\$6,324,490	\$12,648,980	
Vacant Land	2	\$61,630	\$0	\$61,630	
<b>Total</b>	<b>1,187</b>	<b>\$309,810,920</b>	<b>\$197,439,295</b>	<b>\$507,250,215</b>	<b>2,089</b>

Source: Grand County Assessor 2020

Table H.7 lists critical facilities and other community assets identified by the five fire protection districts as important to protect in the event of a disaster. These are facilities located within districts' boundaries, but in most cases are not owned by the districts.

**Table H.7. Critical Facilities and Other Community Assets**

Name of Asset	Type	Replacement Value (\$)	Hazard Specific Issues
East Grand FPD			
Winter Park Resort	EA	Unknown	Drought, wildfire,
Fraser Safeway	EA/EF	Unknown	Flooding
East Grand School	LS	Unknown	Extreme temperatures
Fraser Experimental Forest	HCNA	Unknown	Wildfire, flooding
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
Grand FPD			
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	Wildfire
Cell and Radio Towers (fire, police)	EF	\$2 million	Wildfire
Grand Lake FPD			
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
HSSPPFD			
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**			
Kremmling FPD			
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: Lifeline 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.

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. While not impacting the district’s now, recent burn scars in the northern part of the county from the East Troublesome Fire in 2020 will temporarily increase risk to flood and landslides. Analysis for these hazards, based on pre-fire data, did not indicate risk to specific facilities for any of the districts. Post-fire risk analyses may yield vulnerabilities in the future.

## **Wildfire**

### ***Existing Development***

Based on the methodology described for wildfire in Section 3.3.3 Vulnerability, the majority of risk to wildfire is to residential structures. The breakdown of property types and values in each District by wildfire risk in WUI communities is shown in Tables H.8-H.16 and Figures H.6 through H.10 show the wildfire intensity in East Grand FPD, Grand FPD, Grand Lake BFPD, HSSPPFD, and Kremmling FPD, respectively.

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 5,129 is designated as high risk or higher and constitutes 3.1 billion in dollars built property values threatened. Total built property value of the areas designated medium or higher is 4.3 billion dollars. The built property value consists of 6,786 structures in the medium risk areas and 5,129 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.

**Table H.8 East Grand Fire Protection Improved Properties within High Risk WUI Communities**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
Agricultural	1	\$664,430	\$664,430	\$1,328,860
Commercial Improved	19	\$18,297,430	\$18,297,430	\$36,594,860
Multi-Residential Improved	8	\$4,905,870	\$2,452,935	\$7,358,805
Residential Improved	2,326	\$1,062,797,930	\$531,398,965	\$1,594,196,895
Residential Vacant	5	\$1,362,480	\$0	\$1,362,480
Tax Exempt	20	\$15,302,710	\$15,302,710	\$30,605,420
<b>Total</b>	<b>2,379</b>	<b>\$1,103,330,850</b>	<b>\$568,116,470</b>	<b>\$1,671,447,320</b>

Source: Wood analysis, County Assessor, East Grand Fire Protection District CWPP

**Table H.9 East Grand Fire Protection Improved Properties within Medium Risk WUI Communities**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
Agricultural	6	\$3,316,340	\$3,316,340	\$6,632,680
Commercial Improved	59	\$32,074,300	\$32,074,300	\$64,148,600
Commercial Vacant	1	\$40,480	\$0	\$40,480
Conservation Easement	2	\$3,231,250	\$3,231,250	\$6,462,500
Mixed Use	1	\$369,800	\$369,800	\$739,600
Multi-Residential Improved	45	\$21,295,220	\$10,647,610	\$31,942,830
Residential Improved	3,253	\$1,522,519,470	\$761,259,735	\$2,283,779,205
Residential Vacant	8	\$1,004,600	\$0	\$1,004,600
Tax Exempt	22	\$7,471,420	\$7,471,420	\$14,942,840
Vacant Land	2	\$498,150	\$0	\$498,150
<b>Total</b>	<b>3,399</b>	<b>\$1,591,821,030</b>	<b>\$818,370,455</b>	<b>\$2,410,191,485</b>

Source: Wood analysis, County Assessor, East Grand Fire Protection District CWPP

**Table H.10 Grand Fire Protection Improved Properties within High Risk WUI Communities**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
Agricultural	26	\$27,540,560	\$27,540,560	\$55,081,120
Conservation Easement	1	\$193,400	\$193,400	\$386,800
Multi-Residential Improved	7	\$2,730,850	\$1,365,425	\$4,096,275
Residential Improved	872	\$325,899,370	\$162,949,685	\$488,849,055
Residential Vacant	16	\$1,654,130	\$0	\$1,654,130
Vacant Land	1	\$8,350	\$0	\$8,350
<b>Total</b>	<b>923</b>	<b>\$358,026,660</b>	<b>\$192,049,070</b>	<b>\$550,075,730</b>

Source: Wood analysis, County Assessor, Grand Fire Protection District CWPP

**Table H.11 Grand Fire Protection Improved Properties within Medium Risk WUI Communities**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
Agricultural	27	\$18,941,790	\$18,941,790	\$37,883,580
Commercial Improved	3	\$1,159,420	\$1,159,420	\$2,318,840
Mixed Use	1	\$4,921,130	\$4,921,130	\$9,842,260
Multi-Residential Improved	5	\$1,705,910	\$852,955	\$2,558,865
Residential Improved	728	\$268,741,910	\$134,370,955	\$403,112,865
Residential Vacant	12	\$4,046,170	\$0	\$4,046,170
Tax Exempt	1	\$164,430	\$164,430	\$328,860
Vacant Land	2	\$13,750	\$0	\$13,750
<b>Total</b>	<b>779</b>	<b>\$299,694,510</b>	<b>\$160,410,680</b>	<b>\$460,105,190</b>

Source: Wood analysis, County Assessor, Grand Fire Protection District CWPP

**Table H.12 Grand Lake Fire Protection Improved Properties within High Risk WUI Communities**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
Agricultural	6	\$5,195,170	\$5,195,170	\$10,390,340
Commercial Improved	13	\$3,538,160	\$3,538,160	\$7,076,320
Commercial Vacant	1	\$396,530	\$0	\$396,530
Mixed Use	4	\$957,580	\$957,580	\$1,915,160
Multi-Residential Improved	2	\$519,030	\$259,515	\$778,545
Residential Improved	850	\$326,840,380	\$163,420,190	\$490,260,570
Residential Vacant	12	\$660,300	\$0	\$660,300
Tax Exempt	1	\$772,060	\$772,060	\$1,544,120
Vacant Land	1	\$5,530	\$0	\$5,530
<b>Total</b>	<b>890</b>	<b>\$338,884,740</b>	<b>\$174,142,675</b>	<b>\$513,027,415</b>

Source: Wood analysis, County Assessor, Grand Lake Fire Protection District CWPP

**Table H.13 Grand Lake Fire Protection Improved Properties within Medium Risk WUI Communities**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
Agricultural	17	\$11,616,130	\$11,616,130	\$23,232,260
Commercial Improved	99	\$31,217,630	\$31,217,630	\$62,435,260
Conservation Easement	2	\$1,538,010	\$1,538,010	\$3,076,020
Mixed Use	19	\$8,876,310	\$8,876,310	\$17,752,620
Multi-Residential Improved	1	\$264,640	\$132,320	\$396,960
Residential Improved	2,341	\$859,004,190	\$429,502,095	\$1,288,506,285
Residential Vacant	28	\$1,772,510	\$0	\$1,772,510
Tax Exempt	15	\$5,728,920	\$5,728,920	\$11,457,840
Vacant Land	7	\$187,600	\$0	\$187,600
<b>Total</b>	<b>2,529</b>	<b>\$920,205,940</b>	<b>\$488,611,415</b>	<b>\$1,408,817,355</b>

Source: Wood analysis, County Assessor, Grand Lake Fire Protection District CWPP

**Table H.14 Hot Sulphur Springs/Parshall Fire Protection Improved Properties within High Risk WUI Communities**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
Agricultural	29	\$9,737,020	\$9,737,020	\$19,474,040
Commercial Improved	18	\$4,080,240	\$4,080,240	\$8,160,480
Commercial Vacant	1	\$1,830	\$0	\$1,830
Conservation Easement	1	\$599,970	\$599,970	\$1,199,940
Industrial Improved	1	\$40,150	\$60,225	\$100,375
Mixed Use	13	\$8,045,810	\$8,045,810	\$16,091,620
Multi-Residential Improved	4	\$821,530	\$410,765	\$1,232,295
Residential Improved	322	\$63,504,990	\$31,752,495	\$95,257,485
Residential Vacant	9	\$67,840	\$0	\$67,840
Tax Exempt	20	\$8,579,980	\$8,579,980	\$17,159,960
<b>Total</b>	<b>418</b>	<b>\$95,479,360</b>	<b>\$63,266,505</b>	<b>\$158,745,865</b>

Source: Wood analysis, County Assessor, HSS/Parshall Fire Protection District CWPP

**Table H.15 Hot Sulphur Springs/Parshall Fire Protection Improved Properties within Medium Risk WUI Communities**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
Agricultural	15	\$5,988,670	\$5,988,670	\$11,977,340
Residential Improved	61	\$18,893,210	\$9,446,605	\$28,339,815
Residential Vacant	3	\$118,440	\$0	\$118,440
<b>Total</b>	<b>79</b>	<b>\$25,000,320</b>	<b>\$15,435,275</b>	<b>\$40,435,595</b>

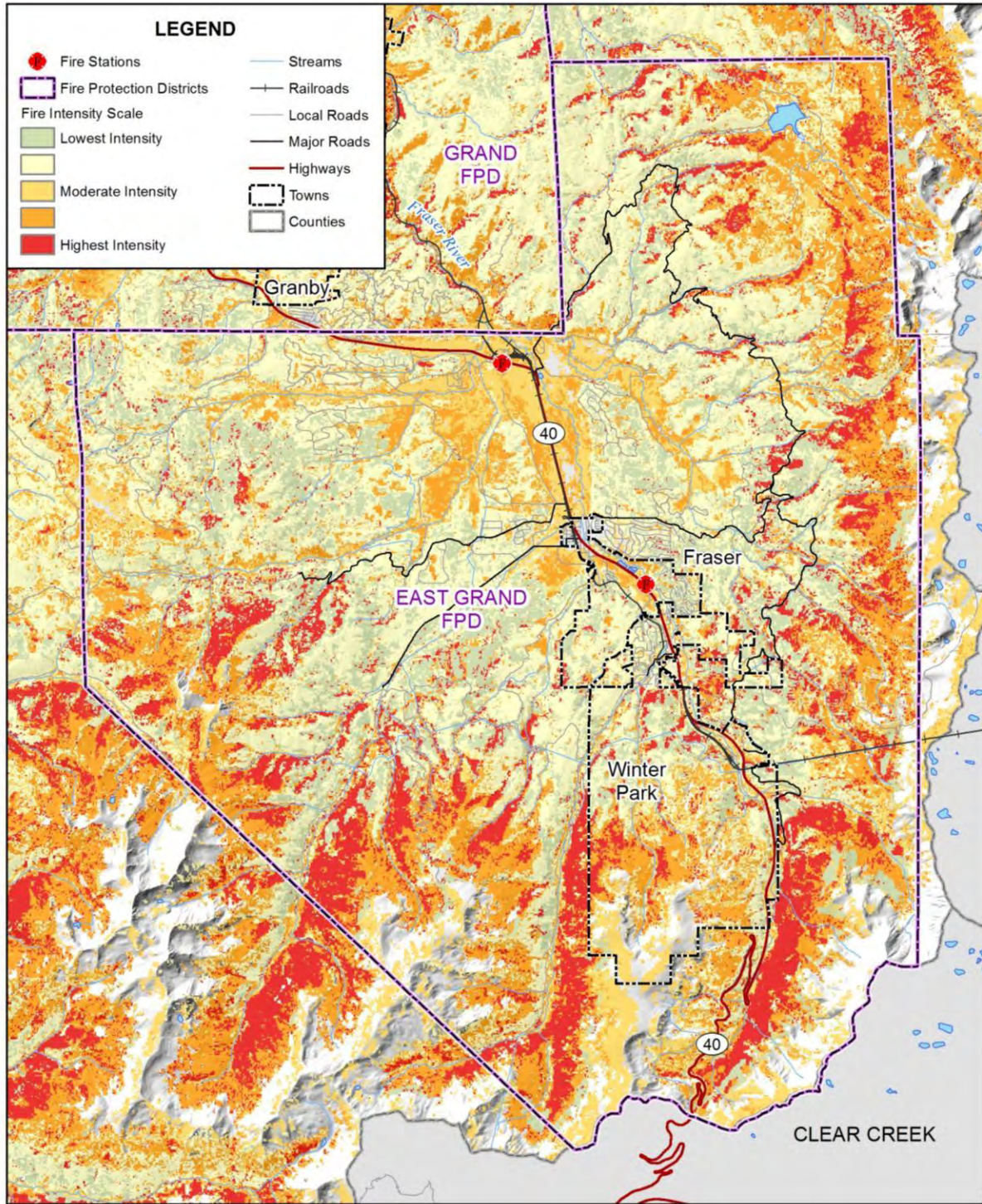
Source: Wood analysis, County Assessor HSS/Parshall Fire Protection District CWPP

**Table H.16 Kremmling Fire Protection Improved Properties within High Risk WUI Communities**

Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value
Agricultural	56	\$22,002,420	\$22,002,420	\$44,004,840
Commercial Improved	3	\$776,150	\$776,150	\$1,552,300
Conservation Easement	3	\$1,455,380	\$1,455,380	\$2,910,760
Mixed Use	1	\$138,580	\$138,580	\$277,160
Residential Improved	431	\$121,192,410	\$60,596,205	\$181,788,615
Residential Vacant	22	\$456,090	\$0	\$456,090
Tax Exempt	3	\$181,020	\$181,020	\$362,040
<b>Total</b>	<b>519</b>	<b>\$146,202,050</b>	<b>\$85,149,755</b>	<b>\$231,351,805</b>

Source: Wood analysis, County Assessor

**Figure H.6. Wildfire Intensity in East Grand FPD**

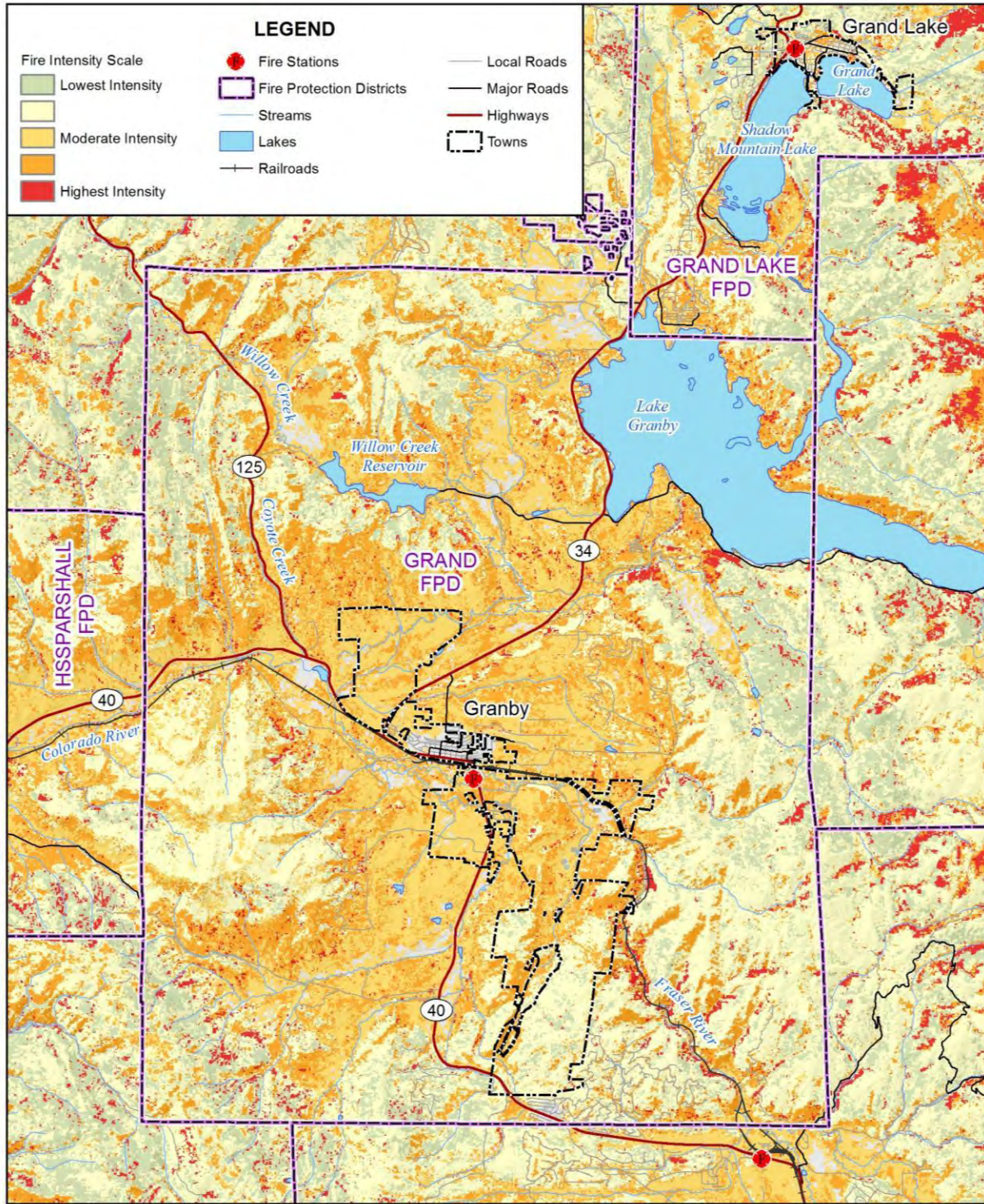


0 4 8 Miles



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**

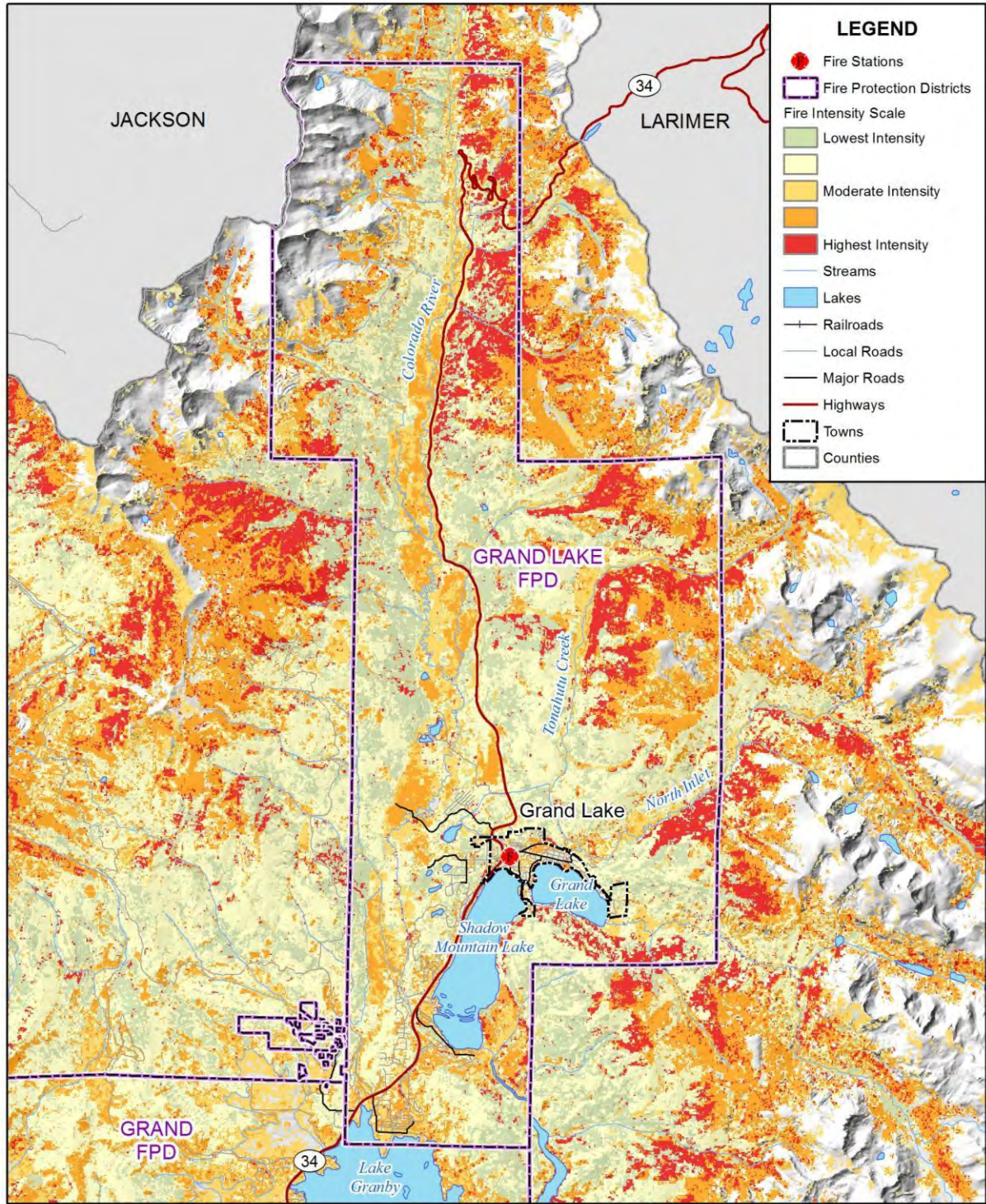


0 4 8 Miles



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**

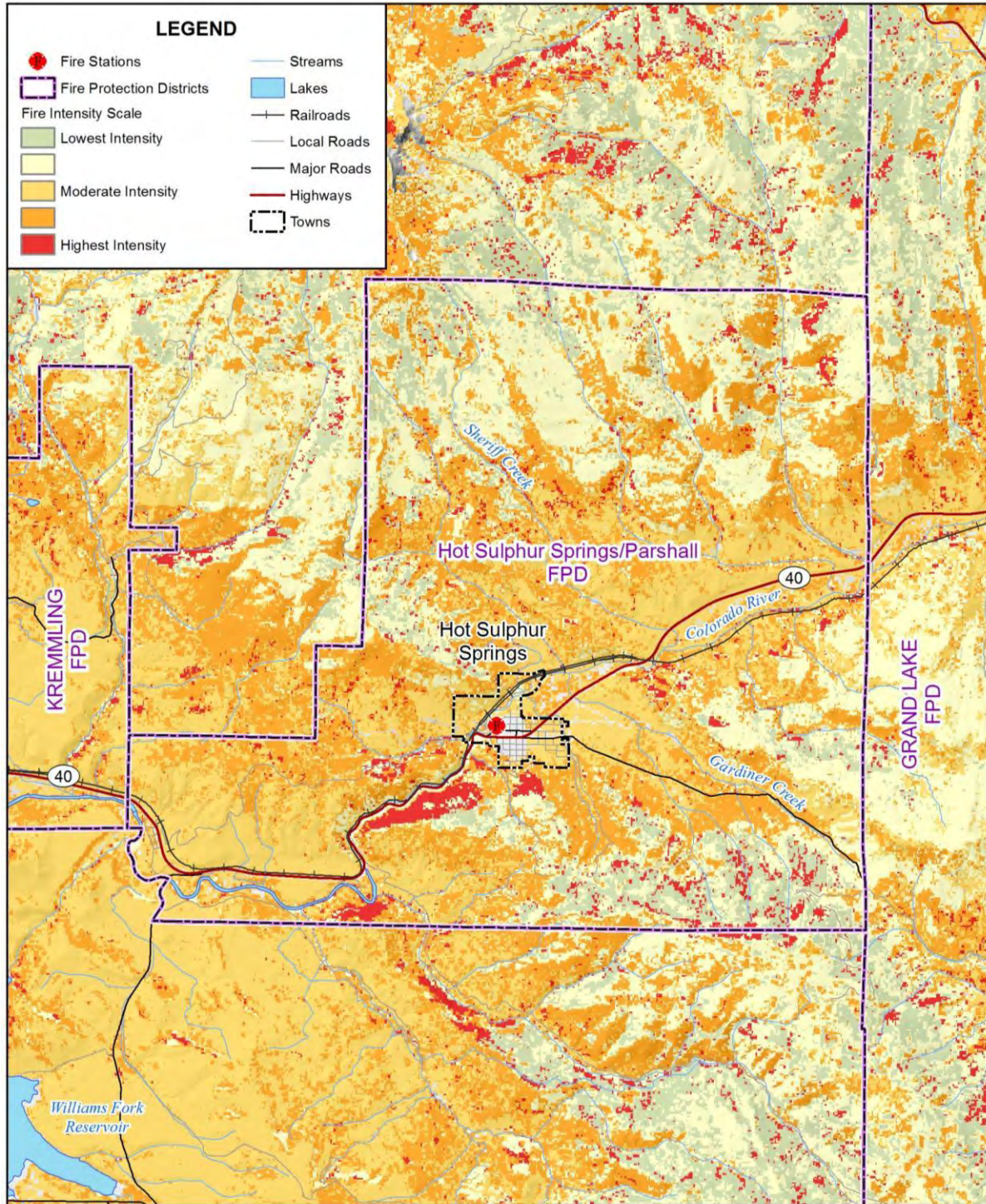


0 4 8 Miles



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 HSSFPD**

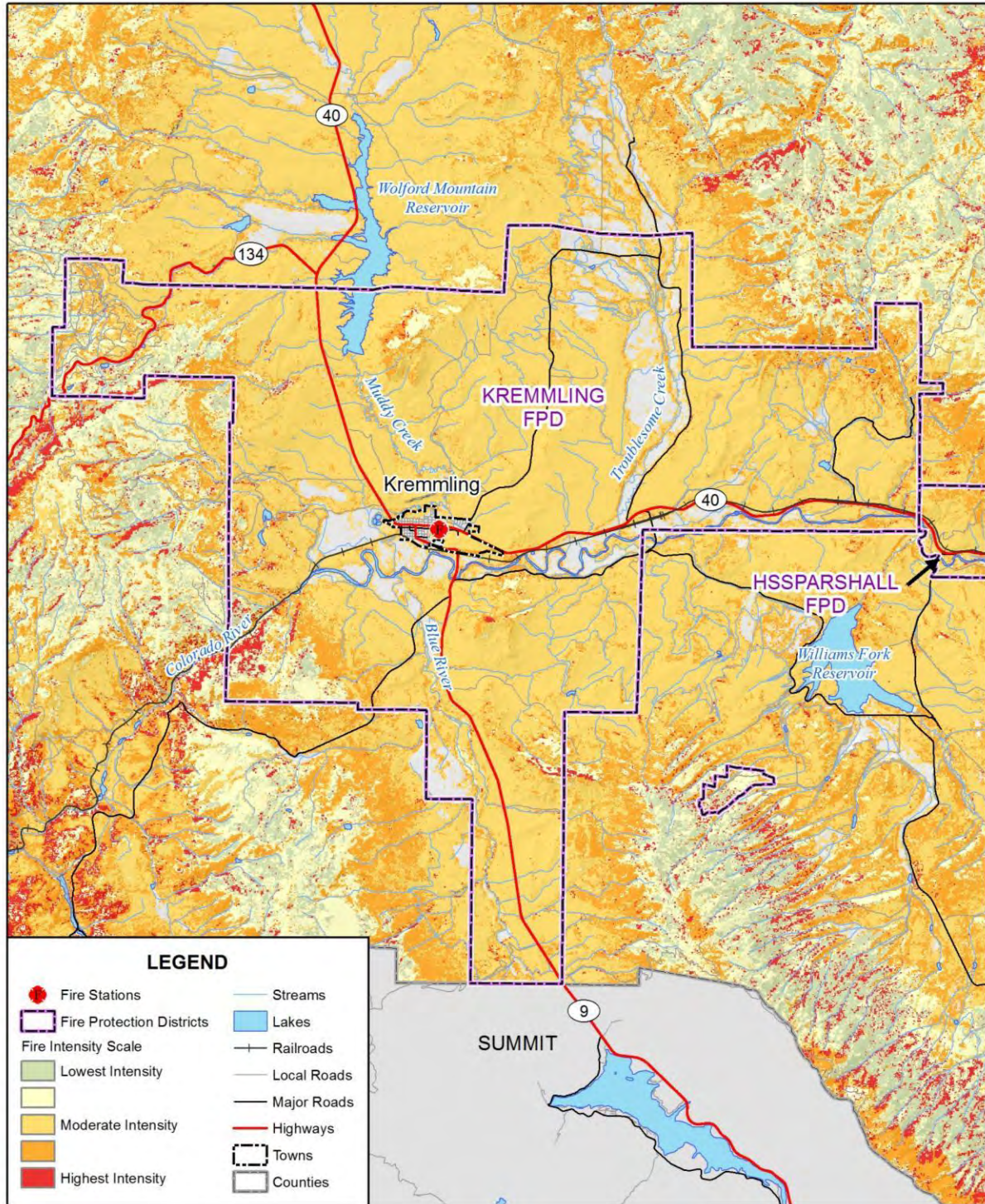


0 2.5 5 Miles



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



Map compiled 8/2013; intended for planning purposes only.  
 Data Source: Grand County, CDOT,  
 Colorado State Forest Service: CO-WRAP

0 5 10 Miles



In total 24,822 people live within medium and high risk WUI communities. Of the high-risk communities, 10,663 people live within and 14,159 people live within the medium risk WUI communities. East Grand FPD also has the most people at risk (12,164) with both high (4,909) and medium (7,255) risk communities. Grand Fire Protection has the second most people with a combined total of 7,104 people. Note There are several second homes in these areas, thus are not populated year-round. However, the population projected in this modeling may reflect the seasonal population swells, that often coincides with high fire season in the summer.

### ***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.

### **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. All 5 fire districts advocated the adoption of the International Fire Codes as part of code adoptions with the building codes. In 2018, all the districts adopted the 2015 International Fire Code. East Grand, Grand, and Grand Lake Fire all have regular plans review and inspection programs, while Hot Sulphur Springs and Kremmling use the code to plan review new projects, and largely implement the code through educational opportunities. 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.

Additional master planning for Grand Fire include a 2015 update to our CWPP, a 2015 ISO study on Standards of Cover, a 2018 study for Fire Impact Fees which includes demographic projection work, and a 2014 Strategic plan which is currently in the update process.

The East Grand County Fire Protection District #4 2020-2024 Strategic Plan is a five-year roadmap and identifies goals and objectives for the District. The plan shares the results of the Strengths, Weakness, Opportunities, and Threats (SWOT) Analysis that was conducted and includes challenges from the COVID-19 Pandemic.

For other regulatory mitigation capabilities, all five FPDs primarily rely on the County or the Towns within their districts.

### **Insurance Service Office Ratings**

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.

### **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. The following fiscal mitigation capabilities were identified by the fire district as being used by all 5 fire protection districts to help fund mitigation activities in the past. These fiscal mitigation capabilities include the following:

- IGA Impact Fees
- Community assistance grants administered by BLM CSFS
- Funding from Grand County Wildfire Council
- District budgets
- Leverage landowners' funds to pair with grant funds or District funds

## **Mitigation Outreach and Partnerships**

The Grand County Wildfire Council (GCWC) is a major partner in wildfire education and outreach throughout the County. The GCWC is a non-profit that consists of members from local, state, and federal government agencies as well as representation from each of the fire district's, homeowner groups, local businesses and concerned citizens. The mission of the GCWC is, "Through education and action, promote wildland fire prevention, preparedness, mitigation and survival" (GCWC 2020). The following are examples of mitigation programs the GCWC have conducted in the past four years.

### **Free Chipping Days**

Between 2016 and 2019 the GCWC held 17 free chipping days in the county. During that time, they had 567 participants, 1,219 loads of slash in pick-ups/trailers, 1,042 acres were mitigated and a total of 4,939 volunteer hours to conduct the free chipping days.

The free chipping days were funded through \$65,000 of grants through specific sources including, Middle Park Conservancy District, Bureau of Land Management, Town of Winter Park, Grand County Commissioners, Grand Foundation, Fire Adapted Colorado, and Rod's Tree Service.

### **Fuels Reduction Cost-Share Program**

The GCWC offers private landowners' opportunities to apply for cost-share funding to implement recommendations listed in each of the fire district's approved Community Wildfire Protection Plans (CWPPs). Homeowners and landowners can apply for funding and/or technical assistance to assist in completing defensible space and landscape-fuel reduction projects on their properties. Between 2016 and 2019 the cost-share program provided a total of \$450,000 in hazardous fuels treatment project and treated 421 acres. The GCWC received funding for the cost-share program from the Colorado State Forest Service, Northern Colorado Water Conservancy District, Bureau of Land Management, and the Middle Park Conservancy District/Colorado Conservation Board.

Mitigation related activities for each district include the following:

### **East Grand Fire Protection District**

- 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.
- 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.
- East Grand FPD participated in the development of the Upper Fraser Valley Community Wildfire Protection Plan (2007).

### **Grand Fire Protection District**

- Certified Winter Park Highlands HOA and CSFS as a FireWise community. Also, Ten Mile Creek HOA, Homestead Hills HOA, and Shadow Mountain Ranch.
- Received funding from BLM to form the Grand County Wildfire Council.

- 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**

- Mountain Shadow Estates is a certified FireWise community.
- 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
- 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**

- Gorewood is a certified FireWise community.
- Fire safety programs are given at Kremmling schools
- 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

## **Opportunities for Enhancement**

Based on the capability assessment, all 5 FPDs have several existing mechanisms in place that already help to mitigate hazards. There are also opportunities for the districts to expand or improve on these policies and programs to further protect the community. Future improvements may include providing training for staff members related to hazards or hazard mitigation grant funding in partnership with the County and Colorado's Department of Homeland Security and Emergency Management (DHSEM). Additional training opportunities will help to inform district staff and board members on how best to integrate hazard information and mitigation projects into the district policies and ongoing duties of the district. Continuing to train district staff on mitigation and the hazards that pose a risk to the districts will lead to more informed staff members who can better communicate this information to the public.

### **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>	Annual implementation
<b>Status:</b>	In progress. Wildfire council formed in 2015; 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 (all)
<b>Hazard Addressed</b>	Landslide/Rockfall
<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

## Mitigation Action: East Grand Fire District 2020-2 Wildfire Protection Lines Improvement (Fuel Breaks)

<b>Jurisdiction:</b>	East Grand Fire District, Grand County, Towns, Emergency Service Providers
<b>Hazard Addressed</b>	Wildfire
<b>Project Description, Issue &amp; Background</b>	Identify buffer areas to have fuel breaks constructed and maintained to slow or stop wildfires from entering Wildfire/Urban Interface (WUI), subdivisions and towns.
<b>Lead Agency and Title of Lead Person</b>	East Grand Fire
<b>Partners:</b>	USFS, Colorado State FS, Landowners, Grand County
<b>Priority:</b>	High
<b>Cost Estimate:</b>	More than \$1,000,000
<b>Benefits: (Losses Avoided)</b>	
<b>Potential Funding:</b>	USFS, CSFS, BLM, GC Wildfire Council, landowners, EGFD general fund 5 years and ongoing maintenance.
<b>Timeline:</b>	
<b>Status:</b>	New in 2020

## Mitigation Action: East Grand Fire District 2020-3 Alternative/Emergency Access Identification and Improvement

<b>Jurisdiction:</b>	Grand County, Towns, FPDs
<b>Hazard Addressed</b>	Wildfire, Wildlife-Vehicle Collisions, Windstorm, Dam/Levee Failure, Earthquake, Flood, Hazardous Materials, Landslide
<b>Project Description, Issue &amp; Background</b>	<p>There are a number of choke points that have either no or poor means of maintaining traffic flows. There are locations that would require routing through adjacent Counties, over restricted bridges, or on narrow back roads if access is blocked. This results in extensive delays to the public and First Responders</p> <p>Project would be to identify and mitigate these problem areas, seek engineering solutions and identify funding.</p>
<b>Lead Agency and Title of Lead Person</b>	Grand County
<b>Partners:</b>	FPDs, Towns
<b>Priority:</b>	High
<b>Cost Estimate:</b>	More than \$1,000,000
<b>Benefits: (Losses Avoided)</b>	
<b>Potential Funding:</b>	Highway improvement funds, DOLA Grants, General Fund Revenues-taxes.
<b>Timeline:</b>	5 years
<b>Status:</b>	New in 2020

## Mitigation Action: East Grand Fire District 2020-4 Capital Replacement Vehicles

<b>Jurisdiction:</b>	Grand County, Towns, FPDs
<b>Hazard Addressed</b>	Drought; Lightning; Wildfire;
<b>Project Description, Issue &amp; Background</b>	<p>Ongoing upgrading and replacement of Wildfire Engines.</p> <p>Provide regular replacement of vehicles and avoid outdated higher maintenance cost and accompanying lower reliability.</p> <p>Ensure that Firefighters have modern efficient equipment to fight wildfires.</p>
<b>Lead Agency and Title of Lead Person</b>	East Grand Fire District
<b>Partners:</b>	
<b>Priority:</b>	High
<b>Cost Estimate:</b>	More than \$1,000,000
<b>Benefits: (Losses Avoided)</b>	
<b>Potential Funding:</b>	EG Fire District Capital Replacement budget, FEMA Assistance to Firefighters (AFG) Grant 5 years
<b>Timeline:</b>	
<b>Status:</b>	New in 2020

## Mitigation Action: Grand Fire Protection District 2020-5 Adopt WUI Codes

<b>Jurisdiction:</b>	Grand FPD, Grand County
<b>Hazard Addressed</b>	Wildfire
<b>Project Description, Issue &amp; Background</b>	Grand County has been resistant to additional codes and restrictions, but recent events have highlighted the need for new construction to meet Wildland Urban Interface best practices. While voluntary action is preferred, a county-wide adopted policy on WUI Codes will promote resiliency, and ultimately cost taxpayers less in providing service to those areas.
<b>Lead Agency and Title of Lead Person</b>	Community Development, Grand FPD
<b>Partners:</b>	Fire agencies, Building departments/ community development
<b>Priority:</b>	Medium
<b>Cost Estimate:</b>	Little cost to adopt, may be some additional cost to projects being built
<b>Benefits: (Losses Avoided)</b>	
<b>Potential Funding:</b>	Department budgets  Next 5 years
<b>Timeline:</b>	
<b>Status:</b>	New in 2020

## Mitigation Action: Grand Fire Protection District 2020-6 Evacuation Planning

<b>Jurisdiction:</b>	Grand FPD, Grand County
<b>Hazard Addressed</b>	Dam/Levee Failure; Earthquake; Flood; Hazardous Materials; Landslide, Debris Flows, Mudflow, Rockfall; Severe Winter Storms; Wildfire; Windstorm;
<b>Project Description, Issue &amp; Background</b>	Grand County needs a comprehensive Evacuation Plan, which includes pre planned evacuation zones, Evacuation Centers, staffing and logistical needs plans, public information plans. Should Include publicly available publications and information.
<b>Lead Agency and Title of Lead Person</b>	Grand County OEM
<b>Partners:</b>	Response agencies, county departments, non-profits
<b>Priority:</b>	High
<b>Cost Estimate:</b>	\$10,000 - \$100,000
<b>Benefits: (Losses Avoided)</b>	
<b>Potential Funding:</b>	Grants, department budgets
<b>Timeline:</b>	2021
<b>Status:</b>	New in 2020

## Mitigation Action: Grand Lake Fire Protection District 2020-7 Grand Lake Fire Protection District CWPP Implementation Support and Outreach

<b>Jurisdiction:</b>	Grand Lake Fire Protection District
<b>Hazard Addressed</b>	Wildfire, 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 potential flooding. This project would entail continued implementation of the Grand Lake FPD, specifically priority fuel break projects.
<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
<b>Benefits: (Losses Avoided)</b>	By implementing a green space buffer around each water source, also a mitigated fuel 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.

## Mitigation Action: Grand Lake Fire Protection District 2020-8 Post East Troublesome Fire Mitigation and Fuels Reduction

<b>Jurisdiction:</b>	Grand Lake Fire Protection District
<b>Hazard Addressed</b>	Hazardous Materials; Wildfire; Landslide, Debris Flows, Mudflow, Rockfall; Lightning; Windstorm;
<b>Project Description, Issue &amp; Background</b>	<ol style="list-style-type: none"><li>1. Address and remove all hazardous trees damaged and destroyed by the East Troublesome Fire that present threats to private property, recreational trails, powerlines, and roadways.</li><li>2. Fuels mitigation on both private properties and recreational district areas to reduce future wildfire threat.</li><li>3. Land / Mud slide education and threat reduction. Due to the destruction of natural topsoil structure, the risk of land / mud slide has increased dramatically. Needs for community education and slide reduction mitigation.</li></ol>
<b>Lead Agency and Title of Lead Person</b>	Grand Lake Fire Protection District
<b>Partners:</b>	Grand Fire Protection District - Grand County Officer of Emergency Management - Grand County Department of Natural Resources - Hot Sulphur Fire Protection District - Arapahoe National Forest
<b>Priority:</b>	High
<b>Cost Estimate:</b>	\$100,000 - \$1,000,000
<b>Benefits: (Losses Avoided)</b>	
<b>Potential Funding:</b>	FEMA, Local Grant Foundations, Other Federal Grants, Donations
<b>Timeline:</b>	2 years
<b>Status:</b>	New in 2020

## Mitigation Action: Hot Sulphur Springs/Parshall Fire Protection District 2020-9 Update Community Wildfire Protection Plan

<b>Jurisdiction:</b>	Hot Sulphur Springs/Parshall Fire Protection District
<b>Hazard Addressed</b>	Wildfire
<b>Project Description, Issue &amp; Background</b>	Update the Hot Sulphur Springs-Parshall Fire Protection District CWPP (2016) with best available data. Integrate risk information in 2020 Grand County Hazard Mitigation Plan.
<b>Lead Agency and Title of Lead Person</b>	Hot Sulphur Springs/Parshall Fire Protection District
<b>Partners:</b>	BLM, CSFS, USFS
<b>Priority:</b>	High
<b>Cost Estimate:</b>	\$50,000
<b>Benefits: (Losses Avoided)</b>	
<b>Potential Funding:</b>	Grand County Wildfire Protection Council
<b>Timeline:</b>	5 years
<b>Status:</b>	New in 2020

## Mitigation Action: Kremmling Fire Protection District 2020-10 Develop and Implement Wildfire Protection Program for Residents in WUI

<b>Jurisdiction:</b>	Kremmling Fire Protection District
<b>Hazard Addressed</b>	Wildfire
<b>Project Description, Issue &amp; Background</b>	Support the implementation of voluntary wildfire protection programs for residents within wildfire/urban interface. Focus on highest risk communities identified in the CWPP and support wildfire community programs provided by various organizations. (NFPA, Ready-Set-Go, etc.)
<b>Lead Agency and Title of Lead Person</b>	Kremmling Fire Protection District
<b>Partners:</b>	Grand County OEM, Grand County Chief's Association, G. C. Wildfire Council
<b>Priority:</b>	High
<b>Cost Estimate:</b>	Staff Time
<b>Benefits: (Losses Avoided)</b>	Reduced property losses and loss of life from wildfires
<b>Potential Funding:</b>	Grants and support agencies.
<b>Timeline:</b>	Ongoing
<b>Status:</b>	New in 2020

# ANNEX I: DENVER WATER

## I.1 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.2 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
Insect Disease 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	Neqligible	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.3 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 – underground tunnel system that transports water from western slope to the Denver metro area. Impact if damages occurred would be to Denver Water customers.
Moffat Tunnel		\$100M	
Vasquez Tunnel		\$50M	
Gumlick Tunnel		\$50M	
Jones Pass			

Sources: Denver Water

\*EF: Essential Facilities; LS: Life Safety Facilities; LL: Lifeline 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*

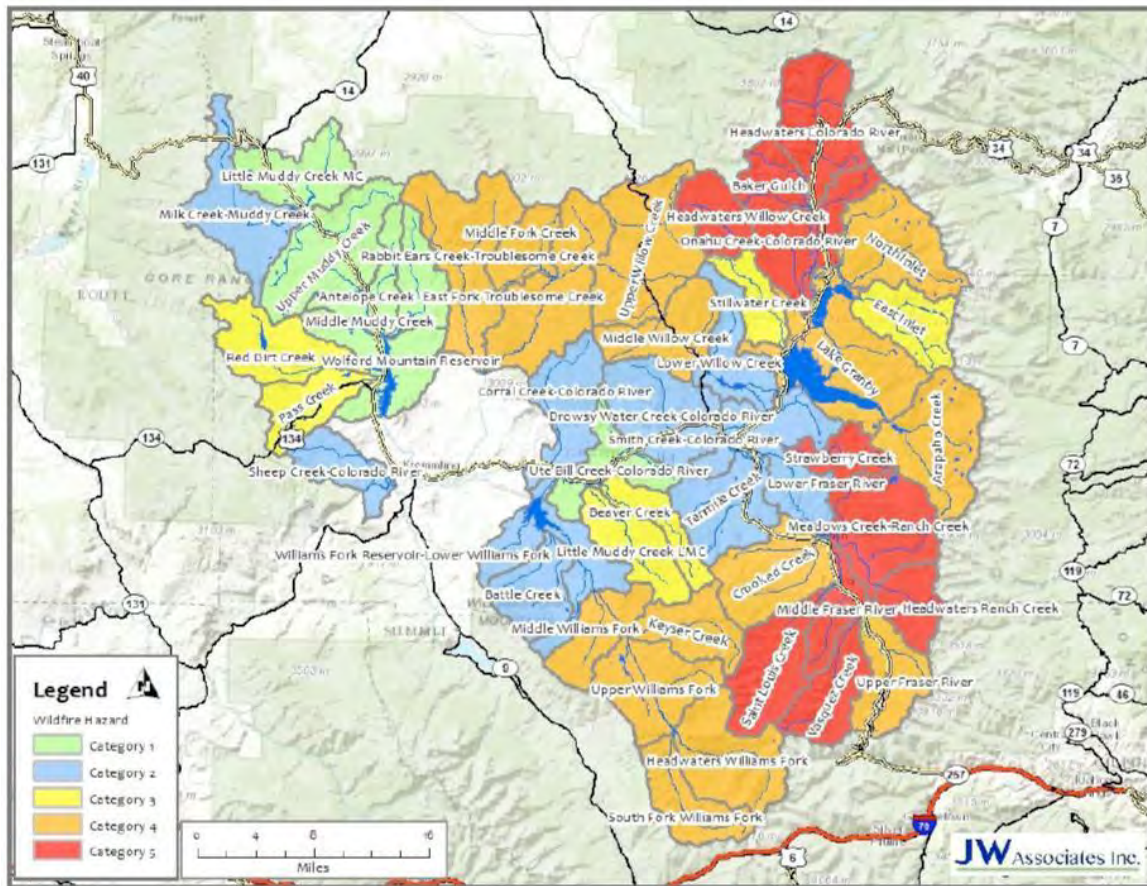
Watersheds and the numerous associated reservoirs in the county could be significantly impacted by high severity wildfire, especially in the wake of the mountain pine beetle epidemic. For

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” (JW Associates, Inc. 2013). 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 collection system or watershed](#).

### **I.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**

Regulatory mitigation capabilities include the planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities. Table I.3 lists regulatory tools that are in place in Denver Water to implement hazard mitigation activities. Many of the regulatory capabilities used by local jurisdictions are not applicable to Denver Water.

As noted in the table, Denver Water developed an Emergency Operations Plan in 2012, and regularly reviews and updates the plan based on the best available data. Denver Water also has several hazard specific plans including a Climate Adaptation plan that identifies potential risks and vulnerabilities to Denver Water as well as in some cases being used a reference before or after emergency situations.

**Table I.3. Denver Water—Regulatory Mitigation Capabilities**

<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	

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
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 Operations Plan developed in 2012, reviewed and updated on regular basis
Other special plans		Drought Response Plan Watershed Management Plan Crisis Communications Plan Climate Adaptation Plan Integrated Resource Plan FERC Emergency Action Plans (EAPs) on all dams. EPA Emergency Response Plans (ERPs) treatment and distribution plans. Continuity of Operations Plans Facility Security 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	yes	External Affairs	Watershed Scientist
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Engineering	
Planner/engineer/scientist with an understanding of natural hazards	Yes	External Affairs	Drought planners Watershed Scientist
Personnel skilled in GIS	Yes	IT/GIS	
Full time building official	N/A		
Floodplain manager	N/A		
Emergency manager	Yes	Emergency Management Section	
Grant writer	No		
Other personnel	Yes	Water resource engineers and drought planners	
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Yes	IT/GIS	
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Yes	IT /Local Dispatch Centers	Internal Warning Systems/Services: Everbridge System Controls Denver Water is responsible for managing the water system and will notify first response agencies when emergencies arise External: Local Systems. First Response Agencies are responsible for notifying their populations of impacting emergencies

## 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.

Table I.5 lists financial tools or resources that Denver Water already does use to help fund mitigation activities

**Table I.5 Denver Water Fiscal Mitigation Capabilities**

Financial Resources	Accessible / Eligible to Use (Yes/No)	Has Been Used in the Past	Comments
Community Development Block Grant	No	N/A	
Capital Improvements Project funding	Yes	Yes	
Authority to levy taxes for specific purposes	<del>Yes</del> No	<del>Yes</del> No	For water rates only – <a href="#">This is covered by fees below.</a>
Fees for water, sewer, gas, or electric services	Yes	Yes	
Impact fees for new development	Yes	Yes	<a href="#">Tapping Fees</a> <a href="#">SDCs</a>
Incur debt through general obligation bonds	<del>No</del> Yes	<del>Yes</del> No	<a href="#">Issue revenue bonds. Charter was amended to prohibit general obligation bonds.</a>
Incur debt through special tax bonds	No	No	
Incur debt through private activities	No	No	
Withhold spending in hazard prone areas	N/A	N/A	

## 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. Denver does not currently participate in the Storm Ready or Firewise programs.

Coordination Efforts include:

- Denver Water’s External Affairs division consists of Customer Relations, Communications & Marketing, Government & Stakeholder Relations, Conservation, Treated Water Planning, Demand Planning and Water Resources. This group provides a plethora of planning and outreach with local partners. They provide media relations, social media, marketing, publications, internal communication, stakeholder relations, government relations, community outreach, and website communications for both our combined service area of 1.4 million people and for the communities where Denver Water’s watersheds and facilities are located.

- Denver Water’s Emergency Management, Safety & Security section partners with local OEMs, local law enforcement agencies to work closely on planning, response, recovery and mitigation efforts in order to build a resilient community that can respond to emergencies. to share public safety messages around flood/runoff safety, create a culture of preparedness and foster an understanding of Denver Water’s operations and constraints.

Denver Water uses the following communication and coordination methods to conduct public outreach:

- TAP stories, videos and infographics across all social media channels, which provide content and opportunities for local partners to adapt for use on their social media channels.
- Partnerships with County Emergency Management and offering content for their annual safety guide
- Presentations to community groups, the annual State of the River event, Emergency Manager’s Town Halls, etc.
- Expert interview(s) on local PATV station.
- Proactive media pitches to local publications and websites.

## **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.

## **Opportunities for Enhancement**

Based on the capability assessment, Denver Water has several existing mechanisms in place that already help to mitigate hazards. There are also opportunities for Denver Water to expand or improve on these policies and programs to further protect the community. Future improvements may include providing training for staff members related to hazards or hazard mitigation grant funding in partnership with the County and Colorado Division of Homeland Security and Emergency Management (DHSEM) or the Colorado Water Conservation Board (CWCB). Additional training opportunities will help to inform staff and board members on how best to integrate hazard information and mitigation projects into Denver Water policies and ongoing duties. Continuing to train Denver Water staff on mitigation and the hazards that pose a risk to the district will lead to more informed staff members who can better communicate this information to the public. Another opportunity for enhancement includes continued relationship building with county and local government staff to raise awareness of preparedness resources and mitigation techniques in the event of high-water flows.

### **I.5 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.6 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

<b>Jurisdiction:</b>	Denver Water
<b>Hazard Addressed:</b>	Drought, Dam Failure
<b>Priority:</b>	Low
<b>Issue/Background:</b>	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.
<b>Responsible Agency:</b>	Denver Water Emergency Management
<b>Partners:</b>	Grand County OEM, participating jurisdictions
<b>Potential Funding:</b>	Denver Water
<b>Cost Estimate:</b>	Staff time, developing and printing public information materials
<b>Benefits: (Losses Avoided)</b>	Strengthen partnership between Denver Water and Grand County; keep public informed
<b>Timeline:</b>	Annual implementation
<b>Status:</b>	In progress.

## Mitigation Action: Denver Water 2020-1 Proactive Right-of-Way Wildfire Mitigation

<b>Jurisdiction:</b>	Denver Water
<b>Hazard(s) Addressed</b>	Wildfire
<b>Priority:</b>	Low
<b>Issue/Background:</b>	Fuel load in and around Denver Water ROW can be characterized as dry standing and downed timber. Targeted fuels reduction to Denver Water utility ROW would provide fuel breaks that reduce risk to the utility and the watershed of Headwaters of the Colorado River.
<b>Ideas for Implementation:</b>	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
<b>Responsible Agency:</b>	Denver Water – Winter Park Office
<b>Partners:</b>	USFS
<b>Potential Funding Cost Estimate:</b>	Denver Water Staff time Youth Corps Time 12,000 dollars per week. Estimated time needed 12 weeks.
<b>Benefits: (Losses Avoided)</b>	Protecting the Colorado River watershed.
<b>Timeline:</b>	Ongoing
<b>Status:</b>	New in 2020

## Mitigation Action: Denver Water 2020-2 Proactive Forest Management (From Forests to Faucets Program and DW Forest and Land Management Services Agreement) for Hazardous Fuels Reduction

<b>Jurisdiction:</b>	Denver Water
<b>Hazard(s) Addressed</b>	Wildfire
<b>Priority:</b>	High
<b>Issue/Background:</b>	Continue proactive forest management with the United States Forest Service (USFS), Colorado State Forest Service (CSFS), and the Natural Resources Conservation Service (NRCS). This project entails forest hazardous fuels reduction on the Arapaho National Forest, private properties, and Denver Water property to advance wildfire risk reduction.
<b>Responsible Agency:</b>	Denver Water,
<b>Partners:</b>	U.S. Forest Service, Colorado State Forest Service, and the Natural Resources Conservation Service. Denver Water, USFS, CSFS, and NRCS
<b>Potential Funding</b>	
<b>Cost Estimate</b>	\$2M
<b>Benefits: (Losses Avoided)</b>	Watershed protection, community protection, habitat improvements
<b>Timeline:</b>	2023
<b>Status:</b>	New in 2020

## Mitigation Action: Denver Water 2020-3 Williams Fork Fire Recovery and Debris Flow Mitigation

<b>Jurisdiction:</b>	Denver Water
<b>Hazard(s) Addressed</b>	Flood, Landslides /Debris Flow
<b>Priority:</b>	Medium
<b>Issue/Background:</b>	<p>The Williams Fork Fire burned over 14,000 acres in Grand County during the Summer of 2020. Landslides and debris flows associated with post-wildfire precipitation events threaten several key pieces of infrastructure that Denver Water owns and operates. Denver Water intends to seek mitigation projects to protect Williams Fork Reservoir, the Big Lake Ditch headgate, and the diversions and tunnels up to and including the Gumlick Tunnel.</p> <p>Denver Water will be seeking additional technical assistance and post-fire assessments to better understand expected debris flows and the type of debris that the burn scar could yield. After post-fire assessments are complete, Denver Water will work through partnerships to consider hillslope stabilization projects and sediment and debris erosion barriers.</p>
<b>Responsible Agency:</b>	Denver Water, Grand County,
<b>Partners:</b>	USFS, CWCB
<b>Potential Funding</b>	Denver Water, Grand County, USFS, CWCB, and CDPHE's 319 Program
<b>Cost Estimate</b>	\$5,000 to \$30,000 depending on level of assessments and technical assistance
<b>Benefits: (Losses Avoided)</b>	Reduce sediment and debris deposition in Williams Fork Reservoir and the Gumlick Tunnel, minimize damages to Denver Water property
<b>Timeline:</b>	2021
<b>Status:</b>	New in 2020

# ANNEX J: NORTHERN COLORADO WATER CONSERVANCY DISTRICT

## J.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 K.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 J.1 Northern Water West Slope Collection System**



Source: Northern Water (<http://www.northernwater.org/WaterProjects/C-BTWestRecreation.aspx>)

## J.2 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 J.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
Insect Disease Infestation	Large	Occasional	Limited	High
Severe Winter Storm	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.

### J.3 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.

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**Table J.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.

## **Insect Disease 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. Wildfire hazard is discussed below.

## **Wildfire**

### ***Existing Development***

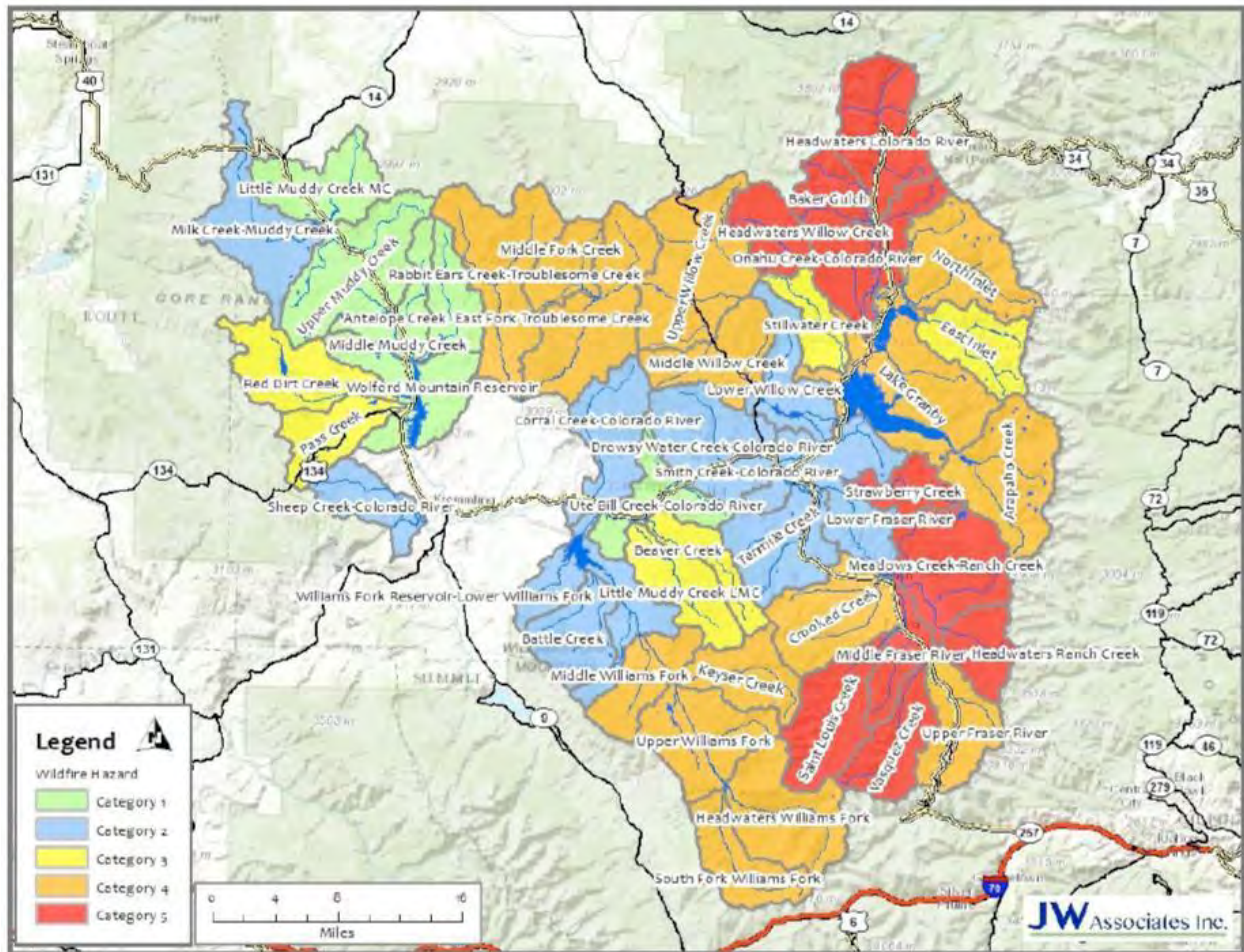
Watersheds and the numerous associated reservoirs in the county could be significantly impacted by high severity wildfire, especially in the wake of the mountain pine beetle epidemic.

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” (JW Associates, Inc. 2013). 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 J.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 Wildland- 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 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.

### J.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, 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 regulatory tools that are in place in Northern Water to implement hazard mitigation activities.

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**Table J.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	

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Other special purpose ordinance (stormwater, steep slope, wildfire)	N/A	
Building code	Yes	
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	Yes	Continuity of Operations Plan (COOP) 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 J.4 Northern Water—Administrative and Technical Mitigation Capabilities**

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Yes	Water Quality Dept, Environmental Service Div.	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Engineering Dept.	
Planner/engineer/scientist with an understanding of natural hazards	Yes	Water Quality / Real Estate / Security / Emergency Management	
Personnel skilled in GIS	Yes	IT/GIS Department	
Full time building official	Yes	Facilities	
Floodplain manager	N/A		

Emergency manager	Yes	Real Estate / Security / Emergency Management	
Grant writer	Yes	Water Quality Dept, Environmental Service Div.	
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Yes	IT / GIS	
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Yes	Real Estate / Security / Emergency Management / O&M / IT	Alertus and Everbridge

### 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.

Table J.5 lists financial tools or resources that Northern Water already does use to help fund mitigation activities

**Table J.5 Northern Water Fiscal Mitigation Capabilities**

Financial Resources	Accessible / Eligible to Use (Yes/No)	Has Been Used in the Past	Comments
Community Development Block Grant	Yes	No	
Capital Improvements Project funding	Yes	No	
Authority to levy taxes for specific purposes	Yes	No	
Fees for water, sewer, gas, or electric services	Yes	No	
Impact fees for new development	Yes	No	
Incur debt through general obligation bonds	Yes	No	
Incur debt through special tax bonds	Yes	No	
Incur debt through private activities	Yes	No	
Withhold spending in hazard prone areas	Yes	No	

### 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**

Between 2016 and 2019 the Northern Colorado Water Conservancy provided \$30,000 to the Grand County Wildfire Council cost-share reimbursement program. The cost-share program provided funding to private homeowner and landowners to complete defensible space and landscape-fuel reduction projects on their property. As part of the funding provided by the Northern Colorado Water Conservancy, 421 acres of private property were treated in Grand County.

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 tabletop exercises in preparation for emergencies related to flood, including communications and reservoir control.

Opportunities for Enhancement Based on the capability assessment, Northern Water has several existing mechanisms in place that already help to mitigate hazards. There are also opportunities for Northern Water to expand or improve on these policies and programs to further protect the community. Future improvements may include providing training for staff members related to hazards or hazard mitigation grant funding in partnership with the County and Colorado Division of Homeland Security and Emergency Management (DHSEM) or the Colorado Water Conservation Board (CWCB). Additional training opportunities will help to inform staff and board members on how best to integrate hazard information and mitigation projects into Northern Water policies and ongoing duties. Continuing to train Northern Water staff on mitigation and the hazards that pose a risk to the district will lead to more informed staff members who can better communicate this information to the public.

## **J.5 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.

## **J.6 Mitigation Actions**

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Northern Water identified and prioritized the following mitigation action 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:** In progress. Since 2012 the Colorado-Big Thompson (C-BT) Headwaters Partnership has successfully worked together to complete over 800 acres of hazardous fuel reduction.

## **Mitigation Action: Northern Water 2020-1 Colorado-Big Thompson Headwaters Partnership for Watershed Protection Hazardous Fuels Reduction**

**Jurisdiction:** Northern Water

**Hazard(s) Addressed** Wildfire, Flood, Landslide/Debris Flow/Mudflow and Rockfall, drought

**Priority:** High

**Issue/Background:** Background: In 2012, Northern Water, Reclamation, the State Forest Service, and the US Forest Service entered into an MOU to work together to begin to restore forest and watershed health conditions near critical infrastructure and in watersheds associated with the Colorado-Big Thompson Project. Since then, the Colorado-Big Thompson (C-BT) Headwaters Partnership has successfully worked together to complete over 800 acres of hazardous fuel reduction treatments. This action would execute nearly 2,500 additional acres of fuels treatments currently scheduled.

Forest and watershed restoration activities supported by this partnership contain mutually beneficial outcomes in addition to watershed protection. These activities have focused on reducing the risk of wildfires to people and communities, making forest stands more resilient, and improving ecological health. These accomplishments make this one of the most successful partnerships in support of the Western Watershed Enhancement Partnership in the western United States.

Since the development and signing of the initial C-BT Headwaters Partnership MOU, several new organizations have been interested in joining the Partnership. This refreshed and updated MOU document adds Rocky Mountain National Park and the Western Area Power Administration as signatories in support of the goals of the C-BT Headwaters Partnership. This addition to the partnership adds several important elements to the group. First, it will provide better opportunities for increased effectiveness in achieving the goals that originally brought us together. Second, it will increase our potential for leveraging project funds and capturing grant opportunities.

Our growing partnership is important because of our focus on the health of Colorado's forests and watersheds. Forest health affects overall ecosystem health and resiliency, ecological balance, recreational opportunities, and regional water supplies, including delivery of supplemental municipal, industrial and agricultural water supplies and power from the C-BT Project.

**Responsible Agency:** Northern Water Conservancy District,

**Partners:** US Department of the Interior Bureau of Reclamation, US Department of the Interior National Park Service Rocky Mountain National Park, US Department of Energy Western Area Power Administration, The Board of Governors of the Colorado State University, US department Of Agriculture, Forest Service Arapaho and Roosevelt National Forests and Pawnee national Grassland.

Northern Water and various grants (IE, CDBG-DR, BRIC, EWP, 404 and 406)

**Potential Funding**

**Cost Estimate** \$300 – 500k annually, split between projects in Larimer and Grand county for C-BT projects.

**Benefits:  
(Losses Avoided)** Reduce wildfire severity, improve water quality and resilience to water supply by limiting impacts from sediment and other pollutants.

**Timeline:** September 30, 2021

**Status:** New in 2020

- 2019 Report on the Health of Colorado's Forests. Colorado State Forest Service. <http://csfs.colostate.edu/pdfs/137233-forestreport-12-www.pdf>
- American Community Survey. 2011. <http://www.census.gov/acs/www/>
- Amman, Gene D., Mark D. McGregor, and Robert E. Dolph, Jr. Mountain Pine Beetle. U.S. Forest Service. Forest Insect & Disease Leaflet 2. 2002. [www.barkbeetles.org/mountain/fidl2.htm](http://www.barkbeetles.org/mountain/fidl2.htm).
- Atkins, Dale. A History of Colorado Avalanche Accidents, 1859–2006. International Snow Science Workshop 2006 Proceedings. 2006. [www.avalanche.org/~issw2004/issw\\_previous/2006/proceedings/data/papers/044.pdf](http://www.avalanche.org/~issw2004/issw_previous/2006/proceedings/data/papers/044.pdf).
- Census 2000 and 2010. U.S. Census Bureau. [www.census.gov/](http://www.census.gov/).
- Colorado Avalanche Information Center. Colorado Geological Survey. <https://avalanche.state.co.us/index.php>
- Colorado Department of Transportation. [www.coloradodot.info](http://www.coloradodot.info).
- Colorado Earthquake Evaluation Report. [www.dola.state.co.us/dem/mitigation/plan\\_2007/2007\\_plan.htm](http://www.dola.state.co.us/dem/mitigation/plan_2007/2007_plan.htm).
- Colorado Earthquake Information. Colorado Geological Survey. <http://geosurvey.state.co.us/hazards/Earthquakes/Pages/Earthquakes.aspx>.
- Colorado Geological Survey. <http://geosurvey.state.co.us/Pages/CGSHome.aspx>.
- Colorado Mountain Pine Beetle Epidemic 1996-2007. Colorado State Forest Service. 2008. [http://csfs.colostate.edu/library/pdfs/iandd/2007\\_1996\\_StateOverview\\_I&D\\_MPB\\_AllForestSpecies.pdf](http://csfs.colostate.edu/library/pdfs/iandd/2007_1996_StateOverview_I&D_MPB_AllForestSpecies.pdf).
- Colorado Office of Emergency Management. <http://www.coemergency.com/>.
- Colorado State Forest Service. [csfs.colostate.edu](http://csfs.colostate.edu).
- Colorado Water Conservation Board. [cwcb.state.co.us](http://cwcb.state.co.us).
- Colorado Wildfire Risk Assessment Portal. [www.coloradowildfire.risk.com](http://www.coloradowildfire.risk.com).
- Community Rating System. Federal Emergency Management Agency National Flood Insurance Program. <http://www.fema.gov/national-flood-insurance-program-community-rating-system>
- Directory of Colorado State Register Properties. Colorado Historical Society Office of Archeology and Historical Preservation. <http://www.historycolorado.org/oahp/listings-county>.
- Drought Impact Reporter. National Drought Mitigation Center. <http://droughtreporter.unl.edu/>
- East Grand Fire Protection District/Upper Fraser Valley Community Wildfire Protection Plan, 2007.
- Edgewater Resort Flood Evacuation Plan, 2006.
- Endangered, Threatened, Proposed and Candidate Species Colorado Counties. U.S. Fish and Wildlife Service Mountain-Prairie Region. August 2013. <http://ecos.fws.gov/ipac/wizard/trustResourceList!prepare.action>.
- EPA, What Climate Change Means for Colorado, <https://bit.ly/38l3q9a>
- Farm Service Agency. U.S. Department of Agriculture. <http://www.fsa.usda.gov/FSA/webapp?area=home&subject=diap&topic=landing>
- Federal Wildland Fire Occurrence Data. <http://wildfire.cr.usgs.gov> FEMA

Map Service Center. [msc.fema.gov](http://msc.fema.gov).

Flood Insurance Study: Grand County, Colorado, Unincorporated and Incorporated Areas. Federal Emergency Management Agency. January 2, 2008.

Fraser Comprehensive Plan, 2010.

Future Avoided Cost Explorer: <https://storymaps.arcgis.com/stories/4e653ffb2b654ebe95848c9ba8ff316e>

Grand County Community Wildfire Protection Plan,

2006. Grand County Emergency Operations Plan, 2016.

Grand County Forest Management Plan,

2008. Grand County Master Plan, 2011.

Grand Fire Protection District Community Wildfire Protection Plan, 2009.

Grand Lake Comprehensive Land Use Plan, 2006.

Grand Lake Fire Protection District Community Wildfire Protection Plan, 2006.

Hazard Mitigation Planning and Hazard Mitigation Grant Program. Federal Register. Interim Final Rule. February 26, 2002. [www.fema.gov/plan/mitplanning/interim\\_final\\_rules.shtm](http://www.fema.gov/plan/mitplanning/interim_final_rules.shtm).

Hazard Mitigation Planning and Hazard Mitigation Grant Program. Federal Register. Final Rule. October 31, 2007.

HAZUS-MH MR2 and 2.0. Federal Emergency Management Agency. [www.fema.gov/plan/prevent/hazus/index.shtm](http://www.fema.gov/plan/prevent/hazus/index.shtm).

Historic American Buildings Survey. National Park Service. [www.nps.gov/history/hdp/habs/](http://www.nps.gov/history/hdp/habs/).

Hot Sulphur Springs/Parshall Fire Protection District Community Wildfire Protection Plan, 2013.

Introduction to Hazard Mitigation. Federal Emergency Management Agency. FEMA IS-393.A. 2006. <http://training.fema.gov/EMIWeb/IS/is393A.asp>.

Kremmling Comprehensive Plan, 2013.

Kremmling Fire Protection District Community Wildfire Protection Plan, 2011.

Local Mitigation Planning Handbook. Federal Emergency Management Agency, March 2013.

Mountain Pine Beetles and Colorado Forests, Granby & Kremmling Community Report, Hua James Qin, Christine Sanders, Elizabeth Prentice, Jamie Vickery – University of Colorado Boulder.

National Atlas. U.S. Geological Survey. [www.nationalatlas.gov](http://www.nationalatlas.gov)

National Flood Insurance Program. Federal Emergency Management Agency. <http://www.fema.gov/national-flood-insurance-program>.

National Flood Insurance Program (NFIP) Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials. Federal Emergency Management Agency. FEMA 480. <http://www.fema.gov/floodplain-management/floodplain-management-requirements>.

National Register of Historic Places. National Park Service. <http://www.nps.gov/nr/research/>.

- National Response Center. [www.nrc.uscg.mil/](http://www.nrc.uscg.mil/).
- National Weather Service – Boulder: [weather.gov](http://weather.gov)
- National Weather Service Lightning Safety. <http://www.lightningsafety.noaa.gov/> National
- Wildfire Coordinating Group. <http://www.nwcg.gov/pms/pubs/glossary/s.htm>.
- Natural Diversity Information Source. Colorado Division of Wildlife. <http://ndis.nrel.colostate.edu/>.
- Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings from Mitigation Activities. National Institute of Building Science Multi-Hazard Mitigation Council. 2005. [www.nibs.org/MMC/mmactiv5.html](http://www.nibs.org/MMC/mmactiv5.html).
- Population Totals. Colorado Division of Local Government State Demography Office. <http://www.colorado.gov/cs/Satellite?c=Page&childpagename=DOLA-Main%2FCBONLayout&cid=1251593346867&pagenam=CBNWrapper>.
- Public Entity Risk Institute Presidential Disaster Declaration Site. Public Entity Risk Institute. [www.peripresdecusa.org/mainframe.htm](http://www.peripresdecusa.org/mainframe.htm).
- Robert T. Stafford Disaster Relief and Emergency Act. Public Law 93-288, as amended, 42 U.S.C. 5121-5207. June 2007. [www.fema.gov/pdf/about/stafford\\_act.pdf](http://www.fema.gov/pdf/about/stafford_act.pdf).
- ScienceMag.org, Climate Change Sends Beetles Into Overdrive, <https://bit.ly/2VCBdWI>
- Spatial Hazard Events and Losses Database for the United States. University of South Carolina Hazards Research Lab. [http://webra.cas.sc.edu/hvriapps/sheldus\\_web/sheldus\\_login.aspx](http://webra.cas.sc.edu/hvriapps/sheldus_web/sheldus_login.aspx).
- Species Tracking Lists. Colorado Natural Heritage Program. <http://www.cnhp.colostate.edu/download/list.asp>.
- State of Colorado Drought Mitigation and Response Plan. 2018. <https://www.colorado.gov/pacific/mars/colorado-natural-hazard-mitigation-plan>
- State of Colorado Natural Hazards Mitigation Plan. Colorado Division of Emergency Management. 2018. <https://www.colorado.gov/pacific/mars/colorado-natural-hazard-mitigation-plan>
- Understanding Your Risks: Identifying Hazards and Estimating Losses. Federal Emergency Management Agency. FEMA 386-2. 2001. [www.fema.gov/plan/mitplanning/howto2.shtm](http://www.fema.gov/plan/mitplanning/howto2.shtm).
- Upper Colorado Headwaters Wildfire/Watershed Assessment, 2013.
- U.S. Drought Monitor Archives. University of Nebraska-Lincoln. <http://droughtmonitor.unl.edu/archive.html>
- U.S. Geological Survey. <http://www.usgs.gov/>.
- U.S. Seasonal Drought Outlook. National Weather Service Climate Prediction Service. [www.cpc.ncep.noaa.gov/products/expert\\_assessment/seasonal\\_drought.html](http://www.cpc.ncep.noaa.gov/products/expert_assessment/seasonal_drought.html).
- Western Regional Climate Center. [www.wrcc.dri.edu/](http://www.wrcc.dri.edu/).

# APPENDIX B: PLANNING PROCESS MATERIALS

## 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**

You have received this email because your agency or organization is based in Grand County, you are a town manager for a municipality in Grand County, you have a vested interest in the water system, high-hazard dams or utilities, you are with a State or Federal agency that has assets (land, highways, etc) in Grand County, or you are a non-profit.

Grand County Office of Emergency Management invites you to a Hazard Mitigation Planning Kickoff Meeting on January 23, 2020, at 6:00 pm. We will begin the process of updating the County's 5-year 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.

Your participation is important to the success of this plan. If you cannot make the kick-off meeting, please delegate someone from your organization to attend. **If you represent a town within Grand County, please bring along someone from your public works department.**

**BONUS** -- by participating in the new 5-year plan, your agency, entity, municipality, special district, non-profit, etc., will be eligible for FEMA pre- and post-disaster mitigation funding!

For more information, see the attached flyer.

**Date/Time:** Thursday, January 23, 6:00 pm

**Location:** Grand County EOC at Fraser Road & Bridge  
350 CR 5103, Fraser CO 80442

Kathleen Conrad  
Grand County Emergency Manager  
Fraser, Colorado  
970-531-1236

Grand County  
2020 Hazard Mitigation Plan  
Kickoff Meeting



Agenda

Introductions  
Review Disaster Mitigation Act Planning Requirements  
Hazard Identification & Profiles  
Mitigation Planning Process  
Grant Programs Linked to Approved Plan  
Data Collection Guides  
Mitigation Action Items  
Public Participation Strategy  
Project Schedule

Contact Information

Kat Conrad, Emergency Management Director  
p70.531.1236 kconrad@co.grand.co.us

HAZARD MITIGATION PLANNING KICKOFF MEETING  
 JANUARY 23, 2020, GRAND COUNTY EOC, FRASER, COLORADO

NAME	ORGANIZATION	TELEPHONE	EMAIL
Brene Belew-Lane	GC P4	970 531 0466	bbelew@co.grand.co.us
Christine Lee	Town of H.S.S.	708 990 5967	stephencheis@RKY.MTN.Hi.com
Kevin Kretzmann	Grand Lake Fire	727-267-6584	kretzmann@grandlakefire.org
Dan Meyer	Grand Lake Fire	970-531-2830	dmeyer@grandlakefire.org
Brad White	Grand Fire	970-531-6742	bwhite@grandfire.org
Doug Bellatty	Town of Granby	970 531 9246	dbellatty@townofgranby.com
Elwin Crubtree	3 Lakes Watershed Assn.	970 626-3422	elwin@crubtree@crubtreeproperties.com
NAME	ORGANIZATION	TELEPHONE	EMAIL
Chris Bauer	Grand County	(970) 887-2123	cbauer@co.grand.co.us
Micah Benson	GRAND COUNTY	(970) 887-2123	mbenson@co.grand.co.us
Amy Siderer	Grand County Nat Res	970-887-0745	asiderer@co.grand.co.us
Russell Pennington	FRASER	970-726-5491	rpennington@town.fraser.co.us
Gerry Vernon	Winter Park	970-726-8086x212	gvernon@wpgov.com
Chris Ziegler	BLM	970 724 3002	cziegler@BLM.gov
KATHLEEN CONRADO	GRAND CO. OEM	970-531-1236	kconrado@co.grand.co.us
Tara D. Gaurdin	GC OEM	970 531-2579	tgaurdin@co.grand.co.us
GLEN TRAINER	WINTER PARK POLICE DEPT	970-531-1497	gtrainer@wpgov.com

HAZARD MITIGATION PLANNING KICKOFF MEETING  
 JANUARY 23, 2020, GRAND COUNTY EOC, FRASER, COLORADO

NAME	ORGANIZATION	TELEPHONE	EMAIL
VICTOR LEE	USBR	970-461-5904	VLEE@USBR.GOV
CRAIG EBEL	NORTHERN WATER	970-685-1710	CEBEL@NORTHERN.WATER.ORG
Rob Krueger	DW-Denver Water	303 748 0425	rob.krueger@denverwater.org
Todd Liko	USFS	970-531-8303	todd.liko@usda.gov
Seth Jennings	USFS	970-887-4127	Seth.jennings@usda.gov
TODD HOLZWARTH	EAST GRAND FPD #4	970726-5824	toddh@eastgrandfire.com
Nick Wall	East Grand Fire	(764)497-7871	nicholasjwall@gmail.com
Tyler Campbell	DFPC	970 286 5289	Tyler.Campbell@state.co.us
Will O'Donnell	GCWIN, Mountain Lake Properties	303-550-8615	will.odonnell.gj@gmail.com
Neil Willems	Snow Mountain Ranch YMCA	970-887-2152	nwillems@ymca.rockies.org



PPT Presentation for Kick-off Meeting

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



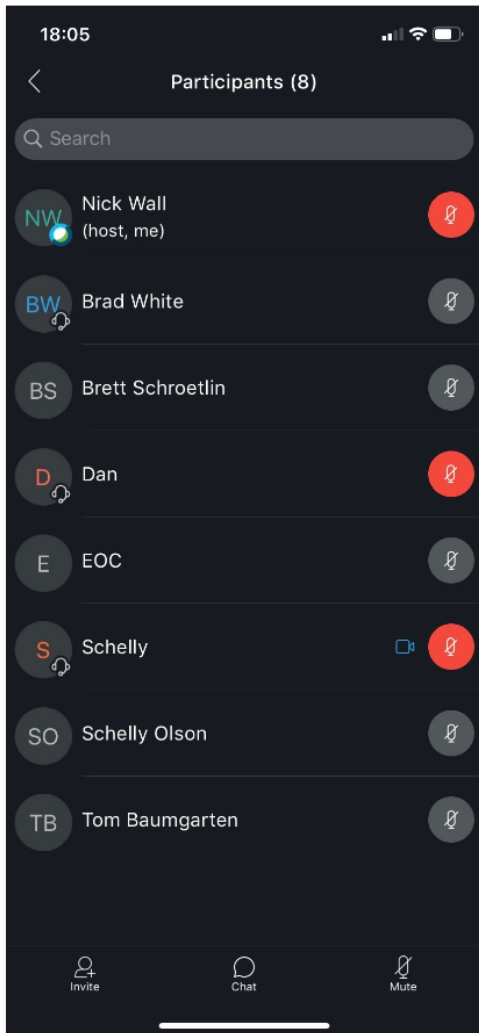
## Agenda

- 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

## Email Invite to HMPC meeting of December 3, 2020 (3<sup>rd</sup> meeting)

Jurisdictions participating in the Grand County Multi-Hazard Mitigation Plan update:

My name is Jeff Brislawn and I'm under contract with Grand County to provide technical assistance in the completion of the Grand County Hazard Mitigation Plan update. The company I work for is Wood Environment & Infrastructure Solutions, Inc, formerly known as Amec, and I was involved in the 2014 plan update. The draft plan was submitted to the Colorado Division of Homeland Security and Emergency Management for review in September and the agency identified a number of deficiencies that must be rectified before it can be sent to FEMA for their final review and approval.

One of the key deficiencies is in the mitigation strategy (See Element C comments in the attached Plan Review Tool). CO DHSEM and FEMA require that each participating jurisdiction have at least one new mitigation action specific to them, that addresses the more significant hazard(s).

To aid in the development of the new action for each jurisdiction, we have developed an input form to capture the necessary details. It can be accessed here:

[https://forms.office.com/Pages/DesignPage.aspx?fragment=FormId%3D7KxDCD79vkm9VBjGBIo\\_0B53D7F45nlKshvPr2mtKcFUMU9MN1ZUT05ZR0UwWlhHMzc5SDIHN1g5QyQIQCN0PWcu%26Token%3Dca41485ee34247cdba33698a0fae191c](https://forms.office.com/Pages/DesignPage.aspx?fragment=FormId%3D7KxDCD79vkm9VBjGBIo_0B53D7F45nlKshvPr2mtKcFUMU9MN1ZUT05ZR0UwWlhHMzc5SDIHN1g5QyQIQCN0PWcu%26Token%3Dca41485ee34247cdba33698a0fae191c)

Please review and provide input to the form by December 2nd.

When developing new actions, consider the mitigation funding sources and describe a project that you might consider submitting a Notice of Intent for. For example, the Hazard Mitigation Grant Program Post Fire will likely be available in coming months in the wake of the East Troublesome Fire. More info on that can be accessed here:

[https://www.fema.gov/media-library-data/1556918984735-8a987093ccd5e121f22ef1325350ea63/MAy2FinalFEMAFactSheetPostFire\(002\).pdf](https://www.fema.gov/media-library-data/1556918984735-8a987093ccd5e121f22ef1325350ea63/MAy2FinalFEMAFactSheetPostFire(002).pdf)

The new Building Resilient Infrastructure and Communities Grant (BRIC) is another potential source of funding that will be available annually after the plan is approved: <https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-com>

Please let me know if you need ideas for projects or want to discuss further.

For your reference (not for editing) the draft plan is on a Google Drive here; Wood will be working on the deficiencies noted in the risk assessment, capability assessment and planning process:

<https://drive.google.com/drive/folders/1SOREc5b4iyyqs2EaexQNcPU6Uk9K9Pbu?usp=sharing>

Secondly, please mark your calendars for a virtual meeting to discuss the planning effort, new mitigation projects, and any remaining needs on December 3 from 10:30am-noon. A Teams meeting calendar invite will be shared with this group shortly.

The timeline is to re-submit the corrected plan to CO DHSEM on December 15th. I understand there is a lot of things going on in the county at the moment, and competing priorities, but we ask that you please make this a priority to get this plan across the finish line and ensure your jurisdictions remain eligible for mitigation grant funds.

Thanks,  
Jeff

## Meeting Chat Log from December 3<sup>rd</sup> HMPC Meeting

### Grand County Multi-Jurisdictional Hazard Mitigation Plan Finalizing – Microsoft Teams Meeting Chat Log

- **Chat**
- Files
- Meeting Notes
- 1 more

#### Grand County Multi-Jurisdictional Hazard Mitigation Plan Finalizing.

December 3, 2020

Meeting ended 0s 12/3 10:08 AM

Meeting started 12/3 10:11 AM

Welcome folks, please type in your name, title and jurisdiction in the chat. , by Brislawn, Jeff P.

12/3 10:24 AM

Welcome folks, please type in your name, title and jurisdiction in the chat.

**Lucas** joined the meeting.

**Town of Hot Sulphur Springs (Guest)** joined the meeting.

**Russell Pennington** joined the meeting.

**Allen Pulliam (Guest)** joined the meeting.

**Michael Brack** joined the meeting.

Russell Pennington - Fraser - Public Works Director, by Russell Pennington.

**Russell Pennington**

12/3 10:28 AM

Russell Pennington - Fraser - Public Works Director

Allen Pulliam Deputy Chief , by Allen Pulliam (Guest).

**Allen Pulliam (Guest)**

12/3 10:29 AM

Allen Pulliam Deputy Chief

Grand County EMS, by Allen Pulliam (Guest).

Grand County EMS

**Lucas** left the conversation.

Michael Brack - Assistant Town Manager - Town of Fraser, by Michael Brack.

**Michael Brack**

12/3 10:30 AM

Michael Brack - Assistant Town Manager - Town of Fraser

**Brad White** joined the meeting.

**Lucas (Guest)** joined the meeting.

**Keith Riesberg (Guest)** joined the meeting.

[12/3 10:33 AM] Jeff Durbin joined the meeting.

[12/3 10:33 AM] Gerry Vernon joined the meeting.

[12/3 11:23 AM] Alexis Kimbrough (Guest)

Absolutely - I saw it in the review tool

[12/3 11:29 AM] Gerry Vernon

Headwater's Trail Alliance

[12/3 10:37 AM] Alexis Kimbrough (Guest) joined the meeting.

[12/3 10:40 AM] Lucas (Guest)

Lucas Ackerman Public Works Director town of Hot Sulphur Springs

[12/3 10:58 AM] Franco, Rebecca J. joined the meeting.

[12/3 11:08 AM] Jeff Durbin left the conversation.

[12/3 11:22 AM] Alexis Kimbrough (Guest)

No - but I can look into it

[12/3 11:31 AM] Keith Riesberg (Guest) left the conversation.

[12/3 11:31 AM] Alexis Kimbrough (Guest)

again - I can look into this. but I do no know

[12/3 11:33 AM] Alexis Kimbrough (Guest)

agreed with Brad

[12/3 11:37 AM] Alexis Kimbrough (Guest)

I am not sure how much funding as come into the county for mitigation, but I will ask finance if they are aware of any recent revenue streams

[12/3 11:37 AM] Alexis Kimbrough (Guest)

has\*

[12/3 11:38 AM] Carr, Amy

**Link to online New Mitigation Action Form:**

[https://forms.office.com/Pages/ResponsePage.aspx?id=7KxDCD79vkm9VBjGBIo\\_0B53D7F45nlKshvPr2mtKcFUMU9M1ZUT05ZR0UwWlhHMzc5SDIHN1g5QyQIQCN0PWcu](https://forms.office.com/Pages/ResponsePage.aspx?id=7KxDCD79vkm9VBjGBIo_0B53D7F45nlKshvPr2mtKcFUMU9M1ZUT05ZR0UwWlhHMzc5SDIHN1g5QyQIQCN0PWcu)

Fill | Grand County Hazard Mitigation Plan New Mitigation Action Worksheet  
forms.office.com

[12/3 11:40 AM] Alexis Kimbrough (Guest)

Are there any jurisdictions that still need to participate or that you haven't heard from yet that we (OEM) needs to reach out to still

[12/3 11:42 AM] Alexis Kimbrough (Guest)

Awesome thank you - I will circle up with those not able to attend today

[12/3 11:44 AM] Russell Pennington

Thank you!

[12/3 11:44 AM] Alexis Kimbrough (Guest)

Thank you Jeff and thank you to your team!

## **PUBLIC COMMENT PERIOD**

A Public Comment Period was started in early September 2020 with two separate postings to our Facebook page, and one to our Twitter feed on September 5, 2020. A 432-page hard copy in a binder was dropped off at the public library in Granby on September 9, 2020.

The following is what GRCO Emergency Management pushed out on social media:



### **Grand County Emergency Management**

Grand County's Multi-Hazard Mitigation Plan has been updated. In order to identify and plan for future disasters, we are seeking public input in the form of a survey.

This link: <https://bit.ly/2Z8eflk> will take you to

-the 432-page redacted draft of the Plan (redacted due to the personal contact information contained within).

-a survey page where we can collect your information on vulnerabilities within the County. The survey questions are designed to help gauge the types of activities that should be considered to mitigate future impacts.

The links and public input questions will be available through September 13, 2020. A physical copy of the Plan will be available for viewing at the Granby Library from September 9th through September 15th.

Thank you for your participation!

## **The residents of Grand County had the option to view the updated plan and answer several questions. These were the results:**

**When asked to indicate what they perceived to be the top 3 hazards for Grand County,** Wildfire came in #1, followed by Severe Winter Weather and Wildlife-Vehicle Collisions (#2). Avalanche, Drought, Hazardous Materials Release, Mountain Pine Beetle Infestation, and Windstorms came in third.

**When asked to indicate the types of mitigation actions they think should have the highest priority,** Wildfire Fuels Treatment Projects was selected the most. Following that was Public Education and Awareness, Stream Restoration, Evacuation Route Development, Improving Reliability of Communications Systems, and Dam Safety

**When asked how many times a natural hazard had disrupted their daily lives in the last five years,** One to two times was selected the most followed by three to five times.

**When asked which Grand County town they live in,** the majority of the survey answers came from full-time residents in the Town of Granby, followed by Fraser and Grand Lake. Only one second homeowner responded to the survey.

# Survey Results

Print

Print

## Public Survey - Submission #1508

Date Submitted: 9/5/2020

Hazard Mitigation: Fire, Flood, and Earthquake

About

Grand County is updating its Multi-Hazard Mitigation Plan per the 5-year update cycle required by FEMA and the Federal Disaster Mitigation Act of 2000. We would like the public's input and you can participate in this process by filling out a brief public survey. This will help us understand how our local community members perceive and identify hazards and risk in Grand County.

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minim

Print

## Public Survey - Submission #1512

Date Submitted: 9/7/2020

Hazard Mitigation: Fire, Flood, and Earthquake

About

Grand County is updating its Multi-Hazard Mitigation Plan per the 5-year update cycle required by FEMA and the Federal Disaster Mitigation Act of 2000. We would like the public's input and you can participate in this process by filling out a brief public survey. This will help us understand how our local community members perceive and identify hazards and risk in Grand County.

The Hazard Mitigation Plan analyzes the County's vulnerabilities to hazards and identifies mitigation actions the County can take to minimize property damage and reduce the loss of life by lessening the impacts of disasters.

The purpose of this survey is to collect information from the public and stakeholders to better understand the vulnerabilities within the County. Please complete this survey by September 13, 2020.

1. The hazards addressed in the Plan update are listed below. Please indicate what you perceive to be the top 3 hazards for Grand County. (Choose Three)

<input type="checkbox"/> Avalanche	<input type="checkbox"/> Dam Failure	<input type="checkbox"/> Mountain Pine Beetle Infestation
<input type="checkbox"/> Drought	<input type="checkbox"/> Earthquake	<input type="checkbox"/> Severe Winter Weather
<input checked="" type="checkbox"/> Windstorm	<input type="checkbox"/> Lightning	<input type="checkbox"/> Disease Outbreak
<input type="checkbox"/> Landslide, Mudflow/Debris Flow, Rock Fall	<input type="checkbox"/> Flood	<input checked="" type="checkbox"/> Wildfire
<input checked="" type="checkbox"/> Wildlife-Vehicle Collisions	<input type="checkbox"/> Hazardous Materials Release	

2. The following types of mitigation\* actions may be considered in Grand County. Please indicate the types of actions you think should have the highest priority. \*Mitigation is defined as the process or result of making something less severe, dangerous, or damaging.

<input type="checkbox"/> Indoor/Outdoor Warning systems	<input checked="" type="checkbox"/> Public Education/Awareness
<input type="checkbox"/> Wildfire Fuels Treatment projects	<input type="checkbox"/> Storm water Drainage Improvements
<input type="checkbox"/> Participation in the National Flood Insurance Program. The National Flood Insurance Program (NFIP) is managed by FEMA and enables homeowners, business owners and renters in participating communities	<input checked="" type="checkbox"/> Stream Restoration
<input type="checkbox"/> Critical Facilities Protection	<input type="checkbox"/> Evacuation route development
<input type="checkbox"/> Generators for Critical Facilities	<input type="checkbox"/> Dam safety
<input type="checkbox"/> Planning/Zoning	<input type="checkbox"/> Improve reliability of communications systems

3. How many times has a natural hazard disrupted your daily life in the last five years? (Pick One)

1-2

3-5

More than 5

4. Please indicate which Grand County town you live in (or unincorporated Grand County)

Granby

5. What type of resident are you? (Pick One)

Full-Time

Second Homeowner

the  
d

2. The following types of mitigation\* actions may be considered in Grand County. Please indicate the types of actions you think should have the highest priority. \*Mitigation is defined as the process or result of making something less severe, dangerous, or damaging.

<input type="checkbox"/> Indoor/Outdoor Warning systems	<input type="checkbox"/> Public Education/Awareness
<input checked="" type="checkbox"/> Wildfire Fuels Treatment projects	<input type="checkbox"/> Storm water Drainage Improvements
<input type="checkbox"/> Participation in the National Flood Insurance Program. The National Flood Insurance Program (NFIP) is managed by FEMA and enables homeowners, business owners and renters in participating communities	<input type="checkbox"/> Stream Restoration
<input type="checkbox"/> Critical Facilities Protection	<input type="checkbox"/> Evacuation route development
<input type="checkbox"/> Generators for Critical Facilities	<input type="checkbox"/> Dam safety
<input type="checkbox"/> Planning/Zoning	<input type="checkbox"/> Improve reliability of communications systems

3. How many times has a natural hazard disrupted your daily life in the last five years? (Pick One)

1-2

3-5

More than 5

4. Please indicate which Grand County town you live in (or unincorporated Grand County)

Fraser

5. What type of resident are you? (Pick One)

Full-Time

Second Homeowner

actions you think

ems

Print

Public Survey - Submission #1511

Date Submitted: 9/5/2020

Hazard Mitigation: Fire, Flood, and Earthquake

About

Grand County is updating its Multi-Hazard Mitigation Plan per the 5-year update cycle required by FEMA and the Federal Disaster Mitigation Act of 2000. We would like the public's input and you can participate in this process by filling out a brief public survey. This will help us understand how our local community members perceive and identify hazards and risk in Grand County.

The Hazard Mitigation Plan analyzes the County's vulnerabilities to hazards and identifies mitigation actions the County can take to minimize property damage and reduce the loss of life by lessening the impacts of disasters.

The purpose of this survey is to collect information from the public and stakeholders to better understand the vulnerabilities within the County. Please complete this survey by September 13, 2020.

1. The hazards addressed in the Plan update are listed below. Please indicate what you perceive to be the top 3 hazards for Grand County. (Choose Three)

<input type="checkbox"/> Avalanche	<input type="checkbox"/> Dam Failure	<input type="checkbox"/> Mountain Pine Beetle Infestation
<input type="checkbox"/> Drought	<input type="checkbox"/> Earthquake	<input checked="" type="checkbox"/> Severe Winter Weather
<input type="checkbox"/> Windstorm	<input type="checkbox"/> Lightning	<input type="checkbox"/> Disease Outbreak
<input type="checkbox"/> Landslide, Mudflow/Debris Flow, Rock Fall	<input type="checkbox"/> Flood	<input checked="" type="checkbox"/> Wildfire
<input type="checkbox"/> Wildlife-Vehicle Collisions	<input checked="" type="checkbox"/> Hazardous Materials Release	

2. The following types of mitigation\* actions may be considered in Grand County. Please indicate the types of actions you think should have the highest priority. \*Mitigation is defined as the process or result of making something less severe, dangerous, or damaging.

<input type="checkbox"/> Indoor/Outdoor Warning systems	<input type="checkbox"/> Public Education/Awareness
<input checked="" type="checkbox"/> Wildfire Fuels Treatment projects	<input type="checkbox"/> Storm water Drainage Improvements
<input type="checkbox"/> Participation in the National Flood Insurance Program. The National Flood Insurance Program (NFIP) is managed by FEMA and enables homeowners, business owners and renters in participating communities	<input type="checkbox"/> Stream Restoration
<input type="checkbox"/> Critical Facilities Protection	<input checked="" type="checkbox"/> Evacuation route development
<input type="checkbox"/> Generators for Critical Facilities	<input checked="" type="checkbox"/> Dam safety
<input type="checkbox"/> Planning/Zoning	<input type="checkbox"/> Improve reliability of communications systems

3. How many times has a natural hazard disrupted your daily life in the last five years? (Pick One)

1-2

3-5

More than 5

4. Please indicate which Grand County town you live in (or unincorporated Grand County)

5. What type of resident are you? (Pick One)

Full-Time

Second Homeowner

Print

Public Survey - Submission #1510

Date Submitted: 9/5/2020

Hazard Mitigation: Fire, Flood, and Earthquake

About

Grand County is updating its Multi-Hazard Mitigation Plan per the 5-year update cycle required by FEMA and the Federal Disaster Mitigation Act of 2000. We would like the public's input and you can participate in this process by filling out a brief public survey. This will help us understand how our local community members perceive and identify hazards and risk in Grand County.

The Hazard Mitigation Plan analyzes the County's vulnerabilities to hazards and identifies mitigation actions the County can take to minimize property damage and reduce the loss of life by lessening the impacts of disasters.

The purpose of this survey is to collect information from the public and stakeholders to better understand the vulnerabilities within the County. Please complete this survey by September 13, 2020.

1. The hazards addressed in the Plan update are listed below. Please indicate what you perceive to be the top 3 hazards for Grand County. (Choose Three)

<input type="checkbox"/> Avalanche	<input type="checkbox"/> Dam Failure	<input checked="" type="checkbox"/> Mountain Pine Beetle Infestation
<input type="checkbox"/> Drought	<input type="checkbox"/> Earthquake	<input type="checkbox"/> Severe Winter Weather
<input type="checkbox"/> Windstorm	<input type="checkbox"/> Lightning	<input type="checkbox"/> Disease Outbreak
<input type="checkbox"/> Landslide, Mudflow/Debris Flow, Rock Fall	<input type="checkbox"/> Flood	<input checked="" type="checkbox"/> Wildfire
<input checked="" type="checkbox"/> Wildlife-Vehicle Collisions	<input type="checkbox"/> Hazardous Materials Release	

2. The following types of mitigation\* actions may be considered in Grand County. Please indicate the types of actions you think should have the highest priority. \*Mitigation is defined as the process or result of making something less severe, dangerous, or damaging.

<input type="checkbox"/> Indoor/Outdoor Warning systems	<input type="checkbox"/> Public Education/Awareness
<input checked="" type="checkbox"/> Wildfire Fuels Treatment projects	<input type="checkbox"/> Storm water Drainage Improvements
<input type="checkbox"/> Participation in the National Flood Insurance Program. The National Flood Insurance Program (NFIP) is managed by FEMA and enables homeowners, business owners and renters in participating communities	<input checked="" type="checkbox"/> Stream Restoration
<input type="checkbox"/> Critical Facilities Protection	<input type="checkbox"/> Evacuation route development
<input type="checkbox"/> Generators for Critical Facilities	<input type="checkbox"/> Dam safety
<input type="checkbox"/> Planning/Zoning	<input checked="" type="checkbox"/> Improve reliability of communications systems

3. How many times has a natural hazard disrupted your daily life in the last five years? (Pick One)

1-2

3-5

More than 5

4. Please indicate which Grand County town you live in (or unincorporated Grand County)

5. What type of resident are you? (Pick One)

Full-Time

Second Homeowner

**From:** Joel Cochran <jcochran@co.grand.co.us>  
**Sent:** Tuesday, January 05, 2021 3:29 PM  
**To:** Brian.Bovaird@summitcountyco.gov; birch.barron@eaglecounty.us;  
sboccia@clearcreeksheriff.us; Lori Hodges; ddemorat@co.routt.co.us; Cheryl  
Dalton; mchard@bouldercounty.or  
**Cc:** Brislawn, Jeff P; Alexis Kimbrough  
**Subject:** Grand County Hazard Mitigation Plan for Review

**CAUTION:** External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Good Afternoon,  
Please find the updated Grand County Hazard Mitigation Plan at the link below. The plan is under review by DHSEM and soon with FEMA.

As neighboring jurisdictions to Grand County, we are requesting you provide any comments, planning concerns or mitigation actions that should be brought to our attention.

Please send any concerns to me by email and also copy Mr. Brislawn with the Wood PLC Group.

Here is a Google Drive link that can be shared.

<https://drive.google.com/drive/folders/1oomnplHm905-AiW32N2P-2AI1LtLONHK?usp=sharing>

Unfortunately, we are on a timeline and need your comments by COB on January 11, 2021.

Thank you.

**Joel Cochran, CEM**  
Director Emergency Management  
Grand County, Colorado  
970-725-3813  
JCochran@co.grand.co.us

**From:** Joel Cochran <jcochran@co.grand.co.us>  
**Sent:** Wednesday, January 13, 2021 9:06 AM  
**To:** Brislawn, Jeff P  
**Subject:** FW: [External Sender] Grand County Hazard Mitigation Plan for Review

**CAUTION:** External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Hi Jeff,  
I received this from Lori in Larimer County on the HMP.  
Joel

**From:** Lori Hodges <hodgeslr@co.larimer.co.us>  
**Sent:** Saturday, January 9, 2021 4:07 PM  
**To:** Joel Cochran <jcochran@co.grand.co.us>  
**Subject:** Re: [External Sender] Grand County Hazard Mitigation Plan for Review

Thank you for sending this along. I do not have any comments or concerns.

Lori H.

On Tue, Jan 5, 2021 at 3:29 PM Joel Cochran <[jcochran@co.grand.co.us](mailto:jcochran@co.grand.co.us)> wrote:

Good Afternoon,  
Please find the updated Grand County Hazard Mitigation Plan at the link below. The plan is under review by DHSEM and soon with FEMA.

As neighboring jurisdictions to Grand County, we are requesting you provide any comments, planning concerns or mitigation actions that should be brought to our attention.

Please send any concerns to me by email and also copy Mr. Brislawn with the Wood PLC Group.

Here is a Google Drive link that can be shared.

<https://drive.google.com/drive/folders/1oompIHm905-AiW32N2P-2A11LtLONHK?usp=sharing>

Unfortunately, we are on a timeline and need your comments by COB on January 11, 2021.

Thank you.

**Joel Cochran, CEM**  
Director Emergency Management  
Grand County, Colorado  
970-725-3813  
[JCochran@co.grand.co.us](mailto:JCochran@co.grand.co.us)

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**Lori Hodges, CEM, PMP**  
Director

Office of Emergency Management

[200 W. Oak St., Ste. 200](#)

W: 970-498-7147 | C: 303-656-3214

[hodgeslr@co.larimer.co.us](mailto:hodgeslr@co.larimer.co.us)

[www.larimer.org/emergency](http://www.larimer.org/emergency)

## Appendix C: Hazard Mitigation Planning Committee

Name	Department	email	Title
<b>Grand County</b>			
Sidener, Amy	Grand County DNR	<a href="mailto:asidener@co.grand.co.us">asidener@co.grand.co.us</a>	Foreman
Cochran, Joel	Grand County EM	<a href="mailto:jcochran@co.grand.co.us">jcochran@co.grand.co.us</a>	Director
Kimbrough, Alexis	Grand County EM	<a href="mailto:akimbrough@co.grand.co.us">akimbrough@co.grand.co.us</a>	Deputy Director
Belew-LaDue, Brene	Grand County Public Health	<a href="mailto:bbelew@co.grand.co.us">bbelew@co.grand.co.us</a>	Director
Baker, Abbie	Grand County Public Health	<a href="mailto:abaker@co.grand.co.us">abaker@co.grand.co.us</a>	Deputy Director
Baer, Chris	Grand County Road and	<a href="mailto:cbaer@co.grand.co.us">cbaer@co.grand.co.us</a>	Superintendent
Benson, Micah	Grand County Road and	<a href="mailto:mbenson@co.grand.co.us">mbenson@co.grand.co.us</a>	Assistant Superintendent
Schroetlin, Brett	Grand County Sheriff's Office	<a href="mailto:bschroetlin@co.grand.co.us">bschroetlin@co.grand.co.us</a>	Sheriff
<b>Town of Fraser</b>			
Durbin, Jeff	Town of Fraser	<a href="mailto:jdurbin@town.fraser.co.us">jdurbin@town.fraser.co.us</a>	Manager
Pennington, Russell	Town of Fraser	<a href="mailto:rpennington@town.fraser.co.us">rpennington@town.fraser.co.us</a>	Public Works Director
<b>Town of Granby</b>			
Bellatty, Doug	Town of Granby	<a href="mailto:dbellatty@townofgranby.com">dbellatty@townofgranby.com</a>	Water Superintendent
<b>Town of Grand Lake</b>			
Crone, Joel	Town of Grand Lake	<a href="mailto:jcrone@toglco.com">jcrone@toglco.com</a>	Town Manager
<b>Town of Hot Sulphur Springs</b>			
Lee, Christine	Hot Sulphur Springs	<a href="mailto:stephenchris@rkymtnhi.com">stephenchris@rkymtnhi.com</a>	Trustee
<b>Town of Kremmling</b>			
Stoltman, Dan	Town of Kremmling	<a href="mailto:dstoltman@townofkremmling.o">dstoltman@townofkremmling.o</a>	Manager
<b>Town of Winter Park</b>			
Trainor, Glen	Fraser-Winter Park PD	<a href="mailto:gtrainor@wpgov.com">gtrainor@wpgov.com</a>	Police Chief

## Appendix C: Hazard Mitigation Planning Committee

<b>Name</b>	<b>Department</b>	<b>Email</b>	<b>Title</b>
Vernon, Gerry	Town of Winter Park	<a href="mailto:gvernon@wpgov.com">gvernon@wpgov.com</a>	Public Works Director
<b>Fire Protection Districts</b>			
Holzwarth, Todd	East Grand FPD	<a href="mailto:toddh@eastgrandfire.com">toddh@eastgrandfire.com</a>	Chief
White, Brad	Grand FPD	<a href="mailto:bwhite@grandfire.org">bwhite@grandfire.org</a>	Chief
Ratzmann, Kevin	Grand Lake FPD	<a href="mailto:kratzmann@grandlakefire.org">kratzmann@grandlakefire.org</a>	Chief
Baumgarten, Tom	HSS/Parshall FPD	<a href="mailto:tomb@hotsulphurfire.com">tomb@hotsulphurfire.com</a>	Chief
Tucker, Tony	Kremmling FPD	<a href="mailto:tony.tucker@kremmlingfire.org">tony.tucker@kremmlingfire.org</a>	Chief
Wall, Nick	East Grand FPD	<a href="mailto:nicholasjwall@gmail.com">nicholasjwall@gmail.com</a>	Resident Firefighter
Olson, Schelly	Grand FPD	<a href="mailto:solson@grandfire.org">solson@grandfire.org</a>	Assistant Chief
Mayor, Dan	Grand Lake FPD	<a href="mailto:dmayor@grandlakefire.org">dmayor@grandlakefire.org</a>	Fire Marshall
<b>Special Districts</b>			
Krueger, Rob	Denver Water OEM	<a href="mailto:rob.krueger@denverwater.org">rob.krueger@denverwater.org</a>	Facility Operations Supervisor
Franco, Rebecca	Denver Water OEM	<a href="mailto:rebecca.franco@denverwater.org">rebecca.franco@denverwater.org</a>	Emergency Manager
Lodge, Bernie	Northern Water	<a href="mailto:blodge@northernwater.org">blodge@northernwater.org</a>	Emergency Management Specialist
Friar, Craig	Northern Water	<a href="mailto:cfriar@northernwater.org">cfriar@northernwater.org</a>	Collection Systems Manager
Struble, Jim	Northern Water	<a href="mailto:jstruble@northernwater.org">jstruble@northernwater.org</a>	Real Estate Manager
Crabtree, Elwin	3 Lakes Watershed Assoc.	<a href="mailto:elwin@crabtreeproperties.com">elwin@crabtreeproperties.com</a>	Board Member
<b>Other Partners and Stakeholders</b>			
Thompson, Mark	Colorado DHSEM	<a href="mailto:markw.thompson@state.co.us">markw.thompson@state.co.us</a>	Mitigation Planning Specialist
Gavelda, Trish	Colorado DHSEM	<a href="mailto:patricia.gavelda@state.co.us">patricia.gavelda@state.co.us</a>	Local Hazard Mitigation Planning Program Manager
Lucero, Bobbie	Colorado DHSEM	<a href="mailto:bobbie.lucero@state.co.us">bobbie.lucero@state.co.us</a>	Regional Coordinator
Ziegler, Chris	U.S. Bureau of Land Management	<a href="mailto:cziegler@blm.gov">cziegler@blm.gov</a>	Acting Asst. District Mgr.

## Appendix C: Hazard Mitigation Planning Committee

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Lee, Victor	U.S. Bureau of Reclamation	<a href="mailto:vlee@usbr.gov">vlee@usbr.gov</a>	Engineer
Jennings, Seth	U.S. Forest Service	<a href="mailto:seth.jennings@usda.gov">seth.jennings@usda.gov</a>	Timber Management Assistant
Todd Like	U.S. Forest Service	<a href="mailto:todd.like@usda.gov">todd.like@usda.gov</a>	Lead Forestry Technician
Campbell, Tyler	CO Fire Prevention & Control	<a href="mailto:tyler.campbell@state.co.us">tyler.campbell@state.co.us</a>	Battalion Chief
Willems, Neil	Snow Mountain Ranch YMCA	<a href="mailto:nwillems@ymcarockies.org">nwillems@ymcarockies.org</a>	Superintendent of Buildings and Grounds
<b>Other</b>			

# **APPENDIX D: PLAN ADOPTION**

Note: A County resolution, municipalities and special districts 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.